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Peer Review on Fossil Fuel Subsidy Reforms in Chinese Taipei

APEC Energy Working Group

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PEER REVIEW ON FOSSIL FUEL SUBSIDY REFORMS IN CHINESE TAIPEI

FINAL REPORT

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The opinions expressed in this report are a consensus view of the APEC Peer Review Panel for Chinese Taipei after discussions with the Chinese Taipei Government and review of various source documents. These opinions do not represent any single individual on the Review Panel, or the Chinese Taipei Government, or any other APEC economy or organization with which a review panel member may be associated. Any errors in the report are solely the responsibility of the members of the Review Panel and the FFSR Secretariat.

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ACRONYMS AND INITIALS

ADA – Agriculture Development Act

AMMA – Agricultural Machinery Manufacturers' Association (India)

APEC – Asia-Pacific Economic Cooperation

APEC/EWG – Asia-Pacific Economic Cooperation, Energy Working Group

APEC FFSR - Asia-Pacific Economic Cooperation, Fossil Fuel Subsidy Reforms

APN – Asia-Pacific Network for Global Change Research

APRP – APEC Peer Review Panel

BAU – Business as usual

BCC – Birmingham City Council

CAMD – Clean Air Markets Division, U.S. EPA

CCS – Carbon capture and storage

CIEE – California Institute for Energy & Environment

CNG – Compressed natural gas

COA – Council of Agriculture (Chinese Taipei)

CPC – CPC Corporation

CPI – Consumer Price Index

ESMAP – Energy Sector Management Assistance Program

GDP – Gross domestic product

GHG –Greenhouse gas

GWh – Gigawatt hour

HDI – Human Development Index

IEA – International Energy Agency

IGES – Institute for Global Environmental Strategies

IISD – International Institute for Sustainable Development

IMF – International Monetary Fund

INDC – Intended Nationally Determined Contributions

ISC – Selective Consumption Tax (Peru)

KLOE – Kiloliters of oil equivalent

kW – Kilowatt

LED – Light-emitting diodes

LPG – Liquefied Petroleum Gas

METI – Ministry of Economy, Trade, and Industry (Japan)

MOEA – Ministry of Economic Affairs

MOI – Ministry of the Interior (Chinese Taipei)

MOT – Ministry of Transport (New Zealand)

NNI – Nominal National Income

NTD – New Taiwan Dollar

OECD – Organization for Economic Cooperation and Development

OCN – Open Climate Network

O&M – Operations and maintenance

OPSF – Oil Price Stabilization Fund

PDOE – Philippines Department of Energy

PFI – Public/private finance initiatives

PPP – Public Private Partnerships

PV – Photovoltaic

R.O.C. – Republic of China

RVAT – Reformed Value Added Tax

SMART – Specific, measurable, achievable, realistic, and time-bound targets

SPUG - Small Power Utilities Group

SUV – Sport utility vehicle

Taipower – Taiwan Power Corporation

TOE – Metric tons of oil equivalent

UC – University of California

UC-ME – Universal Charge for Missionary Electrification

UCT – Unconditional cash transfer

UK – United Kingdom

UNEP – United Nations Environment Programme

UNESCO – United Nations Educational, Scientific, and Cultural Organization

UNFCCC – United Nations Framework Convention on Climate Change

USAID – United States Agency for International Development

USD – United States Dollar

VAT – Value Added Tax

VPRT – Voluntary Peer Review Team

WPI – Wholesale Price Index

WRI – World Resources Institute

WTO – World Trade Organization

PREFACE

Starting in 2009, the Asia-Pacific Economic Cooperation (APEC) Leaders have committed "to rationalize and phase out inefficient fossil fuel subsidies that encourage wasteful consumption, while recognizing the importance of providing those in need with essential energy services." In 2011, APEC Leaders agreed to set up a "voluntary reporting mechanism" that they would review annually to assess APEC's progress toward this goal. Subsequently, APEC Leaders in 2013 agreed to build APEC economies' regional capacity for meeting the APEC goal on fossil fuel subsidy reforms, as noted above.

Fossil fuel subsidies incentivize fossil fuel production and consumption and can result in increased energy demand and use. Inefficient subsidies can lead to fiscal pressure on the government and harmful emissions and potentially undermine APEC's sustainable green growth agenda. The APEC Energy Ministers noted in the 2012 Energy Ministers' statement that "the reduction of subsidies will encourage more energy efficient consumption, leading to a positive impact on international energy prices and energy security, and will make renewable energy and technologies more competitive." Such inefficient fossil fuel subsidies reform (IFFSR) can also reduce local pollution and greenhouse gas (GHG) emissions.

Identifying appropriate reforms and implementing these reforms is challenging despite the benefits for individual economies. Therefore, an APEC voluntary peer review (VPR) process on reform of inefficient fossil fuel subsidies can help APEC economies identify reform options and help disseminate best practices on reform of inefficient fossil fuel subsidies. The VPR can also improve the quality of voluntary reporting to APEC Leaders.

Chinese Taipei (CT) is the fourth volunteer member economy that has participated in the fossil fuel subsidy reform peer review process since 2014, following Peru (in 2014), New Zealand (2015), and the Philippines (2015). (Viet nam is currently undergoing an IFFSR VPR as well.) The Government of Chinese Taipei believes, as do the other APEC economies, that any measure that promotes wasteful consumption of fossil fuels is inefficient and should be reformed in order to meet the government's goals on energy security, optimal energy use and sustainable economic growth.

The VPR for fossil fuel subsidies is led by the APEC Energy Working Group (EWG). This peer review report is the culmination of the activities conducted under the APEC EWG, with support from ICF and Nathan Associates, which served as the Secretariat team. The report provides useful information on the Chinese Taipei economy and energy use, as well as detailed descriptions of the subsidies chosen for the peer review process and the panel's findings and recommendations on potential inefficiencies for these pre-selected list of subsidies.

This report is divided into two parts. The first part presents a global perspective on energy subsidies and the need for fossil fuel subsidy reform, discusses the background of the APEC VPR process, and provides an overview of the Chinese Taipei economy, socio-demographics and the energy landscape. The second part delves into the subsidies reviewed, with details on the history and context for each subsidy, presents key findings and recommendations from APRP, and highlights some lessons learned and best practices for reforms using case studies from other economies.

Dr J.S. Chern
Lead Shepherd, APEC EWG

EXECUTIVE SUMMARY

In 2013, APEC Leaders agreed to build regional capacity to assist APEC economies in rationalizing and phasing out inefficient fossil fuel subsidies that encourage wasteful consumption, while recognizing the importance of providing those in need with essential energy services. As part of such capacity building, APEC set up a Voluntary Peer Review (VPR) process to support APEC economies' progress toward the group's shared goal of phasing out *inefficient* fossil fuel subsidies that encourage wasteful consumption. In November 2013, the Energy Working Group (EWG) endorsed voluntary peer review of inefficient fossil fuel subsidy reform (VPR/IFFSR) guidelines and established a Secretariat to conduct the VPR/IFFSR reviews. The first review was for Peru in 2014, followed by New Zealand and the Philippines in 2015. A review for Viet Nam was commenced in 2016 and conducted in early 2017, with final report forthcoming. Chinese Taipei had also volunteered to undergo a peer review of a selected set of fossil fuel subsidies and this report summarizes the results of that process.

The VPR/IFFSR Secretariat (hereafter "Secretariat") worked closely with the EWG Lead Shepherd and the EWG Secretariat to provide technical and logistical support for the peer review activities in Chinese Taipei. The economy-level peer review was conducted in late September, 2016 in Taipei City.

An APEC Peer Review Panel (APRP) was established under guidance from the EWG Lead Shepherd, consisting of volunteers from the APEC and ASEAN economies. The APRP for the Chinese Taipei VPR consisted of four experts from the U.S., Japan, Thailand, and Switzerland.

In coordination with the Secretariat and the EWG Lead Shepherd, Chinese Taipei selected the following five policy instruments for evaluation by the APRP:

- The **Offshore Islands Sea Freight Subsidy for Petroleum Products:** provides a subsidy for transit fuels for consumers on offshore islands by reimbursing oil importing companies' shipping costs;
- **Preferential Electricity Pricing for Street Lights:** helps street light owners stay in operation to promote public safety;
- **Petroleum and Electricity Sales Tax Exemption for Agricultural Machinery-Related Use**: an exemption from a 5 percent business tax on all transactions for petroleum products and electricity for use by farmers, intended to increase production and promote welfare of domestic farmers;
- **Preferential Electricity Pricing for Agricultural Motors**: provides a discount to farmers to offset their electricity load fees during non-peak hours of consumption; and
- **Petroleum Product Price Subsidy for Agricultural Machinery**: using an established formula, the government pays a calculated share of farmers' increased fuel costs during periods of price spikes.

The goals of the **Offshore Island Sea Freight Subsidy** are (a) to ensure a steady and reliable supply of transport fuels to the islands, and (b) to maintain fuel prices at levels consistent with the main island. This subsidy for petroleum products effectively lowers the price of transport fuels for all residents of offshore islands. It is paid for by the governmental Petroleum Fund.

Preferential Electricity Pricing for Street Lights is a government policy dating back to 1947. The preferential tariff lowers the price of electricity for central and local government entities that are the owners and operators of street lights and other public illumination goods. Savings from the discounted electricity accrue to government entities. Chinese Taipei has embarked on a major scheme to replace all

mercury vapor streetlamps with LEDs by January 2017, which will reduce electricity consumption and expenses for government entities, potentially reducing the need for this subsidy.

The Petroleum and Electricity Business Sales Tax Exemption for Agricultural Machinery benefits farmers by lowering their purchase costs for fuel and for electricity. The exemption constitutes a cost savings of 5 percent in taxation, amounting to a relatively small change in overall price but tangible savings for individual farmers, and is limited by caps determined by reasonable fuel or electricity use for each type of equipment, serving to prevent free riders and market distortions. The policy is financed by forgone tax revenue to the economy's treasury.

Preferential Electricity Pricing for Agricultural Motors lowers the cost for electricity and maintenance of electricity service to farmers during non-peak periods. The load fee reduction provides a small subsidy in periods of near-peak consumption and a greater subsidy when electricity consumption is at or near zero. The subsidy is partially met by the governmental distribution grid company, TaiPower. TaiPower is able to recoup the cost of this subsidy by increasing its charges on other ratepayers. The remainder is paid for by budgetary expenditures of the Council of Agriculture.

The Petroleum Price Subsidy for Agricultural Machinery is intended to cushion farmers from petroleum fuel (diesel and gasoline) price spikes that harm their welfare and production capacity. The subsidy partially defrays the price increase of fossil fuels in times of rising prices according to a defined formula. The benefit applies only to farmers and is subject to caps based upon the machinery they operate. Since instituted in 2011, the subsidy has amounted to between zero and five percent of the cost of fuel, depending on the direction of fuel price movements in the marketplace. The cost of the subsidy is covered by the Agricultural Development Fund, a government fund administered by the Council of Agriculture.

Both the costs and benefits of all three agricultural subsidies are limited in scope even when considered on a per-farming household basis.

Chinese Taipei used the VPR/IFFSR process to exchange information and obtain policy recommendations to consider whether reforms to these policies to better achieve the government's objectives might be warranted. The discussions with APRP were intended to explore best practices or alternatives for addressing the intended objectives of the instruments cited above.

Based on the key findings and expected end goals, as defined by the APRP during its deliberations, a set of consensus-driven recommendations was developed. The APRP also made additional observations that are not meant to have the same level of authority as the recommendations mentioned, but are meant to serve as additional discussion points that the Chinese Taipei government may want to consider.

Table ES-1 summarizes the key Findings and the Recommendations developed by the APRP on the subsidies evaluated during the peer review.

Table ES-1. Key Findings and Recommendations from the Peer Review Process

Subsidy Policy	Key Findings	APRP Recommendations
Offshore Islands Sea Freight Subsidy	• Policy is a fossil fuel subsidy, which, as currently designed, appears to have inefficiencies and likely leads to wasteful consumption • Subsidy's effectiveness in meeting objectives appears suspect and can be improved • Impact on market distortions appears relatively low	• Subsidy could either be converted to cash transfers or phased out in favor of targeted investments to reduce fossil demand in offshore islands • An assessment of the subsidy design and cost efficiency should be conducted to determine optimal arrangements • Complementary measures to ensure

	• Subsidy dampens the incentives for oil companies to find low cost alternatives, reducing their motivation to be more efficient	reliability of fuel provisions to offshore islands should be considered to allay CPC concerns
Preferential Electricity Pricing for Street Lights	• Policy is effectively a fossil fuel subsidy since most of the electricity is fossil generated and the policy reduces electricity price below market levels • Subsidy policy is likely to be inefficient and lead to wasteful consumption, especially in the long run (mandates on street lights limit wastefulness in the short run) • Policy has been carried over from 1947 and it is unclear whether the subsidy is currently needed to provide street lighting • Policy imposes cross-subsidy on other ratepayers as opposed to all taxpayers if the subsidy costs were transferred to the government	• Subsidy could be made more efficient through greater targeting • Review local and other government's ability to pay full electricity price and whether they need the subsidy • Consider whether this subsidy is hindering the uptake of even greater levels of energy efficiency for street lights • Consider whether converting to a cash subsidy in the near term and/or incentivizing energy efficient measures in the long term can better meet government's goals • Subsidy should be converted from a cross subsidy to a government subsidy, paid for through a budgetary line item
Petroleum and Electricity Sales Tax Exemption for Agricultural Machinery-Related Use	• Policy can be defined as a post-tax subsidy, as the tax exemption leads to cost savings • Price impact of the subsidy measure is relatively small at $20-$30 per farmer per year • Subsidy is capped in terms of reasonable fuel/electricity use limiting free ridership • Subsidy has a dampening effect on petroleum price volatility for farmers • Subsidy likely benefits disproportionately farmers with more energy-intensive operations	• Opportunities exist for making this subsidy more targeted, if desired, and thereby more efficient • Converting the subsidy to a cash benefit could promote more efficient fuel use and conservation, while providing the same benefits to farmers • Complementary measures could promote efficiency and reduce market distortions • Review of farmers' preferences and needs might illuminate whether there are alternative ways to achieve similar social goals
Preferential Electricity Pricing for Agricultural Motors	• Reduction in electricity tariffs through discounted load fees constitutes a subsidy that appears to be relatively small in magnitude • Subsidy has built in provisions to prevent wasteful consumption though it does appear to create some perverse incentives • Subsidy magnitude is small, so not clear whether it delivers adequate benefits to farmers to justify the administrative costs	• Subsidy is likely to be regressive, so reforms could help level the playing field across all rate-paying entities • Converting policy to a cash benefit or incentives for energy efficiency would reduce market distortions • Subsidy should be converted from a cross subsidy to a govt. budget expenditure paid for by the COA

Petroleum Product Price Subsidy for Agricultural Machinery	• Policy constitutes a subsidy when in effect (i.e., during petroleum fuel price spikes) • Effective design and caps by fuel use limits the levels of inefficiencies and distortionary effects and likely makes the subsidy cost-effective • Subsidy reduces fuel price volatility risks for farmers, thereby reducing their incentives to become more fuel efficient; also disproportionately benefits large farmers with more energy intensive production	• Converting subsidy amounts to equivalent cash benefits will provide more targeted support and reduce perverse incentives • If left unchanged in form, more efficient targeting, such as targeting small farmers only, would make the policy more effective in meeting its social goals • Complementary measures to promote efficiency and reduce market distortions could limit the need for the subsidy

The peer review team thus concluded that all five subsidies evaluated have inefficiencies that lead to wasteful consumption because they disincentivize efficiency, and, in the case of the three agricultural subsidies, promote use of fossil fuels rather than productive farming activities. However, the magnitude of the inefficiencies and waste is small relative to almost all relevant metrics, such as other farming support measures, household expenditures on energy, farmer household income, and the farming and energy sectors as a whole. These subsidies lead to negative environmental impacts but positive social impacts for citizens of Chinese Taipei, especially farming households, residents of offshore islands, and inhabitants of areas served by street lighting. The impacts on the economy as a whole are unknown and is one area which should be explored further by the government. The agricultural and offshore islands subsidies were determined to be regressive because they do not target the neediest individuals, but instead benefit larger farms that consume more fuel. It is worth noting that the population of Chinese Taipei is highly educated and wealthy compared to other Southeast Asian economies. The VPRT recommends conducting a review of who is receiving the current subsidies, their income, expenditure, and activities such that policymakers can determine whether the subsidies are fulfilling their purposes and are adequately targeted. To assist in improving the efficiency of administration, the VPRT recommends that all activities involved in administering and accessing the subsidies are logged and rough cost estimates made.

For the agricultural subsidies as well as the offshore islands subsidy, the VPRT recommends improving targeting based upon farmers' needs (e.g., age, types of farming, size of plot). A large number of farming and agricultural support schemes already exist, and the money spent on these subsidies could be redirected into one or more of those schemes. The subsidies could be converted to cash transfers, agricultural input vouchers, or rebates on new farming equipment. In the case of the offshore islands fuel transit subsidy, measures to target needy households, to provide other social benefits, and to reduce demand for transport fuels might more efficiently and equitably meet the subsidy's objective. In the case of the electric street lighting subsidy, enhanced energy efficiency measures and conversion to an on-budget fiscal transfer could increase the policy's efficiency and transparency (if it is to be retained).

While all of the subsidies considered by the VPRT are currently in effect, the peer review team believes that these subsidies have potential to be streamlined and consolidated to reduce administrative costs and incentives for fossil fuel consumption, improve targeting, and better meet the subsidies' objectives consistent with government policy of Chinese Taipei. For example, agriculture sector strategies include providing for elderly farmers, promoting agricultural production, and attracting new technology and workers to the sector. A number of policies that currently address these goals could be expanded using the resources currently devoted to fossil fuel subsidies. In the case of offshore island fuel and electricity

street lighting subsidies, energy efficiency policies consistent with Chinese Taipei's green growth strategies are likely to save households and governments more money while reducing energy consumption and associated CO_2 emissions. For all subsidies, extensive consultation with stakeholders to understand their needs and concerns as well as communication of the government's reform objectives and rationale are vital to successful reform.

There are specific lessons learned and best practices that Chinese Taipei can use in developing its implementation plans for reforms. The report provides some of these best practices and lessons learned, with a focus on those from the Asia-Pacific region and Southeast Asia in particular, but further analysis should be conducted to specifically identify an implementation strategy for the APRP recommendations. The task remains to devise specific implementation strategies, developed and executed through these intergovernmental mechanisms, for the sectors impacted by the subsidy, tax, and pricing policies examined in this peer review.

Overall, the APRP developed a series of recommendations and noted multiple key findings for each of the policies reviewed. The APRP carefully considered the recommendations in order not to be too prescriptive, and the recommendations represent the compromise position agreed to by all APRP members. The APRP is confident that there is sufficient capacity within Chinese Taipei to implement some of these recommendations and conduct further studies on these subsidies to determine if they are effective in meeting the goals set out initially. The government should also consider complementary measures for ensuring a smooth transition with any envisioned changes in policies.

1. INTRODUCTION AND FFSR PEER REVIEW PROCESS

The APEC Energy Working Group (EWG) endorsed a Voluntary Peer Review of Inefficient Fossil Fuel Subsidy Reform (VPR/IFFSR) proposal in March 2013, at the EWG45 meeting in Thailand. The proposal aimed to build regional capacity to assist APEC economies in rationalizing and phasing out inefficient fossil fuel subsidies that encourage wasteful consumption, while recognizing the importance of providing those in need with essential energy services (APEC/EWG, 2013a). The proposal put in place an ongoing series of reviews of inefficient fossil fuel subsidies across APEC economies that volunteer to be a part of this review process. The reviews are "peer reviews"— i.e., the reviewers are from other peer APEC economies and relevant institutions, with expertise in energy, fossil fuels, finance and economics. Guidelines for the VPR/IFFSR process were approved at the November 2013 EWG46 meeting in Da Nang, Viet Nam (APEC/EWG, 2013b). The VPR/IFFSR guidelines (APEC, 2015a) are modeled after the ongoing APEC peer reviews on energy efficiency (PREE).

At the November 2014 EWG48 meeting in Port Moresby, Papua New Guinea, the final report from the first VPR/IFFSR peer review in Peru was presented (APEC, 2015b). At this meeting, the Philippines volunteered to undertake the VPR/IFFSR, and planned for its peer review in late 2015. New Zealand also volunteered for its peer review at the EWG48, and its peer review was conducted in March 2015. Subsequently, Chinese Taipei volunteered to undertake a similar peer review in early 2016 and the peer review was conducted in late September 2016 in Taipei City. This report summarizes the findings and recommendations of that peer review process.

As in the previous review processes, the VPR/IFFSR Secretariat (hereafter, "Secretariat") coordinated the activities associated with the VPR in Chinese Taipei. The Secretariat worked closely with the EWG Lead Shepherd and the EWG Secretariat to provide technical and logistical support in Chinese Taipei. The EWG Secretariat issued a call for volunteers for the APEC Peer Review Panel (APRP) members. Several volunteers responded to the call, and ultimately four volunteer peer reviewers were selected by the EWG Secretariat, with approval from the EWG Lead Shepherd and agreement of the Government of Chinese Taipei. The APRP consisted of Dr Niall Mateer (U.S.A.), Dr Ruengsak Thitiratsakul (Thailand), Peter Wooders (Switzerland), and Takako Wakiyama (Japan). Dr Niall Mateer was designated as the APRP Team Leader. The biographies of the APRP members and the Secretariat are in Appendix C.

In early 2016, the Secretariat also began its interactions with the Taiwan Institute of Economic Research (TIER) and the Bureau of Energy/Ministry of Economic Affairs (MEA), to begin planning for the APRP to conduct the peer review in late 2016. TIER was designated as the primary point of contact for the Secretariat. TIER and the EWG Secretariat confirmed the dates (September 26-30) for the Peer Review visit to Taipei City, Chinese Taipei.

Subsidies reviewed under this process were chosen by TIER and MEA. These organizations also provided extensive information on these policies as well as the background information on the Chinese Taipei economy that formed the basis of the pre-briefing background report for the peer reviewers. The five selected subsidies chosen for the peer review were:

- The **Offshore Islands Sea Freight Subsidy for Petroleum Products:** provides a subsidy for transit fuels for consumers on offshore islands by reimbursing oil importing companies' shipping costs

- **Preferential Electricity Pricing for Street Lights:** helps street light owners stay in operation to promote public safety
- **Petroleum and Electricity Business Tax Exemption for Agricultural Machinery-Related Use**: an exemption from a 5 percent business tax on all transactions for petroleum products and electricity for use by farmers, intended to increase production and promote welfare of domestic farmers
- **Preferential Electricity Pricing for Agricultural Motors**: provides a discount to farmers to offset their electricity load fees during non-peak hours of consumption
- **Petroleum Product Price Subsidy for Agricultural Machinery**: using an established formula, the government pays a calculated share of farmers' increased fuel costs during periods of price spikes.

The selection of the policy instruments by MEA and TIER was based on their perceived importance. The Secretariat and the APRP (during the meetings) noted that all of these measures constituted subsidies that led to varying degrees of inefficiencies and some levels of wasteful consumption. Chinese Taipei used the VPR/IFFSR process to exchange information and obtain policy recommendations for effectively eliminating subsidies to fossil fuels in the long run. The discussions with APRP were intended to explore best practices or alternatives for addressing the intended objectives of each policy. These objectives are consistent with those of the APEC VPR/IFFSR process.

The APRP and the Secretariat met in Taipei City with the TIER and MEA on September 26, 2016, beginning five days of meetings with various government departments and agencies, and other stakeholders. On the final day of these meetings (September 30, 2016), the APRP communicated the preliminary findings and recommendations to the Bureau of Energy and Council of Agriculture, the two main organizations responsible for the subsidies being reviewed.

The APRP has carefully considered the recommendations in order not to be too prescriptive, and the recommendations presented in this report represent the positions to which all APRP members agreed. The recommendations, as well as the lessons learned and best practices, provide inputs to Chinese Taipei as it develops reform options for the policy instruments put forward for review.

Following the peer review meetings in Taipei, the Secretariat worked closely with the APRP members and finalized the draft report for review by the APRP members, EWG Secretariat, EWG Lead Shepherd, and the Chinese Taipei Government. Comments by these reviewers are incorporated into this final report.

PART 1: BACKGROUND

Part 1 of the report contains background information for the APEC peer review of the fossil fuel policy instruments selected by Chinese Taipei. The three sections below are focused on: a) a summary of the need for fossil fuel subsidy reforms in general; b) an overview of the macroeconomics and socio-demographics of Chinese Taipei; and c) a brief overview of the energy landscape in Chinese Taipei. The Government of Chinese Taipei contributed to the information on the Chinese Taipei economic and energy context, with additional research undertaken by the Secretariat.

2. ENERGY SUBSIDIES – A GLOBAL PERSPECTIVE

Energy subsidies are assumed to protect consumers from sharp increases in energy and other commodity prices (UNEP, 2008; IMF, 2013a). Providing stable, low-cost sources of domestic energy are also thought to provide a means for economic development and growth. However, protection of consumers from energy and commodity price increases comes with a price, as the country has to compensate for the subsidies in some other way. Government expenditures for energy subsidies can worsen fiscal imbalances and divert funds from high priority public spending and private investment. Subsidies can also lead to inefficient allocation of resources, and they often lead to overconsumption of energy. Such a situation can drive imbalances in trade for net energy importers, reduce incentives for the adoption of renewable energy and energy efficiency, and accelerate the depletion of natural resources. Finally, while the goals are usually noble, the benefits of energy subsidies are not always limited to the targeted lower income population; instead, the benefits are often captured by higher income consumers as well—leading to perverse incentives. These distributional effects actually extend to future generations in the form of reduced availability of key inputs for future growth and increased damages from GHG emissions.

Energy subsidies absorb considerable levels of global GDP and government revenue. In 2011, pre-tax[1] energy subsidies totaled US $480 billion[2] (NT $14,921 billion) (0.7 percent of global GDP or 2 percent of government revenue),[3] and are concentrated in low- and middle-income countries (IMF, 2013a; Clements, et al., 2014). The largest subsidies are for petroleum products, about 44 percent.

Despite the negative aspects of energy subsidies, they are often difficult to reform due to political resistance from those stakeholders who are receiving the most benefit (IMF, 2013a; Clements, et al., 2014). The reforms also often lack political and public support, reflecting lack of trust in a government's ability to reallocate expenditures to programs that support broader initiatives to support vulnerable population groups. Inflationary concerns and competitiveness issues can also dominate the governmental decision process. In many countries undergoing reform, there is often resistance from state-owned or state–operated enterprises, as they are concerned about the effect on their operations in a more competitive business environment.

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[1] Subsidies can be categorized as pre-tax or post-tax. Pre-tax subsidies exist when consumers and firms pay less than the costs of supply and distribution. Post-tax subsidies exist when levels of taxation on energy (or energy producing activities) are not taxed at economically efficient levels.

[2] As of January 2017, NT $100 = US $3.16.

[3] Post-tax subsidies are substantially larger, amounting to an estimated US $1.9 trillion in 2011 or 2.5 percent of global GDP and 8 percent of government revenues. Petroleum products accounted for roughly half or US $879 billion of the post-tax subsidies.

FOSSIL FUEL SUBSIDIES

There are two distinctly different definitions of a "subsidy" among the international community (APEC/EWG, 2012). The International Energy Agency (IEA) uses an 'effects test' to determine whether a subsidy exists. The 'effects test' is applied by determining whether a policy instrument lowers production costs of energy, raises prices received by energy producers, or lowers energy prices to the consumer. On the other hand, the World Trade Organization (WTO) uses a definition based on the policy instruments used to pass a subsidy to the recipient, and this definition can be applied to any sector. The subsidy-generating policy instruments can include: 1) government transfers of funds or potential transfers of either funds or liabilities; 2) forgone revenue; 3) government procurement policies; and, 4) government income or price support. The IEA definition overlooks the potential for an effect to be the result of a more than one government intervention. The WTO definition provides a more accurate picture as to exactly what subsidies are in place and allows for the identification of subsidy-specific costs and impacts. Even with these apparent differences, however, no general consensus on the definition has been reached. For example, some experts do not consider preferential tax treatment or other limited support measures to be subsidies if fossil fuel prices (or fossil fuel input prices in the case of electricity or other petroleum products) are still at or above the international market price of delivery of the fuel.

From a practical stand-point in terms of reform, identification of a subsidy is the first step in the process. Figure 1 overviews classes of subsidies that can be used in the energy sector (UNEP, 2008).

Figure 1: Main types of fossil fuel subsidies

Government intervention	Example	How the subsidy usually works		
		Lowers cost of production	Raises price to producer	Lowers price to consumer
Direct financial transfer	Grants to producers	●		
	Grants to consumers			●
	Low-interest or preferential loans	●		
Preferential tax treatment	Rebates or exemptions on royalties, sales taxes, producer levies and tariffs	●		
	Tax credit	●		●
	Accelerated depreciation allowances on energy-supply equipment	●		
Trade restrictions	Quotas, technical restrictions and trade embargoes		●	
Energy-related services provided directly by government at less than full cost	Direct investment in energy infrastructure	●		
	Public research and development	●		
	Liability insurance and facility decommissioning costs	●		
Regulation of the energy sector	Demand guarantees and mandated deployment rates	●	●	
	Price controls		●	●
	Market-access restrictions		●	

Source: UNEP, 2008.

The identification of a subsidy, and whether it is efficient or inefficient, requires an understanding of how the subsidy arose, the costs of the subsidy, who the recipients are, and the impacts of the subsidy on the economic and energy systems. Once these attributes have been identified, then consideration of potential reform options is possible. Reform options need to be defined in terms of new policies (pricing/taxation), if complementary policies are required, timing, and the potential political strategy. Therefore, the process of reform is not a simple process, and requires a structured, sequential, formalized approach (APEC/EWG, 2012).

LESSONS LEARNED FROM FOSSIL FUEL SUBSIDY REFORM

Over more than a twenty-year period, fossil fuel subsidy reform attempts have been made in over two dozen countries. These previous fossil fuel subsidy reform attempts can be classified into three categories (Clements, et al., 2014):

- Success: Reform led to permanent and sustained reductions of a subsidy;
- Partial Success: Reform achieved a reduction of the subsidy for at least a year, but then the subsidy re-emerged or remained a policy issue; and
- Failure: Reforms rolled back soon after the reform (e.g., resistance to price increases or efforts to improve efficiency in the energy sector push back the reforms).

There are a number of lessons to be learned about the reform process from the history of previous reforms. Generally, energy subsidy reforms are more likely to succeed when the following components exist (Clements, et al., 2014):

- A comprehensive reform plan;
- A far-reaching communications strategy, aided by improvements in transparency;

- Appropriately phased energy price increases, which can be sequenced differently across energy products;
- Targeted mitigating measures to protect the poor; and,
- De-politicization of energy pricing to avoid the recurrence of subsidies.

Most successful reforms were well planned and based on a clear reform strategy (Clements, et al., 2014). A comprehensive reform plan requires: 1) establishing clear long-term objectives, 2) assessing the likely impact of reforms, and 3) extensive consultations with stakeholders. Reform efforts are more likely to be successful and durable if they are embedded within a broader reform agenda. Evidence from countries implementing reforms suggests that reforms should have both a sustainable approach to energy pricing and a plan to improve the efficiency of energy consumption and supply. Designing a comprehensive subsidy reform strategy also requires information on the likely reform impacts, including impacts on various stakeholders, and identification of measures to mitigate adverse impacts (which are often temporary). This involves assessing the fiscal and macroeconomic impacts along with the distributional impacts to identify winners and losers. Finally, stakeholders should be involved in the development of a subsidy reform strategy.

To gain political and public support for a reform effort requires a communications strategy and transparency (Clements, et. al, 2014). Case studies of country reform movements found that the probability of success almost tripled with strong public support and proactive communications. The benefits of removing subsidies should be couched in terms of ability to finance other high-priority spending (investments) on education, health, infrastructure, and social protection. Transparency is a key element for a successful communications strategy. Some of the relevant information that needs to be communicated includes: the magnitude of subsidies and how they are funded; the distribution of subsidy benefits across income groups; changes in subsidy spending over time; and, potential environmental and health benefits from subsidy reform.

Pace and timing of price increases, and sequencing of those increases, determines success (Clements, et al., 2014). A phased, but consistent, approach to reforms permits both households and enterprises time to adjust, and it permits the government to build credibility by showing that subsidy savings can be put to good use. A phased approach also helps reduce the impacts of inflation and allows a government to build other more sustainable social safety nets. Further, sequencing reform for 'luxury' products first will shield lower-income groups until later rounds, and further builds public support amongst the lower-income population. Sequencing should take into account spill-overs across products and the consequences for environmental goals.

Public support for subsidy reforms is reliant on how well the government implements efforts to mitigate the impact of energy price increases on the poor (Clements, et al., 2014). One approach to mitigate those impacts, if the government feels there is a need to do so, could be via targeted cash transfers or near-cash transfers in the form of vouchers. Cash transfers not only provide flexibility for recipients, but also remove governments from the need to be directly involved, which can be quite costly. If cash transfers are not feasible, efforts should be focused on programs that can be expanded quickly such as school meals, public works, reductions in health user fees, or subsidized mass transit. Subsidy reform can be more acceptable if it is accompanied by complementary measures that support the reform objective. Such measures as providing alternative sources for cooking (substituting LPG for kerosene) or off-grid electricity access can soften the impacts.

Finally, initial public reaction to price increases on international energy markets should not be allowed to reverse subsidy reform efforts; i.e., pricing of commodities should be depoliticized (Clement, et al., 2014). Automatic pricing mechanisms reduce the possibility of subsidy reversal by distancing the government from energy pricing; and, this makes it clearer that domestic price changes reflect changes

in international markets which are out of the control of a single government. Further, delegation of such pricing mechanisms to an independent entity ensures that reform can proceed as planned. Finally, adoption of a smoothing rule into an automatic pricing mechanism avoids sharp increases in domestic prices.

Throughout the subsidy reform process, it is vital to engage stakeholders at all levels in order to craft solutions that are inclusive of diverse needs and perspectives. Increasing transparency and conducting effective outreach campaigns can strengthen public trust and support for reforms. The following examples and lessons learned emphasize the value of timely, clear communication and stakeholder involvement while developing and implementing reforms.

Building Support for Reform

In order to strengthen support for reforms and build legitimacy in the eyes of stakeholders, decision-makers must identify their audiences, understand the basis for opposition to reform, and craft salient messages that can resonate with multiple types of stakeholders. A government that considers stakeholder opinions and gains support is less likely to experience failure or initiate a political backlash. An International Institute for Sustainable Development (IISD) guidebook for policy-makers underscores the importance of coordination, consultation, and communication, and notes that the balance and components of these three aspects will vary depending on the type of reform under consideration (IISD, 2013). Coordination with internal stakeholders (i.e., other government entities) allows the primary decision-makers to ensure that national government agencies, municipal authorities, and other jurisdictions have the information necessary to address the proposed reform. Additionally, reform efforts that rely on cross-government linkages involving relevant government agencies have a greater chance of success. Consultation involves having an interactive dialogue with stakeholders, using methods such as surveys, public comment periods, media commercials or articles, interviews, polls, and online discussion boards. Ideas gathered from both internal and external stakeholders may change the course of the reform or offer new avenues for achieving change. Policymakers should be flexible and willing to compromise, while remaining focused in their intent. In addition to gathering ideas and feedback, governments may wish to convey some or all of the following points to their audiences to raise awareness, according to the IISD guidebook:

- Fuel prices are determined by market forces, not the government;
- The government must act in the national interest, not to maintain popular but harmful policies;
- A history of subsidization does not make cheap fuel an ongoing entitlement;
- Cheap supply of domestically produced resources is a wasteful use of the country's resources;
- Much subsidy spending does not actually benefit the intended recipients;
- Other successful and growing economies have much higher fuel prices and are in a much stronger financial position because they do not subsidize or they subsidize less. (IISD, 2013).

In general, messages should be varied, but simple and clear, while remaining focused on the target audiences. It is important to highlight the positive economic and societal outcomes associated with the proposed reform or reforms. IISD identifies communication as one of the three principles necessary for turning government commitments into action. The other two principles, ambition and targeted support, are closely related. In combination, these three principles can help decision-makers channel their vision into reality without alienating or ignoring stakeholders, but rather harnessing stakeholders' support for successful change (IISD, 2015a).

Economy-Specific Examples

A discussion of subsidy reform in Thailand emphasizes that reform should embody a "whole government" approach, as changes will inevitably have ramifications across multiple branches and levels of government. Including various government entities early in the reform process will foster support. If

government decision-makers and policy-makers are concerned about stakeholders' opinions on potential reform, they may wish to conduct a review of media reports, local articles, and existing literature in order to gain a sense of the public's stance on energy issues. The discussion of subsidy reform in Thailand also recommends hosting public events such as workshops, panels, or discussion groups to facilitate public input. This not only ensures that the public are receiving relevant, fact-based assessments of the reform's status, it also creates legitimacy of the reform as the public feels they have some involvement in the planning stages. Liaisons between stakeholders and the reform team are also encouraged to consider the tone and type of their communications for different audiences. The table below, presented in the IISD Thailand report, describes the communications approach taken by Thailand's Ministry of Energy.

Table 1. Thailand's Communications with Households and Street Vendors Regarding LPG Price Increases

Timing	Before Adjustment Jan–Mar 2013	After Adjustment Mar–Dec 2013
Objective	Create a better understanding about the need to adjust and raise LPG price. Inform and explain mitigation measures.	Create awareness about efficient use of LPG in order to decrease the growing consumption.
Avenue:	1. Interviews: Thai Ministry of Energy executives and experts 2. Seminars and public hearings 3. Traditional and new media: Leaflets Posters TV Print media Radio Online news	1. Interviews: Thai Ministry of Energy executives The outcome of LPG price adjustment 2. Traditional and new media: Leaflets TV Print media Radio Online news

Source: Tabmanie, 2013.

The methods used by Thailand's Ministry of Energy not only show an understanding of their audiences' news sources, they also provide updates and feedback to keep the public informed at different stages of the process (IISD, 2013).

A case study on fossil fuel reform in Indonesia offers an example of how government can characterize their audience and understand their opinions (IISD, 2015b). Although a survey of Indonesian citizens indicated that the majority were opposed to the proposed subsidy reform, a subsequent analysis of the data revealed that characteristics such as gender, education, region, income, and transportation mode were all correlated with opinions towards reforms. In general, those with higher levels of education

were more likely to support subsidy reform, as were those living in urban areas. This same survey found that most Indonesians were unaware of the subsidy's existence and were unable to guess the scope of the subsidy. Public opinion can evolve as people inhabit different regions, own vehicles, gain education, or learn more about the current subsidy policies.

Other economy-specific case studies offer insights into the strengths and weaknesses of past communications efforts. A report from the International Monetary Fund (IMF) highlights the lessons and implications of energy subsidy reform efforts around the world. The following list provides some of the key communications lessons learned (IMF, 2013):

- In Ghana, the deregulation of petroleum product pricing involved a significant communications undertaking to inform the public about the benefits of the reform. Well-recognized public figures, including the President, made public addresses about the reform. The public was able to participate in discussions throughout the process, and government representatives emphasized that money saved from the subsidies would allow for greater investment in other priority areas.
- In Iran, authorities educated the public on the benefits that households would gain from energy reform. Authorities focused their message on the low-income household audience.
- In Nigeria, the government faced opposition after implementing a gasoline subsidy reform, due in part to an ineffective, scattered, and rushed public information effort. The price of gasoline increased 117 percent once price caps were removed, resulting in public unrest and pushing the government to once again decrease the price.
- A thorough communications campaign in the Philippines contributed to successful deregulation of the downstream oil industry and elimination of fuel subsidies, despite an initial lack of support for the reform. Internal government coordination was also key to the Philippines' success, as the policymakers had to navigate a change in administration and a low level of political cohesion among parties. Internal coordination was key to passing and implementing the reform under challenging political circumstances.

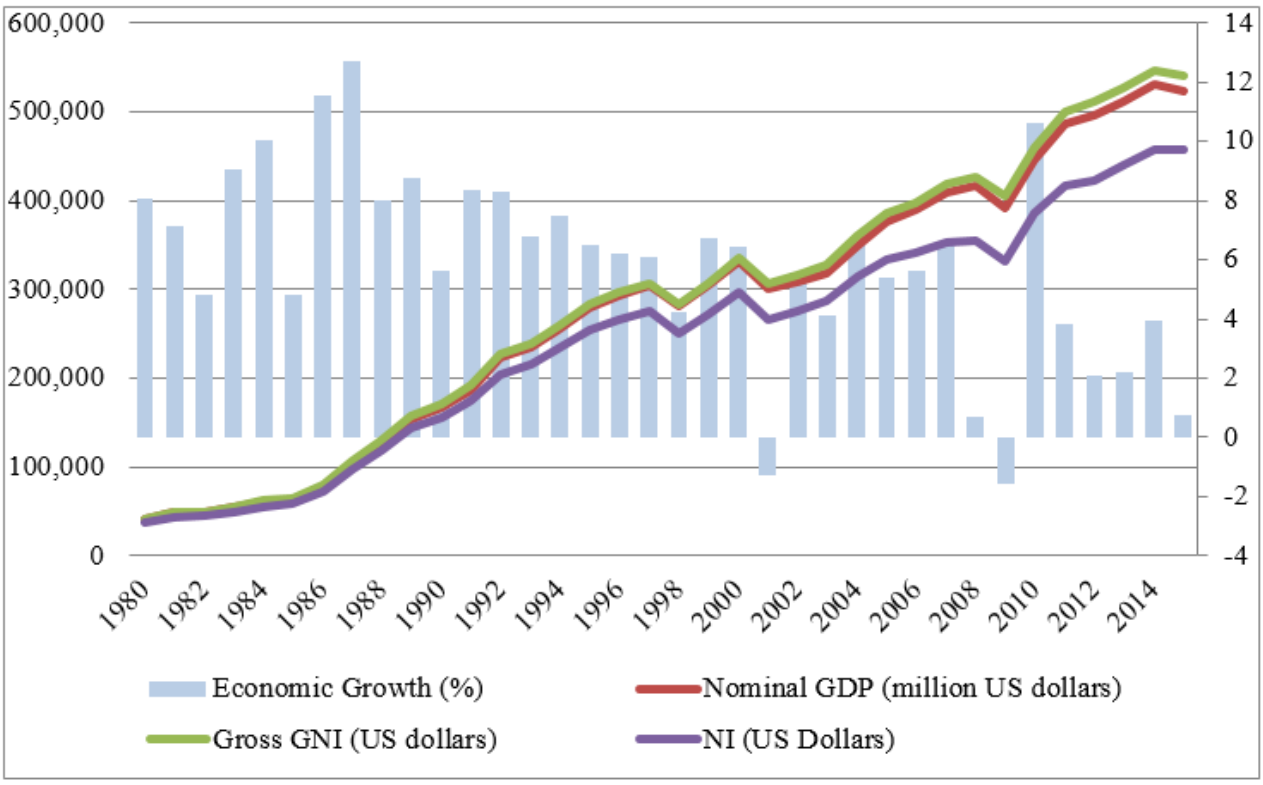
3. MACROECONOMIC AND SOCIODEMOGRAPHIC PROFILE

Located off the southeastern coast of the Asian continent, Chinese Taipei is a long and narrow island roughly stretching from north to south. To its east is the Pacific Ocean; to its west, Mainland China; to its south, the Philippine Islands; to its north, the East Sea; and to its northeast, about 600 kilometers away is Japan and the Ryukyu Islands. Including the main island proper and surrounding satellite islands, Chinese Taipei's total land area is approximately 36,193 square kilometers.

A high degree of economic freedom led Chinese Taipei to initially develop in agriculture and light industry as well as other labor-intensive industries. After the oil crisis in 1970s, Chinese Taipei shifted to developing capital-intensive industries such as petrochemicals and heavy industries. By the 1980s, Chinese Taipei began to further liberalize and gradually deregulate its imports and exports, investments, and foreign exchange, in addition to shifting its economy towards more high-tech sectors. Currently the major industries consist of electrical, photovoltaic, petrochemical, and machinery industries. In the last decade, Chinese Taipei has emphasized human resource investment, research and development, and industry upgrades in an attempt to promote sustainable development and enhance economic competitiveness. Chinese Taipei is developing its high value-added industries such as manufacturing, IT, and the service industries, while simultaneously developing high-value added emerging industries, including cultural creativity, biotech, and green energy.

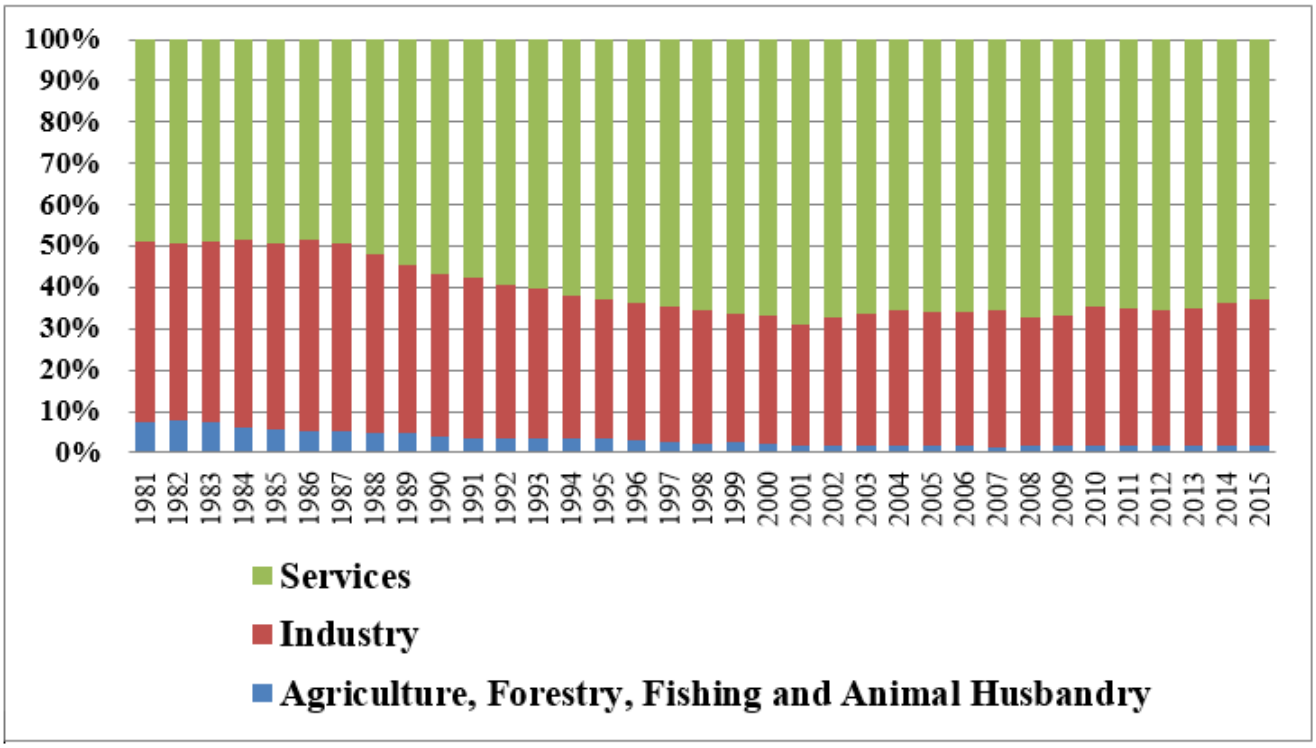
Chinese Taipei's economy continues to grow, reaching US $523,009 million in Gross Domestic Product (GDP) by 2015 with US $22,294 per capita, and US $540,515 million in Gross National Income (GNI) with US $23,040 per capita. Following stronger exports and an increase in private sector consumption and investment, Chinese Taipei's economic growth was roughly 4 percent in 2014; however, growth slowed in 2015 due to the decline in global economic growth and the impact of decreased foreign demand, resulting in a 0.65 percent growth rate. Nevertheless, the recent slow recovery in developed economies and modest recovery in the emerging markets were expected to boost the economic growth of Chinese Taipei to nearly 1.5 percent in 2016.

Figure 2: Chinese Taipei's Economic Growth and Nominal GDP Trend Chart



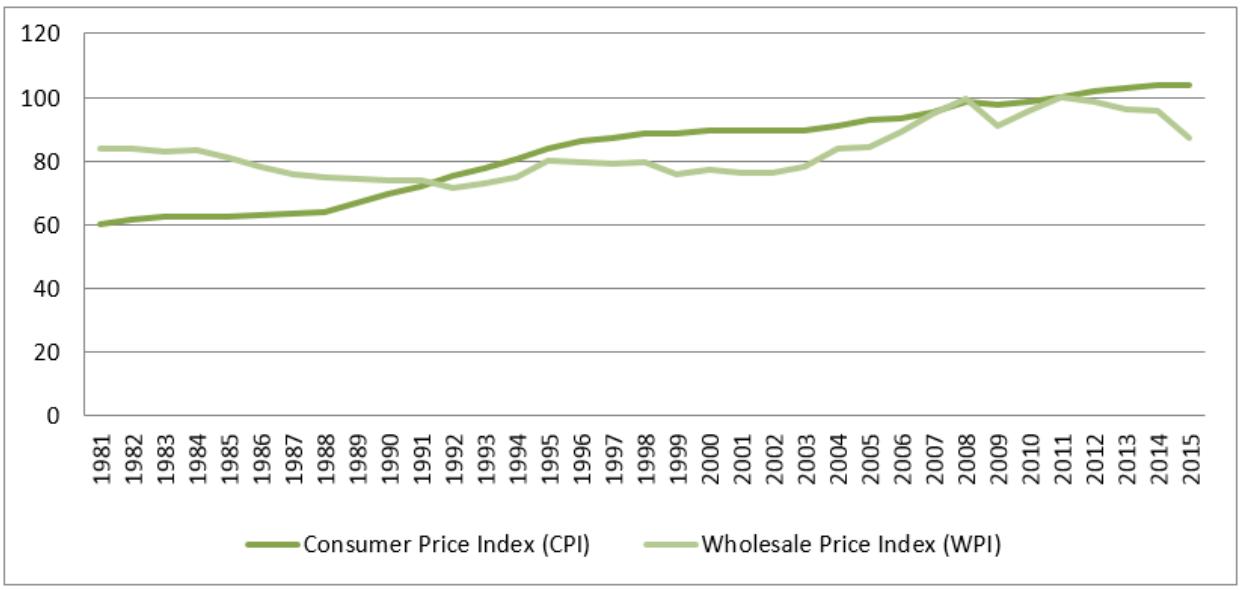
Service and industrial sectors constitute the majority of the Chinese Taipei economy. Primary industries, including agriculture, forestry, fishery, and husbandry accounted for nearly 2 percent of total GDP in 2015, while the industrial sector accounted for over 35 percent, and the service sector accounted for just under 63 percent. In particular, manufacturing, construction, power, and fuel supply industries account for the majority of the industrial sector, while the service sector is mainly comprised of wholesale and retail industries, real estate agencies, public administration, national defense, social security, financial and insurance industries, and educational industries.

Figure 3: GDP Contribution Trend and Major Industrial Distribution of Chinese Taipei's Tertiary Industrial Sector



In terms of commodity prices, the 2015 Chinese Taipei Consumer Price Index (CPI) was 103.7, down 0.31 percent compared to the previous year. At the same time, oil and fuel prices reflect the gradual decrease in international oil prices, which were down 25 percent in 2015, while gas and electricity prices dropped by about 22 percent and 10 percent, respectively. Food prices increased by about 3 percent, and the core CPI, excluding vegetable/fruit and energy, rose slightly by almost 1 percent in 2015. Wholesale prices in Chinese Taipei experienced a slight decline due to the decrease in the prices of oil and coal products, mineral products, chemicals, and machinery products. The 2015 wholesale price index (WPI) was 89.5, down almost 7 percent from 2014. In particular, the products previously sold in the domestic market decreased by over 9 percent. Imported product prices decreased by about 13 percent and prices for exported products decreased by roughly 4 percent.

Figure 4: Chinese Taipei CPI and WPI Trends



In terms of trade, the 2015 Chinese Taipei foreign exchange rate was US $31.90 and has shown an upward trend since 2011. According to the International Trade Statistics 2015, released by the World Trade Organization (WTO), the total exports for Chinese Taipei in 2015 were approximately US $285 billion, making Chinese Taipei the 17th largest exporting economy in the world, an improvement from 20th place in 2014. The total imports were US $237 billion, which makes Chinese Taipei the 18th largest importing economy in the world, showing no change in ranking from 2014. The cumulative surplus is US $48 billion, up nearly 26 percent from 2014 to 2015 (Ministry of Economic Affairs, 2015). Due to a combination of global economic growth falling short of expectations, slowing demand, and a drastic decrease in international oil prices, the inventory closeout speed for electronic products is still slow, yet protectionism is prevalent. Thus, most trading countries performed rather poorly in export in 2015.

Electronic components are the top export item, accounting for over 30 percent of the total export, followed by IT and visual/audio products at approximately 11 percent. The third largest category is basic metal and metal products, accounting for almost 9 percent of overall export. Mineral products are the top import, accounting for over 17 percent of the total import, followed by electronic components at approximately 16 percent of the total import. The third largest import is chemicals, accounting for nearly 11 percent. The 2015 Annual Changes in Industrial Production Index was -1.7 percent, representing negative growth for 8 consecutive months as of the end of December 2015.

Figure 5: Foreign Trade of Chinese Taipei (2005-2015)

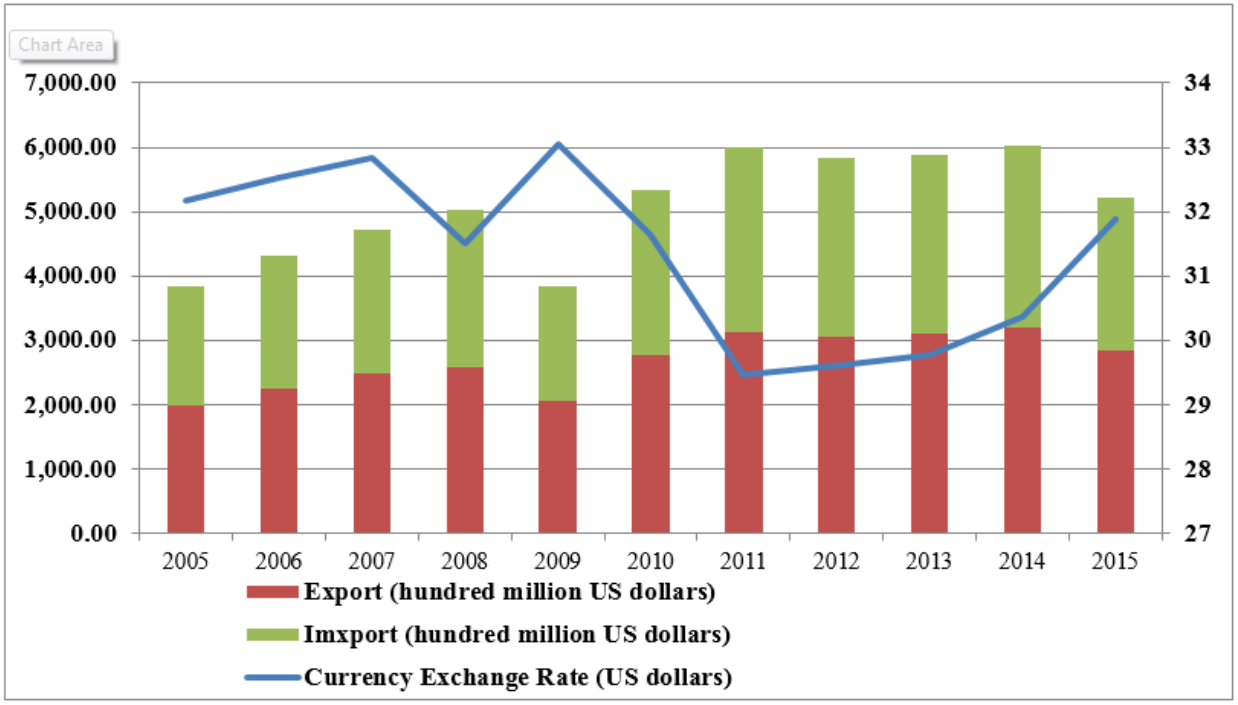


Table 2: Key Economic Indices

Items	Economic Growth (%)	Real GNP (according to the 2011 price)	Industrial Production Index	Foreign Trade			Whole-sale Price Index	Consu-mer Price Index	Total Currencies	
				Export	Import	Balance			M1B	M2
Year		NTD$1 trillion	2011=100	USD$100 million			2011=100		NTD$1 trillion	
2005	5.42	11.17	75.0	1,999.6	1,854.4	143.2	84.22	92.92	7.40	23.49
2006	5.62	11.80	78.6	2,259.0	2,064.4	194.6	88.96	93.48	7.79	24.94
2007	6.52	12.57	84.7	2,487.9	2,231.2	256.8	94.72	95.16	8.29	25.98
2008	0.70	12.66	83.7	2,580.5	2,444.7	135.9	99.59	98.51	8.05	26.68
2009	-1.57	12.46	77.1	2,056.6	1,776.0	280.7	90.90	97.66	9.38	28.67
2010	10.63	13.79	95.8	2,780.1	2,562.7	217.3	95.86	98.60	10.78	29.97
2011	3.80	14.31	100.0	3,129.2	2,880.6	248.6	100.00	100.00	11.55	31.71
2012	2.06	14.61	99.8	3,064.1	2,773.2	290.9	98.84	101.93	11.95	33.04
2013	2.20	14.93	100.4	3,114.3	2,780.1	334.2	96.44	102.74	12.82	34.62
2014	3.92	15.52	106.8	3,200.9	2,818.5	382.4	95.95	103.97	13.84	36.58
2015	0.65	15.63[P]	104.9	2,853.4	2,372.2	481.2	89.54	103.65	14.68	38.89

Source: Directorate General of Budget, Accounting and Statistics, Executive Yuan, R.O.C., Ministry of Economic Affairs, Ministry of Finance, and Central Bank of China.

Notes:

1. P is the preliminary statistics.

2. The real GNPs before 2014 Q2 (inclusive) have all been traced and corrected according to the 5-year modified results.

SOCIODEMOGRAPHIC STATISTICS & SOCIAL POLICIES

POPULATION OVERVIEW

According to the Department of Statistics at the Ministry of the Interior, Chinese Taipei had a total population of approximately 23.5 million in 2015. In the same year, Chinese Taipei experienced an annual growth rate of roughly 0.25 percent, with 11.71 million males and 11.78 million females. The 2015 gender ratio[4] was 99.4 percent, down about one quarter of a percent from 2014.

Chinese Taipei's fertility rate was higher than that of Japan, Korea, Singapore, and certain European countries in 2000, despite a long period of declining fertility rates. Nonetheless, fertility rate for the following ten years dropped much more quickly, and Chinese Taipei had one of the world's lowest birth rates by 2010. The 2015 World Population Data Sheet released by Population Reference Bureau, a U.S. non-profit, reveals that Chinese Taipei's 2015 fertility rate was 1.2[5], ranking it among the top ten economies with lowest fertility rates in the world. Chinese Taipei faces the increasingly serious issues associated with low birth rate (Population Reference Bureau, 2015). The population aged 15 years or younger accounts for 14 percent of the total population, similar to that of Japan and Korea, which is approximately half of the world average of 26 percent. Chinese Taipei's population is aging. The population aged 65 years or older in Chinese Taipei has accounted for more than 7 percent of total population since 1993, and reached 12 percent of the total population (global average is 8 percent) in 2015. Although the figure is lower than most developed economies, the fertility rate continues to decline, which accelerates population aging. The National Development Council has estimated that this ratio will exceed 20 percent by 2026, and Chinese Taipei will become a super-aging society (National Development Council, 2016a). The elderly population will reach 40 percent by 2060, which is likely to exceed that of certain advanced economies such as the U.S., Japan, German, U.K., and Korea. Chinese Taipei's aging index in 2015 was approximately 92 percent; in other words, the ratio between the elderly population and youth population is approximately 1:1.1. The elderly population has been estimated to surpass the youth population by 2017, surpassing 100 percent in the aging index.

Labor

The 2015 Chinese Taipei labor participation rate was over 58 percent, maintaining a rising trend. Notably, female labor participation rate is over 50 percent and has been rising for 6 consecutive years (Population Reference Bureau, 2015). The 2015 Chinese Taipei unemployment rate is under 4 percent with 440,000 unemployed workers, down from 2014. As Chinese Taipei expands its higher education, young people postpone entering the workplace by extending their period of study, resulting in relatively lower labor participation rate among young people aged 15-24 years old, compared with that of certain European countries and the United States. The early withdrawal from the labor market among mid-aged and senior workers results in the relatively lower labor participation rate in the population over 45 years old, compared with certain European countries and the United States. As Chinese Taipei's economy slowly recovers, unemployment has been mitigated since its peak in 2009, resulting in an

[4] Gender ratio refers to the relative number of male to every one hundred females.
[5] Measured in average number of children born per woman.

average number of 440,000 unemployed workers in 2015, down 199,000 people from 2009. Unemployment due to business volume shrinking or business closure has substantially decreased since the 2008 financial crisis, suggesting the vicious cycle of unemployment has lessened.

Table 3: Labor Market Index

Year	Labor-Force (thousand people)	Employ-ment (thousand people)	Unemployment (thousand people)	Labor Force participation rate (%)			Unemployment Rate (%)		
				AVG.	Male	Female	AVG	Male	Female
2008	10,853	10,403	450	58.28	67.09	49.67	4.14	4.39	3.83
2009	10,917	10,279	639	57.90	66.40	49.62	5.85	6.53	4.96
2010	11,070	10,493	577	58.07	66.51	49.89	5.21	5.80	4.45
2011	11,200	10,709	491	58.17	66.67	49.97	4.39	4.71	3.96
2012	11,341	10,860	481	58.35	66.83	50.19	4.24	4.49	3.92
2013	11,445	10,967	478	58.43	66.74	50.46	4.18	4.47	3.80
2014	11,535	11,079	547	58.54	66.78	50.64	3.96	4.27	3.56
2015	11,638	11,198	440	58.65	66.91	50.74	3.78	4.05	3.44

Demographic Characteristics

According to the statistics released by the Ministry of the Interior, the number of Chinese Taipei population receiving higher education increases every year (National Development Council, 2016b). The rate of population of 25-64 year-old receiving higher education reached 47 percent by the end of 2015, which is higher than the average of 33 percent among members of Organization for Economic Co-operation and Development (OECD) and equivalent to Japan and Korea, Chinese Taipei's peers in Asia. Except for the United States, Canada and Israel, the rate is higher than the remaining economies. The population aged over 15 years-old in registered households at the end of 2015 was 20.3 million people, or 86 percent of the total population. In terms of education level, college level accounts for the majority at over 43 percent, followed by senior/vocational high school at approximately 30 percent. The population with higher education (college or higher) increases every year, and has risen by 11 percent in the last 10 years. The population with graduate school education has also increased from roughly 3 percent to 6 percent in recent years. The population with a junior high school education or less declines annually with steady downward trend, and literacy is on the rise.

Socioeconomic Overview

The 2015 Nominal National Income (NI) of local residents was US $458,417, and the Per Capita National Income was US $19,540.

Currently, the Chinese Taipei Government has not yet developed the poverty line, and hence, some scholars treat the low income standard as the de facto poverty line (Ministry of the Interior, 2015).[6]

[6] Gross monthly household per capita income falls below the minimal standard of living expenses while the amount of family mobile asset (saving investment…etc.) and total value of real estate (land+ house) do not exceed the standard announced for that year. The minimal standard of living expenses are calculated by the central and municipal governments, in accordance with the Report on the Survey of Family Income and

According to the statistics from the Department of Statistics at Ministry of Health and Welfare, the number of people in low-income households in 2015 was 325,490, or nearly 1.5 percent of the total population. This represents a declining trend since 2013 (Ministry of Health and Welfare, 2015).

According to the 2015 Human Development Index (HDI) calculation by the United Nations Development Programmed (UNDP), the 2014 HDI for Chinese Taipei is 0.882, ranked 25th among 189 economies.

Social Welfare Policy

Currently, the key basis for the implementation of social welfare policies is the Guiding Principles for Centenary Social Welfare Policy of R.O.C. which was revised and approved in 2012. The current social welfare system includes social assistance and allowance, social insurance, welfare services, health and medical care, employment security, and housing justice and community building.

(1) Social Assistance and Allowance

The government policies are based on social insurance and supplemented by social allowance, with social assistance being the last line of social security system, in addition to properly identifying the difference and integration of the functions for these three. Main work includes: reviewing the qualification for requesting social assistance, assisting low-income households to accumulate assets, building the connection between unemployment pay and social assistance system, and integrating the supplementary social assistance, disaster relief, and medical assistance with private-sector resources.

(2) Social Insurance

Social insurance prevents citizens from falling into personal and family financial crisis due to aging, disease, death, physical/mental disability, or child birth, and to help the employed avoid negative financial effects due to occupational disaster, unemployment and retirement. The system includes occupational disaster insurance, health insurance, pension insurance, employment insurance, and long-term care insurance.

(3) Welfare Services

The Government combines family and private-sector forces to provide proper services in order to promote the development of physical and mental health for citizens with special needs pertaining to age, gender, physical/mental status, race, religion, marriage, and sexual preference as well as other social population characteristics. Welfare services include care for the economically disadvantaged, integration of social welfare and education departments, provision of early children development therapy, encouragement of senior participation, building a security network of anti-sexual violence, and locally customized measures for indigenous regions.

(4) Health and Medical Care

The purpose is to promote and protect health, actively promote the health care and maintenance program for disadvantaged citizens in order to shrink gap in access to healthcare, and establish a supportive senior-friendly environment. Care includes: creating supportive social environment, strengthening disease prevention and safety, building food and drug safety management system,

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Expenditures released by the Directorate-General of Budget, Accounting and Statistics, Executive Yuan but is in subject to the actual numbers announced by the central and municipal government

improving long-term care system, and strengthening health and medical disaster prevention contingency performance.

(5) Employment Security

To reinforce the social security of workers with full employment, to encourage fair participation in economic and social activities without discrimination against working rights, and to improve workplace welfare, the Chinese Taipei government provides an employment security system, which focuses on integrating unemployment pension, protecting workers with labor standards, assisting workers to properly utilize employment services, devoting resources to occupational security and health, and strengthening employment counseling for discharged military officers and soldiers.

(6) Housing Justice and Community Building

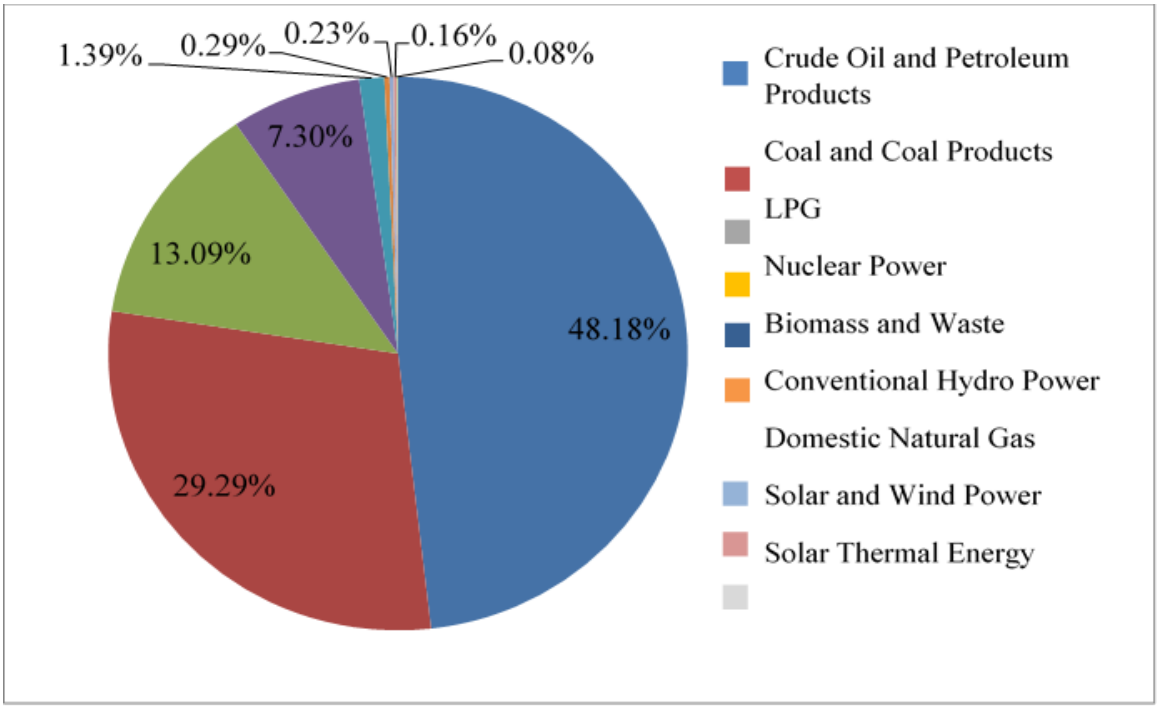
To ensure suitable housing for citizens, the government provides appropriate assistance to families or individuals with housing needs, including mortgage, rental and renovation subsidies. Housing justice and community building program include the encouragement of rental, building, supportive system, community, and residential post-disaster reconstruction, promotion of sustainable development of community homes, combination of indigenous tribe culture and ecological characteristics, and promotion of community construction project.

4. ENERGY LANDSCAPE OF CHINESE TAIPEI

ENERGY SITUATION

Chinese Taipei's 2015 total energy supply was 145 million kiloliters of oil equivalent (KLOE), down 1.6 percent from 2014. In particular, imported energies totaled 142 million KLOE, accounting for nearly 98 percent of total energy supply, and domestic energy accounted for just over 2 percent. The 2015 imported energies were down nearly 2 percent compared with 2014, while the 2015 domestic energies were up 8 percent compared to 2014. For energy supplies grouped by energy categories, as shown in Figure 6, crude oil and petroleum products account for the majority at approximately 48 percent, followed by coal and coal products at 29 percent, LPG at 13 percent, nuclear power at 7 percent, biomass and waste at 1 percent, conventional hydro power at 0.3 percent, domestic natural gas at 0.2 percent, solar and wind power at nearly 0.2 percent, and solar thermal energy at 0.08 percent. The 2015 primary energy supply was 121 million KLOE, representing a slight decrease of -1.2 percent.

Figure 6: 2015 Energy Mix of Chinese Taipei



Currently Chinese Taipei's power installation capacity is 48,476 MW, and Taipower's device capacity is 31,651 MW, accounting for almost 65 percent of the total power system. Private power plant installation capacity is 8,704 MW, accounting for over 18 percent of the total power system. Additionally, the private co-generation plant installation capacity is 8,120 MW with a nearly 17 percent share of the total power system. Taipower's 2015 power generation was 175,551 GWh, producing co-generation power of 39,322 GWh for a total of 214,873 GWh. In the Taipower generation structure, conventional hydro power accounts for over 2 percent; pumped hydro power accounts for just below 2 percent; coal-fired power accounts for approximately 34 percent; oil-fired power accounts for roughly 7 percent; gas-fired power generation accounts for over 34 percent; nuclear power accounts for nearly 21 percent; wind power accounts for 0.4 percent; and solar power accounts for 0.01 percent. Chinese

Taipei's 2015 total electricity consumption was 249,870 GWh. Out of this total, the energy sector accounted for nearly 8 percent of consumption, the industrial sector accounted for over 53 percent, the transport sector accounted for 0.5 percent of electricity consumption, the agriculture sector accounted for above 1 percent, service industries accounted for over 19 percent, and the residential sector accounted for approximately 18 percent.

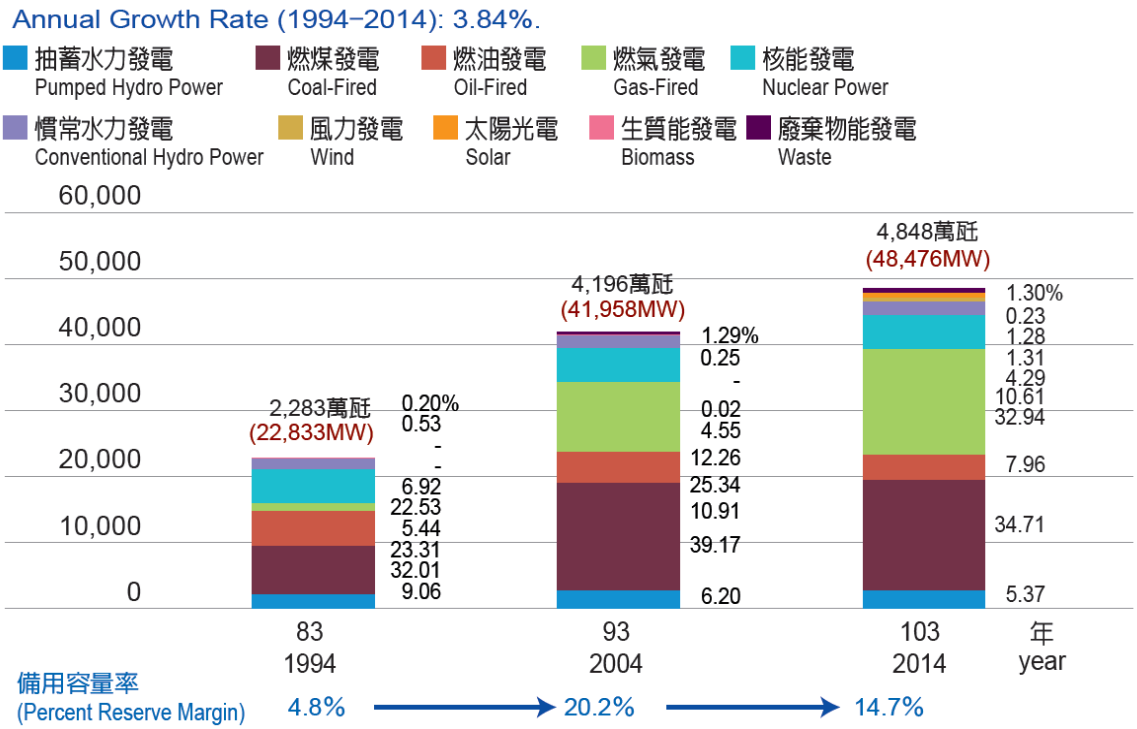


Figure 7 Chinese Taipei Power Installation Capacity Distribution (1994-2014)

2015 renewable energy power generation was approximately 10,482 GWh, up 6 percent from 2014. In particular, conventional hydro power accounted for approximately 43 percent of total renewable power; wind power accounted for over 14 percent; solar accounted for more than 8 percent; biomass power generation accounted for about 3 percent; and waste energy power generation accounted for 31 percent. Solar thermal energy supply was about 114,000 KLOE, up 1.2 percent compared to 2014. Renewable oil was approximately 56,000 KLOE, down 34 percent from 2014. In particular, biomass alcohol accounted for 0.26 percent; biomass diesel accounted for 0.31 percent; and biomass fuel accounted for over 99 percent.

ENERGY RESOURCE

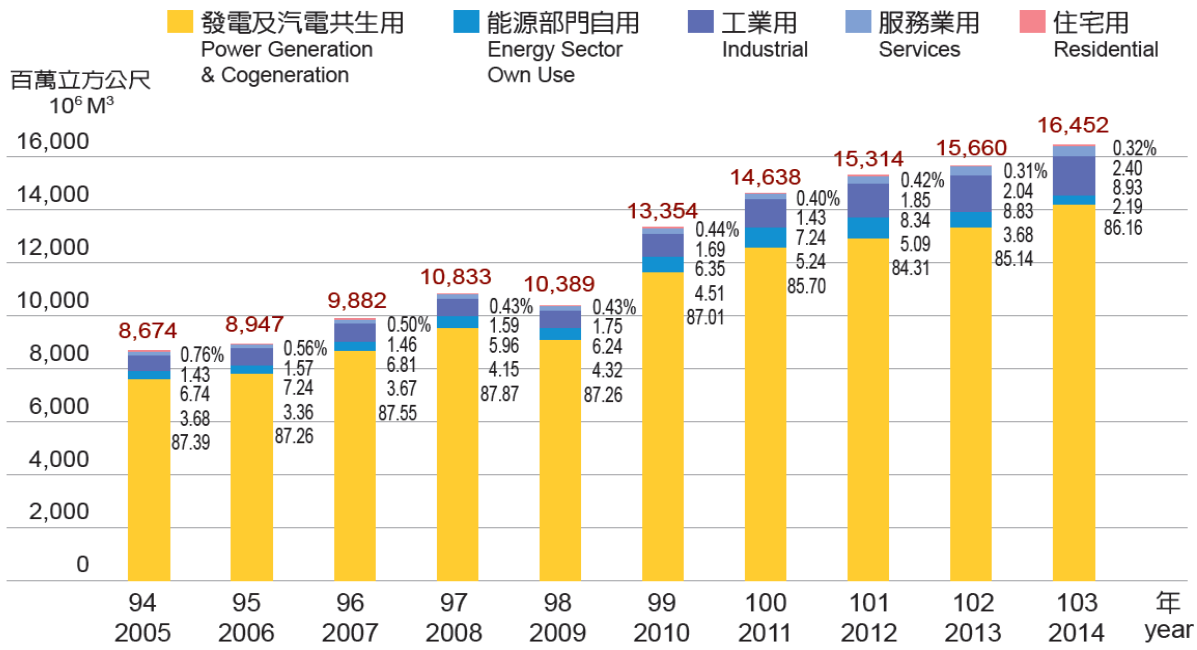
Chinese Taipei's energy resource is mainly grouped into fossil fuel energy and renewable energy. Fossil fuel energy mostly consists of coal, petroleum, and natural gas. The 2015 total coal supply was approximately 65 million metric tons, down more than 1 percent from 2014. The 2015 imported coal amount was over 45 million metric tons, and the major import sources include Australia, Indonesia, and Russia, which account for approximately 55 percent, 26 percent, and 15 percent, respectively. In 2015, domestic coal consumption was about 43 million metric tons, up more than 5 percent from 2014. The industrial sector accounts for just under 10 million metric tons of domestic coal consumption, or roughly 99 percent, while non-energy consumption accounts for just 1 percent.

The 2015 crude oil supply was nearly 5 million KLOE, down more than 2 percent from 2014, and accounted for nearly 100 percent in terms of import portfolio. Among the 2015 crude oil import

sources, Saudi Arabia accounts for 32 percent; Kuwait accounts for 22 percent; Oman accounts for 13 percent; Iraq accounts for 9 percent; United Arab Emirates accounts for 9 percent; Angola accounts for 8 percent; Indonesia accounts for 2 percent; Iran accounts for 1 percent; and others account for 5 percent.

The 2015 domestic natural gas supply was 1,668 million cubic meters with productivity of 374 million cubic meters, down 1.5 percent from 2014. 2015 domestic natural gas consumption was 1,619 cubic meters. The residential sector accounts for 52 percent of consumption; industrial sector accounts for 26 percent; service industry sector accounts for 20 percent; energy sector accounts for nearly 1 percent; and power and co-generation accounts for 0.3 percent. The 2015 LPG import amount was 18,947 million cubic meters, up 7 percent from 2014. The 2015 total domestic consumption was 17,782 million cubic meters. In particular, power and co-generation accounts for 86 percent; industrial sector accounts for 9 percent; service industry sector accounts for 2 percent; energy sector itself accounts for 2 percent; and residential sector accounts for 0.3 percent. Among the sources of 2015 LPG imports, the top three sources include Qatar, Indonesia, and Malaysia, accounting for 47 percent, 17 percent, and 16 percent, respectively.

Figure 8: LPG Consumption Overview



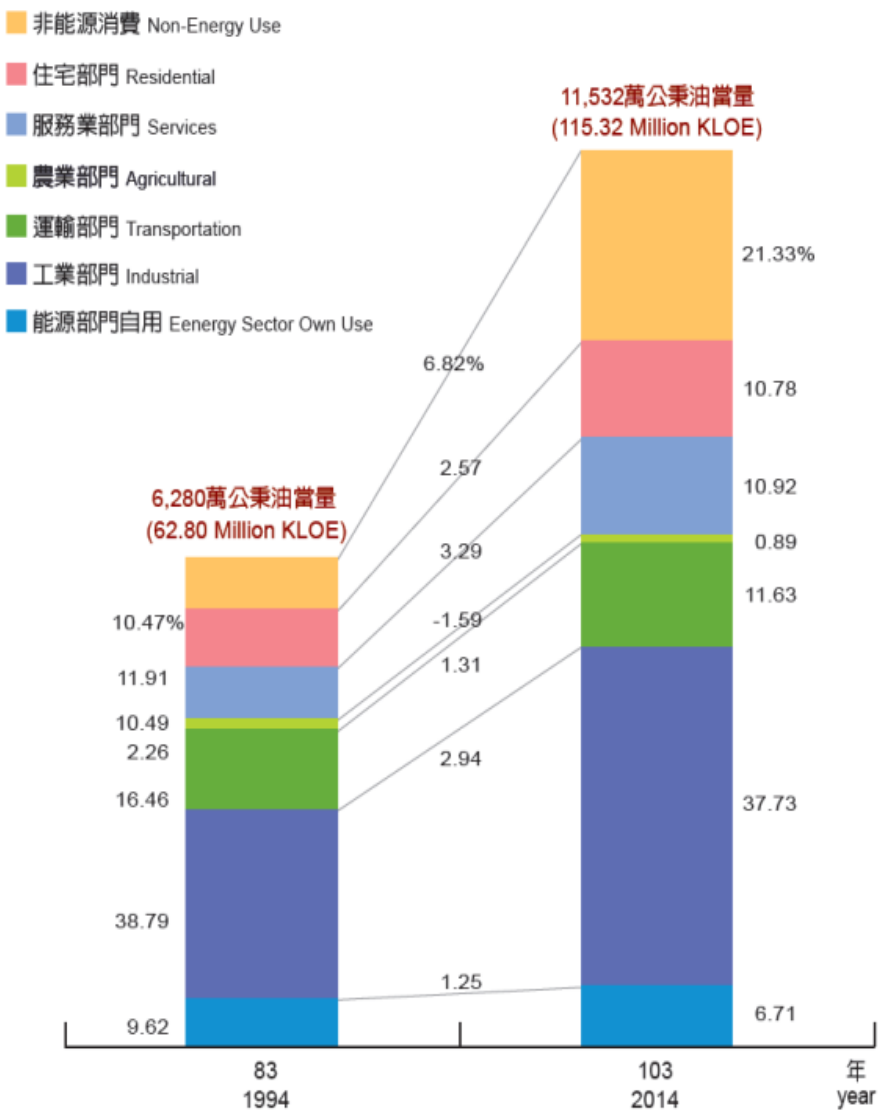
The 2015 renewable energy total installation capacity was 4,319 MW, up almost 6 percent from 2014. Conventional hydro power accounts for 48 percent; solar accounts for 19 percent; wind accounts for 15 percent; waste energy power accounts for 15 percent; and biomass power accounts for 3 percent.

ENERGY CONSUMPTION

Chinese Taipei's energy consumption in 2015 was 115 million KLOE, down nearly 0.3 percent from 2014. Of this, energy consumption accounts for 78 percent, and non-energy consumption accounts for 22 percent. Non-energy consumption includes use of fuel resources as raw materials (in manufacturing, for example) rather than as energy sources. When compared by sector, industrial sector consumption accounts for 37 percent of total energy consumption; transportation sector consumption accounts for 12 percent; agricultural sector consumption accounts for 1 percent; service industry sector consumption accounts for 11 percent; residential sector consumption accounts for 11 percent; and energy sector's own use accounts for 7 percent. Between 1994 and 2014, energy consumption grew by

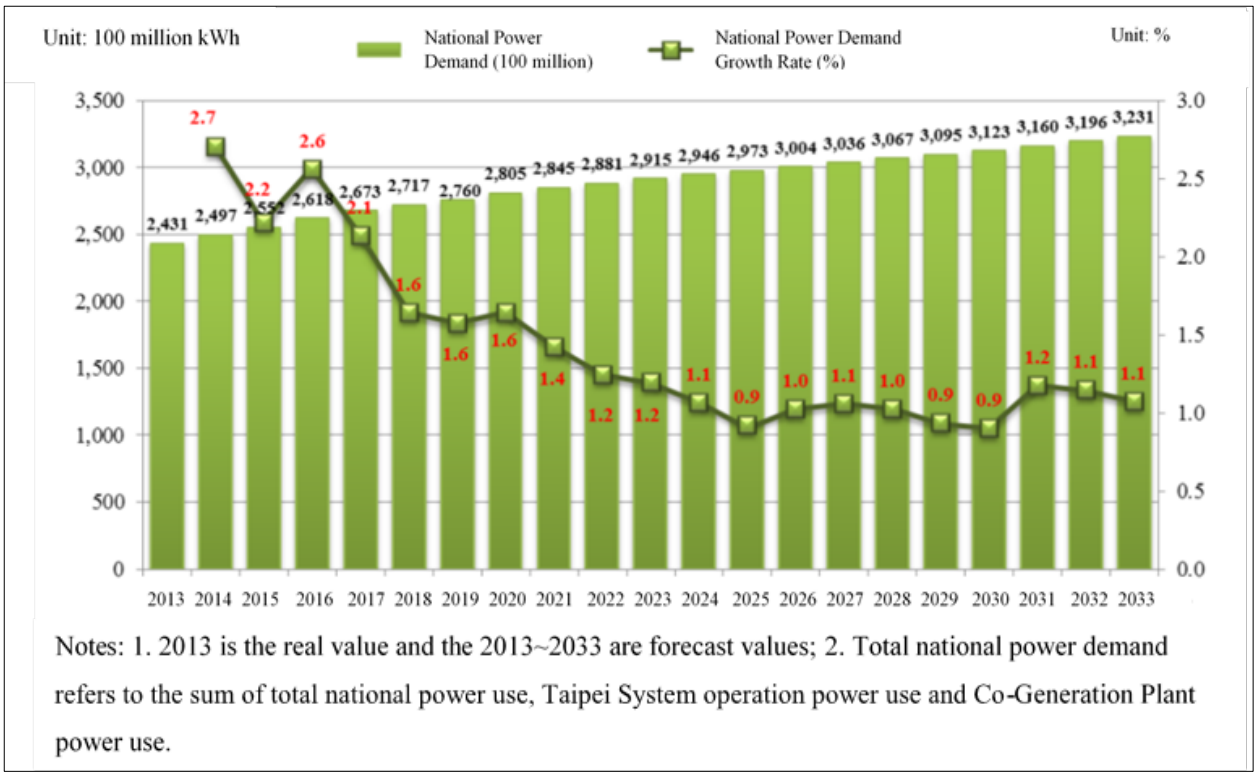
about 85 percent, and residential, service industry and transportation sectors all have grown substantially in energy consumption.

Figure 9: Chinese Taipei's Energy Consumption Structure



Regarding future energy use forecast, the total electricity use in Chinese Taipei is estimated to grow from just under 226,050 GWh in 2013 to 300,900 GWh in 2033 with an average growth rate of 1.44 percent over the next 20 years. The demand for power (sum of total power and plant power use) will increase from 243,110 GWh in 2013 to 323,070 GWh in 2033.

Figure 10: 2014-2033 Chinese Taipei Total Power Demand Forecast



Notes: 1. 2013 is the real value and the 2013~2033 are forecast values; 2. Total national power demand refers to the sum of total national power use, Taipei System operation power use and Co-Generation Plant power use.

Except for the slight increase in 2013, Chinese Taipei's energy intensity has shown a declining trend in the last 10 years. The 2015 energy intensity was 7.37 (liters of oil equivalent (LOE)/NT thousand). The average energy consumption per capita is 4,932 LOE.

Table 4: Chinese Taipei's Energy Intensity and Average per Capita Energy Consumption (2006-2015)

Year	Energy Intensity (LOE/NT Thousand)	Per Capita Energy Consumption (LOE)
2006	9.10	4,722
2007	8.96	4,935
2008	8.64	4,777
2009	8.60	4,661
2010	8.25	4,936
2011	7.84	4,861
2012	7.66	4,830
2013	7.67	4,933
2014	7.43	4,957
2015	7.37	4,932

Source: Bureau of Energy, Ministry of Economic Affairs

OWNERSHIP AND INVESTMENT IN ENERGY SECTOR

The state-owned business for petroleum and natural gas is CPC Corporation (abbreviated as CPC), and the private sector mainly consists of Formosa Petrochemical Corporation. With regards to power generation, Taiwan Power Corporation (Taipower) is the state-owned power company of Chinese Taipei, in charge of power supply for the main island and outlying islands including Penghu, Kinmen, and Matsu. Private power companies are responsible for providing energy from hydro power, solar power, and wind power. Hydro power currently is issued to three private hydro power companies in official commercialization with an electricity license according to the Electricity Act, with a total device capacity of 38,954 kW. The solar power sector currently consists of five private solar system power companies in commercial operations with licenses, accounting for a total device capacity of 25,137 kW. Wind power currently consists of nine private wind power companies in commercial operation with licenses, with a total device capacity of 348,300 kW from 156 wind power generators.

ENERGY POLICY

Energy Development Policy

Energy plays a critical role in human economic activities. The increasingly complex energy issues in recent years drove the gradual international rise of sustainable development policy ideas that take into consideration energy, economy, and environment objectives as the key orientation of government policy implementation.

Chinese Taipei's energy and power structure are highly dependent on fossil energy with 98 percent of primary energy relying on import. Secondary energy power is also an island-type independent power system that lacks a backup support system. Once the power encounters a shortage or interruption, it will immediately jeopardize the state's security.

As the international pressure for carbon reduction increases, and in consideration of the impacts that from different energy distribution portfolios have on the environment (including social, economic, and energy items), the Bureau of Energy at Ministry of Economic Affairs thus drafted the Energy Development Policy that designs the future installments of total energy supply, definition of energy development, and the distribution portfolios solutions for different situations in accordance with the framework guidelines disclosed by Guidelines on Energy Development approved by the Executive Yuan on October 2, 2012. Such policy can be used by the government for subsequent planning of the future

state energy development policy. The purpose of Energy Development Policy aims to ensure the stable supply of energy with active and pragmatic low-carbon energy development, thereby taking into account of the delicate balance between energy, economy, and environment for sustainable energy development. The policy aims at safety, cleanliness, and efficiency.

Recent History of Energy Policy

Since the approval of the Framework of Chinese Taipei's Sustainable Energy Policy in June 2008, energy policy has shifted towards increasing energy use and production efficiency, with an emphasis on added-value for increased energy use, pursuit of low carbon and low polluting energy supply and consumption, and reducing dependence on fossil fuel and imported energy. Chinese Taipei is undertaking this approach in attempt to meet the development needs of future generations under the policy objectives of triple-wins in energy safety, environmental protection, and economic development.

The Framework of Chinese Taipei's Sustainable Energy Policy further outlines the complete set of laws and regulations as well as relevant mechanisms, including the launching of Greenhouse Gas Reduction Act (2015), Renewable Energy Development Ordinance (2008), Energy Tax Regulations, and Energy Management Act (2009).

On November 3, 2011, the "Robust Nuclear Reduction" policy was promulgated to establish a mechanism to review the development progress of energy technology, effectiveness of supporting measures for nuclear and carbon reduction, and carbon emission control situations, thereby gradually reducing dependence on nuclear energy. The policy mainly focuses on energy saving and carbon reduction, reducing peak load and power demand from the supply perspective while fully promoting renewable energy, stabilizing power supply, and reducing carbon emissions from the supply perspective.

The energy policy aims to pursue sustainable development from the Framework of Chinese Taipei's Sustainable Energy Policy to the Robust Nuclear Reduction Policy. Chinese Taipei is committed to the gradual reduction in nuclear energy and fossil fuel dependence, while promoting the development of renewable energy, to eventually replace nuclear energy and fossil fuels. Chinese Taipei is working to accomplish this while taking into account energy supply safety, environmental protection, and economic development.

Framework of Energy Development

To ensure the balance and stability in short-, mid-, and long-term energy supply and demand, in addition to accomplishing the objectives of aforementioned energy development, the Executive Yuan approved Guidelines on Energy Development on October 2, 2013 in accordance with the provision stipulated in Paragraph 2, Article 2 of the Energy Management Act promulgated in July 2009 to revise the regulations and guidelines for energy policy as a reference for planning the overall government's energy development.

The content of Guidelines on Energy Development consists of regulations and guidelines for the framework of Chinese Taipei's energy policy with references and instructions for the development policy on energy supply. The drafting of Guidelines on Energy Development is based on the principle of developing total supply from reasonable demand and managing demand from limited supply capacity. The reasonable overall energy demand is estimated with the development of total supply quantity and the structural distribution of energy development objectives to assure the balance and stability in future energy supply.

Guidelines on Energy Development can be used as the policy guidelines for formulating state energy related policy programs, standards, and action plans. The development envisions building safe and stable energy supply system with efficiency and clean environment, creating a development environment that will facilitate energy saving and carbon reduction in order to achieve the govenrment's objectives in

energy saving and carbon reduction. The policy in general aims to promote safe, efficient, and clean energy system as the core philosophy of our energy development.

The Standards for Evaluation of Energy Development and Use and Energy Development Policy were drafted according to the Guidelines on Energy Development in order to implement energy pilot management and planning future installments of total energy supply. Additionally, the guidelines serve to plan the future definition and distribution of energy development.

Energy Tax

The Chinese Taipei Ministry of Finance first proposed the Energy Tax Regulation Draft in August, 2006 in response to the global warming caused by GHG emissions with no effective control of GHG concentration in the atmosphere. The draft includes items for taxation such as gasoline, diesel, aviation fuel, liquid fuel, LPG, natural gas, kerosene, and coal. However, the draft has not been passed in the Legislative Yuan as of 2015.

The purpose of the Energy Tax Regulation Draft is to save energy, stabilize energy supply, develop renewable energy, encourage sustainable development, and reduce GHG emissions. The Energy Tax Regulation Draft is an economic incentive policy tool to reduce GHGs, which internalizes the external costs from energy use to reflect the external costs (i.e., costs of GHG emissions) produced from energy use on the purchasing price for energy users, thereby remaining true to the user-pay principle and relying on emission control to meet the emission standards.

Greenhouse Gas Reduction and Management Act

The United Nations Framework Convention on Climate Change (UNFCCC) COP 21 was held in Paris on November 30, 2015. Chinese Taipei submitted the Intended Nationally Determined Contributions (IDNC) in November 2015 with the commitment to reduce 2030 GHG emissions to below year 2000 levels. This would require a reduction of 50 percent from business-as-usual (BAU) and would be equivalent to 20 percent less than 2005 emissions. Chinese Taipei's objectives of committing to IDNC are to implement the Greenhouse Gas Reduction and Management Act, reducing 2050 emissions to 50 percent below 2005 emissions. The first step to meet this objective is to establish a comprehensive inventory registration system.

To realize its promised IDNC objectives, Chinese Taipei's key future work includes conducting inventory of various energy portfolios to plan for reasonable limitations on energy growth and carbon reduction methods. Chinese Taipei's simulated estimation of 2030 BAU greenhouse gas emissions totaled approximately 428 million metric tons. Different carbon reduction routes were computed to simulate and estimate that Chinese Taipei can reduce 2030 GHG emissions to approximately 240±20 million metric tons.

Chinese Taipei's Legislative Yuan promulgated the implementation of the Greenhouse Gas Reduction and Management Act on July 1, 2015. The sources of emissions announced by the central competent authority shall undergo emission inventory check each year and be registered with the emission source account issued by the information platform designated by the central competent authority prior to the specified deadline. The emission inventories and relevant data shall be verified by certification bodies every three years.

The fundamental provisions in the Greenhouse Gas Reduction and Management Act involve formulating the objective and schedule for Chinese Taipei government's greenhouse gas reduction and implementing the common international regulations that are somewhat different from UNFCCC, while taking into consideration the sustainable development of the environment, economy, and society. Setting development objectives for certain controlled sectors in stages shall take cost-benefit analysis into consideration, ensuring that GHG reduction targets are met with minimum costs. Chinese Taipei is

taking initiatives to adopt preventive measures to forecast, avoid, or reduce the causes of climate change, as well as mitigate the adverse effects. Chinese Taipei also actively reinforces international collaboration to maintain global competitiveness in productivity development.

Energy Transition Initiative

On May 25, 2016, the Ministry of Economic Affairs (MEA) of the new government announced electricity market reform and energy transition initiatives, including a goal to achieve a nuclear-free Chinese Taipei by 2025. This initiative aims to establish a low-carbon, sustainable, stable, efficient, and affordable energy system. Energy conservation strategies, energy generation, energy storage and smart systems integration are being implemented in order to achieve energy transition goals. The strategies include energy supply side, energy demand side, system side and regulation side, as shown in the following table.

Table 5: Energy Transition Strategies

Energy Transition Strategies	
Demand Side	◆ Promoting industry transformation and upgrading. ◆ Enhancing industrial energy conservation guidance and assistance. ◆ Reinforcing energy conservation regulations. ◆ Providing incentives to maximize energy conservation. ◆ Improving energy efficiency.
Supply Side	◆ Actively developing new green energy to achieve the target of renewable resources accounting for at least 20% of Chinese Taipei's total power generation by 2025. ◆ Continuing with replacement of existing coal-fired and gas-fired power generation units. ◆ Accelerating construction of the third LNG receiving terminal in order to promote increased use of natural gas. ◆ Reduce air pollution and carbon emissions from existing thermal power plants.
System Side	◆ Accelerating deployment of energy storage. ◆ Accelerating deployment of smart grid infrastructure. ◆ Enhance power grid stability.
Regulation Side	◆ Complete revisions to the Electricity Act to create the market structure needed to facilitate energy transition.

(Data source: Bureau of Energy, Ministry of Economic Affairs, R.O.C.)

Current nuclear policies include suspending construction of the fourth nuclear power plant and not extending the service life of the three existing plants (which are scheduled to be decommissioned in 2018, 2019 and 2025, respectively). To achieve the goal of a nuclear-free Chinese Taipei by 2025, efforts are being made to improve renewable energy accounting of total power generation, increase use of natural gas, and promote energy conservation and energy efficiency.

PART 2: APRP KEY FINDINGS AND RECOMMENDATIONS

Part 2 of the report summarizes the background, key findings, and consensus APRP recommendations for each of the five subsidies selected by Chinese Taipei for review. These findings and recommendations are intended to support Chinese Taipei during its ongoing reforms of fossil fuel subsidies. After careful consideration, APRP developed recommendations that are not too prescriptive, and the recommendations represent a compromise position to which all APRP members agreed.

The subsidies reviewed below include five that were examined under the voluntary peer review. The selected subsidies for review included:

1) Sea freight subsidy for oil products shipped to offshore islands, to reimburse oil companies shipping costs for petroleum products delivered to small inhabited islands offshore of the Chinese Taipei main island in order to equalize fuel prices;
2) Preferential electricity pricing for street lights, providing reduced-cost electricity for owners and operators of municipal street lights;
3) Exemption from sales tax of agricultural machinery-related oil and electricity, a targeted tax benefit for farmers;
4) Preferential electricity pricing for agricultural motors, reducing farmers' fixed load charges during off-peak seasons; and
5) Petroleum product price subsidy for agricultural machinery, providing partial price relief during periods of spikes in market prices.

For each subsidy, some lessons learned and best practices from other economies are also provided as possible ideas for Chinese Taipei to consider. The APRP has also developed some cross cutting lessons learned, findings, and recommendations for the three agricultural subsidies, which share a number of similarities. These recommendations and lessons learned sections are based on the available information at the time of drafting this report and are subject to revisions and updates as new information becomes available. To that end, we encourage readers of this report to analyze these sections carefully with an aim to develop economy-specific and strategic reform options that can be implemented.

5. SUBSIDY #1: OFFSHORE ISLANDS SEA FREIGHT SUBSIDY FOR PETROLEUM PRODUCTS

SUMMARY: Small islands of Chinese Taipei offshore of the main island are heavily dependent on petroleum products for electricity and transportation, but face elevated costs due to shipping of fuels from the main island. This policy provides a subsidy for petroleum products by reimbursing oil importing companies all shipping costs. The policy results in fossil fuel prices for consumers on the offshore islands roughly equal to those on the main island.

CURRENT STATUS

This subsidy is currently in effect.

POLICY BACKGROUND

1. Policy-making's Timing and Background

Referring to the definition of fossil fuel subsidy by different international organizations, the Offshore Island Oil Product Sea Freight Charge Subsidy belongs to the price subsidy for an intermediate product input defined by OECD, the transportation cost subsidy defined by the International Monetary Fund (IMF), and the direct financial transfer defined by International Energy Agency (IEA).

Since the oil products for the offshore islands are shipped from the main island, the additional sea freight charges for the oil products shipped from the main island to the offshore islands on the offshore island residents may be transferred to the industry or the public as follows:

(1) Oil industry's increased operating cost: The industry's willingness of operating business in the offshore islands may be jeopardized if the sea freight charge for oil shipment is to be paid for by the industry, and thus the supply of oil products in the offshore islands is affected.

(2) People facing higher oil price: If the oil industry has the sea freight charge reflected on the retail prices of oil, the oil price in the offshore islands will be increased by up to 2 percent.

2. Policy Objectives and Considerations

To safeguard the local residents' oil consumption rights and to help local residents secure access to basic energy services, the government has established the additional sea freight charge for shipping oil products to the offshore islands by offering sea freight charge subsidies. Fuel oil is a necessity in daily life and is one of the basic raw materials for local economic development; therefore, the government concludes that this subsidy is important in stabilizing local economic development and improving the welfare of local residents. The policy objectives are as follows:

(1) Stable oil supply: Stabilizing oil supply in the offshore islands in order to ensure the oil consumption rights of local residents.

(2) The oil price for local residents in the offshore islands is close to the price for residents on the main island: Closing the gap of retail prices between the offshore islands and the main island.

3. Related Policies

This subsidy arrangement is intended to ease the cost difference of sea freight charges between the offshore islands and the main island. Since the sea freight charge is paid for by the oil industry, the subsidy is therefore granted to the oil industry. (The subsidy is paid for by the governmental Petroleum Fund, an earmarked fund created by the government and assessed on imports and production of petroleum products.) In this way, the oil retailers in the offshore islands can obtain the same oil price as those in the main island in order to ensure that the local oil consumption conditions are the same as those in the main island.

CONTEXT AND HISTORY

1. History of Revisions

The related regulations of sea freight charge subsidy for oil products were implemented on February 28, 2002 without any subsequent amendments.

2. Current Regulations

According to Article 36, Paragraph 2 of the Petroleum Administration Act of the Republic of China, the government has provided this subsidy from the Petroleum Fund to the oil industry that has been paying for the sea freight charge. The regulations governing the sea freight charge subsidy for shipping oil products to the offshore islands are detailed in the following table.

Table 6: Regulations Governing the Sea Freight Charge Subsidy for Shipping Oil Products

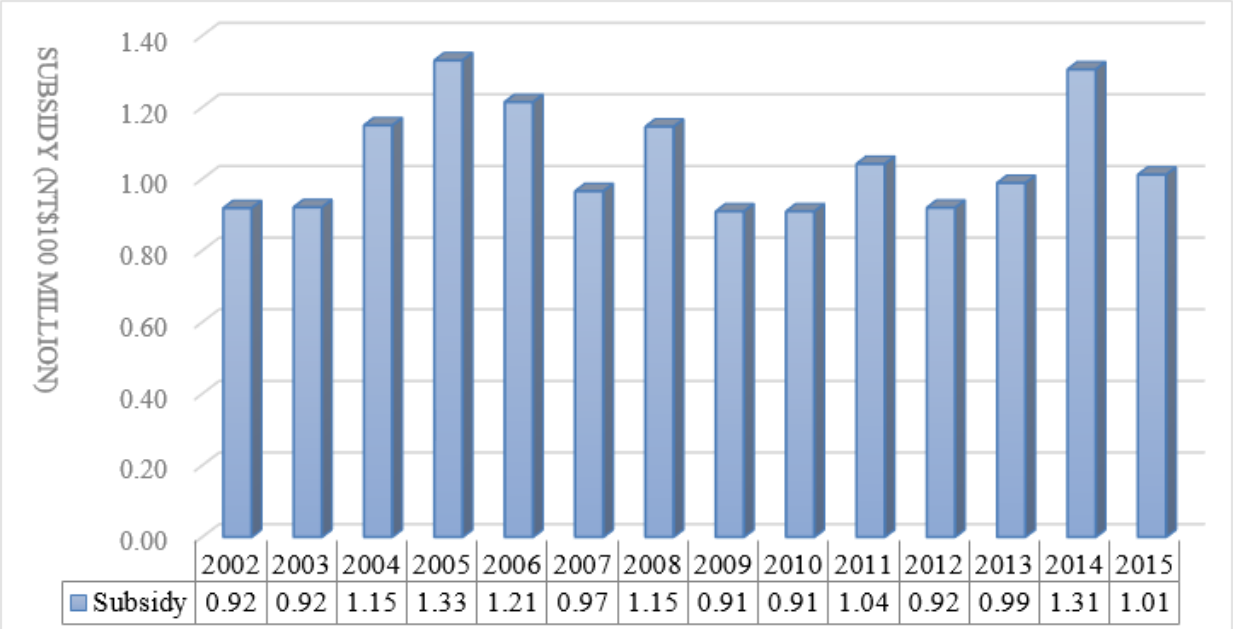
I.	An application for sea freight charge subsidy of the following year for shipping oil products to the offshore islands is to be filed before the end of November with the transportation and business prospectus of the following year enclosed for the review and approval *by* the central competent authorities. First-time applicant who cannot file an application within the prescribed period or applicant who cannot file application within the prescribed period with valid reason should file the application with transportation and business prospectus of current year enclosed for review and approval to receive the subsidy covering the period from the filing date to the end of the current year.
	The transportation and business prospectus stated in the preceding paragraph should contain the following information:
	(I) Oil storage and transportation business overview;
	(II) The responsible transportation industry;
	(III) Name of oil product and its supply sources, vessel tonnage, sea freight oil tank model, quantity of sea freight oil tank, mode of transportation, volume, and number of voyages;
	(IV) Voyage distance data of the closest supply sources
	(V) Transportation expense data;
	(VI) Annual freight volume and expense budget;
	(VII) Sea freight related expenses;
	(VIII)Other matters designated by the central competent authorities;
II.	The sea freight charge subsidy stated in the preceding paragraph is limited to oil products related delivery. The central competent authorities shall have the subsidy amount reviewed and approved by referring to the actually incurred sea freight charge and other related necessary handling charges.
III.	In terms of sea freight charge subsidy, if the oil product delivery cannot be arranged according to the transportation and business prospectus due to natural disasters or incidents, an application should be specially filed with the central competent authorities within 90 days from the next day of the mode of transportation changed with the mode of transportation, transportation expense, and cost analysis documents enclosed for project subsidy.
IV.	Once the application filed for sea freight charge subsidy is reviewed and approved by the central competent authorities, the applicant should submit the following documents at the end of each month to the central competent authorities for the subsidy for the prior month; also, an application filed 90days after each month's deadline will be rejected without further processing.
	(I) Application Form;
	(II) Evidences of transportation made in the prior month;
	(III) Receipts or invoices;

SUBSIDY EFFECT

1. Economic Aspect (subsidies granted in previous years)

The annual sea freight charge subsidy for shipping oil products to the offshore islands for the years 2002 through 2015 is shown in Figure 11.

Figure 11: Oil Products Sea Freight Charge Subsidy (Unit: NT$100 million/year)



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Subsidy	0.92	0.92	1.15	1.33	1.21	0.97	1.15	0.91	0.91	1.04	0.92	0.99	1.31	1.01

(Data source: Bureau of Energy, Ministry of Economic Affairs, R.O.C.)

2. Social Aspect/Welfare Implications

The government provides residents on the offshore islands with the same oil prices that are available to the residents of the main island by granting sea freight charge subsidy for shipping oil products to the offshore islands. The reasons for providing sea freight charge subsidy are as follows:

- Ensure oil product prices in the offshore islands are close to oil product prices on the main island:
  - Compensate for the sea freight charge of shipping oil products to the offshore islands in order to have the local oil price close to the oil price in the main island.
- Maintain a stable oil supply to the offshore islands:
  - Help the oil industry maintain a stable business operation with a steady oil supply for the offshore islands by helping the oil industry reduce sea freight cost.
- Help local residents gain access to basic energy services:
  - This subsidy makes it possible for the local residents on the offshore islands to enjoy the same oil prices as the residents in the main island. Currently, the sea freight charge subsidy supports 19 villages (towns and cities) on the offshore islands benefitting around 87,400 households and 269,300 residents.

3. Industrial Aspect (the impact of the subsidy on the domestic oil industry)

The subsidy amount and volume granted by the government account for a small percentage of the total oil demand in Chinese Taipei and has no real effect on the oil market of Chinese Taipei. The granted subsidies are to compensate for only the price difference due to additional sea freight charge; therefore, this subsidy does not affect the overall market price of oil in Chinese Taipei. Subsidy amount per unit is as follows:

Table 7: Oil Product Sea Freight Charge Subsidy Amount

Year	2010	2011	2012	2013	2014	2015
Subsidy Amount per Liter (NT$/liter)	0.48	0.49	0.38	0.39	0.52	0.40
Subsidy Ratio per Liter (subsidy amount / average oil price)	1.73%	1.61%	1.51%	1.47%	1.53%	2.06%

(Data source: Bureau of Energy, Ministry of Economic Affairs, R.O.C.)

The subsidy volume accounts for a small portion of the total consumption of Chinese Taipei, as indicated in the table below. The government-granted sea freight charge subsidy for shipping oil products to the offshore islands accounts for a very small percentage of the total oil demand in Chinese Taipei, about 0.96 percent to 1.28 percent, so the overall oil market in Chinese Taipei will not be affected.

Table 8: Oil Product Sea Freight Charge Subsidy Volume

Year	2010	2011	2012	2013	2014	2015
Transport Fuel Subsidy Volume (ten thousand kiloliters)	18.77	21.43	24.01	25.24	25.16	25.21
Subsidy Ratio (Transport fuel subsidy volume / Total oil volume in Chinese Taipei)	0.96%	1.23%	1.27%	1.26%	1.28%	1.27%

(Data source: Bureau of Energy, Ministry of Economic Affairs, R.O.C.)

REFORM SOLUTION/EXPERIENCE

1. Government of Chinese Taipei Self-evaluation

The sea freight charge subsidy for shipping oil products to the offshore islands is intended to protect the basic oil consumption rights of local residents. Additionally, such a subsidy does not distort the energy market, will not result in energy waste, and is efficient. The subsidy is granted for the following reasons:

(1) According to the government's assessment, this does not cause wasteful consumption that leads to increased greenhouse gas emissions: The government provides subsidies for the additional sea freight charge in order to keep the oil price in the offshore islands close to the oil price in the main island without increasing offshore island residents' oil consumption or incentivizing wastefulness.
(2) Will not affect the overall oil market in Chinese Taipei: The government-granted sea freight charge subsidy for shipping oil products to the offshore islands accounts for a very small percentage of the total oil demand in Chinese Taipei, at about 0.96 percent to 1.28 percent, so it will not affect the overall oil market of Chinese Taipei.
(3) People benefitting from the same oil consumption conditions: The government strives to close the retail price gap between the offshore islands and the main island by granting the sea freight charge subsidy. The subsidy also helps stabilize the local oil supply and helps local residents receive basic energy services.

2. Reform Objectives, Policies, and Measures, etc. Carried out/Being Considered

Currently no reform is contemplated. This is subject to change based on the findings of the peer review.

3. Chinese Taipei Vision/End goal for Subsidy

Chinese Taipei intends to continue supporting the welfare of residents of offshore islands through programs that curtail fuel and electricity costs, maintaining them at levels consistent with those on the main island of Chinese Taipei. Part of this agenda includes a transition to low-carbon energy for cost and sustainability reasons. There is no current effort to reform or remove the petroleum product shipping subsidy.

INSIGHTS FROM THE PEER REVIEW PROCESS

The following sections summarize the insights gained from the APRP meetings conducted in Taipei in late September 2016.

OBSERVATIONS

Goals and Objectives

1. **The goals of the Offshore Island Sea Freight Subsidy are (a) to ensure a steady and reliable supply of transport fuels to the islands, and (b) to maintain fuel prices at levels consistent with the main island. This subsidy is achieved by covering shipping costs of transport fuels.**
2. **It is unknown whether outlying island residents would prefer budgetary funds spent on this subsidy be spent on other social needs.** It is unknown whether local residents are aware of the subsidy and support it, or whether local government officials have been consulted regarding their preferences.

Effectiveness of the Subsidy

3. **The Offshore Islands Sea Freight Subsidy for petroleum products effectively lowers the price of transport fuels for all residents of offshore islands.** Since 2011, the subsidy has constituted roughly NT$100M per year over 2002-2015 (roughly US$3.3M), equivalent to 1.5 percent to 2.0 percent of total fuel costs. The peer review panel did not ascertain whether the subsidy applies to other uses of transport fuels (e.g., diesel power generation).
4. **Retail prices for transport fuels on offshore islands have been observed to be 4-5 percent below average retail prices on the main island from 2010-15.** Officials explain that most of this difference is due to the VAT exemption of 5 percent off of retail purchases, and claim that the deviation from 5 percent VAT reflects other higher costs for CPC on offshore islands vis-à-vis the main island. (The peer review panel considers the VAT exemption a subsidy, but not one specific to fossil fuels and one that was not explicitly reviewed under this process.)
5. **The subsidy appears to address only one aspect of the high cost of transport fuel provision on outlying islands.** CPC, a governmental fuel company and the sole provider of transport fuels to outlying islands, indicated that the provision of transport fuels to certain outlying islands is not a profitable operation. These extra costs are not known. CPC expressed concern that a reform of current arrangements may threaten the reliable provision of transport fuels to the islands.
6. **Implicit cross-subsidies, aside from the subsidy in question, may contribute to the reliable supply of fuel and stable, low fuel prices on outlying islands**. Because CPC is responsible for all aspects of fuel provision to outlying islands, including operational and capital costs of maintenance and infrastructure, it is possible that the subsidy or other resources are implicitly cross-subsidizing fuel prices on outlying islands. Under implicit pressure to maintain service, CPC

appears to cover all outlying island costs with its own balance sheet resources rather than transferring them to local consumers through higher retail prices.

Structure and Operation of the Subsidy

7. **Only actual shipping costs are reimbursed post factum to petroleum companies.** Actual shipping costs are reimbursed to petroleum companies on receipt. Shipping services are provided by one company selected for two-year periods via tender. The current vendor has been providing these services uninterrupted since before 2002.

8. **The structure of the subsidy and its administration may reduce incentives for market efficiency, undermining the purpose of the subsidy.** It is possible that because their shipping expenditures are reimbursed, oil companies may have a weak incentive to select efficient and low-cost shipping companies. Furthermore, the potentially uncompetitive process through which shipping contracts are awarded may undermine market efficiency. Whether these potential inefficiencies are in fact negatively impacting efficiency and fuel prices would require further study.

Subsidy Efficiency and Targeting

9. **Offshore islands are well targeted by this subsidy and represent a small share of petroleum product use in Chinese Taipei, equivalent to roughly 1.25 percent.** This share has been consistent in recent years. There is no known evidence of leakage, i.e. re-export of the fuel to the mainland, the presence of which would otherwise suggest possible large-scale market distortions or waste.

10. **The subsidy primarily benefits island residents who purchase transport fuels (i.e., vehicle owners), and is likely to be regressive.** The peer review panel did not receive data on the socioeconomic breakdown of beneficiaries of the transport fuel subsidy (i.e., transport fuel consumers). This issue would benefit from further study. It is probable that the benefits this subsidy are not evenly distributed among island residents, and that wealthier residents who purchase more fuels disproportionally benefit. Less wealthy residents may benefit indirectly through lower costs of consumer goods and of public and other transit on outlying islands. Non-resident visitors to the islands also benefit from the subsidy, which may be an unintended and inefficient consequence of the subsidy.

11. **The subsidy may not be equally effective at keeping fuel prices low on all offshore islands.** The peer review panel did not ascertain whether prices are similar on all offshore islands. However, because transportation is only one factor in higher costs of fuel provision to outlying islands, together with labor, high cost of maintenance of infrastructure, and low efficiencies of scale, it is possible that some outlying island consumers are more exposed to high fuel prices than others.

Source of Funding

12. **The subsidy is paid for by the governmental Petroleum Fund, an earmarked fund created by the government and assessed on imports and production of petroleum products.** As such, the fund is paid for with public monies but from an earmarked fund with duties and excise taxes assessed on the import and production of petroleum products. The Petroleum Fund also pays for oil & gas exploration and clean energy programs, indicating that there are opportunity costs (i.e. alternative uses) of Petroleum Fund resources.

13. **It is unclear whether offshore island VAT exemption impacts local government tax revenues.** Further study is required to determine direct local tax receipts or federal allocations directly or indirectly related to transport fuel sales on the island.

KEY FINDINGS

Effectiveness of the Subsidy

1. **The Offshore Islands Sea Freight Subsidy is a fossil fuel subsidy.** By reimbursing transport costs to shippers, the subsidy lowers the price of fuel for offshore island residents below the landed market price.
2. **There appears to be reliable transport fuel supply on the islands, and the prices are below that of the main island.** Therefore the policy goals of the subsidy are being met (regardless of the impact of the subsidy). The peer review panel takes as given the statements of the BOE and CPC regarding fuel reliability and prices on the offshore islands.
3. **Other policies likely have a greater impact of fuel price stability and fuel access reliability.** It is uncertain if the degree to which this subsidy ensures current fuel availability and price stability. Other policies, however, appear to influence the subsidy's goals more. These include the VAT exemption for offshore islands and the legislative obligation of CPC to ensure fuel supply and low prices for offshore islands, leading it to incur uncompensated costs.
4. **The subsidy as designed appears to have inefficiencies, and the peer review panel believes that the goal of the subsidy could be reformulated to deliver benefits more efficiently to offshore island residents.** This conclusion derives both from the design features of the subsidy as well as the lack of local stakeholder input into the selection of benefits provided by the subsidy.
5. **It is unknown the degree to which this subsidy is effective in meeting the broader needs of local residents.** Further study and outreach to local residents and political representatives might reveal higher priorities than subsidies for fuel prices and reliable delivery that might otherwise be addressed with the resources spent on the subsidy.

Structure and Operation of the Subsidy

6. **There are strong controls in place to prevent outright fraud and waste.** The tendering of contracts to shipping companies and the payment of shipping expenses after the fact upon receipt provides certain assurances against corrupt and wasteful practices.
7. **Because their shipping expenditures are reimbursed, oil companies have no incentive to select efficient and low-cost shipping companies.** There may be potential to reduce these costs and, thereby, the subsidy payments. There is a lack of competitive tendering and performance requirements or targets for vendors to reduce costs and increase efficiency. Excessive costs are paid exclusively by the government through the Petroleum Fund, raising questions whether the operation of the subsidy elicits maximum efficiency of fuel shipping.
8. **The efficiency of the subsidy's structure is difficult to evaluate without further study.** Areas for future study include a detailed survey of CPC's costs and local fuel prices on outlying islands, and an assessment of the potential for greater efficiency and competition in procurement of shipping services.

Subsidy Efficiency and Targeting

9. **There are inefficiencies and market distortions resulting from this subsidy.** By lowering the price to final consumers, the policy leads to wasteful consumption. The magnitude of the wasteful consumption is unknown as it has not been studied.
10. **The magnitude of the inefficiencies and distortions is relatively low.** The peer review panel reached this conclusion because (a) the percentage share of the subsidy relative to the total

fuel cost is small, (b) the subsidy is narrowly and effectively targeted to a small share of the population, and (c) there is no observed leakage.

11. **In the near term and at the margin, residents and businesses consume more and have less incentive to conserve fuel than they would if they paid the full market price.**

12. **In the medium to long term, residents and businesses have reduced incentives to invest in energy efficiency, renewable energy, energy storage, and electric vehicles**.

13. **Inefficient consumption is paid for by taxpayers and fuel users who directly or indirectly contribute to the Petroleum Fund or who benefit from its expenditures.** In a direct sense, the inefficiencies are paid for by the entities contributing to the Petroleum Fund, and consumers to whom such costs are passed on through higher prices. The inefficiencies are also arguably paid for by the beneficiaries of the Petroleum Fund through forgone spending on other programs.

14. **Further, there are questions whether the distribution of subsidy benefits among island residents is consistent with the government policy on socioeconomic equity and social spending.** Further study is required to determine whether richer, commercial entities, and/or high fuel- consuming residents disproportionately and unduly benefit.

VPRT RECOMMENDATIONS

1. **To reduce market distortions, reduce subsidy expenditures, and promote reduced petroleum fuel consumption on offshore islands, Chinese Taipei could consider phasing out the sea freight subsidy in favor of targeted investments to reduce demand for fossil fuels on offshore islands.**

2. **These investments could include, among other potential priorities, renewable energy, energy efficiency, electric vehicles, energy storage, public transit, and connection of offshore islands to the main island.** The Government of Chinese Taipei already provides support for low carbon development in the offshore islands, which could be enhanced to reduce fossil demand.

3. **The subsidy could also be converted to cash transfers to local government budgets for provision of other social benefits aligned with higher-priority social objectives at the discretion of local authorities.** It is currently unknown whether this subsidy is the optimal use of public resources to meet local needs that can be addressed by government, such as health care and education, public works, jobs, and energy and transportation infrastructure. Offshore islands can then determine optimal policies to benefit them, including measures to target low-income and vulnerable populations who are likely most vulnerable to fuel price increases.

4. **An assessment of the design and cost efficiency of the subsidy is recommended to determine optimal arrangements.** By considering the efficiency of the current subsidy administration of the subsidy, policymakers could either reform the subsidy or replace it with a more efficient and targeted alternative. Possible measures to consider include: (a) establishing a benchmark for offshore and mainland fuel price comparison; (b) measures to evaluate value for money of current arrangements; (c) potential measures to drive down shipping costs, such as competitive tenders, cost audits, and/or contracted performance targets, incentive or penalties to vendors to incentivize lowering shipping costs.

5. **Complementary measures to ensure the reliability of fuel provision to the outlying islands should be considered**. Based upon CPC concerns about unaddressed costs under the current subsidy regime, measures are likely to be desirable regardless of whether the subsidy is

reformed. These measures to fulfill the existing legislative mandate for fuel reliability might include state expenditures for and/or management of transport fuel-related infrastructure and labor on offshore islands. One approach would be financial transfers to CPC to cover appropriate fuel retail costs on offshore islands where operational losses are incurred; another could transfer such infrastructure and labor to a government entity with explicit government funding. Such measures might also more equitably stabilize operational costs and reliability risks that currently vary greatly across different offshore islands.

CASE STUDIES AND LESSONS LEARNED

Introduction and Overall Policy Lessons from Energy Subsidies to Remote Areas

There are numerous instances documented in world literature of government policies that target subsidies at geographic areas inhabited by disadvantaged groups. Often those areas are remote, leading to limitations on energy access and high costs of the energy that is available. Energy – particularly electricity and transportation fuels – is a popular tool for social policy because it is a widely consumed and highly visible commodity whose price is known to most consumers. Consequently, the equalization of energy prices for the residents of remote areas with those in more central regions signals fairness, and concerted efforts by governments to care for the remote residents. In this section, case studies of subsidies in the Philippines, Peru, and Japan to address the social needs of remote populations are profiled.

As the analysis above and the following case studies document, however, subsidies that artificially lower energy costs for all residents of remote areas are often beset by inefficiencies and market distortions. First, those subsidies invariably must be paid for, and are often borne disproportionately by other consumers in central areas when the subsidized services are provided by national companies or state-owned enterprises that absorb excess costs by raising prices for other consumers. Those other consumers may themselves be low- or middle-income, and suffer adverse economic impacts. Such impacts in the form of higher energy prices for most households have been observed in the case of the Missionary Electrification electricity surcharge in the Philippines, which serves to provide subsidized electricity for remote areas.

Second, lowering energy prices encourages wasteful consumption, further increasing the financial, social, and environmental cost of the subsidy. When the price signal is weakened by subsidies, consumers will consume more. At a household level it may be desirable for lower-income residents to have the means to consume more. But when all residents increase consumption due to low prices, those low prices make it more difficult to promote efficiency and conservation, the strategies that areas where fossil fuels are naturally expensive should take to save money and make their economies more competitive. Consuming more fuel also artificially inflates the cost of the subsidy to taxpayers and other consumers. The relative absence of renewable energy and energy efficiency technologies as well as the forced curtailment of electricity access in areas with highly subsidized electricity in the Philippines illustrates these phenomena.

Third, as with many energy subsidies, lowering of prices for all is regressive within the target community. While it may be true that most residents of outlying islands are low- or middle-income, it is the relatively rich on the islands who, in all likelihood, drive and use transport fuels the most. Or, it is larger, wealthier businesses with large vehicle fleets (delivery vehicles, bus companies, etc.) that use the most fuel. Consequently, corporations may benefit more than households. These specific phenomena were not carefully studied in the cases of the Philippines and Peru regional subsidies, though it was widely acknowledged that the subsidies did not target the poor, rather they reduced fuel costs for all, without volumetric caps on fuel eligible for the subsidy. Consequently, those who purchase and consume more,

benefit more. Chinese Taipei's approach to capping the subsidies for agricultural fuel use reflects a keen appreciation of the value of preventing wasteful consumption, unfair practices, and fraud.

Fourth, the cost-reimbursement structure of the subsidy lends itself to low levels of competition and innovation. Because the government does not cap the amount it reimburses CPC for fuel transshipment to outlying islands, there is no incentive for CPC or its shipping vendors to reduce their costs through innovation and effective management. Consequently, there is no policy incentive for them to adopt cleaner technologies or to save resources. This phenomenon is also observed in the case of the Philippines Missionary Electrification subsidy, where diesel fuel costs for power generation are fully reimbursed, leading to exorbitant bills paid by the government and a failure to foster cheaper, cleaner alternative energy production in the remote island areas that most need it.

Fifth, targeted reimbursements of certain input costs, such as fuel transshipment fees, may lead to suboptimal outcomes. These can include: (1) not lowering fuel costs for target beneficiaries (if other costs overwhelm the effect of the shipment subsidy); (2) not serving as the primary mechanism for achieving lower costs (i.e., reliance on VAT exemption instead); and (3) not benefiting all outlying islands (or other remote areas) equally. The Japan offshore islands gasoline subsidy illustrates these possible outcomes.

Lastly, such subsidies may not actually address the most pressing social and economic needs of the target beneficiary populations, or address those needs very effectively, and may even yield perverse outcomes. In remote areas, economic stagnation and poverty are often widespread, and minor adjustments in fuel prices are seldom sufficient to substantially improve the local economic condition. In the case of the Peruvian Amazon VAT exemption for fuel, poverty was not alleviated in any substantial measure, while fuel smuggling spiked and likely contributed to accelerated deforestation and illegal mining. These disappointing results led to the recommendation to phase out the subsidy, and replace it with more targeted benefits for needy households, as well as economic growth and social support programs to target the remote areas' deeper problems.

The VPRT is aware of an offshore islands subsidy for gasoline in Japan that appears quite similar to Chinese Taipei's. It is included in a brief case study below. However, little information on this subsidy was available in English or in published literature. The VPRT encourages the Government of Chinese Taipei to conduct further research into this program if it is of interest.

Case Study #1: Japan off-shore gasoline subsidy

Relevance: Japan has an offshore island sea freight shipping subsidy for fuel that is similar to Chinese Taipei's.

Brief summary: Japan has a subsidy in place to cover freight shipping costs for gasoline transported to offshore islands, with the purpose of lowering transport fuel costs for residents of those islands. In 2014, Japan's Board of Audits conducted a review of the islands gasoline transportation subsidies and published a report. According to the report, the Board of Audits collected data and found the fact that gasoline prices with the subsidy in 48 islands out of 157 islands were below the price in mainland (Board of Audit of Japan, 2014).

The subsidy was determined by tanker transportation fee, oil terminal cost, and land transportation cost to gasoline service station. But if a tank truck is loaded on a ferry to deliver the gasoline, a fixed price was used. Here, a significant range in transportation costs was observed (e.g. ferry shipping: the cost range was from US$26 to US$597) and those gaps were not considered in the subsidy calculation. The result was likely either variable gasoline costs on the islands, and/or variable uncompensated costs absorbed by the supplying fuel companies. The report said that although Ministry of Economy, Trade and Industry (METI) surveyed the differences of shipping time from mainland to islands, they did not survey

the differences of transportation modes and costs. Moreover, even though METI knew some of the issues, they did not review the subsidy until the Board of Audits raised the issue.

Lessons learned: Off-shore gasoline subsidies in Japan have resulted in gasoline prices below those observed on the main islands, as in Chinese Taipei. The method used for establishing the subsidies also results in uneven benefits and variable pump retail prices on different islands, based upon price input factors aside from transportation (such as off-shore market size and cost of off-shore island infrastructure). If Chinese Taipei were to collect data and review the full range of costs related to fuel provision on offshore islands, the government might find some islands enjoy the benefits from the subsidies more than other islands and the mainland. Chinese Taipei might also discover that some costs are unmet, leading to other implicit subsidies paid for by fuel companies and their other consumers, or that the transport subsidy alone fails to lower prices to mainland levels.

Case Study #2: Peru Amazonia VAT and Other Tax Exemption for Liquid Petroleum Gas (LPG)

Relevance: Peru implemented a fuel subsidy targeted to a remote geographic region with high fuel prices and low levels of economic development. The subsidy objectives and design are similar to those of Chinese Taipei's fuel shipment subsidy.

Case Study Summary (APEC FFSR, Peru, 2014)

HISTORY AND CONTEXT

To promote sustainable development of, and investment in, the Amazon Region, the Government of Peru in 1998 provided a tax exemption from the Selective Sales Tax Law (VAT) and the ISC (Selective Consumption Tax) for fossil fuels sold within the region. The preferential tax treatment of fossil fuels was part of a much larger tax package that included 14 tax provisions favorable to businesses and consumers in the region. The ISC applies only to fossil fuels, whereas the VAT exemption applies to other activities and taxes besides fossil fuels.

First passed in 1998, Law 27037 (Promotion of Investment in Amazonia) waived the VAT and the excise tax on fuels for several areas, including the Departments (administrative districts) of Loreto, Ucayali, Madre de Dios, Amazonas, and San Martin regions. Gas and oil derivatives sold in Loreto, Ucayali and Madre de Dios were totally exempt from the ISC and VAT. For Madre de Dios, the ISC paid for fuel purchases outside the Department (e.g., from Cusco) were to be returned to the Department.

KEY FINDINGS OF THE APEC VOLUNTARY PEER REVIEW ON PREFERENTIAL VAT

The APEC Peer Review found that VAT exemption for the Amazon regions is ineffective. The exemption is not meeting the stated goals of promoting development in the region. The exemption has led to wasteful and inefficient consumption of fossil fuels. A black market exists for fuels in the regions bordering the Amazon regions, which have the VAT exemption. The suspicion that the subsidy benefits illegal mining, logging, and drug trafficking further adds to the problems. The exemption tends to benefit the higher income population, resulting in perverse incentives in the Amazon region. The exemption has mostly benefited traders and those who consume higher quantities of fuel. It has also resulted in unintended consequences and perverse incentives. At the same time, there are regions of Peru that lag behind the Amazon region and do not receive these exemptions. The VAT exemption results in high fiscal costs to the Government of Peru. The VAT exemption has cost or will cost the Government of Peru from US$0.78 billion to US $1.24 billion a year. The cost of hydrocarbon-related exemptions is between 8 percent and 14 percent of those total costs.

END GOAL/VISION

While the Peer Review Team recognized the need of continued support to "vulnerable" groups, the current blanket tax exemption for fuels in the Amazon region should be eliminated. Further, the exemptions should be replaced with targeted social and regional developmental programs for schools, hospitals, transportation, and other infrastructure. The removal of this fossil fuel subsidy is consistent with the energy, economic, and fiscal policies of the Government of Peru. The substitution of targeted social and developmental programs would provide a more effective means of meeting the social policy and development unique to the Amazon region. The VPRT also recommended outreach and communications with the target beneficiaries to learn their priorities and needs, and gain their support for reform.

Lessons learned: The VAT exemption for the Amazon regions is ineffective. The exemption is not promoting development in the target underdeveloped region; it has led to wasteful and inefficient consumption of fossil fuels; and the exemption tends to benefit traders and those who consume higher quantities of fuel. It has also resulted in unintended consequences and perverse incentives, such as ecological destruction and smuggling. The APEC peer review panel recommended replacing the VAT exemption with a stronger social safety net and targeted public investments to benefit the local population. This review has lessons for other geographically-specific fossil fuel subsidies, such as Chinese Taipei's fuel subsidies for outlying islands, which on their own are often less effective than cash transfers, provision of social benefits, and public investment to create jobs. These lessons are likely particularly true in advanced economies.

Case Study #3: Philippines Missionary Electrification Subsidy Program for Remote Islands

Relevance: A geographically targeted energy subsidy designed to promote economic welfare of remote area dwellers, but without income targeting, caps, or cost-containment mechanisms.

Case Study Summary (APEC Peer Review, Philippines, 2016**)**

The Universal Charge for Missionary Electrification (UC-ME) is a cross-subsidy designed to provide affordable electricity access in areas across the Philippines without central grid connection. The UC-ME appears to have been successful in achieving its primary purpose of supplying some 280MW of power to the remote areas served by the program (known as SPUG, or Small Power Utilities Group, the government unit that services those areas), a number that is rising with new commissions to private-sector power producers. UC-ME, in relying on ratepayer surcharges rather than government appropriations to support rural electrification, has reduced the financial burden on the government and contributed to the government's improved fiscal position. Regulated tariffs in SPUG areas do not distinguish between consumer classes. Since UC-ME subsidizes all consumers in SPUG areas regardless of their electricity consumption, there is no differentiation of customers on the basis of income or consumption. Therefore, SPUG electricity tariffs can provide the subsidy to rich households, including those with second houses in the region, as well as to wealthy businesses such that the benefits of this subsidy are being captured more by those who can afford non-subsidized prices. UC-ME, as currently structured, effectively encourages inefficient fossil fuel consumption. The collected UC-ME is allocated only to fill the gap between the cost of electricity generation and the regulated electricity tariffs for consumers in SPUG areas (which is below the prevailing tariff in the grid-connected parts of the economy).

There is little incentive to power generators in the area to modernize facilities, as their costs are recovered through the UC-ME scheme and electricity tariff is regulated. This leads to inefficient and wasteful use of fossil fuels, and perpetuates inefficient and high-cost production. Although the SPUG-area power production only amounts to less than one percent of total fossil fuel consumption for power

generation nationwide, the fuel volumes are substantial at the local and regional scale. Therefore, absent additional measures to promote diversification of power generation away from diesel and fuel oil, the subsidy effectively encourages wasteful consumption of fossil fuels. Current regulatory policy on SPUG power procurement also favors incumbent diesel infrastructure.

Ratepayer surcharges, including the UC-ME, have been said to undermine the industrial competitiveness of the Philippines relative to other neighboring economies by pushing up electricity costs in the grid-connected areas. Electricity costs in the Philippines are among the highest in the region, next only to Japan. UC and other taxes constitute more than 10 percent of the average electricity tariff, and UC charges have been increasing over time (UC outlays have increased almost tenfold from 2009 to 2014). Therefore, the entire UC program, including the UC-ME, has been a source of concern for energy-intensive industries, as they consider high electricity prices as one of the barriers to investment in the economy.

APEC PEER REVIEW TEAM RECOMMENDATIONS

The peer review team recommended (1) Further detailed cost-benefit analysis is recommended to evaluate the impacts of the UC-ME as cross-subsidy; (2) Structure the regulated tariffs closer to the deregulated price; and (3) Expand the mandate of the National Power Corporation (which manages SPUG) to allow for capital investment in power plant construction and refurbishment to promote efficient power plants in SPUG areas.

Lessons Learned: Geographically targeted energy subsidies can quickly become costly and inefficient, imposing a high fiscal burden on the payers of the subsidy. If not properly structured to promote the adoption of new technologies, cap wasteful consumption, and contain costs, perverse outcomes are widespread. Other mechanisms may be more effective at promoting the economic welfare of remote area dwellers. It is likely that these same inefficiencies and disbenefits exist in providing energy subsidies to dwellers of Chinese Taipei's offshore islands, albeit at a lesser scale.

6. SUBSIDY #2: PREFERENTIAL ELECTRICITY PRICING FOR STREET LIGHTS

SUMMARY*: Since 1947, Chinese Taipei law has ensured that government entities owning and operating streetlights benefit from preferential electricity rates. In recent years, Taiwan Power, the monopoly transmission and distribution utility, has secured legal sanction to recoup these subsidies from other ratepayers through higher electricity rates. Because of the large share of fossil fuels in Chinese Taipei's electricity generation mix, preferential electricity prices are tantamount to a fossil fuel subsidy.*

CURRENT STATUS

Currently in effect.

POLICY BACKGROUND

1. Policy-Making's Timing and Background

The preferential streetlight electricity price was implemented by Taiwan Power Company in accordance with Article 66 of the Electricity Act of 1947. Power supply was considered one of the most important aspects in economy's economic infrastructure at the time.

2. Policy-Making Objectives and Consideration

Back then, the preferential streetlight electricity price was stipulated because the power company was supposed to fulfill its maximum obligations to local people due to its existing privilege of using public lands and deployment of power lines in its business regions.

3. Other Related Supporting Policies

It is stipulated in Article 79 of the Electricity Act that the discounted electricity price given by the electric power industry in accordance with the Electricity Act will not jeopardize the profit margin of the electric power industry, which can protect itself from deficit resulting from the discounted rate and allow for sustainable management.

CONTEXT AND HISTORY

1. History of revision

The preferential streetlight electricity price was implemented by Taiwan Power Company in accordance with Article 66 of the Electricity Act, 1947. With reference to electricity acts of Europe, the U.S., and Japan, the Electricity Act was revised and submitted by the Ministry of Economic Affairs to the Executive Yuan to complete the legislation procedures in Legislative Yuan.

2. Current regulation

It is stipulated in Article 66 of the Electricity Act that "power companies providing electricity to public street lights shall set a price lower than the regular price. In principle, however, the said price shall not be less than half of the regular lighting price." This discount is collected at a price lower than the regular

price when the power company collects fees. In other words, no additional financial source needs to be raised.

SUBSIDY EFFECT

1. Economic Aspect

In the figure below, the statistics for the last 10 years of subsidies reveal that on average every kWh is subsidized with about NT$1.29/kWh , and the annual subsidy is about NT$3.23 billion. The streetlight management agency thus saves NT$3.23 billion each year below the level of expenditure absent the subsidy. The expenditures saved are used by the government agency managing the streetlights at its discretion.

Figure 12: Streetlight Electricity Bill Reduction in the Last 10 Years

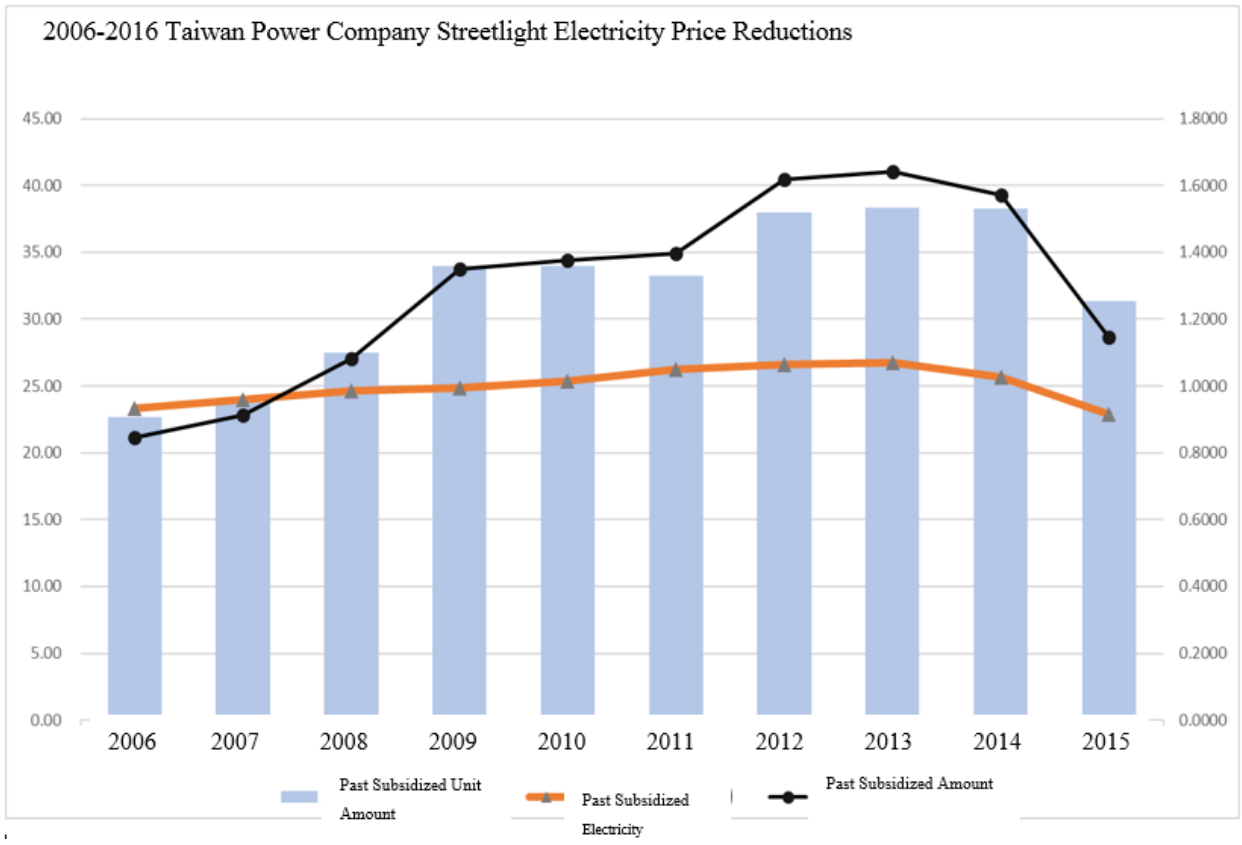


Table 9: Annual Subsidized Streetlight Unit Price, Power, and Amount

Item	2006	2007	2008	2009	2010
Past Subsidized Unit Amount (NT$/kWh)	0.9062	0.9504	1.0991	1.3590	1.3579
Past Subsidized Electricity (100GWh)	23.34	23.98	24.61	24.82	25.34
Past Subsidy Amount (NT$100 million)	21.15	22.79	27.05	33.73	34.41
Items	**2011**	**2012**	**2013**	**2014**	**2015**
Past Subsidized Unit Amount (NT$/kWh)	1.3298	1.5180	1.5331	1.5318	1.2531
Past Subsidized Electricity (100GWh)	26.23	26.64	26.75	25.65	22.88
Past Subsidy Amount (NT$100 million)	34.88	40.44	41.01	39.29	28.67

2. Social Aspect

Streetlights are managed mostly by local governments. The subsidy for streetlights can reduce the local government expenditures in electricity bills so that funds can be reallocated to other areas, such as subsidies for social welfare.

3. Industrial Aspect

Benefits of public street lighting to the commercial and industrial sectors are indirect and have not been quantified.

REFORM SOLUTION/EXPERIENCE

1. Government of Chinese Taipei Self-evaluation

a. The preferential streetlight electricity price has subsidized more than NT$32 billion over the last 10 years. In other words, government agencies operating streetlights have had additional budgetary funds of NT$32 billion to use freely. From the perspective that power companies shall fulfill maximum obligations to local residents, this subsidy has in fact become effective. The streetlight management agency has proposed whether or not to maintain the subsidy during the past discussions.

b. Subsidies for streetlight electricity price have the following characteristics which should not result in end-user energy waste:

- Conform to principles of fairness and equality: In Article 66 of the Electricity Act, power companies were supposed to fulfill maximum obligations to local people due to the existing privilege of using public lands and deploying power lines.
- Improve public safety without creating unfair competition:
    - Improving public safety: Streetlights are mainly used for lighting public facilities such as roads, which reduces the likelihood of accident.
    - Without creating unfair competition: The existing preferential electricity price for streetlights is for the entire economy, not for specific targets and it does not result in unfair competition.
- Conform to public interests: Streetlights provide lighting for public facilities such as roads, and this reduces the likelihood of accident and improves public safety.

- Cause no inefficient use of fossil fuel: Streetlights have fixed operating times and do not prolong the time of use, which would otherwise lead to inefficiency. The Government of Chinese Taipei thus concludes that this subsidy does not result in wasteful use of fossil fuel.

2. Reformation guidelines, policies, and measures already implemented or considered

The Executive Yuan held a meeting on "Taiwan Power Company, CPC and Taiwan Water Corporation's Policy-based Liabilities and Related Matters" on January 31, 2013. Taiwan Power Company's policy-based liabilities will gradually be restored to the budget preparation of each involved competent authority.

CHINESE TAIPEI VISION/END GOAL FOR SUBSIDY

Chinese Taipei has established and maintained the preferential electricity tariff for street lighting to promote the social and safety benefits of street lighting and to provide fiscal assistance to government entities that own and operate street lights. The Electricity Act is currently under review in the legislature, and these conclusions will contribute to the reform efforts.

INSIGHTS FROM PEER REVIEW PROCESS

OBSERVATIONS

Goals and Objectives

1. **The preferential electricity tariff is designed to lower electricity costs for the government entities that are the owners and operators of street lights.** This subsidy dates to 1947 when public budgets were much more difficult to fund. The policy treats street lights and other public illumination-related infrastructure (such as reflectors) as public goods delivering public safety, and deserving of subsidy support.
2. **It is unknown whether government entities benefiting from the electricity subsidy would elect to use the subsidy resources currently provided for this purpose if given the choice.** Government entities might have other more pressing social and fiscal needs. Some government entities may also no longer need the subsidy to pay for electricity bills, particularly after the transition to LEDs.

Effectiveness of the Subsidy

3. **The preferential streetlight electricity price has subsidized more than NT$32 billion (US$1.0 billion) over the last 10 years.** The subsidy rate is roughly NT$1.29/kWh (US$0.04/kWh), and the annual subsidy is about NT$3.23 billion (US$100 million), most of which accrues to the streetlight management agencies (in most cases, local governments).
4. **The preferential electricity tariff lowers the price of electricity for the government entities that are the owners and operators of street lights, and savings from the discounted electricity accrue to government entities.** Because TaiPower bills the government entities directly at the discounted rate, the subsidy is delivered to the desired entities, lowering their electricity bills.

Structure and Operation of the Subsidy, and Current Operating Environment

5. **The preferential electricity tariff lowers the price of electricity for central and local government entities that are the owners and operators of street lights.**
6. **Chinese Taipei has embarked on a major scheme to replace all mercury vapor streetlamps with light-emitting diodes (LEDs) by January 2017.** 56 percent of all

streetlamps across Chinese Taipei are currently LEDs. Mercury vapor lamps represent 40 percent of remaining non-LED streetlamps in Chinese Taipei.

7. **LEDs save roughly 70 percent of energy use (and electricity costs) compared to existing streetlights, meaning that operating costs of street lighting to government entities will further decline in the near future as more streetlights are converted to LEDs**. Once capital expenditures have been amortized (or been paid by other entities), often within 5 years, government entities will enjoy much lower electricity bills than today, reducing the need, and rationale, for electricity subsidies. The conversion to energy-efficient LEDs is a contributor to the reduction in the overall street lighting subsidy (see Figure 12) as overall electricity consumed in street lighting has declined.

8. **Most governments across Chinese Taipei are adopting schemes to effect the transition.** A combination of central government support, local government budgets, and public-private partnerships (PPPs), in particular public finance initiatives (PFIs) financed with private capital, is driving the transition.

Subsidy Efficiency and Targeting

9. **Because the quality of streetlight is mandated, streetlight use does not increase as a result of the preferential pricing policy.** Around the economy, street lights are controlled remotely and operated on a regular schedule. Consequently, street light consumption does not increase as a result of the preferential pricing policy.

Source of Funding

10. **TaiPower, the transmission and distribution grid monopoly, assumes the cost of the pricing discount.** TaiPower is allowed to recover the cost in tariffs charged to other ratepayers. TaiPower assumes the cost of the pricing discount.

11. **Since TaiPower is allowed to recover the subsidy's cost in tariffs charged to other ratepayers, this makes it a cross-subsidy.** The peer review panel heard that the government is considering an amendment to transfer the cost of the cross-subsidy to government budgets, making it a pure subsidy. As of late 2016, this proposal had not yet become law.

KEY FINDINGS

Goals, Objectives, and Effectiveness of the Subsidy

1. **By reducing the price of electricity below market levels for government entities, the preferential electricity tariff constitutes a subsidy.** Because the bulk (90 percent) of Chinese Taipei's grid power mix is generated by fossil fuels, the policy is effectively a fossil fuel subsidy.

Structure and Operation of the Subsidy, and Current Operating Environment

2. **The subsidy is effective at lowering the price of providing street lighting to government entities responsible for providing this public good.** The system of administration appears simple and straightforward: government entities are billed for street lighting at a lower rate by TaiPower. The system appears to impose minimal administrative burden on government entities, and thus is efficient in its operation.

3. **The 'light touch' of the subsidy design likely diminishes government agencies' awareness that they even receive a subsidy, and discourages holistic and proactive management of street lighting.** While reducing budgeting and financial burdens on local authorities, this subsidy imposes social costs that are transferred to TaiPower and its ratepayers. This effect appears to be minimized by the current economy's transition to LED street lights.

Subsidy Efficiency

4. **The VPRT believes this subsidy contains inefficiencies.**

5. **In the short term, the preferential electricity price does not lead to wasteful consumption because quality and quantity of street lighting (i.e., the hours of operation and number of streetlights) are mandated and fixed.** In this manner, short-term consumption behavioral impacts of street lighting subsidies are minimal.

6. **In the middle to long term, the preferential electricity price likely leads to wasteful consumption because it discourages the adoption of more efficient alternatives, such as Light-Emitting Diodes (LEDs).** Because LEDs represent a significant up-front capital expenditure, artificially low electricity tariffs lengthen the payback period and rate of return for LED fixture replacements and other efficiency measures. However, government mandates on LED conversion are likely offsetting this disincentive.

7. **The disincentive for efficiency created by the low electricity tariffs may constrict TaiPower's ability to curtail electricity load growth, potentially leading to inefficient and unnecessary investments in new power plants**. In an atmosphere of rising electricity demand in Chinese Taipei, the subsidy may have engendered missed opportunities to pursue demand reduction and energy efficiency that might postpone or obviate entirely the need to construction expensive and polluting new power plants. Again, the widespread adoption of high-efficiency LEDs may largely remove this concern.

8. **It is likely that the subsidy has held back up-front capital expenditure that would have led to more rapid and extensive adoption of LEDs.** Because low prices make incumbent technologies cheaper, they reduce the attractiveness of cheaper alternatives and slow the adoption of new technology. The nationwide transition to LEDs is now largely addressing this market distortion through mandates.

Targeting and Need for the Subsidy

9. **It is unclear whether the subsidy is needed by government entities to provide for street lighting.** Seventy years after the subsidy's creation, city and other governments responsible for street lighting have substantially more financial resources to draw upon to finance street lighting demands. Further, citizens' expectations for street lighting have significantly risen, suggesting subsidies may no longer drive the provision of this service. In addition, in an advanced society such as Chinese Taipei, the street lighting network is fully built out and mature, suggesting electricity expenditures for street lighting have stabilized.

10. **Other mechanisms than the subsidy may be adequate to ensure adequate street lighting.** Legal frameworks and civic obligations of government agencies to their constituencies might be sufficient to ensure adequate street lighting absent the subsidy.

11. **Anecdotal evidence suggests that not all entities are equally in need of electricity tariff support.** The slow adoption of LEDs in smaller cities and remote areas suggests that these areas have lower financial and administrative resources to manage street lighting. The subsidy is not targeted to smaller or poorer administrative entities that may be more in need of budgetary and administrative support and merit subsidies.

Source of Funding

12. **TaiPower's cost recovery of street lighting subsidies places the fiscal burden on electricity ratepayers rather than on taxpayers and the broader public, who are the beneficiaries of municipal street lighting.** The current cross-subsidy imposed on ratepayers penalizes households and adds costs for businesses. It also appears the financing of

the subsidy internally by TaiPower largely shields it from view of government officials, lawmakers and the broader public. Transferring the cost of the subsidy to the government would make it more transparent and correctly place the burden on taxpayers rather than other ratepayers, as is being current considered by the government.

VPRT RECOMMENDATIONS

Goals, Effectiveness, and Targeting of the Subsidy

1. **The VPRT believes that the subsidy could be made more efficient through greater targeting.** The government could consider reviewing types of targeting, such as small, rural, and low-income municipalities. Some targeting options are discussed below.

2. **The VPRT recommends a review of local and other government authorities' ability to pay the full price of electricity.** If the subsidy is to be maintained, a survey of government entities' ability to pay for electricity and pressing fiscal needs would shed light on whether the subsidy is needed. For those governments that can pay (according to objective criteria), the government could consider removing the street lighting electricity subsidy. The current review of the Electricity Law may prove useful for identifying opportunities for reform.

Structure and Operation of the Subsidy

3. **To promote energy efficiency and budgetary savings by government entities that own and operate street lights, Chinese Taipei should consider reforming and/or removing the preferential electricity tariff subsidy.**

4. **Preferable reform options include: (a) Removing the preferential street lighting electricity rate; (b) Converting the preferential rate to a cash subsidy in the near term; and/or (c) Replacing the subsidy with incentives for energy efficiency measures, including LED installation and technical support for energy service contracting.** The VPRT acknowledges that a comprehensive policy is in place to replace older streetlights with high-efficiency LEDs. This effort, perhaps in tandem with additional efficiency and conservation measures, may largely eliminate the need for the current electricity tariff subsidy.

5. **For subsidy removal, a grace period may be necessary to allow existing streetlight investments commitments to be recovered.** Because current PPP/PFI contracts are predicated on certain tariffs and payback period arrangements, tariff reforms will have to be phased in consistent with the commercial viability of those contracts. A phased transition will also give governments time to adjust their budgets and accelerate the phase-in of energy-saving LEDs.

Source of Funding

6. **If this subsidy is to be maintained or replaced with other electricity subsidies, the subsidies should be converted from ratepayer cross-subsidies to government subsidies, and be paid for through a direct budgetary line item.** This reform would remove market distortions, increase the fairness of the funding source (aligning it with public beneficiaries), and increase the transparency of the subsidy.

CASE STUDIES & LESSONS LEARNED

Introduction to Lessons Learned and Case Studies

This section reviews public policy best practices, provided by the World Bank and the World Resources Institute (WRI), on electricity subsidy structure, and in two case studies also profiles the experiences of Birmingham, England and Belo Horizonte, Brazil with public-private partnerships (PPPs) using the private finance initiative (PFI) model. This section first explores some of the challenges and pitfalls of embedding subsidies in the operations and payment of state-owned enterprises and/or national utilities where they are not easily measured and tracked. It then explores global experience, highlighted by the World Bank's

Energy Sector Management Assistance Program (ESMAP), of PPP/PFIs, mining them for approaches that might be useful for Chinese Taipei. Of particular relevance are the details of the tendering and contract design process in Birmingham, and the expansion of programs in large cities to smaller regional ones, which may be relevant for the completion of Chinese Taipei's LED transition in remote and less densely populated areas.

Lessons learned include the following:

1) Cross-subsidies for public goods provided by government monopolies, such as electricity and public transit, often create market distortions, and are paid for disproportionately by businesses and households rather than all taxpayers as a whole. Because all taxpayers benefit and governments raise tax revenue through social policies designed to be fair, the World Bank usually recommends such cross subsidies be removed.

2) The World Bank also encourages that subsidies provided by government monopolies be converted to explicit budgetary financing that is paid for out of the budgets of the government agencies whose interests are served. Otherwise, the amount of the subsidy and the source of funding are often unclear, and passed to consumers, state-owned enterprise shareholders, or taxpayers in other opaque and inefficient ways.

3) Many subnational and city governments – including in New Taipei City in Chinese Taipei – have successfully adopted the PPP/PFI (public-private partnership/private finance initiative) model to adopt LED street lights, thereby rapidly adopting new technologies that provide better lighting at less cost. LED transitions also can substantially contribute to environmental objectives such as greenhouse gas emissions reductions. The benefits of the PPP/PFI approach are manifold. These include: (1) relying on the private sector for up-front capital expenditures, obviating the need to raise scarce public funds; (2) transferring operations and maintenance (O&M) to highly specialized and qualified private companies; (3) transferring technology choice and performance risk to private entities; and (4) rolling capital upgrades and O&M together so that longer-term savings and performance are considered in the choice of technology, favoring a longer-term view over lower-quality, short-term economy.

Resources on Design of Electricity Tariffs and Subsidies

Policy Best Practices Resource #1: FINANCING TARGETED SUBSIDIES

Relevance: A World Bank report on transportation encourages implicit subsidies, often structured as cross-subsidies (in this case, provided to public transit riders, be made explicit, and to be allocated in government budgets to the entity/sector/ministry/jurisdiction that benefits, rather than force a monopoly supplier to take a loss (IBRD/World Bank, 2002). This argues in support of Chinese Taipei's current reform allowing TaiPower to recoup the forgone street lighting electricity subsidy revenue directly from the government.

Subsidy Design for Public Transit

Many countries have extensive lists of categories of passengers qualifying for free or reduced-fare travel. Rarely is there any specific mechanism for remunerating suppliers for these fare exemptions or reductions. This has two effects. First, it means that some passengers are paying more, or receiving poorer service, than would otherwise be the case in attempts to secure cross-subsidy. Because the rich often do not use public transport, this means, at best, subsidy of the poor by the poor.

Second, it creates a vested interest of benefiting non-transport agencies (health, education, police, and so on) in maintaining a subsidy for their particular user group that they might not favor if it had to be financed from their own budgets. The lesson is that, in the interests of poor people, any public transport fare reductions or exemptions should be carefully considered in the light of other uses that might be made of the resources involved. That consideration is probably best ensured by putting the responsibility for finance of fare exemptions or reductions directly on the benefiting line agencies, with the obligations on the transport operators contingent on the receipt of the appropriate compensation.

Even where a fiscal basis for corrective action to reduce poverty exists, the question arises as to whether intervention in the transport sector is the most appropriate use of such funds. The answer to that question turns partly on the relative efficiency with which funding can be targeted in different sectors, and partly on the political feasibility of taking poverty-reducing actions in various sectors.

Lessons Learned: While government agencies may wish to protect their subsidies as they would a type of budgetary funding, those subsidies often are not the most effective mechanism at solving the underlying social problem motivating their creation. Moreover, subsidies determined at the level of the consumer and not the financing agency often do not reckon with their true costs. Agencies that benefit from subsidies should receive the funding directly from the government to address recognized public service needs, rather than mask the cost of the public services they provide through below-cost procurement that is paid for in a diffused manner.

Policy Best Practices Resource #2: Electricity Tariff Structuring

Relevance: This WRI guide on establishing electricity tariffs, offers key principles such as promoting efficiency and reducing waste, promoting cost recovery, understanding fairness of tariff rate structure, consideration of present and future private and social benefits of electricity provision (Wood, et al., 2014). Chinese Taipei may find these principles instructive in determining whether current electricity tariff rates for various consumers – including the street lighting subsidy - are fair and efficient.

WHAT ARE THE SUBSIDIES IN THE TARIFF?

The electricity sector is capital intensive and natural resource intensive. Several countries use preferential pricing (e.g., selective access to lower-cost resources) or overt subsidies to assist low-income groups to access electricity. Subsidies are sometimes offered to electricity generators to encourage them to deploy new technologies, and to energy-related sectors such as coal mining, water supply, and fuel transportation. Subsidies may also be offered to industries to encourage investment, and to farmers to promote food production. Further, many countries cross-subsidize electricity, whereby one group of consumers pays higher rates for electricity to cover or subsidize lower rates for other consumers. This could include lower tariffs for residential use by low-income or vulnerable residential consumers and higher tariffs on industrial or commercial consumers.

Poorly designed or implemented subsidies can have perverse effects. In order to minimize negative effects of subsidies, and to ensure that the objectives of the subsidies are being met, periodic reviews of the subsidy, its benefits, beneficiaries, and outcomes is a crucial exercise to be completed by regulators. A tariff determination process that provides a transparent view of subsidies and cross-subsidies is more likely to be aligned with the public interest. Periodic review and analysis of the outcomes of subsidy allocations can prompt measures to prevent perverse impacts. While evaluating the implementation of subsidies, groups can also consider issues of transparency and accountability.

Lessons Learned: Subsidies should be regularly reviewed for costs, benefits, effectiveness, and efficiency. The ratepayers or government budgets responsible for paying the tariff should be carefully tracked, and ratepayer impacts monitored for perverse effects, such as higher costs for other electricity

consumers. In the case of the street lighting electricity subsidy, after 70 years, there is ample reason to review whether the subsidy is still merited in its current form.

Case Studies

Case Study #1: PPP/PFI for Municipal Street Lighting in Birmingham, England

Relevance: This case study presents a detailed review of a procurement mechanism for private financing, LED installation, and operation of a municipal street lighting network with limited cash resources. This model may be relevant for smaller municipalities in Chinese Taipei looking to reduce the burden of electricity costs and/or improve service. The PPP/PFI model may be a viable and more efficient and cost-effective alternative to electricity tariff subsidies.

Case Study Summary (Makumbe, et al., 2016)

- Location: City of Birmingham, United Kingdom
- Project Dates: 2007 to 2035
- Project Size: 97,000 points of light (57,000 from 2010 to 2015; 40,000 from 2015 to 2035)
- Implementing Agency: Birmingham City Council
- Funding Mechanism: Public-private partnership Implementation/ Procurement
- Process: A special purpose vehicle manages and delivers contract requirements overseen by the Birmingham City Council
- Expected Energy Savings: 50 percent

With a population of 3.7 million people in England's West Midlands region, the metropolitan area of Birmingham is the United Kingdom's second most populous urban region after London. The city has struggled to properly maintain its aging public infrastructure, postponing needed maintenance and upgrades year after year. Birmingham has approximately 2,500 kilometers of streets, roads, and urban highways, as well as 850 bridges, tunnels, and related transportation structures. At night the city is illuminated by 97,000 streetlights that are owned by the city. In the past, most of these were high-pressure sodium, mercury vapor, and metal halide lamps.

Before the LED program, many of Birmingham's streetlights were old and in need of replacement. In 2000–01, the Birmingham City Council (BCC) conducted a Best Value Review of highway maintenance in an attempt to solve some of the challenges identified above. That review, and a subsequent review by BCC's Audit Commission, concluded that City staff would be unable to carry out a step-wise improvement in the highway assets, and a cash infusion was needed to bring the asset to a reasonable standard. The Commission recommended that plans be drawn up for a Private Financing Initiative (PFI)—a public services contracting model in the United Kingdom based on the public-private partnership (P3 or PPP) model—in order to capitalize upgrades and modernization of streets, roads, tunnels, street lighting, and related assets.

PFI contracts are long-term contracts (typically 20–35 years) where the private sector constructs the project's assets (for example a building) and raises the required funding, usually on a project finance basis (i.e., where contractual payments from the public sector represent the primary security for funders). By contracting in this way, the aim is to ensure that whole-life costs associated with such assets are minimized and required associated services are provided competitively.

Wherever possible, contracts specify the outputs rather than the inputs associated with a particular project. Under PFI, a private sector firm creates and/or maintains the asset at its own cost. The public sector counterpart agrees to cover these costs over time, including the cost of capital, which is typically

higher than if the public sector had funded the project itself. As long as the higher cost of capital is offset by greater efficiencies elsewhere, such projects still offer value for money for the public sector.

The key advantage of PPP contracts from a municipal government point of view is the source of capital, which is typically the private sector. National governments may also incentivize PPP contracts by offering supplementary grants. Hence, there is no need for the municipality to raise upfront capital. It is not surprising that the PPP approach strongly appealed to cash-strapped Birmingham's City Council. Another appealing innovation of PPP contracts is that they shift technology and performance risk to the private sector. Payments can be withheld until an asset is refurbished or built to a specific performance standard. The government can impose strict penalties for poor performance during the operations and maintenance period. The arrangement is attractive to the private sector looking to add that asset class to its portfolio as well. Thus, both the public and the private sector benefit from the PPP. The BCC, therefore, adopted a PFI contract approach to access significant private investment alongside national government support to fund the backlog of necessary maintenance, to upgrade key assets such as lighting to a higher standard, and to maintain these assets over the next 25 years.

Using the PFI framework, Birmingham contracted with a private service provider, Amey plc, to repair, modernize, and maintain these assets over a 25-year period. The value of the total contract was £2.7 billion (US$4.2 billion) of which US$117 million was for lighting. The whole contract covers a step-improvement in the highways network, the removal of the works backlog, and the maintenance and management of 2,500 kilometers of roads, 4,200 kilometers of footways, 97,000 streetlights, 76,000 street trees, 1,100 traffic light signals and over 850 bridges, tunnels and highway structures. The small but integral streetlight component of Birmingham's PFI was Europe's first LED streetlight retrofit project financed through a PPP. At the time of procurement, LED technology was not a widely used technology in the UK. However, it was clear to the service provider that LED street lighting could offer substantial cost savings and was firmly on the ascendant, so Amey plc made a business decision to deploy it where appropriate.

Another driver of the LED program for efficient street lighting was the BCC's Sustainable Community Strategy, Birmingham 2026, which was endorsed in 2008. This plan aimed for Birmingham to become the best place in the UK to live, learn, work, and visit, "with a low-carbon energy infrastructure and well prepared for the impact of climate change."

Under the PFI, Birmingham's streetlights are being modernized in two stages, as follows:

■ Stage One is the five-year Core Investment Period, 2010–15, which officially concluded June 7, 2015. During this stage, 57,404 streetlight luminaires were replaced on 35,804 columns with a combination of 21,402 Philips Indal Stela LED luminaries, 14,204 conventional high-pressure sodium luminaires, and 198 other types of luminaires.

■ Stage Two is the 20-year operational expenditures (Opex) period, 2015 to 2035, during which the aim is to maintain the higher performance standards reached by 2015. During this stage, the balance of the city's streetlights, approximately 40,000 luminaires, will also be gradually upgraded. Meanwhile, some remaining assets will become due for replacement over the next 20 years, and they will be upgraded by 2035. Final decisions on technologies and products have not yet been made on this second stage.

Lessons Learned: Government best practices in designing public-private partnership PFIs have evolved to the point that they can be tailored very effectively to local needs and provide adequate assurances to government of quality of service and technology. By not demanding up-front capital, such programs can effectively transform street lighting through good public policy and administration, without the need for subsidies. International experience may provide valuable lessons to Chinese Taipei as it expands its LED adoption program to smaller municipalities with greater capital and other resource constraints.

Case Study #2: Belo Horizonte, Brazil Public-Private Partnership Model

Relevance: As in Birmingham, the city of Belo Horizonte used a Public-Private Partnership Procurement model to finance energy-saving street lighting retrofits, cutting electricity bills by large amounts without outlay of public resources. The city programs are being used as pilots to help scale the upgrades nationwide, including in smaller and more remote areas. As small and remote areas are the remaining priorities for Chinese Taipei's LED adoption program, a similar approach might be warranted for developing nationally-appropriate LED adoption business models for small municipalities.

Case Study Overview: (World Bank Group, 2016)

In Brazil, public lighting accounts for about 4 percent of the country's total electricity consumption. Within cities, this consumption ranges from 10 percent to 40 percent of the municipal energy budget depending on the number of lights and their efficiency.

In Belo Horizonte – the sixth largest city in Brazil – the electricity price has been increasing rapidly, jumping by 45 percent in 2015. The quality of public lighting was low, compromising the safety of residents especially in remote and poor areas. To add to that, a recent law requiring cities to assume ownership of public lighting infrastructure from local utilities posed a challenge for Belo Horizonte's existing institutions.

Switching to LEDs presented an opportunity for Belo Horizonte, not only for cutting GHG emissions and achieving cost savings, but also for realizing additional socio-economic benefits, such as increasing local nighttime economic activity, and improving provision of public services to citizens by improving security and traffic safety. To this end, the municipality and Brazilian and international development banks collaborated to deliver a solution for the city to identify energy-efficient investments for public street-lighting.

A feasibility study recommended private sector participation in investments through public-private arrangements. This acted as a trigger for Belo Horizonte to put in place a public-private-partnership (PPP) to upgrade 178,000 public street lights with more efficient LED lights over a five-year period for an investment of US$100 million.

The overall 20-year, US$300 million PPP contract is a third less than the US$430 million the city had planned to pay based on historical costs, and the largest for public street lighting in Latin America to date. ESMAP supported city officials in designing the PPP and the city moved to the installation of the lights quickly after the contract was signed in July 2016.

Some areas already have better lighting and the city is expected to save 40 percent on electricity cost, and operation and maintenance expenditures. The project is also changing people's lives by reducing the price they have to pay for electricity by bringing down public energy usage rates, improving their safety, enabling them to keep their businesses open for more hours, and beautifying their city.

Learning from the experience of Belo Horizonte, the project is being scaled up. The World Bank has studied an additional 300 municipalities in Brazil and assessed their street lighting infrastructure to help identify the most applicable business models. To share findings, ESMAP and its partners organized a forum on "Business Models for Energy Efficient Public Lighting" held in São Paulo in June 2016 targeting stakeholders interested in participating in the street lighting market. Over 250 participants from over 30 major cities in Brazil, private sector financiers, development banks and manufacturers flocked to the

event to learn how to expand LED street lighting in municipalities across the country. Eight business models were presented, aiming to provide options for the diverse needs of all 5,570 Brazilian municipalities, including public-private partnerships that have the potential to boost investment in large-scale LED infrastructure projects. The full report, as well as a tool that will help cities to conduct financial and economic analyses of public street lighting projects will be launched later this year.

Lessons learned: In the age of LED technology and companies adept at partnering with governments through PPPs, dramatic improvement in street lighting quality and management coupled with sharp reductions in costs can be achieved at little cost. Perhaps most importantly, drawing on local experiences with LED street lighting technologies and business models for deployment, such programs can be expanded even to remote and small areas (World Bank Group, 2016).

7. SUBSIDY #3: PETROLEUM AND ELECTRICITY SALES TAX EXEMPTION FOR AGRICULTURAL MACHINERY-RELATED USE

SUMMARY*: To promote the welfare and production of domestic farmers, Chinese Taipei has instituted an exemption from a 5 percent business tax on all transactions for petroleum products and electricity for use by farmers. In Chinese Taipei, the fuel mix for electricity generation has a large share of fossil fuels. This policy creates preferential tax treatment for farmers' use of energy, constituting a support measure commonly called a post-tax subsidy. The subsidy can be quantified in terms of forgone tax revenue by the government and lower post-tax energy prices for farmers.*

CURRENT STATUS

This preferential tax treatment policy is currently in effect.

POLICY BACKGROUND

1. Policy Making Timing and Background

The legislation of *Agricultural Development Act* was designed to promote the sustainable development of agriculture, respond to agricultural internationalization and liberalization, promote the reasonable use of farmland, adjust the agricultural industrial structure, stabilize agriculture production and marketing, increase farmers' income and welfare, and improve farmers' living standards. It is stipulated in Article 29 of *Agricultural Development Act* that the price of electricity, gasoline, and water for powering agricultural operation shall not be higher than those for general industrial purposes. It is stipulated in Article 8, Paragraph 1, Subparagraph 27 of the *Value-added and Non-value-added Business Tax Act* that agricultural machinery, transportation equipment for farmland, as well as fuel oil and electricity used by such machinery and equipment, etc. are exempted from business tax. It is also stipulated in Article 15 of the *Enforcement Rules of Value-added and Non-value-added Business Tax Act* that agricultural machinery and equipment eligible for the exemption of business tax shall be limited to machinery and equipment for soil preparation, transplanting, fertilizing, irrigating, draining, harvesting, drying, and other farming uses. The agricultural tractors shall be limited to those conforming to the specifications set forth by the competent authority of the relevant industry.

2. Policy-Making Objectives and Considerations

Chinese Taipei is a small island with high population density, where farmers on average make meager profits from farming operations due to the small farmland area. To improve the living standards of the farmers, Chinese Taipei's government exempts farmers from the 5 percent business tax on fuel oil and electricity for agricultural machinery required in agricultural production in order to reduce the agricultural production costs and increase farmers' income and welfare.

3. Other Related Supporting Policies

To provide counseling on exemption of fuel oil and electricity for agricultural machinery used and managed by farmers in accordance with the provisions in Article 28 and Article 29 of the Agricultural

Development Act, the Council of Agriculture has developed the *Regulations Governing Farm Machinery License Management and Instructions for Business Tax Exemption of Fuel Oil Agricultural Machinery and Equipment and Transportation Equipment for Farmland* to regulate the matter properly. The different fuel oil standards for the agricultural machinery and equipment as well as transportation equipment under each category are developed in accordance with the annual reasonable operating quantity of the agricultural machinery (as shown in Appendix A). The individual agricultural machinery is given exemption from business tax on the fuel oil usage in accordance with the standard, provided that the farmers present agricultural machinery license and identification when purchasing tax-exempt fuel oil. Any part exceeding the standard oil quantity will be excluded from the exemption while the quantity of tax-exempt fuel oil is under reasonable limit and restriction, which consequently will avoid fossil fuel waste. Additionally, agricultural electricity use is limited to five electricity use categories directly required for agricultural production according to the regulations, including the electricity use for agricultural irrigation and water conservation facilities, agricultural crop cultivation and post-harvest processing, agricultural product freezing and food warehousing, aquaculture, and husbandry. Non-agricultural use of agricultural electricity will be suspended to avoid abuse.

CONTEXT AND HISTORY

1. History of revision

The *Agricultural Development Act* was promulgated with a total of 38 articles in September 1973. The legislative intent of the *Value-added and Non-value-added Business Tax Act* regulates that the sales of goods or labor services and import of goods within Chinese Taipei shall be imposed with value-added or non-value-added business tax in accordance with this act, which was promulgated with 13 articles in June 1931. The Act was revised and promulgated with 60 articles in November 1985 and announced the implementation of a 5 percent tax rate starting April 1, 1986 in accordance with the Executive Yuan's *Tai-1986-Cai-Zi No. 1279 Order* dated January 20, 1986. Article 8 and other articles were revised and promulgated in May 1988. Additionally, in concert with the implementation of Article 8, Paragraph 1, Subparagraph 27 of the *Value-added and Non-value-added Business Tax Act* and Article 16-1, Paragraph 1 of the *Enforcement Rules of Value-added and Non-value-added Business Tax Act*, the Council of Agriculture promulgated the *Instructions for Business Tax Exemption of Fuel Oil Agricultural Machinery and Equipment and Transportation Equipment for Farmland* in February 1989. The Act underwent 5 revisions as of 2015. The last revision took place in January 2009, where the fuel oil use by agricultural machinery and equipment and transportation equipment for farmland was revised to include husbandry machinery and equipment.

2. Current Regulation (including financial resources)

It is stipulated in Article 8, Paragraph 1, Subparagraph 27 of the *Value-added and Non-value-added Business Tax Act* that agricultural machinery, transportation equipment for farmland, and fuel oil as well as electricity used by such machinery and equipment are exempted from business tax. It is also stipulated in Article 15 of the *Enforcement Rules of Value-added and Non-value-added Business Tax Act* that the agricultural machinery and equipment eligible for business tax exemption shall be limited to machinery and equipment for soil preparation, transplanting, fertilizing, irrigating, draining, harvesting, drying, and other farming uses. The agricultural tractors shall be limited to those conforming to the scope of specifications set forth by the competent authority of the relevant industry (see detailed specifications in

Appendix A – Additional Information on Subsidies for Review). Investigation shows that the exemption of business tax for agricultural machinery totaled over NT$80 million (US $2.6 million) in 2015.[7] The financial resource required for this item is Chinese Taipei's tax deduction.

SUBSIDY EFFECT

Statistics reveal that the amount of agricultural machinery fuel exemption from the 5 percent business tax is about NT$140 million, $140 million, $170 million, $160 million, and $80 million (as shown in the table below), or roughly US$4.4 million, US$4.4 million, US$5.3 million, US$5.0 million, and US$2.5 million (NT$100 equals roughly US$3.16). (The annual change observed in the aggregate volume of the subsidy is driven primarily by the change in the retail price of diesel fuel, which closely tracks international petroleum prices.) Calculated from the 150,000 farmers in the agricultural machinery license information system, the average tax exemption per person per year is about NT$933, NT$933, NT$1,133, NT$1,067, and NT$533 (from roughly US$17 to US$34).

Table 10: 5 percent Business Tax Exemption for Fuel Oil Used by Agricultural Machinery in the Last 5 Years

Year/Item	Agricultural Machine Fuel Oil Exempt from 5% Business Tax (NTD$/Thousand)
2011	144,407
2012	137,146
2013	169,619
2014	159,724
2015	81,436
Total	692,332

REFORM SOLUTION/EXPERIENCE

1. Self-Evaluation

Chinese Taipei is a small island with high population density, where farmers on average make meager profits from farming operations due to the small farmland area. To improve farmers' living standards, Chinese Taipei's government offers a 5 percent business tax exemption for the fuel oil and electricity of agricultural machinery required for agricultural production in order to reduce the costs and increase the income and welfare of farmers. Agricultural and transportation machinery is exempted from business tax based on fuel oil usage in accordance with the standard, provided that the farmers present agricultural machinery license and identification when purchasing tax-exempt fuel oil. Any part exceeding the standard oil quantity (per farmer and per piece of equipment) will be excluded from the exemption,

[7] NTD is the abbreviation for the New Taiwan Dollar, the currency of Chinese Taipei.

while the quantity of tax-exempt fuel oil is within reasonable limit and restriction. Therefore, this measure will not lead to fossil fuel consumption waste in Chinese Taipei.

2. Reform Guidelines, Policies, and Measures Already Executed /Taken into Consideration

Agricultural machinery fuel oil is exempted from the 5 percent business tax in accordance with the *Value-added and Non-value-added Business Tax Act*. In the past, the agricultural machinery owner could purchase the fuel oil at the gas station with the paper form of the agricultural machinery fuel oil business tax exemption voucher to take the advantage of exemption. Nonetheless, the paper voucher could easily be abused. To better control the tax-exempt fuel oil for agricultural machinery, *the Fuel Oil for Agricultural Machinery Exemption of Business Tax Boucher Information* policy was launched in 2015. Together with the agricultural machinery fuel oil information system and the identification number of each farmer, the computer system will automatically issue the fuel oil exemption for farmers each year, and farmers may present the identification number and agricultural machinery license to purchase agricultural machinery fuel oil from different gasoline companies. The computer system of the gasoline company can immediately connect to the fuel oil use information system at the Agriculture and Food Agency under the Council of Agriculture, and the amount of tax-exempt fuel oil for farmers will be deduced. The new measure will effectively control the identification of persons purchasing fuel oil to avoid the abuse of tax-exempt agricultural machinery oil.

CHINESE TAIPEI VISION/END GOAL FOR SUBSIDY

Chinese Taipei seeks to promote farmer welfare and agricultural productivity by reducing farming production costs. At the same time, Chinese Taipei is committed to reducing wasteful subsidies. Chinese Taipei is not currently considering a phase-out or reform of this subsidy.

INSIGHTS FROM PEER REVIEW PROCESS

OBSERVATIONS

Goals and Objectives

1) **To increase production and promote welfare of domestic farmers, Chinese Taipei has instituted an exemption from a 5 percent business tax on all transactions for petroleum products and electricity for use by farmers.** All farmers are eligible, and benefits are targeted to farming-related activities, which include machinery and equipment for soil preparation, transplanting, fertilizing, irrigating, draining, harvesting, drying, and other farming uses.

Effectiveness of the Subsidy

2) **The Petroleum and Electricity Business Sales Tax exemption for agricultural machinery benefits farmers by lowering their purchase costs for fuel and for electricity.**

3) **The support measure constitutes a cost savings of 5 percent in taxation, amounting to a relatively small change in overall price but tangible savings for individual farmers.** Over the past five years, the average tax exemption per person per year has ranged in value from US$17 to US$34. The value of the subsidy directly proportional to the cost of a liter of fuel, thereby increasing when most needed by farmers.

Structure and Operation of the Subsidy, and Current Operating Environment

4) **The subsidy is limited by caps determined by reasonable fuel or electricity use for each type of equipment, serving to prevent free riders and market distortions.** The Government of Chinese Taipei has developed a detailed and highly specific list of appropriate levels of fuel consumption for each type of agricultural equipment, limiting purchases by each farm.

5) **With the transition from paper to digital and internet-based records and administration, the administrative costs of the subsidy have decreased.** Originally, paper tickets were issued and manual entry into ledgers and databases was required. Now, electronic cards are swiped at petrol stations. Following the creation of this system, annual administrative costs have declined, though actual costs numbers are not available.

6) **The subsidy can be quantified in terms of forgone tax revenue by the government and lower post-tax energy prices for farmers.** Over the past five years, the COA reports that the average annual cost of the subsidy (absent administrative costs) has been roughly US$4 million per year.

7) **The value of the subsidy fluctuates with the price of the underlying taxable goods.** When oil prices were higher from 2011-14, the subsidy's annual value was at peak. In 2015, with low oil prices, the value fell.

Subsidy Efficiency and Targeting

8) **The subsidy is carefully targeted to farmers for agricultural activities including electricity consumption and fuel purchased for use in agricultural equipment and vehicles.** There is a roll of 150,000 eligible farmers. The COA reports that many farmers do not avail themselves of the tax exemption.

9) **It is unknown the degree to which this subsidy encourages farming activity and provides social protection to farmers.** This information was unavailable to the peer review panel.

10) **It is unknown whether farmers support the VAT exemption over other forms of government support.** Surveys or beneficiary feedback were unavailable for the peer review panel.

11) **It is unknown whether fuel and electricity inputs are a larger and more appropriate target for subsidies than other farming inputs such as seeds, fertilizer, agricultural equipment, water, labor, processing, shipping etc.** The COA reported that fuel costs might constitute 20 percent of household income. However, other inputs might represent a larger share.

Source of Funding

12) **The support measure is financed by forgone tax revenue to the governmental treasury.** The program does not appear to be funded directly by the Council of Agriculture as a budgetary expenditure, but is financed through forgone tax revenue to the governmental treasury.

KEY FINDINGS

Goals and Objectives

1) **By creating preferential tax treatment for farmers' use of energy, this support measure constitutes a subsidy commonly called a post-tax subsidy.** By the conventional measure of a subsidy that the policy is a subsidy because it results in targeted price reductions for the goods in question. However, this policy is not a subsidy according to the IEA price-gap approach because it does not reduce fuel prices to below the landed international price, but rather reduces prices vis-à-vis other goods and services subject to the business tax.

Effectiveness of the Subsidy

2) **The Petroleum and Electricity Business Sales Tax exemption for agricultural machinery benefits farmers by lowering their purchase costs for fuel and for electricity.** The tax exemption policy constitutes a support measure that lowers prices for affected consumers (farmers).

3) The support measure constitutes a cost savings of 5 percent in taxation, amounting to a relatively small change in overall price but tangible savings for individual farmers. This support measure is a relatively small considered on a per-farmer basis. It is unknown whether this small measure serves meaningfully to reduce costs and increase the financial viability of farming, particularly at a small scale.

4) **The price impact of the support measure (5 percent impact on consumer price) and per capita magnitude of the program (roughly US$20-$30 per farmer per year) are limited.** The small size of this policy both limits its impact on beneficiaries, and limits the potential for inefficiencies and market distortions.

Structure and Operation of the Subsidy, and Current Operating Environment

5) The subsidy is limited by caps determined by reasonable fuel or electricity use for each type of equipment, serving to prevent free riders. Though it appears not to have been studied, the limits appear not to be frequently breached or violated, implying there may be little leakage of subsidized fuel to non-sanctioned uses.

6) The COA reports that the current system of administration is cost-effective and efficient. No complaints about the system's efficiency, cost, or effectiveness were noted. However, no information was forthcoming upon which to test the veracity of the system's efficacy.

7) The subsidy's current structure inherently increases the size of the benefit as oil prices rise, and reduces the benefit as oil prices fall. This is because the post-tax subsidy's value is equivalent to forgone tax revenue, which is a fixed percentage of a good whose value rises and falls, thus rising and falling in tandem. This feature is presumed to be desirable and beneficial to recipients, who need price relief the most when petroleum is expensive.

Subsidy Efficiency and Targeting

8) This subsidy is small when considered on a per-farming household basis to reduce costs and increase the financial viability of farming, particularly at a small scale. Though individual farmers were not surveyed, because average farming household's income is less than US$7,000 per year (though household income is more than 5 times greater), small subsidies are assumed not to be considered negligible by the beneficiaries. The subsidy is enjoyed directly and immediately by a subset of the intended beneficiaries, at least some of whom are aware of the benefits. However, given substantial non-participation amongst eligible farmers, the support measure appears to not be reaching a significant share of potential beneficiaries (smallholder farmers).

9) **The subsidy's caps serve to prevent market distortions.** Due to the small amount of subsidized fuel provided to each household, behavior is likely only affected at the margins at a *de minimis* level. While lowering fuel prices may encourage wasteful consumption and discourage adoption of energy-efficient technologies and practices at the margin, the small size of the subsidy and targeted nature to small farmers likely limits this effect. The peer review panel learned that there are few types of mechanized equipment appropriate for small farms in general, and that equipment running on alternative fuels is largely unavailable.

10) The subsidy applies to all farmers, and is not narrowly targeted by sub-sector or income level. Consideration of the highest priorities for supporting farmers – income support for

farmers, encouragement of land usage for farming activities, etc. – might lead to the conclusion that further targeting is desirable.

11) **The subsidy likely disproportionately benefits farmers with more energy-intensive production, and farmers who own and operate farm equipment.** Because Chinese Taipei has a highly diversified farming sector, it can be presumed that the energy- and resource-intensity of different types of farming varies widely. This would lead to unintended and disproportionate support for energy-intensive industries as well as unfairly penalizing energy-efficient farming operations.

12) **Farmers might benefit equally or more from price supports for other farming inputs.** Providing support for other inputs (seeds, fertilizer, equipment, processing, training, technology, labor, and shipping) might more equitably spread benefits among farmers and lead to less wasteful consumption of fossil fuels.

13) **Regardless whether its implementation is efficient, this subsidy's small size and limited impact suggest it is not an efficient use of government resources.** Government time and funding might better be targeted to measures that directly serve specific economy's agricultural policy objectives.

Source of Funding

14) **Because the subsidy represents forgone revenue from the governmental treasury, it is not attributed to the Council of Agriculture.** This subsidy likely does not appear as a budgetary expenditure.

VPRT RECOMMENDATIONS

- **There are opportunities for this support measure to be more targeted and more efficient.**
- **Converting the subsidy to a cash benefit while restoring fuel taxes would promote more efficient use of fuel, including conservation, efficiency, and substitution to cleaner technologies, while maintaining support for farmers.**
- **Targeting the subsidy only to smallholder and/or low-income farmers might allow for limiting the subsidy to those who most need it.** Such a policy might better align the design and fiscal outlays with the stated goals of the subsidy.
- **Complementary measures are encouraged to promote efficiency and reduce market distortions**. These measures might include:
    - Technical assistance to farmers on fuel and electricity efficiency;
    - Rebates for farmers' purchases of clean and efficient agricultural machinery; and
    - Research and development for the commercialization of alternative technologies that do not require fossil fuels (e.g., electric vehicles and motors) or require less use of tractors and other equipment (e.g., no-till agriculture and organic, fertilizer-free farming)
- **The small size of the program and the lack of clear social goal suggest that it should be considered for reform (see 'cross cutting agricultural subsidies' section below).** As noted above, the time and resources currently devoted by taxpayers and the Council of Agriculture to this program should be reviewed in light of the highest priorities for the agriculture sector. A review of these priorities and resources devoted to them might yield a set of more targeted policies with greater benefits than the subsidy in question.

- **A review of stakeholder preferences and needs is encouraged.** The peer review panel recommends surveying farmers and other target beneficiaries (retired farmers, farmers' families, young people considering farming careers) to determine which government resources, protections, and benefits most address their social and professional needs. In particular, a study of the farming inputs and needs with the greatest value for the greatest number of farmers would be extremely valuable information for policymakers. These results would contribute valuably to reform efforts and help ensure public support for them.
- **Reform efforts should consider the need of vulnerable farming households to get relief from petroleum price spikes.** This need may not require explicit fuel subsidies, but could envision automatic disbursement of other social benefits in times of rising prices.

CASE STUDIES & LESSONS LEARNED

This section explores post-tax fossil fuel subsidies, i.e. exemptions of fuels from taxes that reduce their prices below competing products or below levels they would otherwise be. As this subsidy pertains to agricultural fuel, one case study below, on diesel fuel tax exemption in New Zealand, deals specifically with agricultural machinery fuel. However, this case differs from the Chinese Taipei subsidy in an important respect: the revenue is earmarked for road use, which does not benefit operators of agricultural machinery. Thus, the case can be made that the exemption does not constitute a subsidy.

Other cases examined below deal with post-tax fuel subsidies more generally. These include the LPG subsidy exemption for the Amazon region of Peru (see subsidy 1) and the excise tax exemption for socially sensitive fuels in the Philippines. Case studies of conversion of fuel subsidies to cash transfers are considered in the cross-cutting section on agricultural subsidies below.

Lessons learned on post-tax fossil fuel subsidies include the following:

1) **Post-tax subsidies – i.e., exemptions from VAT, excise taxes, import duties, etc. – seldom are an efficient and effective way of addressing social objectives.** They are most frequently used in lower-income countries where mechanisms of providing a social safety net to low-income and vulnerable populations are weak or absent. Directed social programs, whether cash transfers, direct provision of goods and services, social services such as job training, health care or education, are usually more effective at targeting the target population's needs. Social problems and vulnerabilities necessarily addressed by the government usually run deeper than the issues small tax exemptions can address. Where the value of the tax exemptions is meaningful to the recipients, cash is more valuable because it can be spent flexibly, and is not limited to a single use.

2) **Tax exemption subsidies are regressive, benefiting those who consume more (usually wealthier individuals and businesses, even within the same social class, geographic population, or industry).** Other social programs can be designed to be progressive or neutral vis-à-vis disbursement of benefits on an individual, enterprise, or household level.

3) **Tax exemptions on fuel that are volumetric (i.e., value is tied to the amount of fuel or electricity consumed) encourage wasteful consumption, because those who use more benefit and those who use less are penalized.** Subsidies should ideally be designed with the goal of taxing activity that is discouraged (e.g., fossil fuel usage) and relieving taxation on activity that is encouraged (e.g., farming the land and encouraging agricultural production). Percentage-based fuel tax-exemption subsidies do have the benefit of providing automatic subsidy increases when prices rise. Replacement policies should take this feature into consideration by considering increasing benefits when petroleum prices rise.

4) **Post-tax subsidies usually preclude the governmental treasury from collecting tax revenue that could be used for other more pressing social needs.** In that sense, such subsidies should be considered as an opportunity cost for the government to spend the money wisely in another manner. For this reason, the VAT tax exemption should be paid for explicitly by the Council of Agriculture, not taken out of the governmental treasury.

   This budgetary line item might be better redirected towards other agriculture sector programs to directly meet Chinese Taipei's policy objectives. Tax-exemption subsidies may be justified if the tax revenue is earmarked for a public good not enjoyed by certain payers of the tax. For example, New Zealand created justified fuel tax exemptions for agricultural machinery because the tax was paid specifically for a road maintenance fund not used by the agricultural machinery.

Case Study #1: Peru Amazonia VAT and Other Tax Exemption for LPG

(See Subsidy #1 Case Study section for full detail)

Relevance: These subsidies constitute post-tax subsidies designed to benefit a particular social group: the residents of a remote and poor region. The program imposes significant costs in terms of forgone revenue to the governmental treasury.

Case Study Summary (APEC Voluntary Peer Review Peru, 2015)

The APEC Peer Review determined that the Government of Peru's VAT exemption for the Amazon region is ineffective, and is not meeting the stated goals of promoting development in the region. The exemption has led to wasteful and inefficient consumption of fossil fuels. A black market exists for fuels in the regions bordering the Amazon regions, which have the VAT exemption. The suspicion that the subsidy benefits illegal mining, logging, and drug trafficking further adds to the problems. The exemption tends to benefit the higher income population, resulting in perverse incentives in the Amazon region. The exemption has mostly benefited traders and those who consume higher quantities of fuel. It has also resulted in unintended consequences and perverse incentives.

The VAT exemption has not met its objective of economic development of Amazon region. Despite exemptions that have been in effect since 1998, the region's output, as a whole, continues to lag compared to other areas of Peru where no such exemption is provided. At the same time, there are regions of Peru that lag behind the Amazon region and do not receive these exemptions. The VAT exemption results in high fiscal costs to the Government of Peru. As Table 5-2 in the foregoing discussion shows, the VAT exemption has cost or will cost the Government of Peru from US$0.78 billion to US$1.24 billion a year. However, the cost of hydrocarbon-related exemptions is between 8 percent and 14 percent of those total costs.

END GOAL/VISION

While the APRP recognizes the need of continued support to "vulnerable" groups, the current blanket tax exemption for fuels in the Amazon region should be eliminated. Further, the exemptions should be replaced with targeted social and regional developmental programs for schools, hospitals, transportation, and other infrastructure. The removal of this fossil fuel subsidy is consistent with the energy, economic, and fiscal policies of the Government of Peru. The substitution of targeted social and developmental programs would provide a more effective means of meeting the social policy and development unique to the Amazon region.

Lessons Learned: As tax expenditures, tax exemptions remove money from the treasury that could otherwise be spent on other effective and high-priority government programs. The program should be

evaluated in terms of the value it provides for the cost to the government. Tax exemptions for consumer goods have limited ability to address deeper underlying issues of economic competitiveness and disadvantage. Tax exemptions, when large, can lead to fraud and smuggling.

Case Study #2: Philippines Excise Tax Exemption for Socially-Sensitive Fuels

Relevance: Illustration of the costs and distortions of fuel tax exemptions; a comparison of VAT vs. targeted excise tax exemptions, and the use of revenues from fuel-specific taxes.

Case Study Summary (APEC Voluntary Peer Review, Philippines, 2016)

Since 2005, the Philippine tax system has had a differentiated excise tax among various fossil fuels—i.e., applying the excise tax to some fuels while exempting others. In general, there are two types of taxes on fossil fuels: a value-added tax (VAT) and an excise tax. The VAT on all oil products in the Philippines is 12 percent. While there is an excise tax on gasoline and jet fuel, there are no excise taxes on petroleum products that are considered "socially sensitive", namely kerosene, diesel, LPG and fuel oil.

The VAT is a general revenue gathering measure applied to the sale of almost all goods and services. Excise taxes, on the other hand, are often intended to cover the externalities associated with the consumption of certain goods and services. Excise taxes are also usually applied "upstream"; i.e., at the time of first importation or sale by the manufacturer (though costs are typically passed on to consumers), and, unlike VAT or sales tax, excise taxes are often assessed on the sale volume rather than on the value of the goods.

The APRP was clear that the excise tax exemption did not constitute a subsidy. However, at the request of the Ministry of Finance and with the agreement of the Philippines Department of Energy (PDOE), the APRP was invited to provide comments on the broader issue of the economic efficiency of such exemptions.

HISTORY AND CONTEXT

Prior to 2005, all petroleum products were exempted from the domestic value-added tax (VAT) of 10 percent but were subject to an excise tax (with the exception of LPG, which had an excise rate of zero). In 2005, a VAT was introduced on all petroleum products at a rate of 10 percent, which was then subsequently increased to 12 percent in 2006. In order to alleviate the price shock from the introduction of VAT, the new law simultaneously removed excise taxes from petroleum products that were considered socially sensitive. These socially sensitive fuels included kerosene, which is used for lighting and cooking; diesel, which is used in public transport; fuel oil, which is used for power generation; and LPG, which is generally used for cooking. Only gasoline products and aviation fuels sales are imposed an excise tax. The removal of excise taxes on the socially sensitive products achieved its primary purpose of alleviating the price shock on consumers due to the imposition of VAT without exemptions, even though there was still an overall increase in prices.

The PDOE estimated that around P180.6 billion (roughly US$4.0 billion) could have been collected from excise and VAT had there been no excise tax exemption since 2005. Of the P180.6 billion, P161.3 billion (US$3.6 billion) could have come from the excise tax and P19.3 billion (US$400 million) could have been generated as additional VAT. The amount represents the cumulative total for the entire period from 2005 to 2015, and the estimates include impact from kerosene, diesel and bunker fuel.

The APEC Peer Review drew the following conclusions regarding the Excise Tax Exemption:

1) **Excise tax exemptions are likely to have limited impact on domestic markets because of their proportionately small size relative to the market-determined fuel prices.**

2) **However, all other things being equal, excise tax exemptions among different fuels create distortions that are likely to be economically inefficient.** All other things being equal, those petroleum products that do not have an excise tax exemption (such as gasoline) will, at the margin, have a lower demand relative to those petroleum products that are exempt, despite any inherent advantages over exempted fuels they may have. By providing a tax advantage relative to oil products that have an excise rate imposed, excise tax exemptions could potentially encourage more consumption of excise-exempt oil products relative to oil products with an excise rate imposed (albeit only by a small degree). The excise tax exemption is also not well targeted among customer classes. Based on the 2000 Family Income and Expenditure Survey conducted by the National Statistics Coordination Board, the top 30 percent of income groups consume 65.4 percent of the total petroleum consumption in the economy, while the bottom 30 percent consume only 7.5 percent.

Lessons Learned: Excise tax exemptions, like VAT exemptions, successfully lower prices for consumers. However, the tax exemptions are poorly targeted and primarily benefit wealthier consumers. The policies represent forgone tax revenue. Excise tax revenues can be used specifically to redress social and environmental issues related to their consumption; VAT revenues are deposited in the governmental treasury for general use. Tax exemptions' impact is thus dependent on the designated use of the tax revenues.

Case Study #3: New Zealand Motor-spirit Excise Duty Refund

Relevance: A post-tax fuel subsidy, or fuel tax exemption, granted to users of agricultural equipment, which is similar in design and function to the subsidy of Chinese Taipei.

Case Study Summary (APEC Voluntary Peer Review, New Zealand, 2015)

A motor-spirit excise tax is charged on transport fuels, the proceeds of which are paid into the National Land Transport Fund, which funds road construction and maintenance. A refund of this levy is allowed for eligible off-road vehicles, including off-road agricultural and commercial vehicles and marine transport, as these vehicles do not use the roads that the excise funds. Diesel fuel does not qualify for any refunds since it is not subject to the motor-spirits excise duty. However, users of diesel fuel do pay a user's charge through a vehicle-kilometres-travelled or distance-based levy. The refunds of the excise tax typically amount to about NZD 1.5 billion (US$1.12 billion) and account for around 3 to 4 percent of the revenue collected through the motor-spirits excise duty. The revenues from the excise duty are the largest source of funds for the National Land Transport Fund; and, expenditures from the fund cannot exceed revenues in any given year. This is mandated by New Zealand law.

The Government of New Zealand allows a refund of the excise duty and the Goods and Services Tax (GST) charged on motor spirits (e.g., gasoline, CNG, and LPG) for fuel consumed in off-road usage. Examples of eligible uses for refunds would include agricultural vehicles (e.g., tractors and harvesters), commercial vessels, and certain licensed vehicles. Refunds are applied for and verified by the New Zealand Transport Agency. Only those applicants meeting legislative and regulative requirements have their refund applications approved. The refunds typically account for around 3 percent to 4 percent of the revenue collected through the motor-spirits excise duty.

Prior to October 1, 2008, revenues derived from the excise duties were treated as general revenues to the New Zealand government. Currently, all funds from the excise duty—along with road-user charges,

motor-vehicle registration, and licensing fees—are paid into the National Land Transport Fund and used for road construction and maintenance purposes only. The current treatment of revenues falls under the general policy adopted by New Zealand, according to which those that cause the damage to the economy's roads should be the parties responsible for paying for its repair and maintenance of road infrastructure. Under this logic, it follows that those parties, who do not consume motor-spirits on roads, should not be subject to this excise tax.

In contrast, diesel fuel does not qualify for any refunds since it is not subject to the motor-spirits excise duty. In New Zealand, light vehicle users pay for their use of roads through either fuel excise duty or road user charges (which apply to diesel vehicles and other vehicles not subject to fuel excise duty). All vehicles are also subject to an annual licensing fee, which varies depending on whether the vehicle is petrol or diesel. Road user charges are distance based, and can be purchased in multiples of 1,000 kilometres from the NZ Transport Agency and approved road user charges agents.

An estimated 36 percent of diesel is used off-road. This includes vehicles and machinery used in farming, manufacturing, industrial and commercial ventures, and boats. Analysis by the New Zealand Government concluded that taxing diesel for these uses would impose an unfair burden on these sectors. Further, operating a refund system would be costly and cumbersome to administer and involve compliance costs without any related benefit. Finally, a refund system would also potentially be susceptible to fraudulent refund claims. A fiscal year 2008 review of the road user charges system considered the introduction of a diesel tax carefully, but determined that light road user charges continue to be the most appropriate charging system for light diesel vehicles.

Lessons Learned: The New Zealand fuel tax exemption does not apply to diesel fuel; only to LPG, CNG, and gasoline. Diesel vehicles are charged a user fee based upon km traveled. No reform was recommended by the peer review team. Equity, distributional issues, and fairness were all considered. Administrative costs of the program are also considered. This subsidy was considered justified because the revenues were directed specifically to road maintenance, which off-road farm vehicles did not use. Thus, its relevance to Chinese Taipei is limited.

8. SUBSIDY #4: PREFERENTIAL ELECTRICITY PRICING FOR AGRICULTURAL MOTORS

SUMMARY*: In Chinese Taipei, as in some electricity markets, all electricity ratepayers are assessed a load fee based upon peak power usage. Farmers' peak electricity load occurs during particular seasons (e.g., planting and harvest), resulting in substantial load fees that persist in off-peak months. To support farmers, farmers are provided discounted electricity load fees during non-peak periods of consumption. The discounts are determined on a sliding scale based upon monthly fraction of peak usage, with greater discounts coming in periods of lowest electricity use. Regulatory policy allows Taiwan Power, the monopoly distribution grid operator, to recoup these discounted fees by raising fees and tariffs on other ratepayers.*

CURRENT STATUS

This subsidy is currently in effect.

POLICY BACKGROUND

1. Policy Making's Timing and Background

According to Article 29 of the *Agriculture Development Act*, the price of electricity, gasoline, and water for agricultural operation shall not be higher than prices for general industrial purposes. Electricity pricing for powering agricultural operations is not calculated by progressive increment, and during the suspension period of power use, the basic electricity fee could be exempted. Based on these principles, the scope and standard of the electricity use for powering agricultural operations formulated by the Executive Yuan are limited to the electricity supplied directly to agricultural production users, covering agricultural irrigation and water conservancy facilities operations, agricultural crop planting and post harvesting process, crop refrigeration, and food storage, as well as aquaculture, livestock and poultry.

(1)The electricity for agricultural irrigation and water conservancy facilities operation: for those who pump water to irrigate crops or operate various types of water conservancy facilities, and for those who completed water right registration to obtain a water right certificate, temporary water use license, or water right wavier certified by water authorities in accordance with regulations.

(2)The electricity for agricultural crop planting and post harvesting process: for planting seeds, culturing seedlings, cultivation management, and various types of machinery used for product drying, threshing, washing, grading, packing, or lighting and temperature adjustment in gardening facilities that are operated by those who hold certification documents issued by competent authorities at municipality or county (city) level, or agricultural machinery license holders.

(3)The electricity for crop refrigeration and grain storage: for farmer groups and refrigerated products in agricultural markets, or farmers' group storage of public-owned grains, rice, and miscellaneous

grains, or milling machinery with certification documents issued by competent authorities or foods authorities at municipality or county (city) level.

(4)The electricity for aquaculture: for onshore feed ingredient storage, refrigeration, mixing, feeding, and screening machineries required in aquaculture at sea with fishing right license or fishing right certifications. For water quality improvement, pumping, drainage, air pumping, greenhouse heating, water recycling facilities and machines for feed ingredient storage, refrigeration, mixing, or feeding required in land-based aquaculture with aquaculture licenses.

(5) The electricity for animal husbandry: for feeding livestock and poultry, pollution control facilities, machinery for egg washing and grading, class-based packing or milk collection station, with certification documents issued by competent authorities at municipality or county (city) level.

2. Policy objectives and considerations

Due to the varying production cycles of different crops, if the basic electricity fee is still being charged after harvesting and during the suspension (fallow) period, it would be a serious burden for those who use electricity for powering agricultural operation. Therefore, Chinese Taipei plans to provide a preferred electricity load factor to reduce the basic electricity fee during the suspension (fallow) period.

(1) If the electricity load factor is zero, the basic electricity fee is free.
(2) If the electricity load factor is below 20 percent, the basic electricity fee is reduced by 50 percent
(3) If the electricity load factor is above 20 percent and below 40 percent, the basic electricity fee is reduced by 30 percent
(4) If the electricity load factor is above 40 percent and below 60 percent, the basic electricity fee is reduced by 10 percent
(5) If the electricity load factor is above 60 percent and below 80 percent, the basic electricity fee is reduced by 5 percent
(6) If the electricity load factor is above 80 percent, the basic electricity fee is charged in full.

3. Other supporting measures

None

CONTEXT AND HISTORY

1. History of revisions

The scope and standard of electricity use for powering agricultural operation is based on Article 29, Paragraph 3 of the *Agriculture Development Act*. It has had 7 revisions since the act was promulgated in 1984. Each revision aims at amending Article 2 on the scope and qualification of electricity use for powering agricultural operation. The last revision was October 2004, when the revised Article 2 was promulgated, which stipulates all types of electricity use licensing information for powering agricultural operation. The revision history and the features and comparison of revision are shown in the two tables below.

Table 11: The Revision History of the Scope and Standard of the Electricity Use for Powering Agriculture Operation

Promulgated Date	File Number	Revision Context
8/21, 1984	Executive Yuan (73) Taiwan Economy 13908	Promulgation
4/20, 1987	Executive Yuan (76) Taiwan Economy 7502	Article 2 revised and promulgated
7/8, 1988	Executive Yuan (77) Taiwan Economy 20453	Article 2 revised and promulgated
6/28, 2000		Article 2 revised and promulgated
11/22, 2000		Article 2 revised and promulgated
6/12, 2001	Executive Yuan (73) Taiwan Agriculture 910027683	Article 2 revised and promulgated
10/21, 2004	Executive Yuan (73) Taiwan Agriculture 931077408	Article 2 format revised and promulgated

Table 12: The Comparison between Revision of the Scope and Standard of the Electricity Use for Powering Agricultural Operation

Version	07/08, 1988	06/28, 2000	11/22, 2000	10/21, 2004
Amending content comparison	Article 1. The scope and standard are in accordance with Article 29, Paragraph 3 of the Agriculture Development Act (ADA).			
	Article 2. The electricity use for powering agriculture operation in Article 29 of ADA is limited to the electricity supplied directly to agricultural production users The electricity for agricultural irrigation and water conservancy facilities operation: for those who pump water to irrigate crops or operate all types of water conservancy facilities, and for those who completed water right registration by obtaining water right and temporary water use license, or water right wavier certified by water authorities based on regulations.			
	The electricity for agricultural crops plantation and post harvesting process: for farming, or various types of machinery used for product drying, threshing, washing, grading, packing, or lighting and temperature adjustment in gardening facilities, and for those who hold certification documents issued by competent authorities at municipality or county (city) level or agricultural machinery license holder.	The electricity for agricultural crops plantation and post harvesting process: for planting seeds, culturing seedlings, cultivation management, and various types of machinery used for product drying, threshing, washing, grading, packing, or lighting and temperature adjustment in gardening facilities, and for those who hold certification documents issued by competent authorities at municipality or county (city) level.	The electricity for agricultural crops plantation and post harvesting process: for planting seeds, culturing seedlings, cultivation management, and various types of machinery used for product drying, threshing, washing, grading, packing, or lighting and temperature adjustment in gardening facilities, and for those who hold certification documents issued by competent authorities at municipality or county (city) level or agricultural machinery license holder.	
	The electricity for crops refrigeration and grain storage: for farmer groups and refrigerated products in agricultural markets, or farmers' group storage of public-owned grains, rice, and miscellaneous grains, or milling machinery, with certification documents issued by competent authorities.	The electricity for crops refrigeration and grain storage: for farmer groups and refrigerated products in agricultural markets, or farmers' group storage of public-owned grains, rice, and miscellaneous grains, or milling machinery, with certification documents issued by competent authorities or foods authorities at municipality or county (city) level.		
	The electricity for aquaculture: land-based aquaculture water pumping, drainage, air pumping, and feeding or ingredient mixing machineries, with aquaculture licenses and completing water right registration to obtaining water right, temporary water use license, or water right wavier certified by water authorities in accordance with regulations.	The electricity for aquaculture: for onshore feed ingredient storage, refrigeration, mixing, feeding, and screening machineries required in aquaculture at sea, with fishing right license or fishing right certifications. For water quality improving facilities by land-based aquaculture pumping, drainage, air pump, greenhouse heating, water recycling, and machines for feed ingredient storage, refrigeration, mixing, feeding, with aquaculture licenses.		
	The electricity for animal husbandry: For feeding livestock and poultry or milk collection station, with certification documents issued by competent authorities at municipality or county (city) level.	The electricity for animal husbandry: For feeding livestock and poultry, pollution control facilities, machinery for egg washing and grading, class-based packing or milk collection station, with certification documents issued by competent authorities at municipality or county (city) level.		

	If the aforementioned electricity-based agricultural motor power facilities located at the same place, application shall be made to Taiwan Power Company (hereinafter referred to as Taipower) to consolidate into one electricity registration number and install one set of electric meter.
	If the aforementioned electricity-based agricultural motor power facilities located at the same place, application shall be made to Taiwan Power Company (hereinafter referred to as Taipower) to consolidate into one electricity registration number and install one set of electric meter. To carry out the first regulation, municipal or county (city) competent authorities may commission its township (town, city, district) offices to conduct; the actual implementation regulations are to be formulated by the municipal or county (city) competent authorities.

2. Current Regulations

In order to assist Taiwan Power Company gradually reduce its burden, the Council of Agriculture at Executive Yuan has planned to progressively return the proportion of subsidy to other Executive Yuan agencies and departments in 10 years within the existing budget. According Taiwan Power Company's statistics, the subsidy for users of electricity for powering agricultural operation was NT$ 292 million (US$9.2 million) in 2014 (including agricultural crop planting and after harvesting process, crop refrigeration and food storage, agricultural irrigation and water conservancy facilities operation, agricultural, livestock and poultry). Other government sectors shared 10 percent of the subsidy for users of electricity for powering agricultural operation, which was NT$ 29.2 million, or US$920,000 (including agricultural power electricity users from Agriculture and Food Agency, Livestock and Poultry Agency, Fishery Agency, Department of Irrigation and Engineering).

SUBSIDY EFFECT

Statistical analysis of the basic electricity fee's 2015 subsidy amount for the various categories of agricultural electricity and the load factor indicate the subsidy amount for these three categories (crops planting, aquaculture, livestock and poultry) are the highest and account for 37 percent-41.3 percent of total amount, while the load factor is below 20 percent. The subsidy amount for irrigation accounts for 53.9 percent, while the load factor is 0. The subsidy amounts is NT$ 61,286,800, or US$2.0 million for crop planting, NT$ 52,463,300 (US $1.7 million) for aquaculture, NT$ 52,456,400 (US $1.7 million) for livestock and poultry, and NT$ 97,539,000 (US $3.1 million) for irrigation, for a total of NT$ 264 million (US $8.5 million). All subsidy amounts for the basic electricity fee in different load factors are shown in the table below.

Table 13: Statistics of the Subsidy for Basic Electricity Fee during the Power Use Suspension Period

	Crop Plantation		Aquaculture		Livestock and Poultry		Irrigation		Total	
	Amount	Ratio	Amount	Ratio	Amount	Ratio	Amount	Ratio	Amount	Ratio
Load factor is 0	11,427.4	18.6%	19,725.4	37.6%	5,508.5	10.5%	**52,612.4**	**53.9%**	89,273.7	33.8%
Load factor is 1-19%	**22,680.1**	**37.0%**	**20,826.7**	**39.7%**	**21,671.2**	**41.3%**	**37,409.0**	**38.4%**	**102,586.1**	**38.9%**
Load factor is 20%-39%	17,946.2	29.3%	8,413.5	16.0%	18,805.2	35.8%	6221.8	6.4%	51386.9	19.5%
Load factor is 40%-59%	6,510.7	10.6%	2,474.0	4.7%	5,529.5	10.0%	1,074.4	1.1%	15,318.5	5.8%
Load factor is 60%-79%	2,722.4	4.4%	1,020.9	1.9%	1,210.3	2.3%	221.3	0.2%	5174.9	2.0%
Load factor is above 80%	0.0	0.0%	3.9	0.0%	1.5	0.0%	0.0	0.0%	5.4	0.0%
Total	**61,286.8**		**52,463.3**		**52,456.4**		**97,530.0**		**263,745.5**	

Remark: Categories with highest ratios are in bold

Unit: thousands of NTD

REFORM MEASURES/EXPERIENCES

1. Self-evaluation

Subsidizing the basic electricity fee during the period of power use suspension for powering agriculture operation is effective. Because this measure is only applicable to users of electricity for powering agricultural operation during the suspension period to reduce basic electricity fee, it would not cause unnecessary domestic fossil fuel consumption.

2. Executed / Considered Reform Guidelines, Policy and Measures

The Council of Agriculture has planned to set up four Energy Saving Technology Service Corps for livestock and poultry, agriculture irrigation, aquaculture, and crop production, respectively, in order to reduce the basic electricity fee, to cope with future energy shortage issues and global warming, and to work in concert with the policy of energy saving and carbon reduction promoted by the Chinese Taipei government. These four service corps are intended to provide consultation and diagnosis services to users of electricity for powering agricultural operations free of charge in order to save electricity expenses, assist farmers and agriculture enterprises in saving electricity, and to give advice to improve energy saving facilities by increasing the efficiency of electricity use. In addition, Chinese Taipei provides a subsidy for energy saving facilities for farmers and farmer groups, and promotes practical, reasonable, and substantially beneficial energy-saving and carbon-reducing measures, in order to create a win-win situation for farmers and consumers.

CHINESE TAIPEI VISION/END GOAL FOR SUBSIDY

Chinese Taipei intends to continue to provide support for farmers' livelihoods through reduced spending on electricity load fees during non-peak seasons. New measures to provide consulting services and technical assistance to promote energy efficiency should lower farmers' peak loads, further resulting in lower load fees in both peak and off-peak seasons. No reform to this policy is currently under consideration.

INSIGHTS FROM PEER REVIEW PROCESS

OBSERVATIONS

Goals and Objectives

1) **The goal of the subsidy is to reduce the capacity charge (also known as a load fee) assessed on farmers, particularly small-scale farmers whose electricity use is concentrated seasonally.**

Effectiveness of the Subsidy

2) **The basic electricity load fee reduction lowers the cost for electricity and maintenance of electricity service to farmers during non-peak periods.** The load fee reduction provides a small subsidy in periods of near-peak consumption and a greater subsidy when electricity consumption is at or near zero. The subsidy appears to perform as intended.

3) **The gross subsidy is quite small, amounting to NT$264 million (US$8.6 million) annually.** It is unknown what fraction of the 800,000 eligible farms in Chinese Taipei have signed up for this subsidy, but at almost any number the per-farm annual subsidy is very small.

4) **There are four agricultural subsectors that benefit from the subsidy: field crops (30 percent), aquaculture (18 percent), livestock and poultry (18 percent), irrigation (35 percent).**

Structure and Operation of the Subsidy, and Current Operating Environment

1) **The subsidy is directly transferred to beneficiaries via the governmental electric utility, TaiPower, in the form of partial or full exemptions on capacity charges.**

2) **The subsidy design creates a tiered structure for electricity capacity charges, with less subsidy as monthly electricity use approaches annual monthly peaks, and greatest subsidy when monthly consumption is near zero.** This allows farmers to minimize electricity bills in off-peak periods when they have minimal cash income.

3) **The structure of the subsidy provides higher subsidies to those with the lowest off-peak usage.** This structure ensures that the farms with the lowest electricity use in off-peak seasons derive the greatest benefits.

4) **The administrative costs of the subsidy are not known.** Given its small size, any significant administrative costs would likely render the subsidy operationally inefficient. The VPRT did not determine whether the provision of the subsidy is automatic, or whether beneficiaries must apply to receive it.

Subsidy Efficiency and Targeting

5) **The subsidy is highly targeted, but may have some abuse.** The subsidy is only paid out to registered farmers. However, there are some questions as to whether registered farmers who are not active in farming (or only minimally so) are still able to collect the subsidy.

6) **Farmers may change their electricity consuming behavior to increase their subsidy payments, leading to inefficiencies.** The design of the subsidy encourages farmers to crowd their electricity use into peak months to maximize their subsidies in off-peak months. Council of Agriculture officials noted that this behavior among farmers is observed. These inefficiencies are absorbed by TaiPower and other grid ratepayers who must pay for the increased peak load during peak agricultural consumption periods.

7) **The Government is currently providing complementary measures in the form energy efficiency technical assistance to farmers to assist them in reducing their electricity needs.**

Source of Funding

- **The subsidy is partially financed by TaiPower, which is able to recoup the cost of this subsidy by increasing its charges on other ratepayers.** This portion of the subsidy is a cross-subsidy.
- **The remainder is paid for by COA budgetary expenditures, paid for by the central government.** COA is in the process of increasing its reimbursement of TaiPower for the foregone electricity ratepayer revenues comprising the subsidy.

KEY FINDINGS

Goals, Structure and Operation of the Subsidy

1) **The reduction in electricity tariffs through discounted load fees constitutes a subsidy.**

Subsidy Efficiency and Targeting

1) **The subsidy appears to be relatively limited, though more information on the subsidy's share of total electricity fees paid by farmers is needed to inform this determination.** The absolute volume of the subsidy is small, both as a share of expenditures and ratepayer tariffs as well as household income to individual farmers.
2) **The subsidy has built-in provisions to prevent wasteful consumption, though it does create some perverse incentives.** Because the subsidy decreases as monthly electricity consumption approaches a farm's annual peak, it does not encourage volumetrically wasteful consumption. However, it is possible that perverse incentives to consume slightly more electricity within different load discounting bands exist, or to transfer consumption to months with peak usage, encouraging farmers to use more electricity and increase wasteful consumption.
3) **The small size of the subsidy suggests it likely has a minimal impact on government objectives to assist farmers, and likely does not justify its administrative costs.**
4) **The technical and consulting support for farmers that Chinese Taipei has already planned will likely reduce wasteful consumption and promote conservation, regardless of future policy reforms.** The planned measures to assist farmers in reducing their consumption of electricity will likely reduce market distortions, wasteful consumption, and total size of the subsidy alike.

Source of Funding

5) **The coverage of the subsidy by TaiPower and ultimately by other ratepayers may place an undue burden on other ratepayers to pay for agricultural support mechanisms.** If the subsidy is maintained, it should be paid for not by TaiPower ratepayers but by government budgetary programs for farmers' assistance.

VPRT RECOMMENDATIONS

1) **To create a level playing field and remove market distortions, Chinese Taipei might consider reforming the electricity load fee regimes to create common policies across all rate-paying entities, or across all rate-paying agricultural and industrial entities with**

similar consumption patterns. Further study of efficient and fair electricity load fee structures is recommended.

2) **If the current electricity capacity charge subsidy is preserved, it could be redesigned to better target bands of electricity consumption, particularly at the low end.** For example, an analysis of the subsidy benefits distribution may suggest it is most needed in the lowest tiers, and not at all at the high tiers.

3) **Conversion of the electricity load fee discount to a cash benefit or investment in energy efficiency for farming operations might reduce inefficiencies, market distortions, and externalized costs imposed on TaiPower and ratepayers.**

4) **The subsidy should be fully converted from a cross subsidy to a governmentally budgeted expenditure paid for by the CoA.**

5) **The subsidy should be considered for comprehensive reform or replacement consistent with broader agricultural sector policy objectives (see below).**

CASE STUDIES & LESSONS LEARNED

The specific nature for the design of capacity (also known as load or demand) charge subsidies appears to be fairly unique to Chinese Taipei. The peer review team has not yet identified subsidies with this particular set of characteristics in other economies.

However, there is a broad literature on the establishment of electricity tariffs, and what constitutes a fair and reasonable tariff. Given that the demand charge exists for a reason, its removal for a certain set of ratepayers – farmers – undermines the purposes for which it was established. These include, foremost: (1) fair collection of revenue from electricity grid customers; (2) creation of an incentive for electricity customers to reduce their peak demand or load; and (3) mechanism by which electric utilities can raise sufficient revenue to address peak demand and load management. By diminishing or removing the capacity charge, the subsidy undermines all three of these justifications and purposes served by the load charge, creating inefficiencies, perverse incentives, and unfair transfer of demand-related grid management costs to other ratepayers. These issues are explored below.

In lieu of electricity capacity charge subsidies, cash transfers or other social benefits are encouraged to help target beneficiaries – smallholding farmers - defray electricity capacity charge expenses without burdening the utilities and other ratepayers with unnecessary costs and creating perverse incentives.

The section below has excerpts from three public policy best practices resources, which provide a theoretical basis for understanding capacity and load charges. One case study on electricity rate structure follows, drawing from the APEC peer review of the Philippines.

Principles of Fair and Transparent Electricity Tariff Design

An electricity policy expert, Ahmad Faruqui, has extensively studied the history of electricity tariff formation, including the theory, politics, and practice of electricity utility retail billing (Faruqui, 2015a). Even today, the key principles for utility rate determination developed by James Bonbright in 1961 remain relevant and good guidance even in the face of technological change and dynamically evolving energy prices and sources. These principles are presented below as "Bonbright's Ten Commandments" (Bonbright, 1961).

"Bonbright's Ten Commandments"

1. Effectiveness in yielding total revenue requirements under the fair-return standard
2. Revenue stability and predictability

3. Stability and predictability of the rates themselves
4. Static efficiency, i.e., discouraging wasteful use of electricity in the aggregate as well as by time of use
5. Reflect all present and future private and social costs in the provision of electricity (i.e., the internalization of all externalities)
6. Fairness in the allocation of costs among customers so that equals are treated equally
7. Avoidance of undue discrimination in rate relationships so as to be, if possible, compensatory (free of subsidies)
8. Dynamic efficiency in promoting innovation and responding to changing demand/supply patterns
9. Simplicity, certainty, convenience of payment, economy in collection, understandability, public acceptability, and feasibility of application
10. Freedom from controversies as to proper interpretation

In particular, the capacity charge subsidy for farmers violates three of the "ten commandments", namely 4, 6, and 9: discouraging wasteful consumption, fairness in allocation of costs, and simplicity of design, respectively. First, the capacity charge subsidy does not discourage all forms of wasteful consumption. While it does not encourage increased overall use of electricity, it does encourage the clustering of electricity consumption into peak months. Such behavior benefits farmers in two ways: first of all, purposely clustered electricity use (beyond what is otherwise optimal for farmers absent the subsidy) raises the annual monthly peak or load set point. This alone lowers the load factor of unchanged consumption in the off-peak months. The concomitant reduction of consumption in off-peak months further benefits the farmer. (For example, if typical off-peak monthly consumption is 400 kWh, and peak is 1,000 kWh, the average off-peak monthly load is 40 percent. If peak is raised to 1,600 kWh, load falls to 25 percent. If the load is fully transferred to on-peak, then off-peak consumption is zero, or 0 percent of peak).

This reduction of load factor by clustering electricity use would be the optimal strategy for farmers to minimize their load. However, this practice is wasteful, because it requires the utility to increase overall electricity grid capacity to meet the higher peak with the marginal addition of previously off-peak season farmer demand. This added capacity imposes additional costs on the system, including the utility and other ratepayers. It also likely leads to additional pollution as high-cost, polluting fuel sources such as diesel fuel or oil often account for the sources of dispatched peak power.

This imposition of additional costs is doubly unfair to other ratepayers and to the utility. Not only are additional and superfluous costs added to the system, but they are borne almost entirely by non-farmer ratepayers, because the farmers enjoy an increased subsidy in off-peak months. Moreover, the presence of the subsidy in itself – independent changes in farmer behavior – is unfair, because it spreads the real costs associated with providing grid capacity and service to farmer ratepayers among the remaining ratepayers (or are absorbed by the utility and its shareholders).

Lastly, the complex, multi-tiered structure of the subsidy violates the commandment for understandability and simplicity. Rather than use an elaborate formula to marginally decrease farmer electricity bills via tariff and charge structure, which creates perverse incentives and is difficult to understand, other simpler measures can preserve fair allocation of costs and proper incentives to consume efficiency, while providing the relief that the government judges farmers deserve. In fact, the energy efficiency and conservation measures currently undertaken by the Council on Agriculture to assist farmers provide precisely this benefit. Other measures may include cash transfers or other subsidies, discussed in the cross-cutting agricultural subsidies section below.

Moreover, as the growth in electricity consumption levels off in mature economies around the world, energy efficiency and distributed electricity generation (e.g., PV solar panels on homes and businesses) are reducing the absolute volume of electricity sold over the grid. As electricity volume falls, capacity and load charges are representing an increasing share of utility cost structure and, consequently, cost-reflective consumer electricity bills (see "Problems with Current Rate Structure" heading below). Therefore, it will become increasingly important over time to address market distortions and inefficiencies related to capacity charge subsidies and cost misallocations.

Problems with Current Rate Structure (De-emphasis of Demand Charges)

- The onset of distributed generation has exposed the failings of existing rate design
- While network costs are largely fixed, the bulk of the revenues are variable under traditional volumetric tariffs
- As growth slows down due to the deployment of distributed generation and "organic" conservation, networks face revenue risks
- Ultimately, tariffs are raised for all customers, creating inequities as customers with low kW demand subsidize customers with high kW demand
- With no demand charges, customers have no incentive to lower their kW demand, creating inefficiencies in the deployment of scarce capital (Faruqui, 2015a).

Components of a Cost-Based Electricity Tariff

Faruqui has further developed an "ideal" cost-based electricity tariff that reflects all the important components of costs borne by the electricity utility responsible for transmission and distribution. These five components are listed below. (If vertically integrated, the utility may also be responsible for generation, which increases the importance of the 'energy charge', or volumetric tariff based upon electricity consumed.) In the future, Faruqui predicts that electricity tariffs that do not incorporate these five distinct elements into the rate structure will likely fail to fully recoup costs, to fairly allocate costs among ratepayers, and to discourage wasteful, suboptimal consumption. If Chinese Taipei and TaiPower are considering broad tariff reform or narrow electricity subsidy reform, it is advisable to consider integrating the following elements into tariff construction (Faruqui, 2015b).

Components of an Ideal Cost-Based Electricity Tariff

A. Service charge
   1) Billing, metering and customer care
B. Demand charge
   2) A reservation charge for transmission and distribution capacity
   3) A reservation charge for generation capacity
   4) A demand charge for actual utilization of capacity
C. Energy charge
   5) Time varying

In the context of Chinese Taipei, Faruqui's prescription for tariff design suggests that demand charges should not be subsidized or removed; this practice unfairly penalizes other ratepayers and results in inefficient management of load on the grid.

Best Practices for Tariff Setting (see Subsidy #2)

The World Resources Institute (WRI) electricity tariff guide, first introduced in the lessons learned section of subsidy #2, contains further guidance on tariff determination from the perspective of the utility (Wood, et al., 2014). The considerations below illustrate the sometimes conflicting imperatives of affordable and accessible electricity on the one hand, and full cost recovery, fair cost allocation, and

sustainable grid management on the other. WRI recommends that these considerations be carefully weighed, and that assumptions and results be periodically revisited and evaluated as local conditions evolve.

WHAT ARE THE OBJECTIVES OF THE TARIFF DETERMINATION?

The objectives for setting tariffs should be clearly stated. Tariff-setting bodies have multiple objectives: promoting investment, improving utility performance, improving service quality, enhancing energy security, improving the financial health of electric utilities, promoting energy efficiency, expanding services, and alleviating poverty (see above). A clear statement of objectives helps all stakeholders assess the appropriateness of tariff proposals and of the tariff that is set. Clear objectives establish predictability and improve stakeholder confidence in the regulatory process.

The next step is to set specific, measurable, achievable, realistic, and time-bound (SMART) targets to achieve the objectives. For example, to improve consumer service by increasing investments in the transmission and distribution network, a target might guide analysis of the investment needed and document how the proposed tariff will recover the investments. A "tariff philosophy document" containing objectives as well as targets and the methodology used to determine a tariff can contribute to greater clarity and accountability.

HOW DOES THE TARIFF SUPPORT MARGINALIZED SECTORS OF SOCIETY AND BROADER NATIONAL GOALS?

Because electricity has become an essential service, it is important to consider the impact of tariffs on poor and remotely located residents, who spend a relatively large percentage of their income on electricity. Subsidies and cross-subsidies of consumed electricity are the most common forms of support and can include subsidies for free connections and "lifeline" amounts of electricity for very poor consumers.

Trade-offs between grid access and financial viability should be kept in mind. For example, while access to electricity in remote areas might be a priority, extending the grid could be weighed against cost-effective alternatives, such as providing off-grid electricity services or setting up a decentralized system. Even so, the choice of option need not be dominated by short-term financial considerations. The tariff determination process is important in achieving broader national goals, such as energy security, access to electricity, poverty alleviation, food security, delivery of basic health and education services, economic development, and environmental protection. The tariff determination process and tariff proposals should include clear analyses of the impacts of tariffs on sector objective and national goals. For example, if achieving food security is a national development priority, then electricity tariff supports might favor the agricultural sector.

In the context of WRI's guidelines, COA and other government agencies responsible for the electricity sector should consider a holistic approach to setting electricity tariffs that include the impact of subsidies on revenue, cost structure of subsidy provision, and on total electricity load management.

Case Study #1. Philippines Missionary Electrification Subsidy (see Subsidy #2)

Relevance: An electricity cross-subsidy to benefit vulnerable consumer groups paid for by other ratepayers.

Case Study Summary (APEC Peer Review, Philippines, 2016)

The Universal Charge for Missionary Electrification (UC-ME), first introduced in the case study section of subsidy #2, is a cross-subsidy designed to provide affordable electricity access in areas across the Philippines without central grid connection. UC-ME, in relying on ratepayer surcharges rather than government appropriations to support rural electrification, has reduced the financial burden on the government and contributed to the government's improved fiscal position. Regulated tariffs in SPUG areas do not distinguish between consumer classes. Since UC-ME subsidizes all consumers in SPUG areas regardless of their electricity consumption, there is no differentiation of customers on the basis of income or consumption. Therefore, SPUG electricity tariffs can provide the subsidy to rich households, including those with second houses in the region, as well as to wealthy businesses such that the benefits of this subsidy are being captured more by those who can afford non-subsidized prices. UC-ME, as currently structured, effectively encourages inefficient fossil fuel consumption. The collected UC-ME is allocated only to fill the gap between the cost of electricity generation and the regulated electricity tariffs for consumers in SPUG areas (which is below the prevailing tariff in the grid-connected parts of the economy).

There is little incentive to power generators in the area to modernize facilities, as their costs are recovered through the UC-ME scheme and electricity tariff is regulated. This leads to inefficient and wasteful use of fossil fuels, and perpetuates inefficient and high-cost production. Although the SPUG-area power production only amounts to less than one percent of total fossil fuel consumption for power generation nationwide, the fuel volumes are substantial at the local and regional scale. Therefore, absent additional measures to promote diversification of power generation away from diesel and fuel oil, the subsidy effectively encourages wasteful consumption of fossil fuels.

Ratepayer surcharges, including the UC-ME, have been said to undermine the industrial competitiveness of the Philippines relative to other neighboring economies by pushing up electricity costs in the grid-connected areas to among of the highest in the region. Electricity costs in the Philippines are among the highest in the region, next only to Japan. UC and other taxes constitute more than 10 percent of the average electricity tariff, and UC charges have been increasing over time (UC outlays have increased almost tenfold from 2009 to 2014). Therefore, the entire UC program, including the UC-ME, has been a source of concern for energy-intensive industries, as they consider high electricity prices as one of the barriers to investment in the economy.

RECOMMENDATIONS

Recommendation 1. Further detailed cost-benefit analysis is recommended to evaluate the impacts of the UC-ME as cross-subsidy. Lack of any cost-benefit analysis with detailed and quantitative data has made it difficult to provide concrete recommendations and propose alternatives to address the concern on the financial sustainability and effectiveness of the current Missionary Electrification policy.

Lessons Learned: This cross-subsidy imposes costs on other ratepayers and contains inefficiencies, leading to wasteful consumption. It is poorly targeted to the neediest households and businesses, and it is unclear whether the subsidy is substantially advancing its underlying objectives. The Philippines Peer Review Team recommended a cost-benefit analysis to determine the subsidy's effectiveness, a step that would also appear warranted for Chinese Taipei's electricity capacity charge subsidy.

9. SUBSIDY #5: PETROLEUM PRODUCT PRICE SUBSIDY FOR AGRICULTURAL MACHINERY

SUMMARY*: One of the newest fiscal support measures the government provides for farmers, a governmental Agricultural Development Fund pays for a share of petroleum fuel prices purchased by farmers for agricultural equipment during times of fuel price spikes. Based upon an established formula, the government pays a calculated share of the incremental recent increase in fuel costs for farmers. The amount of discounted fuel is capped by regulatory limits of reasonable use for particular equipment types. The subsidy is only in effect in times of sharply rising prices, and is designed to protect agricultural producers from spikes in fossil fuel-related supply costs.*

CURRENT STATUS

This subsidy is currently in force.

POLICY BACKGROUND

1. Policy Making's Timing and Background

To cope with the fluctuation of global oil price, Chinese Taipei's Executive Yuan announced a measure supportive of oil price subsidies for underprivileged groups on April 28, 2011, and the measure was implemented on May 1, 2011. The agricultural machinery fuel oil's base price is set according to the listed oil price of CPC Corporation on April, 25, 2011 (the diesel fuel is NT$30.4 per liter and the 92 unleaded gasoline is NT$32.4 per liter), and the subsidy price for each month is half of the difference between the base price and the average of first three weeks' oil prices of previous month. *The Review for Oil Price Measures of All Agencies and Departments* meeting on December 18, 2013 concluded that the base price should adopt the average price of diesel fuel and gasoline in 2013 for the agricultural machinery subsidy increase in 2014.

2. Policy Objectives and considerations

Due to the fact that the subsidy for agricultural machinery oil price is aimed at underprivileged groups, and the oil price has to be higher than the base price for the subsidy, the goal of this measure is to avoid the impact on farmers' livelihood due to an oil price increase.

3. Other Supporting Measures

According to the Council of Agriculture's Management Directions for Agricultural Machinery Use Permit and Directions for the Exemption of Fuel Oil Business Tax for Agricultural Machinery and Farmland Transport Vehicles, the standard fuel oil usage is established for all types of agricultural machinery and farmland transportation, taking annual reasonable use into consideration (see Appendix A – Additional Information on Subsidies for Review). Each agricultural machine is certified with the usage of fuel oil in business tax exemption, and it is necessary for farmers to present an agricultural machinery

using permit and personal ID to purchase tax exempted fuel oil. If the purchase volume exceeds the standard usage, there is no discount. There is a reasonable limit for business tax exempted fuel oil.

CONTEXT AND HISTORY

1. History of Revisions

This agricultural machinery fuel oil subsidy is intended to cope with global oil price fluctuations and is meant to assist underprivileged groups with their basic needs to relieve their financial burdens. Therefore, the Executive Yuan implemented the oil price subsidy on April 28, 2011, targeting these underprivileged groups. The competent authority implementing this agricultural machinery oil price subsidy is the Council of Agriculture. It holds regular annual review meetings, and the subsidy is subject to the impact of oil price increases on farmers' livelihoods, when applicable.

2. Current Regulation (Including Financial Source)

This subsidy was ordered by Chinese Taipei's Executive Yuan. The expense for this subsidy is paid for by Chinese Taipei's Agriculture Development Fund.

SUBSIDY'S EFFECT

The amount of subsidy for agricultural machinery fuel oil price (shown in the table below) was $6,790USD for 2011, US$1,410,000 for 2012, US$1,712,000 for 2013, and US$310,550 for 2014. Since September 2014, the subsidy has not been implemented since the oil price has been steadily below the base price. The expense for this subsidy is paid for by Chinese Taipei's Agriculture Development Fund. Monthly subsidy of agricultural machinery fuel oil price from 2011 to 2014 is shown in Table 15.

Table 14: The Subsidy Amount for Agricultural Machinery Fuel Oil Price from 2011 to 2014

Year	Subsidy Amount (USD)
2011 (100)	$6,790
2012 (101)	$1,410,000
2013 (102)	$1,712,000
2014 (103)	$310,550
2015 (104)	$0

Table 15: Monthly Subsidy for Agricultural Machinery Fuel Oil Price from 2011 to 2014

Month	Diesel Fuel			92 Unleaded Gasoline		
	Average Price of Previous Three Weeks	Subsidy	Base Oil Price	Average Price of Previous Three Weeks	Subsidy	Base Oil Price
	-	0.1	4/25/2011 (Price)	-	0.1	32.4
April 2012	33.1	1.4	30.4	34.0	0.8	32.4
May	32.9	1.3		33.8	0.7	
June	31.8	0.7		32.7	0.2	
July	30.6	0.1		31.6	0	
August	30.2	0		31.5	0	
September	32.7	1.2		33.8	0.7	
October	33.6	1.6		34.7	1.2	
November	32.7	1.2		33.8	0.7	
December	32.0	0.8		33.2	0.4	
January 2013	32.0	0.8	30.4	33.2	0.4	32.4
February	32.3	1.0		33.4	0.5	
March	33.5	1.6		34.6	1.1	
April	32.5	1.1		33.6	0.6	
May	32.2	0.9		33.4	0.5	
June	31.2	0.4		32.5	0.1	
July	31.3	0	(2013 Average Oil Price)	32.6	0	32.7
August	31.7	0.2		32.9	0.1	
September	32.5	0.6		33.6	0.5	
October	33.4	1.0		34.5	0.9	
November	32.3	0.5		33.5	0.4	
December	32.0	0.3		33.2	0.3	
January 2014	32.7	0.2	(2013 Average Oil Price)	33.8	0.2	33.4
February	32.5	0.1		33.6	0.1	
March	32.5	0.1		33.6	0.1	
April	32.7	0.2		33.8	0.2	
May	32.4	0.1		33.5	0.1	
June	32.6	0.2		33.7	0.2	
July	32.7	0.2		33.8	0.2	
August	32.6	0.2		33.7	0.2	
September	32.0	0		33.1	0	
October	31.1	0		32.4	0	
November	29.4	0		30.8	0	
December	27.7	0		29.2	0	

Unit: NTD dollars/Liter

Notes:

1. The agricultural machinery fuel oil base price was originally set according to the listed oil price from CPC Corporation on April, 25, 2011 (the diesel fuel is NT$30.4/L, and the 92 unleaded gasoline is NT$32.4/L), and the subsidy price for each month is half of the difference between the base price and the average of previous three weeks' oil prices of each month.

2. Since July 2013, the base fuel oil price was changed to the average price of whole year 2012. The diesel fuel is NT$31.4/L and the 92 unleaded gasoline is NT$32.7/L.

3. In January 2014, the base oil price was changed to the average price of the entire year 2013. The diesel fuel is NT$32.3/L, and the 92 unleaded gasoline is NT$33.4/L.

REFORM MEASURES/EXPERIENCES

1. Self-evaluation

Due to the fact that the subsidy for agricultural machinery oil price is aimed at underprivileged groups, and the oil price has to be higher than the base price for the subsidy to be available, the goal of this measure is to avoid the impact on farmers' livelihoods due to oil price increases. This subsidy does not encourage wasteful consumption and does not violate the principles of the APEC Peer Review on Fossil Fuel Subsidy Reform.

2. Reform Guidelines, Policy and Measures Carried out/in Consideration

According to the Council of Agriculture's Management Directions for Agricultural Machinery Use Permit and Directions for the Exemption of Fuel Oil Business Tax for Agricultural Machinery and Farmland Transport Vehicles, the standard fuel oil usage is established for each types of agriculture machinery and farmland transport vehicles, taking annual reasonable use into consideration (see Appendix A). Fuel subsidy limits for each farmer are determined based upon number and type of machines registered to that farmer. Each agricultural machine is certified with the oil usage in business tax exemption, and it is necessary for farmers to present an agriculture machinery using permit and personal ID to purchase tax exempted oil. If purchase volume exceeds the standard usage, there is no discount. There is a reasonable limit for purchasing tax exempted oil; therefore, the measure will not cause the waste of fossil fuel.

CHINESE TAIPEI VISION/END GOAL FOR SUBSIDY

Chinese Taipei intends to continue to support the livelihoods of farmers as an underprivileged and vulnerable group. Though the subsidy only takes effect in times of rapidly escalating fuel prices – which have not been the case since 2013 – the government intends to maintain this policy going forward, and is not currently considering reform.

INSIGHTS FROM PEER REVIEW PROCESS

OBSERVATIONS

Goals and Objectives

1) **The petroleum price subsidy for agricultural machinery is intended to cushion farmers from petroleum fuel (diesel and gasoline) price spikes that harm their welfare and production capacity.**

Effectiveness of the Subsidy

2) **Since instituted in 2011, the subsidy has amounted to between zero and five percent of the cost of fuel, depending on the direction of fuel price movements in the marketplace.**

3) **The policy only becomes operational in times of rising petroleum fuel prices.**

4) **The subsidy has not exceeded US$1.8 million per year in any year since 2011.**

Structure and Operation of the Subsidy, and Current Operating Environment

5) **Subsidy targets specific consumers (farmers) and specific uses (agricultural machinery). Like the VAT exemption for agricultural fuel use, this subsidy is also limited in amount to a threshold of reasonable use for each piece of farming machinery.**

6) **The subsidy builds on the farmer identification and allocation system created under the VAT exemption program.** This administrative feature appears to limit operational costs.

7) **The support measure partially defrays the price increase of fossil fuels in times of rising prices according to a defined formula.** The subsidy appears to fairly efficiently deliver limited fuel price reductions to farmers during times of rising petroleum fuel prices. The subsidy covers roughly one-half of increases in fuel prices.

Subsidy Efficiency and Targeting

8) **Though the policy is designed to target "underprivileged groups," it does not appear only to apply to a subset of farmers, but rather to all farmers.** The CoA considers all farmers in Chinese Taipei to be smallholders and underprivileged. It is also unknown what fraction and which subset of eligible farmers claims the subsidy.

9) **The partial fuel price stabilization effect of the subsidy effectively shields consumers from price spikes, transferring fuel price volatility risk from consumers to the government (and taxpayers).** Fuel price volatility risk exists at all times, whether oil prices are low or high. Farmers' knowledge that the fuel price volatility risk is partially transferred to the government, which provides subsidies during price spikes, diminishes their incentives to take provisions to protect themselves against such price spikes. This is a market distortion that leads to wasteful consumption, including disincentives for efficiency, conservation, and adoption of alternative fuel technologies.

Source of Funding

10) **The cost of the subsidy is covered by the Agricultural Development Fund, a government fund administered by the Council of Agriculture.**

KEY FINDINGS

Goals and Objectives

1) **When in effect – in times of rising prices – the petroleum fuel price support constitutes a subsidy.** This support measure also is tantamount to a partial fuel price risk insurance policy, which has value to farmers even when prices are low or stable.

Effectiveness of the Subsidy

1) **Because the subsidy is targeted, limited in scope, and dependent upon market conditions, it has limited but not eliminated inefficiencies and distortionary effects.** However, farmers face a reduced price incentive to curtail fuel consumption in times of high prices, creating an inefficiency and market distortion (albeit of limited magnitude).

2) **The subsidy is limited by caps determined by reasonable fuel or electricity use for each type of equipment, serving to prevent free riders.** Though it appears not to have been studied, the limits appear not to be frequently breached or violated, meaning that there is little leakage of subsidized fuel to non-sanctioned uses.

3) **The current system of administration is, by all accounts, cost-effective and efficient.** The government described an automated system built around the existing fuel VAT exemption database. No complaints about the system's efficiency, cost, or effectiveness were noted.

4) **The subsidy's current structure inherently increases the size of the benefit as oil prices rise, and reduces the benefit as oil prices fall.** This is because the post-tax subsidy's value is equivalent to forgone tax revenue, which is a fixed percentage of a good whose value rises and falls, thus rising and falling in tandem. This feature is presumed to be desirable and beneficial to recipients, who need price relief the most when petroleum is expensive.

Subsidy Efficiency

5) **This subsidy is small when considered on a per-farming household basis to reduce costs and increase the financial viability of farming, particularly at a small scale.** Though individual farmers were not surveyed, because an average farming household's income is less than US$7,000 per year (though overall household income is more than 5 times greater), small subsidies are assumed not to be considered negligible by the beneficiaries. The subsidy is enjoyed directly and immediately by the intended beneficiaries, who are aware of the benefits.

6) **The subsidy's caps serve to prevent market distortions.** Due to the small amount of subsidized fuel provided to each household, behavior is likely only affected at the margins at a de minimis level. While lowering fuel prices may encourage wasteful consumption and discourage adoption of energy-efficient technologies and practices at the margin, the small size of the subsidy and targeted nature to small farmers likely limits this effect.

7) **Because the subsidy removes some of the fuel price volatility risk from the farmers, farmers are shielded from some of the costs of maintaining petroleum fuel consumption that might otherwise incline them to seek alternatives.** The removal of fossil fuel volatility risk may retard or prevent the adoption of clean technologies such as fuel-efficient equipment and alternative technologies, such as electric tractors and farming approaches that minimize fossil fuel-powered equipment use.

Targeting

8) **The subsidy applies to all farmers, and is not narrowly targeted by sub-sector or income level.** Consideration of the highest priorities for supporting farmers – income support for farmers, encouragement of land usage for farming activities, etc. – might lead to the conclusion that further targeting is desirable.

9) **The subsidy likely disproportionately benefits farmers with more energy-intensive production, and farmers who own and operate farm equipment.** Because Chinese Taipei has a highly diversified farming sector, it can be presumed that the energy- and resource-intensity of different types of farming varies widely (for example, growing of orchids in greenhouses versus pineapples in groves). This would lead to unintended and disproportionate support for energy-intensive industries as well as unfairly penalizing energy-efficient farming operations.

10) **Further targeting the subsidy to low-income and/or small-scale farmers would further improve the fiscal efficiency of the subsidy**. While CoA stated that all farmers are small holders and low-income, there may be a sufficiently wide range of production scale and income among farmers to justify further targeting.

11) **Farmers might benefit equally or more from price supports for other farming inputs.** Providing support for other inputs, many of which are also affected by fuel price increases (seeds, fertilizer, equipment, processing, training, technology, labor, shipping) might more equitably spread benefits among farmers and lead to less wasteful consumption of fossil fuels.

12) **Despite its efficient implementation, its small size and limited impact suggest this subsidy is not an efficient use of government resources.** Government time and funding might better be targeted to measures that directly serve specific governmental agricultural policy objectives.

Source of Funding

13) **The subsidy appears to be paid by the Council of Agriculture.**

VPRT RECOMMENDATIONS

1) **Conversion of the fuel subsidy to a cash benefit for farmers roughly equivalent in size to the current subsidy could remove the perverse incentives and distortions while continuing to provide targeted support in times of price spikes.**

2) **Promotion of fuel-efficient, conservation, and fossil-free agricultural technologies and farming approaches could reduce the need for the subsidy and promote farmer welfare in times of future price spikes.**

3) **There are opportunities for this subsidy to be more targeted and more efficient.**

4) **Converting the subsidy to a cash benefit while restoring fuel taxes would promote the efficient use of fuel, including conservation, efficiency, and substitution to cleaner technologies, while maintaining support for farmers.**

5) **Targeting the subsidy to the neediest smallholder and/or low-income might allow for limiting the subsidy to those who most need it.** Such a policy might better align the design and fiscal outlays with the stated goals of the subsidy.

6) **Complementary measures are encouraged to promote efficiency and reduce market distortions**. These measure might include:

a. Technical assistance to farmers on fuel and electricity efficiency;

b. Rebates for farmers' purchases of clean and efficient agricultural machinery; and

c. Research and development for the commercialization of alternative technologies that do not require fossil fuels (e.g., electric vehicles and motors) or require less use of tractors and other equipment (e.g., no-till agriculture and organic, fertilizer-free farming)

7) **The small size of the program and the lack of clear social goal suggest that it should be considered for reform (see 'cross cutting agricultural subsidies' section below).** As noted

above, the time and resources currently devoted by taxpayers and the Council of Agriculture to this program should be reviewed in light of the highest priorities for the agriculture sector. A review of these priorities and resources devoted to them might yield a set of more targeted policies with greater benefits than the subsidy in question.

8) **A review of stakeholder preferences and needs is encouraged.** The peer review panel recommends surveying farmers and other target beneficiaries (retired farmers, farmers' families, young people considering farming careers) to determine which government resources, protections, and benefits most address their social and professional needs. In particular, a study of the farming inputs and needs with the greatest value for the greatest number of farmers would be extremely valuable information for policymakers. These results would contribute valuably to reform efforts and help ensure public support for them.

9) **Reform efforts should consider the need of vulnerable farming households to get relief from petroleum price spikes.** This need may not require explicit fuel subsidies, but could envision automatic disbursement of other social benefits in times of rising prices.

CASE STUDIES & LESSONS LEARNED

While admittedly not large, the petroleum price subsidy for users of agricultural machinery during rising price environments is a subsidy, and it is a mechanism that is similar to petroleum price stabilization efforts around the world. While Chinese Taipei targets its subsidy narrowly to farmers, caps the benefits, and only minimally changes prices rather than fixing them, the effects are largely the same but on a smaller scale. The efforts of other economies to stabilize oil prices for consumers thus offer a wealth of lessons. A specific case study is introduced on the Philippines Oil Price Stabilization Fund.

Other broader lessons and recommendations on reforming fossil fuel subsidies for farmers are discussed in the cross-cutting section on agricultural subsidies below.

Key lessons learned:

1) Oil price stabilization transfers oil price volatility risk from consumers to the government, which is a form of subsidy distinct from fiscal transfers. This subsidy creates market distortions that discourage efficiency, conservation, and the adoption of fuel-efficient and alternative fuel technologies.
2) The dampening of the price signal (i.e., lowering of prices) weakens the market signal to consumers to reduce consumption, artificially raising prices and consumption in a 'rebound effect' that undermines the subsidy when its size is large relative to the market.
3) Oil price stabilization mechanisms can provide valuable price relief during petroleum price spikes. However, other social benefits and cash transfers can serve this function. Such benefits should be designed to be triggered (or increased) in times of consumer price spikes.

Case Study #1: Philippines Oil Price Stabilization Fund

Relevance: The Oil Price Stabilization Fund (OPSF), like this subsidy, was created to help smooth the impacts of price spikes for consumers. It was subsequently removed, though measures to protect consumers from petroleum price volatility remain of great interest to the Philippines government, and motivate policy development, as does policy in Chinese Taipei.

Case Study Summary (APEC FFSR Peer Review, 2016)

From 1984 to 1998, the Philippines operated an Oil Price Stabilization Fund (OPSF), which allowed the government to peg the domestic crude oil and petroleum fuel prices to a level that was fixed by the government. When global crude oil prices fell below this fixed level, oil companies paid a surcharge into the OPSF account; and when prices were above the level, oil companies received payouts from the

OPSF to effectively keep the domestic retail price fixed. When oil prices were high, political resistance did not allow the government to increase the fixed price levels, and the fixed prices were kept low—resulting in an effective subsidy. The OPSF resulted in government budgetary shortfalls as, over time, payouts exceeded revenues into the fund. The fund was liquidated during the restructuring and liberalization of the oil industry in the Philippines; however, the OPSF continues to be an option weighed by policy makers in the Philippines to smooth out petroleum product price volatility on the domestic market.

APEC Peer Review Panel (APRP) Recommendation 1. The APRP recommended, consistent with current Philippine policy, not to reinstate the OPSF, regardless of oil price, as it results in wasteful consumption of fossil fuel and fiscal imbalances. Fuel diversification and efficiency improvements can enhance the resiliency of the Philippine economy to oil price volatility over the medium- to long-term. Although the Philippine energy sector is mostly deregulated and market-based, if there are policy concerns about significant price swings, they could be addressed through higher excise taxes, emissions charges, and similar measures. If an urgent, temporary measure is required to provide fiscal relief, targeted cash transfers and other social programs could be used to alleviate financial pressures on the poor in times of high prices (such as occurred in the Philippines in 2007 and 2008).

OBSERVATIONS

In addition to the recommendations, the APRP provided some additional observations to the Philippines government for consideration.

Observation 1. A wide range of additional measures can, over time, lower dependence on fuels with volatile prices determined by international markets. Given that the Philippines are dependent on internationally-priced petroleum, it (and all other importing economies) will remain vulnerable to oil price swings. However, complementary energy policies can promote the transition to more price-stable and/or lower-cost alternatives. Some of these measures could include, building on current government policies: (1) encouraging partial or full fuel substitution and modal alternatives; and (2) promoting energy conservation and efficiency to reduce petroleum demand through mandates, standards, labelling programs, and other incentives.

Observation 2. Price-dampening measures can protect against economic damage resulting from oil price volatility. In the near term, measures could be taken by the government directly or using regulatory or tax policy to spur action by the private sector to equip the economy to manage oil price spikes through price shock dampening. There are a number of best practices employed throughout the world that would be less costly and distortive than an oil price stabilization fund, and potentially more effective. These include: (1) creating a strategic petroleum reserve, (2) encouraging (through tax or regulatory policy) oil-dependent private firms to engage in fuel price hedging; and/or (3) encouraging or requiring large oil-dependent private firms to stock minimum petroleum fuel inventories.

Lessons Learned: Rather than reinstitute its oil price stabilization fund, the Philippines is seeking to reduce vulnerability to oil price spikes more broadly. A number of strategies exist to do this, from price smoothing to development of alternative fuels to strategic petroleum reserves. Methods to protect socially vulnerable groups include ad hoc cash transfers in times of price spikes. These cash transfers have the benefit of not creating the moral hazard of all fossil fuel volatility risk being transferred from the private citizen to the government; and giving the private citizen the flexibility to use the funds for any products rather than fuel alone, thereby enhancing household welfare.

10. CROSS-CUTTING REVIEW OF AGRICULTURAL SUBSIDIES

CHINESE TAIPEI AGRICULTURAL SECTOR STRATEGY

The Chinese Taipei Council of Agriculture articulated to the APEC Peer Review Team a number of objectives of the government's policies in the agriculture sector, which are assumed to be the main motivation for the various agricultural subsidies discussed above (subsidies #3, #4, and #5). Similar to many economies, Chinese Taipei places a strong emphasis on financial protection of farmers as a social group and promotion of domestic agricultural production.

The government's stated agricultural sector goals include:

- Social support to farming households
- Promotion of domestic agricultural production- output and land use
- Promotion of agricultural competitiveness
- Attraction of young workers to the agricultural profession
- Adoption of new technologies in the agriculture sector[8]

The three subsidies discussed above – fuel and electricity VAT exemption, electricity capacity charge subsidies, and partial fuel subsidies in times of price spikes – are all (1) small in size, (2) benefit a subset of farmers, and (3) in focusing narrowly on fuel and electricity, are unlikely to be addressing the broader goals above identified by the COA. Rather, the subsidies provide a small margin of protection for farmers against fossil fuel price spikes, and incrementally reduce electricity and fuel costs related to agricultural production.

The COA made clear that it sees caring for smallholder farms and promoting farming as a key priority and strategic imperative for the economy. However, no information has been provided to suggest that these subsidies are substantial contributors to the livelihood or social protection of farmers. Further, it appears that fossil fuel subsidies do little to attract new farmers into the industry. Rather, the three agricultural subsidies reviewed here appear to achieve the following aims: (1) provide a modicum of income to primarily elderly farmers, most of whom do not farm full-time; (2) encourage those elderly farmers to produce more, at the margin; and (3) convey to those farmers through targeted programs that the government cares for them.

While it is true that the farmers who do receive these three subsidies enjoy them and would potentially be upset if they are taken away, it is unclear whether these subsidies are addressing farmers' highest priorities and needs, or are promoting the broader goals of Chinese Taipei's agricultural policy. The

[8] Power Point Presentation, Council of Agriculture. September 2016.

analysis above further suggests that the subsidies as currently structured are regressive and unevenly distributed: many eligible farmers do not receive them (for reasons not well understood), and those farmers who consume more fuel – presumably those with larger farms and higher production, and those operating in more heavily fuel-consuming subsectors of the agricultural industry – disproportionately benefit because the fuel subsidies are volumetric. (The electricity load subsidy is not volumetric, but encourages wasteful and inefficient load transfer to peak months). Given the costs associated with administering these programs; the costs imposed on other ratepayers and taxpayers due to inefficiencies, cross subsidies, and forgone tax revenue; and the negative environmental externalities associated with fossil fuels that serve as the basis for Chinese Taipei's green growth policies, Chinese Taipei might wish to consider other approaches than fossil fuel subsidies to meet its overall agricultural sector goals.

In this context, the peer review team encourages Chinese Taipei to (1) review the full costs and benefits of the current agricultural fossil fuel subsidies; (2) consider whether these resources could achieve greater benefit if combined with other targeted programs; (3) explore alternative support measures for current and prospective farmers; and (4) conduct outreach to the target beneficiaries – current and potential farmers – to determine their priorities and preferences, and to educate them on the benefits of alternative programs to support agricultural production and farming livelihoods. In particular, COA should consult not only farmers who currently receive the subsidy, but also those who are eligible but do not currently claim the subsidy. Inquiries into those farmers' preferences should focus less on whether they like the current subsidies, but more on understanding their greatest needs and priorities, and whether these subsidies are preferable to concrete alternatives.

In particular, the COA should consider focusing support programs on productivity enhancement and adoption of new technologies, and on promoting farming as a career for young professionals. It is likely that these efforts will look quite different from programs to provide social support to the current cohort of ageing farmers who mostly benefit from existing subsidies. Consequently, COA might wish to bifurcate its agricultural support programs into those that focus on agricultural competitiveness of current and future farmers, and those that provide social supports to the elderly who are in or close to retirement, and who are unlikely to change their methods or reinvest in their businesses.

The case studies below explore some approaches that Chinese Taipei might take to better align its agricultural support programs with its stated goals. These include cash transfers and provision of other social benefits (in addition to those already provided). In particular, case studies on subsidies for agricultural machinery are considered.

Lastly, in the instance that Chinese Taipei deems it politically unviable to remove the fossil fuel subsidies, the Peer Review team presents a case study on a novel effort in India to encourage eligible beneficiaries to relinquish their subsidy voluntarily. This last approach could be taken to sunset fossil fuel subsidies by restricting them to current users and encouraging them to forgo them or voluntarily switch to an alternative scheme. A voluntary alternative scheme might also provide the added benefit of a real-life experiment: the government could determine whether beneficiaries prefer the current benefits scheme, or any number of proposed alternatives.

THREE AGRICULTURAL SUBSIDIES: CONCLUSIONS

Goals and Objectives

1) **The subsidies are developed with fuel price relief in mind. It appears that the subsidies were not designed with holistic consideration of their broader place in Chinese Taipei's agriculture sector social and sector development policy.**

Effectiveness and Efficiency of the Subsidies

1) **The VPRT considers all three agricultural policies under review to be subsidies.**

2) **All three have inefficiencies and lead to wasteful consumption.** They disincentivize efficiency and promote use of fossil fuels rather than productive farming activities.

3) **The magnitude of the inefficiencies and waste is small relative to almost all relevant metrics.** Such metrics include other farming support measures, household expenditures on energy, farmer household income, and the farming and energy sectors as a whole.

4) **The subsidies lead to negative environmental impacts, positive social impacts for farmers' households, and unknown impacts on the economy as a whole.** A cost-benefit analysis of the subsidies' impact would help shed light on these impacts and their magnitude.

5) **The subsidies are regressive.** They are not targeted to the most needy, instead those farms that consume more fuel, which are likely the largest and those in the most fuel-intensive agricultural sub-sectors.

6) **The distribution of benefits from these subsidies within the farming community is not well known.**

7) **The efficiency of administration of these subsidies is not well known vis-à-vis other agricultural support and social support programs.**

THREE AGRICULTURAL SUBSIDIES: RECOMMENDATIONS

Effectiveness of the Subsidy

1) **The VPRT recommends conducting a review of who is receiving the current subsidies, their income, expenditure, and activities such that policymakers can determine whether the subsidies are fulfilling their purposes and are adequately targeted.**

Structure and Operation of the Subsidy, and Current Operating Environment

2) **To assist in improving the efficiency of administration, the VPRT recommends that all activities involved in administering and accessing the subsidies are logged and rough cost estimates made.** These will enable an assessment of their operational costs and efficiencies.

3) **The peer review panel suspects that administrative savings could be achieved by combining and streamlining agriculture assistance programs.** A large number of farming and agriculture support schemes already exists, e.g. welfare payments to elderly farmers and the rice price support scheme. The existence of these subsidy mechanisms should be exploited. Even smaller efforts to streamline could be beneficial. For example, the VAT exemption could be rolled into the existing fuel and electricity subsidies to reduce the number from 3 to 2.

Subsidy Efficiency and Targeting

4) **A review of the subsets of farmers who benefit from these subsidies should be conducted, reviewing farm size, income level, age, geographic locale, and type of production.**

5) **A similar review of agricultural sector energy subsidies and support programs should be conducted in light of the broader objectives of the Council of Agriculture for Chinese Taipei's agriculture sector development.**

6) **The subsidies could be converted to cash transfers, agricultural input vouchers, or rebates on new farming equipment (or other inputs).** These measures would provide more flexibility to target beneficiaries, discourage wasteful consumption (presuming the new equipment is energy-efficient), and remove most market distortions. The VPRT acknowledges that the Government of Chinese Taipei has considered cash transfers and finds them difficult to administer. Other proxies for fuel should be studied to identify appropriate metrics for determining subsidy support, such as level of agricultural output or number of years' service actively farming.

Source of Funding

7) **All programs should be funded through budgetary line items through the Council of Agriculture so that it might properly assess the costs and benefits, and plan holistically to achieve maximum benefits with taxpayer resources.**

THREE AGRICULTURAL SUBSIDIES: CASE STUDIES & LESSONS LEARNED

This section examines two types of case studies of subsidies relevant to the agriculture sector. These represent the two broad goals addressed by the fossil fuel subsidies Chinese Taipei uses to support the agriculture sector: social benefits, and agricultural sector competitiveness. The Government of Chinese Taipei provides subsidies and other payments to farmers for a number of reasons related to providing social benefits: farmers are low-income small holders who are largely older workers and who are socially disadvantaged. Further, the government wishes to encourage their continued employment, way of life, and cultivation of the land. Consequently, social benefits programs with social welfare in mind are reviewed here, with a focus on cash transfer programs. Examples are provided from Mexico, Indonesia, and Malaysia.

The government of Chinese Taipei also wishes to promote competitiveness and productivity in the agriculture sector. Consequently, agricultural machinery subsidy programs are considered as a possible replacement for fossil fuel subsidies. These may be attractive for several reasons. First, agricultural machinery subsidies do not necessarily have the same adverse environmental and social impacts of fossil fuel subsidies. Second, machinery is a value-adding input that may promote agricultural productivity. Third, machinery may have the potential to promote industry, job growth, and labor conservation on labor-scarce farms. However, it should be noted that these potential benefits have not been proven and should be studied for greater insight into their likelihood, costs and benefits. Two case studies address agricultural machinery subsidy programs potentially relevant to Chinese Taipei: one in India, and one in mainland China.

A case study on India is also included because of its novel approach incorporating voluntarism as a tool to reduce fossil fuel subsidies. Rather than eliminate a subsidy, India chose to run a public awareness campaign encouraging wealthier Indians to voluntarily relinquish their fossil fuel subsidy. This soft

approach to reform was meant to save public funds and better target needy recipients without risking the political backlash of firm restrictions. This new program is profiled below.

A. Cast Transfer Social Benefits Programs

Conversion of Fossil Fuel Subsidies to Cash Transfers & Other Social Benefits

1. Mexico cash transfer
2. Malaysia cash transfer & social benefits programs
3. Indonesia cash transfer

B. Agriculture Sector Competitiveness Programs

4. Public investments and in-kind subsidies India agricultural machinery subsidies
5. Mainland China agricultural machinery subsidies

C. Voluntary Abstention Approach

6. India LPG Subsidy Reform

Cross-cutting agricultural subsidy case studies:

A. Cash Transfer & Social Benefits Programs

Overview & Public Policy Best Practices

There is a broad literature on fossil fuel subsidies and their use to address oil price volatility and address the needs of socially disadvantaged populations.

Masami Kojima notes,

"Fuel and other price increases effectively reduce household income. For those who are already below the poverty line, this could mean forgoing such essential goods and services as food, housing, primary health care, and education" (Kojima 2009). Consequently, governments wishing to address the needs of socially marginal populations may consider addressing fuel prices not with subsidies but with income supplementation or direct provision of these and other social benefits on which the poor spend their money.

Kojima adds, "Targeted cash transfers and other safety net mechanisms that increase income or reduce expenditures provide immediate relief to the poor from the effects of higher prices. These transfers are the best option for protecting the poor, as they enable consumers to spend the cash where it is most needed. However, targeted cash transfers require that the poor be identified and an effective cash delivery mechanism be established" (Kojima 2009). Thus, where the poor are readily identified and can be reached through social programs, provision of alternative goods and services rather than fuel subsidies can both better meet the needs of marginalized groups, while also avoiding the market distortions and environmental externalities resulting from fossil fuel subsidies.

Case Study #1: Mexico Oportunidades Cash Transfer Program

Relevance: This program uses cash transfers to replace fossil fuel subsidies, a mechanism that might be considered to replace, simplify, streamline and rationalize the current suite of agricultural fossil fuel subsidies.

Mexico LPG Subsidy Reform (Toft et al. 2016)

LPG in Mexico is sold in large 20-kg and 30-kg cylinders or supplied through large, stationary tanks. According to 2008 household expenditure survey data, around 80 per cent of households identified LPG as their primary cooking fuel. On average, households consume 29 kg of LPG per month, costing 5.6 per

cent of rural household expenditure and 4.4 per cent of urban household expenditure. Until recently, Mexico has subsidized LPG by setting a maximum price each month, typically below the actual costs of importing LPG from the international market. The costs of this have been absorbed by the state-owned energy company Pemex without compensation.

Strategies Mexico Has Pursued to Reform Its LPG subsidies

The major motivation behind reforms in Mexico has been to try to cut inefficient fiscal expenditure. The government has adopted the following strategies in order to reduce LPG subsidies:

• **Gradual price increases**. Since 2010, the Mexican government has introduced annual average increases in LPG retail prices of about 7 to 8 per cent. Although this has not eliminated the subsidy during high prices, it has reduced average subsidy expenditure and effectively eliminated subsidies during the current period of low international crude prices.

• **Development of alternative social welfare infrastructure**. In Mexico, the inefficiency of the LPG subsidy as a social welfare mechanism has not been a principle motivation for reform. This is likely because Mexico has—over the course of the past 18 years—developed a comprehensive social safety net system. A pillar of this is its conditional cash transfer system Oportunidades, which covers 5.5 million households through distribution centres and debit cards and contains a subcomponent related to energy, Oportunidades Energeticas. Arguably, these more efficient social assistance policies have made it relatively less important to develop targeted LPG subsidies. Oportunidades provides low-income households with cash transfers linked to accessing health and education. Payments are made to female heads of household. Oportunidades Energeticas is a MXN 60 (US $4.60) per month supplement to this, intended to help vulnerable households afford energy-related expenses. In 2010 more than 5 million people were enrolled in Oportunidades.

Lessons Learned: First, gradual price increases (removal of subsidies) can be politically viable if fossil fuel prices are low and appropriate complementary social benefits are provided. Second, in counties where social safety nets are strong, fossil fuel subsidies are not needed to deliver benefits to target populations. Third, cash transfers and other social safety net programs are often more effective at protecting against energy price burdens than energy price subsidies. Additionally, cash transfers and other social benefits (e.g., education, health care, jobs) can produce higher value for the poor or other marginalized groups than subsidized fuel; they can give the poor the freedom to spend on the most high-value activities; they promote efficiency of fuel use, beneficial for climate change and air quality; and they protect against the adverse effects of fossil fuel price shocks by encouraging diversification and conservation.

Case Study #2: Indonesia Mid-2000s Kerosene Pricing Reform and Cash Transfer Program

Relevance: This Indonesian program uses cash transfers to replace fossil fuel subsidies, a mechanism that might be considered to replace, simplify, streamline and rationalize the current suite of agricultural fossil fuel subsidies in Chinese Taipei.

Case Study Summary (Vagliasindi 2012)

Social Safety Nets

Indonesia has been particularly successful at designing targeted cash transfers that were passed on simultaneously with fuel price increases in 2005. The UCT [unconditional cash transfer] program is the

largest such program in the world— covering 19.2 million households, or one-third of the Indonesian population. The program was introduced after the October 2005 price increases. Before execution of the transfers, each household was given a proxy means test. Recipients were issued smart cards (with instructions printed on the back of the cards), and transfers were delivered through the post office system. The program delivered benefits of US$30 per quarter, significantly more than the increase in energy costs. This served to increase the level of assistance for the poor and to buy their acquiescence to the fuel price increases. At the same time, by covering the bottom two income quintiles (40 percent) of the population—more than the targeted bottom 28 percent—the program also helped prevent those on the verge from falling into poverty. In addition to transferring cash to the lowest-income households, the government also used the savings from the decreased fuel subsidies to finance programs in education, rural development, and health.

Outcomes (Vagliasindi 2012)

The earlier stages of the subsidy reform in Indonesia are largely regarded as successful, particularly given the size of the program and previous episodes of unrest. The speed with which the UCT was designed and implemented meant that some leakage, targeting errors, and logistical difficulties were inevitable. However, the government responded quickly to reports of irregularities and, in spite of the challenges, the program proved largely successful in reaching the poor: the poorest decile received 21 percent of the benefits, while deciles 2, 3, and 4 captured 40 percent. In the absence of compensation, the fuel price hikes would have led to an estimated 5 percent rise in the poverty headcount index. In recent years, however, there has been only limited progress in the area of subsidy reforms because domestic prices of fuels and electricity remain mostly fixed by the government. Indonesia has a history of violent protests against attempts to implement fuel price increases—for instance, when President Megawati was forced to roll back prices in 2003. However, an important lesson that emerges from the case of Indonesia is that decisive leadership and government popularity, along with appropriate compensation measures and an effective information campaign, work to counteract citizen disenchantment and prevent any public discontent. Current President Yudhoyono's credibility helped to successfully increase fuel prices, the savings from which he then directed toward the UCT program in 2006. Additionally, before introducing UCT, the government initiated an extensive nationwide information campaign about the benefits of the program, which helped citizens learn about the value of the program and prevented possible unrest. By shifting away from subsidized fuels and below-market electricity tariffs, Indonesia will make room for the renewable energy technologies that it is keen to scale up.

Lessons Learned: Despite Indonesia's massive energy subsidies, and the habituation of the population to them, in the mid-2000s Indonesia transferred away from kerosene subsidies to LPG and introduced a massive cash transfer program to 19 million households. The cash transfer exceeded the fuel price increase in value, and was accompanied by a massive public awareness campaign, leading to its widespread public acceptance. The program has had success in weaning the economy off of kerosene. While not perfectly relevant to Chinese Taipei, the success of reform (at least for a time) indicates that such programs can be acceptable to constituencies used to fuel subsidies. Reforms can be executed to achieve multiple benefits, such as social policy, anti-poverty efforts, and employment (or economic modernization). These lessons apply strongly to Chinese Taipei. Key determinants of success are outreach and information campaigns targeting the subsidy beneficiaries, and popularity of the government.

Case Study #3: Malaysia 2013 Fossil Fuel Subsidy Reform

Malaysia Fossil Fuel Subsidy Reform of 2013: Countervailing Measures to Assist Vulnerable Groups (Bridel and Lontoh 2014)

Context

The rationalization of subsidies forms an important part of both the 10th Malaysia Plan (2010–2015) and the New Economic Model (Economic Planning Unit, 2010), which set out the government's strategy for making Malaysia a high-income economy. In July 2010, a subsidy reform program was initiated by Prime Minister Najib. This set out a schedule of subsidy reductions for fuel, sugar and other products, to span a 3- to 5-year period. The reforms stalled, though the rationale for the government's ongoing commitment to subsidy reform is that subsidies are inefficient at assisting households and businesses, and they can contribute to a range of economic problems, including Malaysia's fiscal deficit and rising economy's debt.

Price Increases

In the September [2013] reform, the following price increases were implemented:

• Diesel: from MYR 1.80 (US$0.57) to MYR 2.00 (US$0.63) per litre (11 percent)

• RON95 petrol: from MYR 1.90 (US$0.60) to MYR 2.10 (US$0.66) per litre (11 percent)

• RON97 petrol: from MYR 2.70 (US$0.84) to MYR 2.85 (US$0.90), although this was dropped in November to MYR 2.75 (US$0.87) (ultimately 2 percent)

Compensation Measures

In September 2013, the Prime Minister said that an expansion of cash transfers and other social welfare measures would mitigate the impact of the fuel price increase on low-income groups. In announcing the Malaysia People's Aid (BR1M) program, Najib said that half of the savings from restructuring subsidies would be distributed in the form of direct cash assistance to low-income groups, with the other half being used to finance development projects. The US$1.5 billion spending on BR1M for 2014 is significantly more than the US$1 billion that the government expects to save in a full year from raising the price of diesel and RON95. BR1M was started in 2012 to provide cash aid of MYR 500 (US$159) to households with incomes of MYR 3,000 (US$953) and below. The second phase was expanded to include singles aged 21 and above with an income of under MYR 2,000 (US$635) per month, receiving MYR 250 (US$79) each.

It was also envisioned to provide pensioners with financial assistance of MYR 250 (US$79) to help them meet the rising cost of living. Prime Minister Najib also outlined various measures to mitigate the effect of the GST, including reducing personal income tax rates by 1 to 3 per cent percentage points for all taxpayers, and giving MYR 2,000 (US$634) to taxpayers with a monthly income of up to MYR 8,000 (US$2,534) received in 2013.

Lessons Learned: The coordination of delivery of social benefits and cash transfers with the removal of fossil fuel subsidies helped to lessen the economic impact on socially vulnerable groups and shore up political support for the reforms.

B. Agriculture Sector Competitiveness Programs

Case Study #4: Mainland China Agricultural Machinery Subsidies

Relevance: Mainland China instituted an in-kind agricultural subsidy designed to benefit farmers, without the disbenefits of fossil fuel subsidies. The policy was designed to increase agricultural production and productivity, address a rural agricultural labor shortage, support rural livelihoods, and promote domestic agricultural machinery production. Many of these motivations in government agricultural policy similarly apply in Chinese Taipei.

***China to direct farm machinery subsidies to growers of key crops* (Patton 2014)**

In 2014, China announced that it would give priority to growers of key staple crops as well as cotton and sugar under changes to its farm machinery subsidy scheme, as it seeks to guarantee food self-sufficiency amid a declining rural workforce.

Maintaining food security has been one of China's top policy priorities for several years, as rapid urbanization swallows up arable farmland and reduces the rural workforce by drawing farmers to better paying city jobs. Beijing has allocated 120 billion yuan ($19.21 billion) to farm machinery subsidies since 2004, supporting the purchase of more than 35 million pieces of machinery. That has helped raise mechanization levels across China's farms to 61 percent last year from 33 percent in 2003.

Farm mechanization is seen as a key tool in countering the decline in rural productivity. Machinery is already widely used in harvesting grain and Xinjiang's cotton growers have also rapidly increased their use of mechanical cotton-pickers in recent years, significantly reducing costs. But machinery is ill-suited to some regions, including mountainous terrain in the south, China's key sugar cane-production area, analysts say. Equipment is also often ill-adapted to China's small farms, with average landholdings still around 8 mu, or slightly more than half a hectare.

"Since farming is still done mostly by households on a small scale in China, the use of agricultural machinery in most cases is often restricted to about 10 days of the year," said Zheng Fengtian, professor at Renmin University, in an editorial in the China Daily newspaper. He said the government should instead offer prepaid vouchers so farmers can rent the machinery they need.

Chinese construction equipment makers such as Zoomlion may benefit from the scheme, as they respond to a drop in demand for machines to build bridges and roads by targeting growing demand from agribusinesses.

Subsidies for farm equipment should typically not exceed 50,000 yuan, or 30 percent of the sale price, but may reach up to 600,000 yuan for large cotton-pickers, according to the agriculture ministry's proposed revisions.

Lessons Learned: Agricultural equipment subsidies in mainland China grew 300 fold to $3.9 billion from 2004 to 2014. These subsidies were designed to substitute for labor and increase productivity and mechanization, much of which was done successfully. Targets were mid-sized and large farms; machinery subsidies are not designed for small farms and upland areas where benefits from mechanization are limited, or mechanization is unaffordable. According to one expert, input subsidies have boosted the application of improved technologies and reduced the cost of farmer access to knowledge. A similar program would likely be less effective in Chinese Taipei because of (1) high baseline levels of mechanization, and (2) the preponderance of small and mountainous plots. However, the mainland China experience may be a model to promote increased efficiency and productivity of existing equipment, and to promote the transition to low-carbon (e.g. CNG, biofuels, or electric) equipment not dependent on fossil fuels.

Case Study #5: India Agricultural Machinery Subsidies

Relevance: See case study #4 relevance above.

India Agricultural Machinery Subsidies *(The Hindu 2013)*

The government of in the State of Karnataka planned in 2013 to put online a subsidy disbursal system for the purchase of farm implements by farmers in order to help farmers track the status of their application.

Local government officials were also considering farmers' and manufacturers' demand for reimbursement of VAT paid towards the purchase of agricultural machinery under the subsidized scheme. An official expressed concern that innovation was missing in development and designing agricultural implements and machinery. Terming the development of a farmer-friendly implement as a challenge, he called upon young agri-engineers to change the lives of farmers through such innovations.

A local academic observed that it was possible to increase agricultural production by about 20 percent by opting for farm mechanization, but there was a dire need to evolve need-based implements and machinery. Expressing concern over shortage of farm labor, he said several farmers were even thinking of shunning agriculture owing to the shortage.

Lessons Learned: A number of Indian states have implemented agricultural machinery subsidies to assist farmers with mechanization and increased productivity. In Karnataka state, among the ideas being considered are VAT reimbursement towards agricultural equipment purchase (rather than a cash refund); and use of machinery subsidies to drive innovation in the agricultural sector. These ideas underscore that fiscal and tax reforms related to agriculture and fossil fuels are closely linked to government objectives for the agriculture sector such as improved quality, efficiency, innovation, and attraction of young workers and entrepreneurs to the sector.

C. Voluntary Abstention Approach

Case Study #6: India LPG Subsidy Voluntary Abstention Program

Relevance: India is currently experimenting with a political viable alternative to binding reductions or removal of fossil fuel subsidy benefits for the middle class and wealthy. This voluntary approach might have appeal for Chinese Taipei if it deems abolition of fossil fuel subsidies for farmers to be too politically difficult.

India Experiments with Voluntary Abstention and Income Thresholds for LPG Subsidy ***(Seetha 2015; Raghavan 2015; Beniwal and Chakraborty 2016)***

India has 163 million LPG cooking gas consumers, all of whom until recently were entitled to subsidized prices.

Prime Minister Narendra Modi has struggled to take advantage of falling oil prices to make structural changes that reduce the fiscal deficit and free up more funds for roads, ports and bridges. Fuel subsidies now amount to more than Modi's entire social welfare budget, and are a sensitive topic in a country where more than 20 percent of the population lives below the poverty line.

To rein in the fiscal impact of this burdensome government subsidy, PM Modi in 2015 undertook voluntary measures to cap LPG subsidy spending. Early last year he urged India's to give up their subsidy for low-cost LPG cylinders voluntarily through what was known as the "Give it Up" campaign. Under this heavily-promoted government initiative, households that could afford it would forgo their LPG subsidy, and were encouraged to make this known publicly. Through the "Give it Up" campaign, 5.75 million consumers opted out as of the end of 2015. However, more than 10 million households with middle to high incomes remained on the subsidy rolls, and expenditures on the subsidy did not fall because new households were added to the subsidy, keeping up with population growth.

When the voluntary campaign didn't yield the expected results, PM Modi began asking those earning a taxable income of more than 1 million rupees (roughly U.S. $17,000) to forfeit the benefit in 2016. He stopped short of announcing steps to enforce the decision.

"It's not the right way of doing it," said D.K. Srivastava, chief policy adviser at EY India, who said the government needs to be unambiguous when issuing restrictions. "Because of political considerations they chose the voluntary route, which makes everything unpredictable." According to another commentator, "No subsidy reform can rely only on voluntarism." In fact, the mechanism appears not to be reliable as a budgetary measure; fears abound that voluntary renunciation may run out of steam. Observers have pointed out that the voluntary renunciation trend could reverse once global oil prices started going up and consumers started feeling the pinch.

One perhaps fairer way of getting wealthier people to renounce the subsidy would be to limit the number of subsidized LPG cylinders per subscriber. At present, all households are entitled to 12 cylinders of 14.2 kg at the subsidized rate of Rs. 419.26 (U.S. $7). The market price is Rs. 608 (U.S. $10) a cylinder. Some Indian states have experimented with the approach of further tightening monthly household allowances for subsidized LPG cylinders, though have stopped short of a strict limit that would more effectively reduce wealthier households' standard level of subsidized consumption.

Lessons Learned: India has had some success with a voluntary program to convince middle- and upper-class Indians to forego their household's lawful allotment of subsidized LPG. However, LPG subsidy levels have not meaningfully declined, due to the unnecessarily high ceiling established for household monthly LPG allotments and the absence of enforcement mechanisms. This new program does not yet have conclusive results. It does present one possible model for Chinese Taipei to utilize voluntary efforts and social pressure to reduce farmer dependence on fossil fuel subsidies, particularly among middle- and high-income farmers. Complementary mandatory measures will likely be required for greatest impact.

11. CONCLUSION

The APEC IFFSR/VPR in Chinese Taipei, the fourth APEC peer review to date, was conducted successfully. This report documents the results of the peer review.

Chinese Taipei selected five fossil fuel-related policies for review by the APRP. The APEC Energy Working Group Secretariat, working with the MEA Bureau of Energy (BOE) and TIER, produced a pre-briefing background paper to the APRP before the review.

The subsidies reviewed included five that were examined under the voluntary peer review. The selected subsidies for review included:

1) Sea freight subsidy for oil products shipped to offshore islands, to reimburse oil companies shipping costs for petroleum products delivered to small inhabited islands offshore of the Chinese Taipei main island in order to equalize fuel prices;
2) Preferential electricity pricing for street lights, providing reduced-cost electricity for owners and operators of municipal street lights;
3) Exemption from sales tax of agricultural machinery-related oil and electricity, a targeted tax benefit for farmers;
4) Preferential electricity pricing for agricultural motors, reducing farmers' fixed load charges during off-peak seasons; and
5) Petroleum product price subsidy for agricultural machinery, providing partial price relief during periods of spikes in market prices.

Based on a review of the background material and extensive discussions with relevant stakeholders during the peer review meetings, the APRP concluded that all five of the reviewed support measures are subsidies; all five lead to wasteful and inefficient use of fossil fuels, though the inefficiency of most of these subsidies is small due to their limited size. The latter three support measures are all agricultural subsidies with similar target beneficiaries; consequently, the APRP has developed some cross-cutting conclusions and recommendations collectively applicable to these policies.

As a general matter, the APRP commends the Chinese Taipei government for the targeted and limited nature of these subsidies, and for the measures taken to constrain the scope of the subsidy and prevent abuse. The APRP likewise applauds Chinese Taipei for automating subsidy administration systems, capping subsidies, and designing the subsidies to limit market distortions, i.e. by limiting incentives for increased consumption at the level of the individual consumer.

At the same time, the APRP notes that these subsidies, most of which have been in place for many years and thus are likely not perfectly congruent with the Chinese Taipei's current sectoral strategies for agriculture and of the current government's green growth priorities. Further, the subsidies were developed from the perspective of constraining fuel and electricity prices, without consideration of whether this objective is the best way for the government to serve the social and economic needs of the target beneficiaries. Independent of any judgment of the individual subsidies, the APRP encourages the Chinese Taipei to consider a holistic approach to providing benefits to farmers, remote island populations, and government agencies managing streetlights. What benefits do these groups need? Could

existing or potential support measures meet these needs better than existing energy subsidies? Could such alternative policies avoid the market distortions and negative externalities inherent to fossil fuel subsidies? In most cases, the APRP suspects that alternative policies do exist, and has attempted to make recommendations to identify such policies, as well as provide case studies that illustrate how other economies have addressed similar challenges through fossil fuel subsidy reform. Comprehensive cost-benefit analyses of these policies would indicate where there may be opportunities to improve on existing approaches.

Should Chinese Taipei wish to proceed with reforms of these policies, international experience shows that reforms to remove or restructure social benefits and/or raise prices are politically sensitive, but can achieve the support of the target beneficiaries under the right conditions. In particular, stakeholders should be extensively consulted regarding their needs and preferences to inform the policy design process. Further, target beneficiaries and the public as a whole should be informed as to the rationale(s) for reforms (e.g., reducing costs, fairness and equity, reducing budget deficits, increasing competitiveness, promoting alternative technologies, protecting the environment, etc.). With adequate consultation, wise policy design, and robust and proactive public awareness campaigns, reforms often succeed.

Sea freight subsidy for oil products shipped to offshore islands. The APRP considers this policy a subsidy that results in wasteful consumption. To reduce market distortions and subsidy expenditures, and to promote reduced petroleum fuel consumption on offshore islands, Chinese Taipei could consider phasing out the sea freight subsidy in favor of targeted investments to reduce demand for fossil fuels on offshore islands, including energy efficiency, electric vehicles, and public transportation. The subsidy could also be converted to cash transfers to local government budgets for provision of other social benefits aligned with higher-priority social objectives at the discretion of local authorities. An assessment of the design and cost efficiency of the subsidy is recommended to determine optimal arrangements. The Chinese Taipei government should also consider complementary measures to ensure the reliability of fuel provision to the outlying islands, such as measures and resources to maintain critical energy infrastructure and cover costs not included in fuel transportation that are higher than comparable costs on the main island.

Preferential electricity pricing for street lights. To promote energy efficiency and budgetary savings by government entities that own and operate street lights, Chinese Taipei should consider reforming and/or removing the preferential electricity tariff subsidy. The VPRT believes that the subsidy could be made more efficient through greater targeting, and that a review of local and other government authorities' ability to pay the full price of electricity.

Preferable reform options include: (a) removing the preferential street lighting electricity rate; (b) converting the preferential rate to a cash subsidy in the near term; and/or (c) replacing the subsidy with incentives for energy efficiency measures, including LED installation and technical support for energy service contracting, to drive further savings that will reduce costs for the subsidy's beneficiaries. Given that Chinese Taipei already has an aggressive campaign to transition to LED streetlights (which will reduce municipal electricity expenditures and improve service), the current ongoing LED installation plan may prove sufficient to remove the subsidy without any fiscal harm to the government entities that currently benefit.

For subsidy removal, a grace period may be necessary to allow existing streetlight investments commitments to be recovered. Because current municipal public-private partnership contracts for street lighting are predicated on certain tariffs and payback period arrangements, tariff reforms will have to be phased in consistent with the commercial viability of those contracts. A phased transition will also give governments time to adjust their budgets and further accelerate the phase-in of energy-saving LEDs. If

this subsidy is to be maintained or replaced with other electricity subsidies, the subsidies should be converted from ratepayer cross-subsidies to government subsidies, and be paid for through a direct budgetary line item.

Agricultural Subsidies: Sales Tax Exemption of agricultural machinery-related oil and electricity; Preferential electricity pricing for agricultural motors; Petroleum product price subsidy for agricultural machinery during periods of spikes in market prices. All three subsidies lead to wasteful consumption. In the case of the electricity load fee subsidy, load balancing inefficiencies and subsidy costs are passed on to the electric utility and other ratepayers. In the case of the VAT exemption, the tax exemption is paid for by foregone revenue to the treasury.

There are opportunities for all three of these support measures to be more targeted and more efficient. Converting the subsidy to a cash benefit while restoring fuel taxes and removing subsidies would promote more efficient use of fuel and electricity, including conservation, efficiency, and substitution to cleaner technologies, while maintaining support for farmers. Targeting the subsidy only to smallholder and/or low-income farmers might allow for limiting the subsidy to those who most need it.

Complementary measures are encouraged to promote efficiency and reduce market distortions. These measures might include: technical assistance to farmers on fuel and electricity efficiency; rebates for farmers' purchases of clean and efficient agricultural machinery; and research and development for the commercialization of alternative technologies that do not require fossil fuels (e.g., electric vehicles and motors) or require less use of tractors and other equipment (e.g., no-till agriculture and organic, fertilizer-free farming).

Cross-Cutting Agricultural Subsidy findings. The small size of these programs and the lack of clear social goal together suggest that they should be considered for reform. Several reviews are warranted, including of the costs and benefits of the subsidies and how to better communicate those costs/benefits. On the cost side, to assist in improving the efficiency of administration, the VPRT recommends that all activities involved in administering and accessing the subsidies are logged and rough cost estimates made. These will enable an assessment of their operational costs and efficiencies. The peer review panel suspects that administrative savings could be achieved by combining and streamlining agriculture assistance programs, including with existing programs to augment farmer incomes.

On the benefits side, a review of stakeholder preferences and needs is encouraged to better align the policy's objectives with those preferences and needs. In particular, reform efforts should consider whether fuel subsidies are the best method of delivering relief from high fuel prices and promoting farmers' productivity, and whether fuel subsidies are the fairest and most equitable way of delivering benefits to farmers, given that some farmers consume more fuel than others, and some do not collect the subsidy at all. A review of the subsets of farmers who benefit from these subsidies should be conducted, reviewing farm size, income level, age, geographic locale, and type of production, to determine whether the current distribution of benefits is fair and consistent with government policy. A similar review of agricultural sector energy subsidies and support programs should be conducted in light of the broader objectives of the Council of Agriculture for Chinese Taipei's agriculture sector development.

A number of options exist for reforming the existing subsidies. The subsidies could be converted to cash transfers, agricultural input vouchers, or rebates on new farming equipment (or other inputs). These measures would provide more flexibility to target beneficiaries, discourage wasteful consumption (presuming the new equipment is energy-efficient), and remove most market distortions. The VPRT acknowledges that cash transfers can be difficult to administer; should this be the case, other alternatives to fuel subsidies could be considered to better align farmers' incentives and benefits with policy goals and to effectively and fairly distribute benefits to farmers.

All programs should be funded through budgetary line items through the Council of Agriculture so that it might properly assess the costs and benefits, and plan holistically to achieve maximum benefits with taxpayer resources.

Overall, the APRP developed numerous observations, conclusions, and recommendations as part of this review, some of which have been summarized in this conclusion. The APRP carefully considered the recommendations in order not to be too prescriptive. The APRP is confident that there is sufficient capacity in Chinese Taipei to conduct the suggested studies, and consider complementary measures for ensuring a smooth transition with any envisioned changes in policies. Noting Chinese Taipei is already committed to promoting clean energy and energy efficiency, the APRP wishes Chinese Taipei fortitude and success to continue its ongoing reform efforts consistent with its economy's development, agriculture sector, and green growth priorities, over time drawing on deeper analyses of its own fossil-fuel related policies and reviews of relevant international experience.

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APPENDIX A – ADDITIONAL INFORMATION ON SUBSIDIES FOR REVIEW

Tax Exempted Fuel Oil Allowance for Agricultural Machinery and Equipment and Transportation Equipment

Operation Category	Agricultural Machinery	Type	Fuel Type	Annual Fuel Oil Standard per Machine (kiloliter)	Operation Standard (hectare/year/ or hour/year)	Remark
Soil Preparation	Tiller		Diesel	2,000	40 hectares	
	Tractor	Under 40HP	Diesel	8,000	140 hectares	
		40.1-80 HP	Diesel	10,000	130 hectares	
		87.1 HP	Diesel	12,000	120 hectares	
Transplanting	Rice transplanter		Gasoline	600	40 hectares	
	Six line ride-type paddy rice trans planter		Diesel	700	50 hectares	
	Other planting machine		Gasoline or Diesel	400	51 hectares	
Fertilizing Management	Cultivation management machine		Gasoline or diesel	700	500 hours	Including cultivation machine and crusher.
	Powered mower		Gasoline	600	500 hours	Including single or double-seat models.
	Powered branch trimming machine		Gasoline	600	400 hours	
	In-depth loose earth fertilizer.		Diesel	1,800	300 hours	
Prevention	Powered sprayer (powder)		Gasoline or diesel	800	600 hours	Including back-carrying type, stationary, backpack, and high-performance spray (powder) machine.
	Automatic Spray vehicle		Diesel	2,000	300 hours	
	Other prevention machinery		Gasoline or diesel	800	200 hours	
Irrigation and Draining	Engine driven water pump		Gasoline or diesel	1,200	200 hours	
	Spray irrigator		Gasoline or diesel	1,200	200 hours	
	Other irrigation drainer		Gasoline or diesel	1,200	200 hours	
	Heater (equipment) used in the facilities		Diesel	1,200	200 hours	
Harvesting	Joint harvesting machine	Under 60 HP	Diesel	2,000	40 hectares	Machine used for harvest including paddy rice, sorghum, corn, peanuts, and beans.
	Paddy rice joint harvest collector	60.1HP or higher	Diesel	10,000	120 hectares	
	Sugar cane collector		Diesel	25,000	800 hours	Referring to European and American model of harvest machine.

	Large joint grain harvest collector	60.1Hp or higher	Diesel	10,000	120 hectares	Including powered tea picker (single and double-seat), powered husker, and other harvest machine.
	Other harvesting machinery		Gasoline or diesel	600	300 hours	
Drying	Grain dryer	Box	Diesel or kerosene	1,200	200 hours	Including rice husk, corn, sorghum, and peanut dryer.
		Circulatory	Diesel or kerosene	3,000	360 hours	
		Container	Diesel or kerosene	3,000	360 hours	
	Tea leaf dryer		Diesel or kerosene	2,200	200 hours	
	Tobacco leaf dryer		Diesel or kerosene	4,000	250 hours	
	Simple dryer		Diesel or kerosene	2,400	200 hours	
	Dryer for other agricultural products		Diesel or kerosene	1,200	120 hours	Machinery used for drying mushroom, beans and other agricultural products.
Processing	Peanut bean huller		Gasoline or diesel	800	40 hours	Including small rice miller, powered sifting, powered blower, powered slicing machine, tea mixer, agricultural product mixer, grain thrasher, feed processor, fruit selection machine, and white mulberry leaf cutter.
	Corn husker		Diesel	1,600	360 hours	
	Other processing machinery		Gasoline or diesel	400	100 hours	
Transportation	Transportation car for farmland.	Under 19HP	Gasoline or diesel	2,500	600 hours	Limited to those conforming with *the Farmland Transport Vehicle Specifications*
	Other transportation machinery		Gasoline or diesel	800	200 hours	Excluding self-assembled vehicle
Husbandry	Napier grass (silage corn) harvester	Under 60 HP	Diesel	2,000	2,080 hours	1. Referring to automatic grass harvest machine.
		60.1-150 HP	Diesel	4,000	2,080 hours	2. *Machinery power source* should come from qualified agricultural machinery plant.
		150.1-190 HP	Diesel	8,000	2,080 hours	
		190.1HP	Diesel	10,000	2,080 hours	

	Husbandry tractor	Under 40HP	Diesel	2,500	1,095 hours	When applying, enclose husbandry registration license or feed license or actual proof of being in agricultural business and filling in additional functions.
		40.1HP or higher	Diesel	4,000	1,095 hours	
	Dipper machine	Under 70HP	Diesel	4,000	1,095 hours	
	Total mixed ration mixer (vehicle body and mixer integrated as one)	Under 100 HP	Diesel	2,200	1,095 hours	When applying, enclose the registration license or feed license for husbandry site, limited to one machine per site.
		100.1-150HP				
		150.1HP of higher	Diesel	3,000	1,095 hours	
	Feeding vehicles	Under 10HP	Diesel	4,000	1,095 hours	1. Stationed power source. 2. Feeding machine limited to use on the husbandry site.
	Powered spraying sterilizer (including sterilizing blower vehicle)		Gasoline	1,200	1,095 hours	Transport mixed coarse and refined feed that daily to the animal feed tank.
	High-temperature high-pressure cleaner		Gasoline or diesel	400	300 hours	When applying, enclose the registration license or feed license for the husbandry site, limited to one machine per site.
	Insulated heater		Diesel	400	320 hours	When applying, enclose the registration license or feed license for the husbandry site, limited to one machine per site.
	Other husbandry machine		Diesel	4,000	1,000 hours	1. When applying, enclose the registration license or feed license for the husbandry site.
			Gasoline or diesel	400	100 hours	2. One machine per every 10,000 of poultries raised. Including milking machine and other husbandry machines.
Other agricultural operations	Chainsaw		Gasoline	1,000	200 hours	
	Others		Gasoline or diesel	400	100 hours	

APPENDIX B – FOSSIL FUEL SUBSIDY REFORM EVALUATION TEMPLATES

SUBSIDY #1: OFFSHORE ISLANDS OIL PRODUCT SEA FREIGHT CHARGE SUBSIDY

Subsidy title: Offshore Islands Petroleum Product Sea Freight Subsidy

Description: Because the oil products on the offshore islands are shipped from the main island, the sea freight charges for the oil products shipped from the main island to the offshore islands create additional cost to the oil price. The increasing oil price may affect the industry's willingness to operate business on the offshore islands and thus jeopardize oil supply on the offshore islands; also, it may force the offshore island residents to face high oil price.
Fuel oil is a necessity in people's everyday life and one of the basic raw materials for local economic development; therefore, the government strives to maintain the oil price on the offshore islands to be the same as the price on the main Island by providing sea freight charge subsidy to stabilize oil supply on the offshore islands, to allow the offshore island residents enjoy the same oil consumption conditions. Such subsidy is important in stabilizing local economic development and improving the welfare of local residents.

Related regulations / specifications link: http://law.moj.gov.tw/LawClass/LawContent.aspx?PCODE=J0020019

Type of subsidy: Manufacturer (producer / consumer / general / other)

Affected fossil fuels: Oil products

History: The government offers sea freight charge subsidy to assist the offshore islands residents to ensure their oil consumption rights. The government, starting on February 28, 2002, has provided sea freight charge subsidy based on *the Petroleum Fund* for shipping oil to the offshore islands.

Qualified subsidy recipients: The oil industry that has shipped oil products from the main island to the offshore islands

Subsidy granting period: From February 28, 2002 to present;

Financial value: From 2002 ~ 2015, the sea freight charge subsidy for shipping oil products to the offshore islands amounts to NTD$91 million ~ NTD$133 million annually.

Potential Impact:

1. Social Aspect (welfare)

The government is to provide offshore island residents with the same oil consumption conditions that are available to the residents of the main Island by granting sea freight charge subsidy for shipping oil products to the offshore islands. The reasons for providing sea freight charge subsidy are as follows:

(1) Oil product price on the offshore islands is close to the oil product price on the main Island: Compensate for the sea freight charge on shipping oil products to the offshore islands in order to have the local oil price close to the oil price on the main Island.

(2) Maintaining a stable oil supply to the offshore islands: Help the oil industry maintain a stable business operation with a steady oil supply to the offshore islands by helping oil industry reduce sea freight cost.

(3) Help local residents access basic energy services: Such subsidy helps make it possible for the local residents in the offshore islands to enjoy the same oil consumption condition as the residents on the main Island. Currently, the sea freight charge subsidy is granted to 19 villages (towns and cities) on the offshore islands benefitting around 87,400 households and 269,300 residents.

2. Industrial Aspect (the impact of the subsidy on the domestic oil industry)

The subsidy amount granted by the government accounts for a very small percentage of the total oil demand in Chinese Taipei without any effect on Chinese Taipei's oil market. It is detailed as follows:

(1) Compensate for additional sea freight charge: The granted subsidies are to make up for only the price difference due to additional sea freight charge; therefore, it does not affect the overall market price of oil in Chinese Taipei.

(2) The subsidy amount accounts for a small ratio of the total consumption in Chinese Taipei: The sea freight charge subsidy for shipping oil products to the offshore islands granted by the government accounts for a very small percentage of the total oil demand in Chinese Taipei, about 0.96% ~ 1.28%, so it will not affect the overall oil market in Chinese Taipei.

Affected Government Ministries/Departments: Bureau of Energy, Ministry of Economic Affairs, R.O.C. (including the regulatory authorities, business competent authorities, etc.)

Affected stakeholders: The oil industry that ships oil products from the main island to the offshore islands;

Inefficient? If so, why?

The sea freight charge subsidy for shipping oil products to the offshore islands is for protecting local residents' basic oil consumption right; also, such subsidy does not distort the energy market, will not result in energy waste, and is efficient. The subsidy is granted for the following reasons:

1. Will not cause wasteful consumption that leads to increased greenhouse gas emissions: The government has provided subsidies for the additional sea freight charge in order to keep the oil price on the offshore islands close to the oil price on the main Island without increasing local residents' oil consumption or causing wasteful consumption; also, it will not cause increased greenhouse gas emissions.
2. Will not affect the overall oil market in Chinese Taipei: The government-granted sea freight charge subsidy for shipping oil products to the offshore islands accounts for a very small percentage of the total oil demand in Chinese Taipei, about 0.96% ~ 1.28%, so it will not affect the overall oil market of Chinese Taipei.
3. People enjoying the same oil consumption conditions: The government strives to close the gap of retail prices between the

offshore islands and the main Island by granting the sea freight charge subsidy; also, it helps stabilize the local oil supply and helps local residents to receive basic energy services.
Reform Options: (possible reform policies / measures / policy) None.
The reform benefits: None.
Value and expected changes to the subsidized objects: None
Action planned (if any): None
Timeframe: None
Current status: In process

SUBSIDY #2: PREFERENTIAL ELECTRICITY PRICING FOR STREET LIGHTS

Name of Subsidy: Preferential Streetlight Electricity Price	
Description: Taiwan Power Company provides preferential streetlight electricity price in accordance with Article 66.	
Links to relevant law/regulation:	http://web3.moeaboe.gov.tw/ECW/populace/law/Content.aspx?menu_id=652 The Electricity Act§ Article 66 http://web3.moeaboe.gov.tw/ECW/populace/law/Content.aspx?menu_id=652
Type of Subsidy: Consumers	
Fossil Fuel Affected:	coal, natural gas, fuel oil
History: Taiwan Power Company started implementation since the promulgation of the Electricity Act in 1947.	
Objects of Subsidy:	Streetlight users.
Period of subsidy:	Taiwan Power Company has implemented since the promulgation of Electricity Act in 1947.
Monetary value	Taiwan Power Company is responsible for the amount of NT$2,867 million (about 85 million USD) for 2015.
Potential impact:	1. The streetlights offer lighting to public facilities such as roads which will reduce likelihood of accidents and improve public safety. 2. It is stipulated in Article 66 of the Electricity Act that the electrical power industry shall fulfill the maximum obligations to the local people. The electric power industry has the existing privilege to use public land and deploy power lines in the business region, and therefore has its due obligations.
Affected government agencies:	Ministry of the Interior, Ministry of Science and Technology, Ministry of Transportation and Communication, Ministry of Economic Affairs, Council of Agriculture, Ministry of Justice, Ministry of Defense. Note: Streetlights under Central Government's jurisdiction will be provided with budget for the expenditures. Taiwan Power Company will collect full fee from the users: Taiwan Power Company are currently paying for streetlights under the 22 county/city governments for the preferential power price difference.
Stakeholders affected:	Streetlight users, Taiwan Power Company
Inefficient? Reason?	**1. Conform with fairness and equality:** In Article 66 of the Electricity Act, power companies was supposed to fulfill its maximum obligations to local people due to its existing privilege of using public lands and deployment of power lines in its business regions. **2. Improve public safety without creating unfair competition:** (1) Improving public safety: Streetlights are mainly used for lighting public facilities such as roads, which will reduce the likelihood of accident. (2) Not resulting in unfair competition: The existing preferential electricity price for streetlights does not provide subsidy on electricity price for any specific objects and therefore does not result in unfair competition. **3. Conform to social welfare:** Streetlights offer lighting for public facilities such as roads, which reduces the likelihood of accident and improves public safety. **4. Cause no inefficient fossil fuel use:** Streetlights have fixed time of operation and do not prolong time of use, which lead to inefficiency, due to the discount subsidy, so there is no wasteful use fossil fuel.
Options of reforms:	N/A
Benefits of reforms:	N/A
Expected change in value and subsidized object:	N/A
Actions planned (if any):	Future review will be continued with further examination on the provisions of electricity subsidy in Article 66 of the Electricity Act.
Time scope:	In progress
Current status:	On going

SUBSIDY #3: PETROLEUM AND ELECTRICITY BUSINESS TAX EXEMPTION FOR AGRICULTURAL MACHINERY-RELATED USE

Subsidy Title: Agricultural Machinery Related Oil and Electricity Business Tax Exemption	
Description: Farmland agricultural machinery, transportation equipment, and fuel oil and electricity used by such machinery and equipment, are exempted from business tax	
Relevant law/regulation links:	http://law.moj.gov.tw/LawClass/LawContent.aspx?PCODE=G0340080 The Value-added and Non-value-added Business Tax Act
Subsidy Type:	Producer
Fossil Fuel Affected:	Diesel, Gasoline
History: Farmland agricultural machinery, transportation equipment, and fuel oil and electricity used by such machinery and equipment, are exempted from business tax in accordance with the Value-added and Non-value-added Business Tax Act	
Subsidy Targets:	Farmers (electricity users of motor powering agricultural operation and agricultural machinery owner)
Subsidy Period:	On going
Monetary Value:	1. Agricultural machinery fuel oil use, 5% business tax in 2015 totaling NTD$80million 2. Agricultural electricity use is calculated by Taipower Company.
Potential impact:	N/A
Government agencies affected:	Council of Agriculture
Stakeholders affected:	Farmers, Taiwan Power Company, fuel oil company
Inefficient? Reason?	Since the tax exemption is only 5%, and the fuel oil quantity is within reasonable limits and not without restriction, this subsidy measure will not cause fossil fuel waste in Chinese Taipei.
Reform Options:	N/A
Reforms Benefits:	N/A
Expected change in value and subsidized targets:	N/A
Actions planned (if any)	N/A
Time scope/Current Status:	On going / In Progress

SUBSIDY #4: PREFERENTIAL ELECTRICITY PRICING FOR AGRICULTURAL MOTORS

Subsidy title: Deduction of Basic Electricity Fee for Agricultural Operation during the Suspension Period	
Description: According to the scope and standard of electricity use for agriculture operation, the basic electricity fee can be reduced by 5% to 100% based on the electricity load factor during the power use suspension period.	
The Website Links to Regulations	The Scope and Standard of Electricity Use for Powering Agriculture Operation http://talis.coa.gov.tw/alris/LawDetail.asp?tID=2007
Subsidy type	Producer
Affected fossil fuel	Reducing basic electricity fee has no impact on fossil fuel consumption
History: Due to different types of crop having their own production cycles, after harvesting or during the fallow period, if basic fee of electricity is still being charged, it is a serious burden for those use electricity for powering agricultural operation. Therefore, to relieve their burden of basic electricity fee during the power use suspension (fallow) period, we provide a preferred electricity load factor to reduce basic electricity fee.	
Subsidy target	Users of electricity for powering agricultural operation
Subsidy period	In progress
Monetary value	NTD$ 264 million in subsidy in 2015
Potential impact	N/A
Affected government agencies	Council of Agriculture
Affected stakeholders	Taiwan Power Company, Users of electricity for powering agricultural operation
Inefficient? Reason?	The reduction of basic electricity fee has no effect on fossil fuel; therefore, there is no impact on efficiency.
Reform options:	N/A
Reform benefit	N/A
Value and expected change of subsidized target	N/A
Planned action (if yes)	N/A
Time scope	In progress
Current status	On going

SUBSIDY #5: PETROLEUM PRODUCT PRICE SUBSIDY FOR AGRICULTURAL MACHINERY

Subsidy Title: Agriculture Machinery Fuel Oil Price Subsidy (the subsidy for the increase of agriculture machinery use)	
Description: Implementation for the underprivileged groups (farmers). When the oil price is higher than the base oil price, the subsidy for each month is half of the increase. (The base oil price is set according to the listed oil price of CPC Corporation, Taiwan in 2013, which is NTD$32.3 /L for the diesel fuel, and NTD$33.4 /L for the 92 unleaded gasoline. The current subsidy is not implemented because oil price is below the base oil price in 2016.)	
The link for relevant article /regulation	The supporting measure for oil price subsidy was implemented by the Executive Yuan on April 28, 2011 aiming at underprivileged groups.
Subsidy type	Consumers
Affected fossil fuel	Diesel fuels and gasoline
History: To reduce the impact on underprivileged groups due to increasing oil price, the subsidy aims to relieve farmers' burdens from increasing agricultural machinery oil price.	
Subsidy target	Farmers that hold agriculture machinery using permit.
Subsidy period	continuing
Monetary value	Since September, 2014, the subsidy has not been implemented due to the oil price steadily below the base price.
Potential impact	N/A
Affected government sector	Council of Agriculture
Affected stakeholder	Farmers (Agricultural machinery owners)
Inefficient? Reasons?	Due to the fact that the subsidy for agricultural machinery oil price aims at underprivileged groups, and the oil price has to be higher than the base price for the subsidy to be available, the goal of this measure is to avoid the impact on farmer's livelihood due to oil price increase. This subsidy is non-normal, and it does not encourage wasteful consumption. It does not violate the principles in the APEC Peer Review on Fossil Fuel Subsidy Reform.
Reform options:	N/A
Reform benefit	N/A
Values and the expected change of subsidized target	N/A
Planned action (if any)	N/A
Time scope	In progress
Current status	On going

APPENDIX C – PEER REVIEW TEAM MEMBER BIOGRAPHIES

FFSR TEAM LEADER

- Dr Niall Mateer

FFSR TEAM MEMBERS

- Mr Peter Wooders
- Ms Takako Wakiyama
- Dr Ruengsak Thitiratsakul

FFSR SECRETARIAT

- Dr Bansari Saha
- Mr Andrew Eil
- Mr Turner Shaw

FFSR TEAM LEADER

Niall Mateer

Dr Niall Mateer was FFSR Team Leader for the review of the Philippines in 2015. He is Director of the University of California's California Institute for Energy & Environment's (CIEE) Carbon Sequestration Research Program. He managed the West Coast Regional Carbon Sequestration Partnership (WESTCARB) contract, part of the U.S. Department of Energy's carbon capture and storage program. His roles included financial and programmatic oversight and management of critical partnerships.

From 1990 to 2000, Dr Mateer was Director of Research Outreach at the University of California (UC) Office of the President where he participated in many research initiatives throughout California during the 1990s and oversaw the administration of UC's diverse system-wide research organizations, including the UC Energy Institute, the National Institute for Environmental Change, and CIEE. He also served on the Board of the California Space Technology Alliance, promoting the California space program. In 2000 he was appointed founding Executive Director of the University of California Trust in the United Kingdom (UK), based in his hometown of London, England. He returned to the United States in 2005 to become a consultant on university management and various venture technology projects. Dr Mateer is an earth scientist by training and has been active in 35 countries as a researcher, as a geoscience project leader for UNESCO, and as editor of an international geological journal. He has written over 100 scientific publications. He was a founder faculty member of geology departments in Texas and in Nigeria. He was educated at the University of Durham (UK) and the University of Uppsala (Sweden).

FFSR TEAM MEMBERS

Peter Wooders

Peter Wooders leads IISD's Energy program, which supports countries move to and deepen the sustainability of their energy systems. The program includes the Global Subsidies Initiative, supportive work on fiscal policy including the green economy, IISD's work on climate change mitigation and a pillar focusing on sustainable electricity systems.

Peter has worked in almost every area of the energy economy, including energy efficiency, electricity sector planning, renewables, CCS, nuclear power and upstream oil and gas. He has worked on climate change issues for over 15 years, with a recent focus on competitiveness.

Peter has worked in over 25 countries. His current focus is in the developing world, notably: Egypt; India; Indonesia; Nigeria; Viet Nam; and other countries of South-East Asia and MENA.

Takako Wakiyama

Takako is a researcher of Climate and Energy Area and Green Economy Area at the Institute for Global Environmental Strategies (IGES). Her research focuses on climate and energy policies and economics in Japan and Asian countries at national and city level. She has conducted policy impact analysis, scenario analysis and simulation analysis focusing on energy efficiency and renewable energy. She has engaged several research projects such as Asia-Pacific Network for Global Change Research (APN) and Open Climate Network (OCN) in collaboration with international research institutes within and outside Japan. Current research focuses are carbon tax and electricity market reform in Japan. She holds two master's degrees in science and economics.

Ruengsak Thitiratsakul

Dr Thitiratsakul is the Deputy Executive Director, Petroleum Institute of Thailand. The Petroleum Institute of Thailand (PTIT) is a neutral, independent, non-profit organization established in September

1985, with a mission to foster better understanding of the petroleum, petrochemical, and related industries in Thailand with emphasis on human resources development, information services, technical services, public policy and regulatory support, to ensure sustainable development and competitiveness of the industry and the economy. Dr Thitiratsakul holds a Ph.D. in Chemical Engineering from University of Toronto, Canada, two master's degrees (Chemical Engineering, University of Toronto, Canada and Manufacturing Administration, Western Michigan University, USA), and a BS in Chemical Engineering, Chulalongkorn University, Thailand. Dr Thitiratsakul has extensive industrial and research experience on energy issues with an emphasis on the Asian Pacific region. He has worked for several international majors in the oil industry and held high-level management positions in the processing and refining industries. He has written on such topics as fuel standardization; bio-fuel development in the ASEAN region; and, LPG and natural gas markets and pricing in Southeast Asia. He has given invited lectures at educational and research institutions in Thailand and elsewhere in Asia.

FFSR SECRETARIAT

Bansari Saha

Bansari Saha is a Senior Manager at ICF, holds a Ph.D. in Economics, and has close to fifteen years of consulting experience. Dr Saha is one the senior economists at ICF supporting public and private sector clients in understanding the economic effects of public policy decision-making. He currently serves as a senior economist on ICF's contract with EPA's Clean Air Markets Division (CAMD) and has been working on analyzing the economic impacts of reducing emissions from the power generation industry. Dr Saha has also been one of ICF's senior energy economists serving clients in South Asia. He has been the lead economist for an USAID program to develop clean energy options for Bangladesh to reduce their power sector GHG emissions. Dr Saha has also been analyzing various economic implications of potential climate change policies, including modeling the macroeconomic impacts using REMI's Policy Insight model, as well as analyzing the competitiveness impacts using bottom-up spreadsheet models. He has also worked on measuring the economic impacts of damages to critical infrastructure, including the transmission grid and other vulnerable infrastructure. Dr Saha has also managed the development of economic impacts models to estimate the regional economic effects of offshore and onshore oil and gas exploration and drilling activities. He has also analyzed the labor market implications (and other regional economic effects) for various infrastructure projects, including building new power plants, as well as the wage and labor supply elasticities for different occupational groups.

Andrew Eil

Andrew Eil has more than twelve years of experience and provides independent consulting on the topics of clean energy, air quality, transit, finance, and international development. Mr Eil recently reviewed models of municipal energy-efficient street lighting in India and Canada for the World Bank and completing energy market writing projects for corporate clients on topics that include natural gas markets, state-level energy utility policy, private equity oil & gas sector investment. Previously, Mr Eil worked as the Coordinator of Climate Change Assistance Programs in the United States Department of State's Office of Global Change (OES/EGC). He has also served as a consulting analyst for the Climate Change Unit at the International Finance Corporation and World Bank. Mr Eil holds a Master of Public Affairs in International Development with a certificate in Science, Technology and Environmental Policy from the Woodrow Wilson School at Princeton University, and a Bachelor's degree in History and Literature (Russia) from Harvard University. He is fluent in Russian and proficient in French, Mandarin Chinese and Spanish.

Turner Shaw

Turner Shaw currently works as a Program Coordinator in the Regional Integration Group of the International Services Unit at Nathan Associates Inc. In this role, he supports management of various long-term USAID and World Bank development projects, oversees the research, writing, and coordination of technical reports, and supports new business development. Prior to joining Nathan Associates Inc., Turner worked in the Economic Policy Office of the Bureau of African Affairs at the US Department of State. He has past work experience in Chinese Taipei, Uganda, Peru, and Viet nam. Turner has a Bachelors' Degree in Economics and International Affairs with a concentration in International Development from The George Washington University, where he graduated magna cum laude with special honours in economics. At Nathan Associates Inc., Turner has experience coordinating a number of long and short term projects from the Nathan Associates Inc. home office, including the Southern Africa Trade Hub, the ASEAN Connectivity through Trade and Investment project, the US – APEC Technical Assistance to Advance Regional Integration project, and the Leadership in Public Financial Management II project, among others. In support of these projects, Turner has helped Nathan Associates Inc. plan and manage a number of international events, review team meetings, and workshops both inside and outside of the United States.