Asia-Pacific
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Energy Efficiency Policy Workshop:
Economic Recovery through Energy Efficiency

Workshop Summary

APEC Energy Working Group

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The Energy Efficiency Policy Workshop aims to promote “high-performance” energy-efficiency policy measures in developing economies in the APEC region by:

- Delivering capacity building in energy efficiency policy
- Provide examples effective energy efficiency policy
- Enabling the sharing of information and experiences among APEC economies

The capacity building workshop is the 5th of the Energy Efficiency Policy Workshop series, organised by the Asia Pacific Energy Research Centre (APERC). This one-day training was intended to support development of rational and robust energy efficiency policy across APEC. Delivered by APERC, it took place alongside the APEC Expert Group on Energy Efficiency and Conservation (EGEE&C) 55th Meetings on 18 November 2020 in Hong Kong, China (online).

Participating Organisations and Economies

Expert Organisations: JFE Steel Corporation, Global Building Performance Network (GBPN), Thailand’s National Energy Technology Center (ENTEC), Vector Limited, Sustainable Energy for All (SEforALL), United Nations Industrial Development Organization (UNIDO), Scania, Energy Efficiency & Conservation Authority (EECA) of New Zealand.

Participating Economies (13 in total): Australia; Brunei Darussalam; Canada; People’s Republic of China; Hong Kong, China; Indonesia; Japan; Malaysia; New Zealand; the Philippines; Chinese Taipei; Thailand; and the United States.

Objectives

The objectives of the workshop were to:

a) Share information on energy efficiency performance, as well as policies and measures for energy efficiency improvement;
b) Explore how energy efficiency goals could be effectively formulated in each APEC economy under review, taking into account the diversity of the strategies and circumstances of individual economies;
c) Monitor progress toward attaining energy efficiency goals and the implementation of action plans. The monitoring process serves to identify recommendations that require more focus;
d) Improve capability on energy efficiency policy across APEC member economies; and
e) Help economies that is still in the early stage of establishing energy efficiency action plan.

Workshop Overview

Session 1. Introduction to Morning Session

Moderator and energy efficiency expert, Mr. Tali Trigg, welcomed the participants and thanked them for joining this timely workshop.

Opening Remarks
Kei Ming Barry Chu, Assistant Director of Electrical and Mechanical Services Department of the host economy, Hong Kong, China, gave the opening remarks. He stressed the importance of energy efficiency research centres in improving energy efficiency as well as hitting targets sooner; the key role of APERC in the APEC region; and the overall importance of multisectoral collaboration.

Poll Question #1
What is the biggest barrier towards an economy recovery through energy efficiency?

The question was posed to participants with the following possible answers (result in parentheses):

- Regulatory (#2)
- Financial (#1)
- Behavioural (#3)
- Capacity (#4)

Introduction to the Energy Efficiency Policy Workshop Series
Hugh Marshall-Tate from APERC introduced the policy workshop and the topic of economic recovery through energy efficiency, detailing the effects on energy from COVID-19, but also the recovery packages being deployed.

Session 2. Morning Keynote Address: The Role of Industrial Energy Efficiency in Economic Recovery and Green Growth

Hiroyuki Tezuka, Fellow and Executive Manager of Climate Change Policy at JFE Steel Corporation, JFE Steel Corporation

This presentation highlighted the impact of the COVID-19 pandemic on the industrial sector, and especially on how the steel industry can play an essential role in economic recovery. The presentation started by highlighting the “Kaya Identity”, namely that CO_2 emissions are the product of human population, GDP per capita, energy and carbon intensities. This was used to underscore the importance of considering energy efficiency not only in terms of electricity usage, but also in terms of recycling and using by-products of steel production such as heat recovery.

An essential path forward is the sharing of best available technologies (BAT) with other countries, as had been done in India for example, with a catalogue of BAT measures ready for implementation ready to enhance energy efficiency in the industry sector with significant greenhouse gas (GHG) emission reduction potential and eventually carbon neutrality. This example highlights the key role of technology transfer activities and overall benefits of

capacity development projects between international partners, as well as public private partnerships.

Another example concerned Thailand, showcasing the usefulness and importance of setting an initial baseline, and then conducting benchmarking exercises at a semi-frequent interval to understand whether or not a given industrial plant is becoming more or less efficient.

In summary, the presentation concluded that economic recovery should be matched with green growth to link energy efficiency and cost savings. This can be done by applying BATs, conducting international public-private cooperation and dissemination, as well as supporting research and innovation to expand the list of BATs.

During the Q&A session a question was asked by the Vice President of APERC (Munehisa Yamashiro) regarding what is considered the most promising technology in the steel industry to improve energy efficiency. The answer was related to the discussion of the Kaya Identity in that, the BAT is not necessarily a technology, but rather a process to reuse waste heat and other by-products of steel production.

Session 3. Morning Panel Presentations

Panel Presentation #1 – Buildings Sector: *Examples of Successful Programs that Delivered Tangible Energy Efficiency and Economic Benefits*

Peter Graham, Executive Director, Global Building Performance Network (GBPN)

This brief presentation focused on the building sector, examining the potential for job creation and value chains for building sector efficiency, potential to link with National Determined Contributions (NDCs), and the importance of not only adopting a “carrots and sticks” approach, but also include “tambourines”, meant to signify the importance of communication, capacity building, and dissemination.

Three key points were made in the presentation:

1. Context: APEC & ASEAN aggregate building efficiency and economic benefits are globally significant;
2. Policies work: evidence shows that ambitious policy settings support economic recovery; and
3. Challenges and opportunities: can be aggregated across APEC & ASEAN with common approaches.

Another key message from the presentation was the effectiveness of integrated policy packages in improving energy efficiency and leading to economic recovery, not only through codes for new buildings, but especially through retrofits of existing buildings stock. The growth in GDP in one aspect, while from an equity point-of-view the lowered operating costs of home energy costs is net positive as well as health outcomes.

In the APEC region, GBPN has found that while voluntary green building codes are commonplace, they lack coverage and enforcement. Also, the region faces a project increase in electricity demand from cooling, but this could be done efficiently through better design and more sustainably using renewable energy, otherwise this development risks becoming a significant emissions driver. Finally, it is worth noting the energy efficiency

potential does not only exist at an operating level, but at several other points in the lifecycle of production, materials, and end-of-life.

Panel Presentation #2 – Transport Sector: *Examples of Successful Programs that Delivered Tangible Energy Efficiency and Economic Benefits*
Nuwong Chollacoop, Team Leader, Thailand's National Energy Technology Center (ENTEC)

This presentation presented work conducted in Thailand on energy efficiency, including a new research organisation dedicated to energy efficiency (ENTEC), and an overall focus on what has been done in the past on energy efficiency in the transport sector in Thailand, and what the future holds.

The presentation included details on Thailand's innovative CO_2-based excise tax as well as its eco-car label, both of which were developed in close coordination with the manufacturing sector and are noteworthy given their support from the automotive sector after much discussion and three years of lead time, as well as very low cost of implementation. The results were presented showing a clear increase in transport energy efficiency, not only for the eco-car vehicle class, but across all segments.

As a next step, and in the context of economic recovery, Thailand is now looking to utilise its existing carbon-based excise tax structure to promote vehicle electrification, including for two- and three-wheelers. Another key tool being put into place this year is increased government procurement of energy efficient vehicles, which both helps manufacturing competitivity, but also improves air quality and reduces CO_2 emissions.

Panel Presentation #3 – Energy Sector: *Examples of Successful Programs that Delivered Tangible Energy Efficiency and Economic Benefits*
Steve Heinen, Manager of Energy System Analytics, Vector Ltd

The final brief panel presentation was by Vector Ltd, which represents New Zealand's largest energy portfolio business and has operations also in Australia and the Pacific.

COVID-19 has accelerated several trends in this sector, including improved energy efficiency, new technologies (EVs, heat pumps, solar PV etc.) as well as changing behaviour. For this reason, Vector Ltd has adopted a new approach to become more customer-centric and to build data from the bottom-up to help capture the shifting landscape in energy use.

The presentation then also illustrated the importance of engaging with the private sector, showcasing a recent initiative between Vector Ltd and Amazon Web Services focused on advanced metering and creating a market enablement platform. The presentation concluded with the following key points, stressing the importance of making data-driven investments decisions that can often last 40 years or more:

- Network planning needs to be flipped to a bottom-up approach to put the customer at centre (unprecedented energy efficiency success over last decade has made that clear);

- Smart meter data is essential to understand changing demand side and provide new robust planning inputs; and
- Non-wire alternatives and distributed energy resources management system (DERMS) are available, but need the right frameworks and tools.

Session 4: Moderated Panel Discussion and Q&A

Poll Question #2
In which sector do you see economic recovery through energy efficiency having the most potential?

The question was posed to participants with the following possible answers (result in parentheses):

- Power (#4)
- Industry (#1)
- Transport (#3)
- Buildings (#2)

The moderator (Tali Trigg) started the panel discussion by asking a guiding question, with an aim to finding synergies and overlaps between the different sectors:

- What contribution can your sector make to economic recovery through energy efficiency, and where do you see the need to interact more with other sectors (represented on the panel)?
    - Hiroyuki Tezuka of JFE Steel Corporation noted that efficiency in industry should not only look at the production process, but also in terms of the output. By providing for example high tensile and lighter weight steel, this has the potential to improve the efficiency of the transport sector, including providing longer range for electric vehicles (EVs). Ultimately, the industry sector can help improve the final end use efficiency of the transport sector, as on illustrative example.
    - Nuwong Chollacoop of ENTEC concurred with this example and gave the additional example of the bus sector in Thailand using aluminium for the chassis instead of heavier steel.

Hugh Marshall-Tate of APERC asked Hiroyuki Tezuka about the potential role of hydrogen in steel production. The answer referred back to the industry presentation in the hydrogen can play a role as being reinjected from a by-product back into the blast furnace to improve energy efficiency and reduce CO_2 emissions by about 10%. This was noted to be relatively easy. Using more hydrogen however comes with energy penalties and does not yet make economic sense. Until this is solved, other transitional methods such as carbon recycling could be employed.

A question then came from Naoko Doi from the Institute of Energy Economics, Japan (IEEJ) regarding Vector's presentation, asking for more information regarding their bottom-up modelling approach as well as how they promote energy efficiency. Steve Heinen noted that

as a network company, they try to build what is used, so disaggregating homes by type of homes helps improve forecasting and match peak demand and in terms of promoting energy efficiency, they do not do so by mandate, but rather as a general trend towards becoming a risk manager, versus an asset builder.

Questions then turned towards the transport sector, with a question for Nuwong Chollacoop regarding what is being done on EVs in Thailand, especially in regard to charging infrastructure in order to facilitate their uptake? Initially there was a subsidy for charging infrastructure three years back from the Ministry of Energy (including both AC and DC chargers), and increasingly the private sector has gotten involved, including fuel stations installing AC chargers.

The moderator then turned things back to Peter Graham of GBPN to gauge his response to the other presentations, and what he saw as potential overlap across sectors to enhance energy efficiency? He noted that in the buildings sector there is an ambition to get to zero emission buildings, but in order to do so, better collaboration with other energy end-use sectors is needed. Part of the reason for this is that operation is only part of the emissions footprint, so materials and a lifecycle approach need to be considered. Peter Graham noted that the interface with urban planning, EVs, and batteries are high-potential areas for load-sharing in the energy sector. He concluded by noting, "*the more we can work out in terms of integrated policy solutions, the better."*

The moderator then invited panellists to ask each other questions, and Nuwong Chollacoop then began by asking Peter Graham on building codes, with the Thai context in mind, what are best practices in dealing with industry that drag their feet and delay energy efficiency improvements? Peter Graham noted that the risk of COVID-19 recovery packages is that they are used to delay improvements by industry and would potentially increase costs, but he argued instead that locking in inefficient building puts a break on innovation for up to 30 years. GBPN aims to show the benefits (economically and health-wise) of efficient buildings, which is increasingly taking place thanks to increasing digitalization and so-called "Industry 4.0". Peter Graham noted that almost all improvements tend to have a payback period of 3-5 years, which is a small share of the lifetime of the building stock.

Another question was asked towards Vector Ltd regarding how a utility can help encourage energy efficiency. Steve Heinen noted that smart meter data is a starting point, without it, things get hard to manage as they cannot be measured. With better data, savings can be identified through for example energy efficiency retrofits. It was also noted that in the Auckland area, the winters are relatively mild, so the lowest income households may attempt to make it through the winter without turning on the heat to save money. These households may increase their heating consumption at some point, which would then be a positive development, but not necessarily from an energy efficiency point-of-view. This important difference can be teased out through data. And where data is missing, artificial intelligence can be used to improve forecasting over time, but Steve Heinen noted that the "human factor" is still very much needed, and called for increased capacity development in this sector.

A question from Naoko Doi (IEEJ) went to Peter Graham (GBPN) regarding the importance of using building renovations as a tool for economic recovery. She asked whether or not Peter Graham could detail any cases where circular economy concepts have been used to for example extend the lifetime of buildings, and thus reduce the material impact? Peter Graham welcomed the question and noted that one needs to take a lifecycle view if one is to achieve a zero-emission outcome. Peter Graham noted that the best case comes out of the Netherlands through their "*Energiesprong*" program, which includes as success factors a close cooperation between the government and industry, leveraging bulk renovations to ask for energy efficient outcomes, which in turn spurred value chain innovation including prefabricated modular techniques allowing residents to remain in their homes during retrofits. The key lesson here is that government can provide the scale in a new market, and for this to work initially, you need good stakeholder engagement to get people onboard with common goals.

Another question from Naoko Doi (IEEJ) to Peter Graham (GBPN) concerned balance between energy efficiency of buildings and ensuring good ventilation, especially important for good indoor air quality, and more so in the context of COVID-19. Peter Graham noted that climatic design needs to be embraced, and we need to move away from central heating and cooling systems, with buildings designed much more sensitively to climate including passive cooling and heating. There exist the methods and abilities to provide thermal comfort without compromising on air flow, in no small part based on very old techniques that have been rediscovered.

Poll Question #3
With today's workshop completed, where is the biggest knowledge gap in your view?

The question was posed to participants with the following possible answers (result in parentheses):

- Sectoral policies (split #2)
- Finance mechanisms (split #2)
- Policy implementation (#3)
- Policy impact assessment (#1)

The moderator then asked each speaker to provide a closing comment in a lightning round:

- Steve Heinen (Vector Ltd) noted that he thought the workshop was very well designed, given that each sector representative comes with their unique views, but the problems we are trying to solve are common ones. He noted that the sectors have more in common than one might think, and that from his perspective there is overall a strong need and desire to better understand the customer's needs using data as a starting point.
- Nuwong Chollacoop (ENTEC) brought up another area of transport that will help economic recovery is the rail sector, which encourages large investments with multiple benefits.

- Peter Graham (GBPN) agreed with the overall assessment that the workshop was useful, and it was quite interesting and useful to share best practices from other sectors.

The moderator then wrapped up the morning session by thanking the Host Economy, Hong Kong, China, as well as all the presenters and participants for their inputs and questions respectively, and APERC for organizing the workshop. In terms of summarizing content, the moderator noted that:

- The opening remarks touched upon the importance of international research centres such as APERC in linking best practices and sharing knowledge;
- APERC then showed the dramatic effects of COVID-19 on APEC economies and their energy use, but also the potential for recovery packages to enable a sustainable recovery;
- From the industry sector, it was clear the potential it has in improving energy efficiency in its own sector, partly through improved operations, but also through material recycling. Furthermore, it can play an important part in lowering the energy footprint of other end-use sectors;
- For the buildings sector, the importance of the full value-chain and job creation was noted in the context of using energy efficiency to boost an economic recovery. Also, it was noted the opportunity of linking with NDCs, as well as thinking closely about communication and stakeholder engagement; and
- The transport sector demonstrated the effectiveness and variety of financial tools available to encourage energy efficiency in this sector.

Session 5. Introduction to Afternoon Session

Moderator and energy efficiency expert, Mr. Tali Trigg, welcomed the participants and thanked them for joining this timely workshop.

Poll Question #1
What is the biggest barrier towards an economy recovery through energy efficiency?

The question was posed to participants with the following possible answers (result in parentheses):

- Regulatory (split #2)
- Financial (#1)
- Behavioural (split #2)
- Capacity (#3)

Introduction to the Energy Efficiency Policy Workshop Series
Hugh Marshall-Tate from APERC introduced the policy workshop and the topic of economic recovery through energy efficiency, detailing the effects on energy from COVID-19, but also the recovery packages being deployed. He also noted three key lessons learnt from different peer-reviews on energy efficiency (PREE), which may be pertinent for participants of the workshop:

1. We are able to benchmark progress by following up previous PREEs;
2. Facilitates interagency communication by bringing all stakeholders together; and
3. A focus on data.

Session 6. Afternoon Keynote Address: Recovery Better with Sustainable Energy in Southeast Asia: A Case for Energy Efficiency

Alvin Jose, Senior Energy Specialist, Sustainable Energy for All (SEforALL)

The presentation showcased SEforALL's recently released (October 27, 2020) report titled, "*Recover Better with Sustainable Energy Guide for Southeast Asian Nations*." The overall message is that energy efficiency should not be seen as a barrier to depressed economies, but rather as a stimulus to bring back economies back at a faster pace and more resilient. Also, it is critical to meeting Sustainable Development Goal (SDG) 7 [Affordable and Clean Energy] by 2030.

Electrification access is improving significantly in Asia, from 548 million without access to electricity in 2010, to 218 million 2018, with COVID-19 adding more urgency to the issue, especially for the issue of clean cooking. Overall, Southeast Asia has a lot of potential left to improve its energy intensity by considering energy efficiency as the "first" and cheapest fuel. And while efficiency trends are moving the right direction, they are moving too slow to hit 2030 targets for SDG 7.

A key topic for Asia in particular is access to cooling. This could either be a power demand issue, or it could be seen as an opportunity for addressing equity and energy efficiency. According to SEforALL, currently 59 million full-time jobs are lost in Asia due to heat stress and related economic losses. Reversing this trend could improve energy efficiency, economic productivity and human health. In the context of COVID-19 it is important as well

to consider cold chains, transporting vaccines and also avoid food losses. The key point is that a transition to access to cooling needs to be sustainable. And for the building sector alone, the estimated potential for improving energy efficiency in Southeast Asia amounts to 2.4 million new jobs and USD 152 billion.

Finally, Alvin Jose detailed eight actions that governments can take to unlock a recovery driven by sustainably energy and capture these opportunities:

1. Promote ease of doing business;
2. Invest in energy efficiency;
3. Enhance policies and regulatory frameworks;
4. Transition to cost reflective tariffs;
5. Eliminate fossil fuel subsidies;
6. Invest in data;
7. Declare moratorium on new coal-fired power; and
8. Invest in people to ensure access to jobs.

During the Q&A session a question was asked by Nina Campbell (EECA) noting the interesting balance between increasing energy demand and improving living standards. In New Zealand, she noted, there is an issue of underheating, versus undercooling, so energy efficiency indicators may miss this positive development. She asked which policies were expected to come online to tackle these issues, and Alvin Jose responded that a traditional approach is being taken, whereby countries are adopting minimum energy performance standards (MEPS) and improving them stepwise. However, he noted that he and SEforALL think the full range of cooling solutions need to be better considered, such as passive cooling design, different types of cooling devices, as well as the cultural context of what is considered a comfortable temperature. A holistic point-of-view is missing, including building codes, with enforcement. Finally, he noted that we should see cooling as a service, and adapt solutions accordingly, rather than a “megawatt problem”, otherwise supply will never keep up with demand.

Session 7. Afternoon Panel Presentations

Panel Presentation #1 – Accelerating Industrial Energy Efficiency: UNIDO Approach
Nurzat Myrsalieva, Coordinator of Industrial Energy Accelerator, UNIDO

The UNIDO approach was represented in terms of its Industrial Energy Efficiency Programme, with the overarching objectives to:

- Strengthen policy and regulatory frameworks for better and sustainable energy efficiency performance in industry
- Accelerate adoption and wide dissemination of industrial energy efficiency best-available practices and technologies
- Save energy and reduce GHG emissions of the industrial sector
- Integrate energy efficiency in industry daily business practices for sustainable increased productivity and competitiveness

While the industry sector presents difficulties in prescribing a monolithic or specific industry energy efficiency solution, two key UNIDO approaches are:

1. To promote capacity building, through for example implementation of ISO 50001 Energy Management System (EnMS); and
2. Implementation of Energy System Optimisation (ESO) measures for:
    a. Motor-driven system (pumps, fans, compressors, motors)
    b. Industrial heat (steam system, process heat, waste heat recovery
    c. Industrial cooling and refrigeration systems

UNIDO mentioned their Industrial Energy Accelerator, which seeks to share best practices across partner countries and major industries, as well as knowledge kits for implementation of ESO and other specific energy efficiency solutions. An example was presented from South Africa, showcasing a saving of 100 GWh and 9 million USD, at no cost.

Panel Presentation #2 – *Driving the Shift: Towards a Sustainable Transport System*
Alexander Mastrovito, Head of Sustainability for Asia-Pacific, Scania

Scania presented its targets, the first of its kind as a commercial vehicle manufacturer adopting science-based targets, aiming for a 50% CO_2 reduction from operations by 2025 (compared to 2015) and a 20% reduction from their products. In order to meet these targets, alternative fuels and electrification play an important role, but energy efficiency is as well integral to their efforts.

Traditionally speaking, Scania's approach to energy efficiency has included four pillars:

1. New truck range: every time a new vehicle line comes out and is upgraded, on average every five years, there is an average 5% fuel savings;
2. Optimised specification: based on operational analysis of what is needed;
3. Optimised driving: through driver training, efficiencies can be reaped; and
4. Optimised maintenance: this targeted maintenance aims to maintain the energy efficiency of the vehicle stock.

Moving ahead, Scania sees a lot of potential in fleet efficiency, with an increasing amount of its vehicles being connected (>70%) and to some degree autonomous one day. Also, bus rapid transit (BRT) is something Scania is working on a lot in Southeast Asia, which entails longer and heavier buses, carrying more people, and leading to overall system efficiency benefits. Finally, electrification of buses is the next frontier, where China has come very far. The energy efficiency benefits of going electric, irrespective of the carbon intensity, is significant due to a relative lack of thermal losses. Electric roads are also another option for the heaviest type of vehicles. In the future buses might even be modular and multi-use.

Panel Presentation #3 – *Economic Recovery through Energy Efficiency: A New Zealand Example*
Nina Campbell, Senior Advisor, Energy Efficiency & Conservation Authority of New Zealand (EECA)

The final brief panel presentation was by EECA, which represents New Zealand's governmental entity dedicated towards energy efficiency. The economies GHG emissions

stem in large part from its agriculture sector (47.8%) and its energy sector (41%). As part of its recovery efforts, funding is targeting several types of projects, including for example:

- Renewable district heating systems;
- Electric and hydrogen-ready hybrid ferries; and
- Energy hardship alleviation (housing energy efficiency.

The stimulus investment principle guiding these investments look not only at short-term benefits, but also on long-term wellbeing outcomes, which includes decarbonisation, supporting economic and employment, and to improve wellbeing. To better understand this metric, a pilot programme (*Warmer Kiwi Homes*) is being used to share early lessons learnt with other agencies and projects, and to make sure metrics and methods are well-aligned through cross-agency evaluation steering groups (and beyond government).

Session 8: Moderated Panel Discussion and Q&A

Poll Question #2
In which sector do you see economic recovery through energy efficiency having the most potential?

The question was posed to participants with the following possible answers (result in parentheses):

- Power (#4)
- Industry (#1)
- Transport (#2)
- Buildings (#3)

The moderator (Tali Trigg) thanked the panellists for their presentations and opened the floor for questions.

The first one came from Harry Lai of the Electrical and Mechanical Services Department of Hong Kong, China, *"I wonder if industrial and transport players are willing to share their innovative technologies on enhancing energy efficiency with other players as they may lose their competitive edges by doing so. What can be done to improve the situation or facilitate the sharing?"*

- Alexander Mastrovito noted that he does not view it as a zero-sum game, and recognised that when innovations come to market, they are no longer a secret, but the issue is not that competitors adopt the innovations, but rather that they do not, due to an uneven playing field where not all players are equally interested in sustainability.
- Nurzat Myrsalieva said that this was a perennial challenge in the industry sector wherein anytime UNIDO wants to publish results from case studies, the industrial counterpart is reticent to share such data or have visitors or audits conducted. One strategy here is to ask industrial players who operate in different subsectors to share their experiences in order to decrease concerns regarding competitiveness, and

usually the bigger and the more multinational the company, the likelier they are to share their results from a single plant.

Another question came from Edito Barcelona of APERC, *"The front-end cost of efficient appliances and equipment are significantly higher than less efficient ones and the latter are purchased by people with lower purchasing power. What would you think should governments do to encourage consumers to purchase more efficient appliances? Would you suggest the banning of the least efficient technologies in the market similar to the 'ban the bulb' idea in the past?"*

- Alvin Jose of SEforALL thanked APERC for the question and noted that this is exactly the important line to walk: affordability versus sustainability, with the aim to achieve both. Establishing regulations that recognise efficient appliances, and push inefficient ones off the market is one approach that can help make the case for more efficient appliances. The other key mechanism is to aggregate demand for energy efficiency by leveraging government scale procurement, this can help drive down costs for everyone, which can be seen in India through its light-emitting diode (LED) scheme using a pay-as-you-go model, underscoring the importance of innovation in the financing side of things. An individual economy might be too small to effect change like this, but by harmonising standards on a regional level, the change can take place.
- Nina Campbell of EECA agreed that this is a difficult challenge with sometimes conflicting objectives, as New Zealand pursues strong MEPS, but also needs to stay cost competitive to not create products that lower-income households cannot afford. The approach of EECA is to pursue relevant MEPS and products carefully considering the potential price evolution to better understand if and when to get involved. A concrete example is that of EVs in New Zealand, which have a much higher upfront cost, and EECA has tried various policy options such as feebates, but ran into questions of equity and thus needs to further evaluate this in detail.
- Alexander Mastrovito of Scania noted that the issue of equity and redistribution is an issue that they have thought about a lot, and their view is that we should not only view at as thinking about shifting from high-polluting cars to zero-emission cars, but also make sure that car buyers are adequately paying their share for infrastructure, which could otherwise be used by for example buses that transport a higher number of people, for a lower cost and at a higher efficiency.

A question then came from Naoko Doi of IEEJ to Alexander Mastrovito, regarding EVs, asking whether or not he thought that COVID-19 had slowed down the positive cost trends of lithium-ion batteries of EVs, estimated by IEEJ and others to reach market parity by 2030? Alexander Mastrovito answered that he thinks the trend will continue, not only for demand reasons or regulations, but because of increased industrial capacity to produce batteries for EVs, including in Europe, which has until recently been lagging behind other regions. Furthermore, due to lower operational costs, Scania expects cost parity for commercial vehicles by 2025. Also, Alexander Mastrovito noted that we should neither forget the remaining and sometimes hidden subsidies for fossil fuel vehicles that need to be removed for EVs to compete more effectively. Finally, his overall assessment was that the COVID-19

crisis has not led to manufacturers abandoning energy efficiency targets, but rather redoubling their efforts.

Poll Question #3
With today's workshop completed, where is the biggest knowledge gap in your view?

The question was posed to participants with the following possible answers (result in parentheses):

- Sectoral policies (#2)
- Finance mechanisms (#4)
- Policy implementation (#3)
- Policy impact assessment (#1)

The moderator then asked each speaker to provide a closing comment in a lightning round:

- Alexander Mastrovito (Scania) concluded that governments need to set clear zero carbon targets to phase out GHGs, otherwise any efficiency improvements risk being outweighed by increased overall use and demand.
- Nina Campbell (EECA) said that the effects of COVID-19 will likely remain, with different ways of working affecting the overall energy use, shifting for example electricity demand from commercial to residential. Also, COVID-19 has created a natural experiment and learning opportunity to better understand behavioural change, and initial market research in New Zealand indicates an increased willingness to change.
- Alvin Jose (SEforALL) thinks that whereas energy efficiency is usually relatively hidden, with COVID-19 it is more visible and hopefully raises awareness of its potential. He also thinks the pandemic has made clearer than ever the value potential in energy efficiency, and the need for a systems approach.
- Nurzat Myrsalieva (UNIDO) agreed that a broader approach is needed, taking indicators into account such as health and safety. And efficiency would free up funds to create more jobs and economic opportunities, so perhaps the ones working in this field should consider spending more time on the co-benefits side of things.

The moderator then wrapped up the afternoon session and workshop by thanking the Host Economy, Hong Kong, China, as well as all the presenters and participants for their inputs and questions respectively, and APERC for organizing the workshop. He then turned it over to EGEE&C Chair Mr. Vy Ek-chin for the closing remarks who made three main points:

1. The closing remarks touched upon the importance of this workshop in providing best practices and knowledge that can be shared with all APEC economies to ensure a sustainable recovery;
2. Energy efficiency can go beyond saving energy and reducing emissions, but play an essential role in creating jobs and economies opportunities as well as to improve competitiveness; and
3. COVID-19 may have impacted APEC's energy intensity target, which was projected to be hit several years earlier than anticipated, but it is too soon to tell what the

impact of the pandemic has been. Nevertheless, it is clear that this workshop and similar efforts by APEC are needed to hasten the improvement in energy efficiency and overall economic recovery.

Workshop Conclusions

This energy efficiency policy workshop aimed to promote “high-performance” energy-efficiency policy measures in developing economies in the APEC region, and was able to do so through two sessions, one in the morning focusing on the differences and commonalities between energy sectors, and one in the afternoon looking more towards measuring and evaluating energy efficiency performance through different institutional lenses, including international, national, and private sectors.

The context of COVID-19 and economic recovery packages provided the overarching theme, but other important themes and lessons learnt emerged between the different discussions, including:

- The importance of sharing knowledge and best practices was made evident in the morning keynote speech, related to providing easy-to-use BAT “menus”, as well as by UNIDO’s approach in helping the industry sector set a baseline and track energy efficiency improvements;
- Aggregating demand through bulk government procurement and scale, as well as other innovative financing solutions, these can together help pave the market for more energy efficient products, which might otherwise have a hard time doing so due to their higher upfront cost, but lower total cost of ownership (TCO);
- Similarly, the importance of creating a solid evidence base and gathering data from the bottom-up was made by both Vector Ltd in the morning and Scania in the afternoon. Without this improved data, it is hard to provide appropriate products for customers; and
- The importance of focusing more on co-benefits of energy efficiency, such as job creation and other economic opportunities. It was suggested that this might very well be a useful focus for the community, given its importance to equity and political economy, and overall there was a signal to increase and improve the communication and dissemination efforts of energy efficiency practitioners.

Three polls were conducted during the workshop – the same ones in the morning as in the afternoon – and the results demonstrate an interesting overlap given that all three poll questions ended up with similar results, despite not being identical groups of participants:

1. For the first poll question regarding barriers, both session groups found financial barriers to be the biggest barrier to ensuring an economic recovery through energy efficiency.
2. Regarding the second poll question on which sector held the most potential, both sessions again found industry to be the most important sector.
3. For the third and final question regarding knowledge gaps, both sessions again found that policy impact assessment.

The workshop consisted of a diverse and comprehensive set of speakers and discussion sessions, with insights from governments, international agencies, private sector, and other key experts from research centres. APEC participants left the workshop with a greater understanding and appreciation of:

1. The similarities and differences of energy efficiency across sectors;
2. Best practices and case studies from around the world, with a special focus on the APEC region;
3. The risks and opportunities of the COVID-19 pandemic vis-à-vis improving energy intensity targets of APEC;
4. A greater awareness of the complete gamut of players in the energy efficiency space; and
5. The importance of a lifecycle and systems approach to energy efficiency, and how more effort in communication can make a difference.

This workshop provided APEC economies with an opportunity to come together and share their concerns, interests as well as identify the opportunities for collaboration. Potential next steps include:

- Bringing together APEC economies to discuss specific aspects of policy impact assessment and other topics related to managing and evaluating energy efficiency programmes;
- Facilitating further discussions on the development of aligned regional standards and bulk procurement, as well as other financing mechanisms to enable energy efficiency, given the financial barrier identified as the key one;
- Developing a follow up session by each sector, with some priority perhaps given to the industry sector based on the poll results.

ANNEXES

- Agenda
- Presentations