Improving Energetic Sustainability and Resilience of APEC Cities through Results-Oriented Monitoring

Steivan Defilla
President Assistant, APEC Sustainable Energy Center
Tianjin University, China
Abstract

Cities already account for more than half the world population and are therefore of growing interest for sustainability. They offer a far greater variability and much smaller size than most countries, yet they show to some degree all unsustainable development trends addressed in the SDGs. Implementing integrated urban planning allows cities to be real life laboratories for sustainability policies creating new infrastructures. APEC started developing Low Carbon Model Towns (LCMT) in 2010. This process should be scaled up to include more cities and to have a measurable contribution not only to the APEC aspirational goals of improving energy intensity and increasing the share of renewable energy, but also to APEC disaster risk reduction. Since its creation in 2014, APEC Sustainable Energy Center (APSEC) started building up a network of cities that can apply results-oriented monitoring as part of the policy cycle to improve sustainability and resilience among its members. The theoretical background of this approach can be found in the report “APEC Sustainable Urban Development Report - From Models to Results” that has recently been endorsed by the APEC Energy Working Group for publication by APEC. The present paper details the concrete steps that are needed to ensure best possible sustainability and resilience development for the participating cities.
APEC Sustainable Energy Center (APSEC) was established at the 11th APEC Energy Ministerial Meeting in 2014, and mentioned in the 22nd APEC Leaders' Declaration. It is a major achievement of the Chinese government responding positively to the initiative of APEC leaders to participate in energy cooperation in APEC region.

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>Sep. 2014</td>
<td>11th EMM, Beijing Declaration, China</td>
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<tr>
<td>Nov. 2014</td>
<td>22nd APEC Leaders’ Declaration</td>
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<tr>
<td>Oct. 2015</td>
<td>12th EMM, Cebu Declaration, Philippines</td>
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<tr>
<td>Nov. 2015</td>
<td>23rd APEC Leaders’ Declaration</td>
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</table>
APSEC Mission
APSEC的任务

1. To promote pragmatic cooperation on sustainable energy development among APEC economics;

2. To act as National Energy Administration’s think-tank on conducting strategic research and international cooperation in the field of sustainable energy development

CCT Pillar Program
Clean Coal Technology

CNSC Pillar Program
Cooperative Network of Sustainable Cities

ETS Pillar Program
Energy Transition Solutions

Events:
Two Workshops
The Annual Forum
Output of self-funded project EWG 11 2018 S

First draft presented at the 4th Asia-Pacific Energy Sustainable Development Forum, September 2018

Final draft endorsed by APEC-EWG

Electronic version
Basic Global Trends

Historically high urbanization in Asia-Pacific

Urbanization = growth

Urbanized yet poor countries

Rural yet (a little bit) better off countries

Per capita GDP vs % urban population (World Bank)
Cities are Engines of Economic Growth

APEC: > 85% contribution of cities to GDP growth

- China region: 94%
- Latin America: 90%
- Australasia: 88%
- Northeast Asia: 86%
- United States and Canada: 85%
- Middle East, North Africa: 80%
- Eastern Europe, Central Asia: 70%
- Sub-Saharan Africa: 70%
- Southeast Asia: 66%
- Western Europe: 64%
- South Asia: 49%

More than average growth in APEC

Per capita GDP 1990 - 2015
>90% of existing, being constructed, planned or envisioned high-rise buildings (>300 m) are in APEC cities.

Adding traffic lanes does not necessarily diminish congestions (Braess’ Paradox).
Five sustainability deficits of APEC cities

- General lack of circularity
- Insufficient disaster resilience
- Lack of decoupling of CO2 emissions from economic growth
- Danger of slum formation
- Lack of SDG-relevant urban statistics
Synopsis of the Policy Responses by the UN

Sendai Framework for Disaster Risk Reduction
2015 - 2030

Included in

Concretized by

1. No Poverty
2. Zero Hunger
3. Good Health and Well Being
4. Quality Education
5. Gender Equality
6. Clean Water and Sanitation
7. Affordable and Clean Energy
8. Decent Work and Economic Growth
9. Industry Innovation and Infrastructure
10. Reduced Inequalities
11. Sustainable Cities and Communities
12. Responsible Consumption and Production
13. Climate Action
14. Life Below Water
15. Life on Land
16. Peace Justice and Strong Institutions
17. Partnerships for the Goals

EEAP Conference, Bangkok, 30 – 31 October 2019
APEC Policy Responses on Energy 2000 - 2010

Extracts from APEC Leaders’ Declarations on Energy Policy Cooperation

2000: “We welcome the new energy security initiative”

2009: “We will rationalise and phase out … fossil fuel subsidies ….”

2010: “We will create low-carbon communities in the region.”
# APEC Low Carbon Model Towns (LCMT, since 2010)

## Low Carbon Town Indicator System LCT-I

<table>
<thead>
<tr>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Tier 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand</td>
<td>Demand &amp; Supply</td>
<td>Supply</td>
</tr>
<tr>
<td>1. Town Structure</td>
<td>1. Town Structure</td>
<td>1. Adjacent Workplace and Residence</td>
</tr>
<tr>
<td>3. Transportation</td>
<td>3. Transportation</td>
<td>3. TOD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Energy Saving Construction</td>
</tr>
<tr>
<td>12. Pollution</td>
<td>12. Pollution</td>
<td>1. Air</td>
</tr>
<tr>
<td>Governance</td>
<td>13. Policy Framework</td>
<td>2. Water Quality</td>
</tr>
</tbody>
</table>

## LCMT Task Force

- **Yujia pu/Tianjin, China**
- **Koh Samui, Thailand**
- **Da Nang, Viet Nam**
- **San Borja, Lima, Peru**
- **Bitung, North Sulawesi, Indonesia**
- **Mandaue, Cebu, Philippines**
- **Krasnoyarsk, Russia**
APEC Policy Responses since 2011

2014: “We aspire to the goal of doubling the share of renewables in the APEC energy mix, including in power generation, from 2010 levels by 2030”.

2014 AMM: “We endorse the APEC Cooperation Initiative for Jointly Establishing an Asia-Pacific Urbanization Partnership”.

APEC Leaders 2015: “We endorse the APEC Disaster Risk Reduction (DRR) Framework”

+ Cooperative Network of Sustainable Cities CNSC
APEC Cooperative Network for Sustainable Cities

APEC Cooperation Network for Low Carbon Energy Efficient Cities: 11 local communities, including Canberra, Australia and Turpan, China

APEC Sustainable City Service Network: 15 organizations including Australian National University and Hongkong and China Gas Group
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APEC Sustainability Gaps and Responses

Basic Commitment Level: Urban Tracker

Commitment Level 2: Vision and Targets

Commitment Level 3: Integrated Plan and Action

Conclusion
Data Requirement for Commitment Level One

Three-steps (commitment levels) to widen and deepen CNSC network

Commitment level one: The basic commitment level is defined as commitment of the city to improve sustainability and to publicly showcase the result.

Data requirements (annual data since 1990):

- Local Population
- Local GDP (local currency)
- Local energy consumption
- Local CO2-emissions

Objective: Allowing APEC communities of any size to participate in the network and showcase their result.
Setting up an Urban SDG Tracker

CNSC platform operator calculates and publishes 3 local SDG indicators on the urban SDG tracker:

<table>
<thead>
<tr>
<th>SDG indicator</th>
<th>Local equivalent indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.3.1</td>
<td>Local energy intensity measured in terms of local energy consumption and local GDP</td>
</tr>
<tr>
<td>8.1.1</td>
<td>Annual growth rate of local real GDP per capita</td>
</tr>
<tr>
<td>9.4.1 or UNFCCC INDC</td>
<td>Local CO2 emission per unit of value added locally</td>
</tr>
</tbody>
</table>

In commitment level 1, only observing and publicizing the three city-level trends (see table) is important.

Global energy intensity 1990 – 2016, taken as example

Source: Official SDG 7 tracker (World Bank 2019)
APEC internal decision scheme

Leaders’ Meeting
Ministerial Meeting
Sectoral
Ministerial Meetings
Senior Officials’ Meeting

Energy Working Group (EWG)

Primary Endorsing Body

Co-endorsing APEC bodies

APEC Policy Support Unit (PSU)

APEC Cities

Conceptor

Platform and Urban SDG Tracker

EEAP Conference, Bangkok, 30 – 31 October 2019
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2050 Vision and 2030 Targets

Commitment level two: elaborate and implement a local 2050 vision with 2030 targets and action plan incorporating commitment level one, as well as energy, innovation and IT. Local targets are based upon SDG indicators and take account of pre-existing local (BAU) scenarios wherever they exist.

<table>
<thead>
<tr>
<th>SDG</th>
<th>Local equivalent indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1.1</td>
<td>Proportion of local population having access to electricity</td>
</tr>
<tr>
<td>7.1.2</td>
<td>Proportion of local population with primary reliance on clean fuels and technology</td>
</tr>
<tr>
<td>7.2.1</td>
<td>Local renewable energy share in local total final energy consumption</td>
</tr>
<tr>
<td>9.2.1</td>
<td>Local manufacturing value added as a proportion of local GDP and per capita</td>
</tr>
<tr>
<td>9.2.2</td>
<td>Local manufacturing employment as a proportion of total local employment</td>
</tr>
<tr>
<td>9.3.1</td>
<td>Proportion of local small-scale industries in total local industry value added</td>
</tr>
<tr>
<td>9.5.2</td>
<td>Local researchers (in full-time equivalent) per million inhabitants*</td>
</tr>
<tr>
<td>9.b.1</td>
<td>Proportion of medium and high-tech industry value added locally in total local value added</td>
</tr>
<tr>
<td>17.6.2</td>
<td>Fixed local Internet broadband subscriptions per 100 inhabitants, by speed</td>
</tr>
<tr>
<td>17.8.1</td>
<td>Proportion of local individuals using the Internet</td>
</tr>
</tbody>
</table>

Objective: Allowing APEC communities to progress fast
Holistic Analysis and Results-oriented Leadership

Need for pro-active holistic science-based information

Results-oriented leadership and stakeholder mechanism to answer the following questions:

- What will the energy system of the city look like in 2050?
- What innovative industrial elements are there / should there be in the city to support this energy transformation?
- How does the city’s IT infrastructure favor this energy transformation?
Compare with Existing BAU Scenarios and with SDGs

Existing Local BAU Scenarios

At city level: urban planning targets
At national level: national targets
At APEC level: APEC goals
At UN level: SDGs
Tracking SDGs Requiring Action

Example: Global Share of Renewable Energy lies between 16 – 18%
Goal: **Doubling** by 2030

IRENA 2017:
Doubling renewables’ share means **tripling** energy storage by 2030
Most of incremental storage is Battery Energy Storage (BES)
Very little BES exists at present
⇒ Needs **17 to 38-fold increase** of BES (170 – 340 GWh), depending on EVs
⇒ **About half of it in APEC cities**

Global share of renewable energy, taken as example

Source: Official SDG 7 tracker (World Bank 2019)
Readiness to Make Local Pilot Projects

Scaling up

3rd and 4th Generation PV

Waste(water)-to-Energy

Scaling up

Plus-Energy Districts cover domestic energy needs plus mobility needs

Waste(water)-to-Energy
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Conclusion
Commitment level three: elaborate and implement local integrated urban policies and planning, incorporating commitment level two as well as all indicators of SDG 11 (cities), all other SDG indicators addressing specifically local communities, and all indicators relating to local infrastructures.

Objective: Allowing APEC communities to progress towards holistic sustainable development
Combine IUP with other Instruments of Local Government

Check empowerment of each local community in the four areas
- IUP Integrated urban policies and planning
- Management of Local Budget
- Data and Early Warning Systems
- Own and Operate Infrastructures

Governance: For each target, the government needs (at least) one independent instrument
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Overview of the Three Commitment Levels

Commitment level one: Allowing APEC communities of any size to participate in the network and showcase their result

Commitment level two: Allowing APEC communities to progress fast

Commitment level three: Allowing APEC communities to progress towards holistic sustainable development: Comprehensive inclusion of all SDG 7 and SDG 11, partial inclusion of each other SDG (may depend on country or city)
“Joining Hands Toward Sustainable Energy Development in the Asia-Pacific Region.”

Thanks for your attention!