



**Asia-Pacific
Economic Cooperation**



APEC Sustainable Energy Center

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

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Tianjin University, China

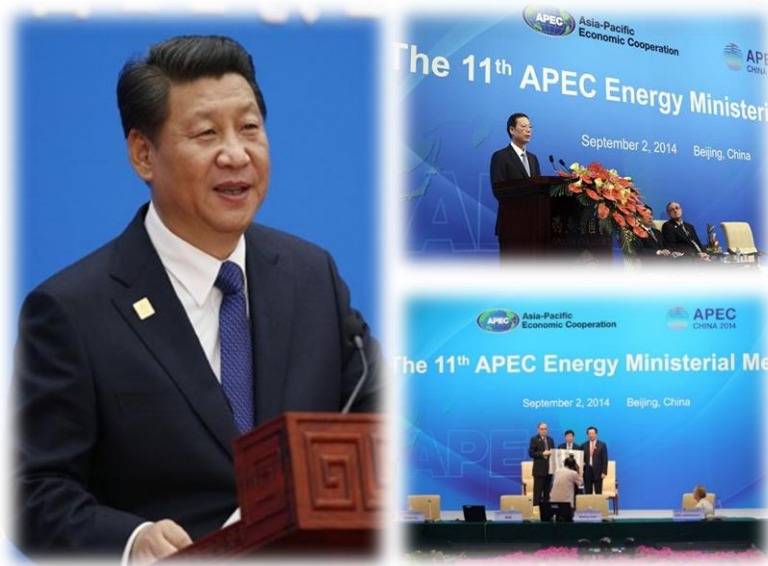
Abstract

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

亚太经合组织可持续能源中心

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.



Sep. 2014	11 th EMM, Beijing Declaration, China
Nov. 2014	22 nd APEC Leaders' Declaration
Oct. 2015	12 th EMM, Cebu Declaration, Philippines
Nov. 2015	23 rd APEC Leaders' Declaration

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

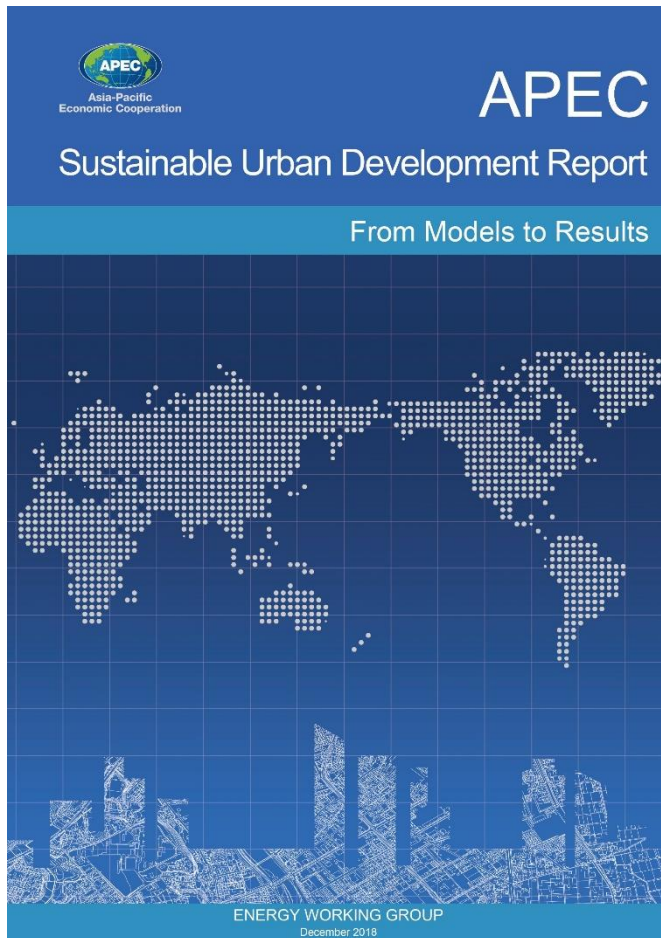
Events:
Two Workshops
The Annual Forum

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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

APEC Sustainable Urban Development Report – from Models to Results



Output of self-funded **project EWG 11 2018 S**

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

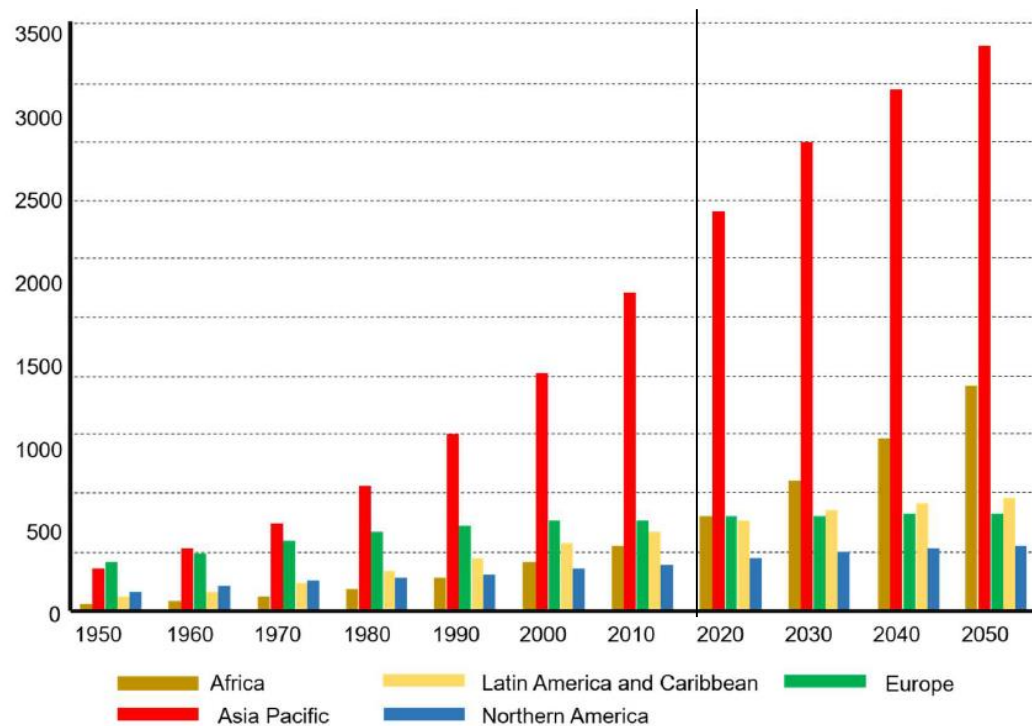
Final draft endorsed by APEC-EWG

Electronic version

<https://www.apec.org/Publications/2019/04/APEC-Sustainable-Urban-Development-Report---From-Models-to-Results>

Basic Global Trends

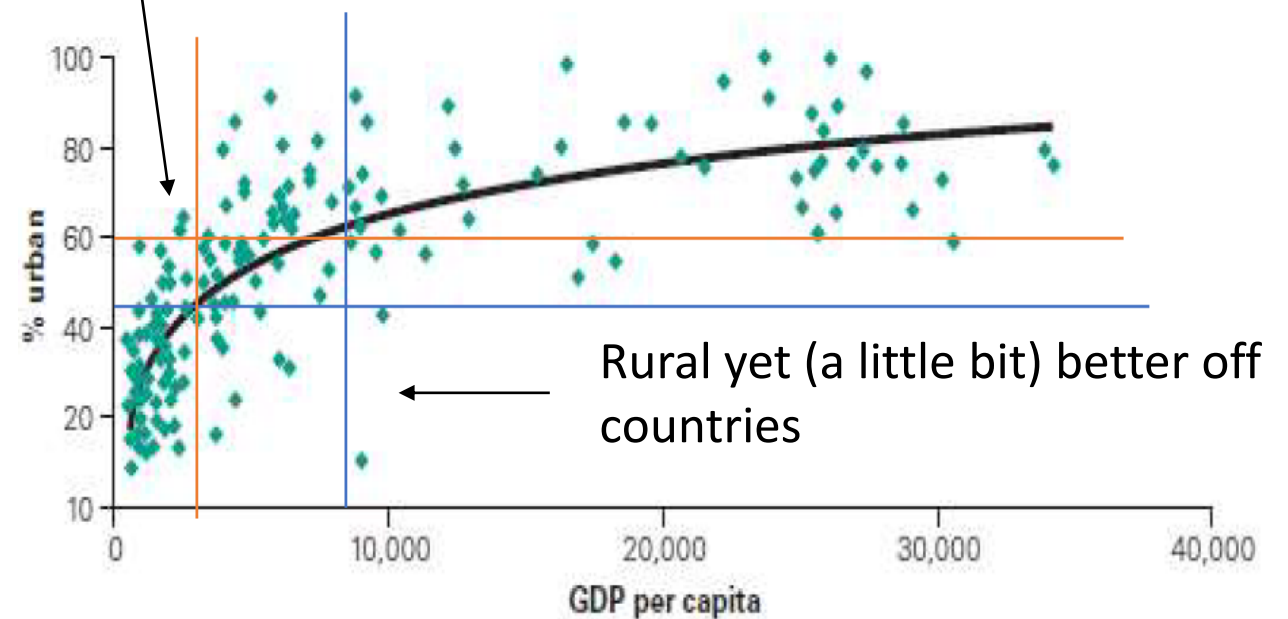
Historically high urbanization in Asia-Pacific



Urban Population (Millions) 1950 - 2050

Urbanization = growth

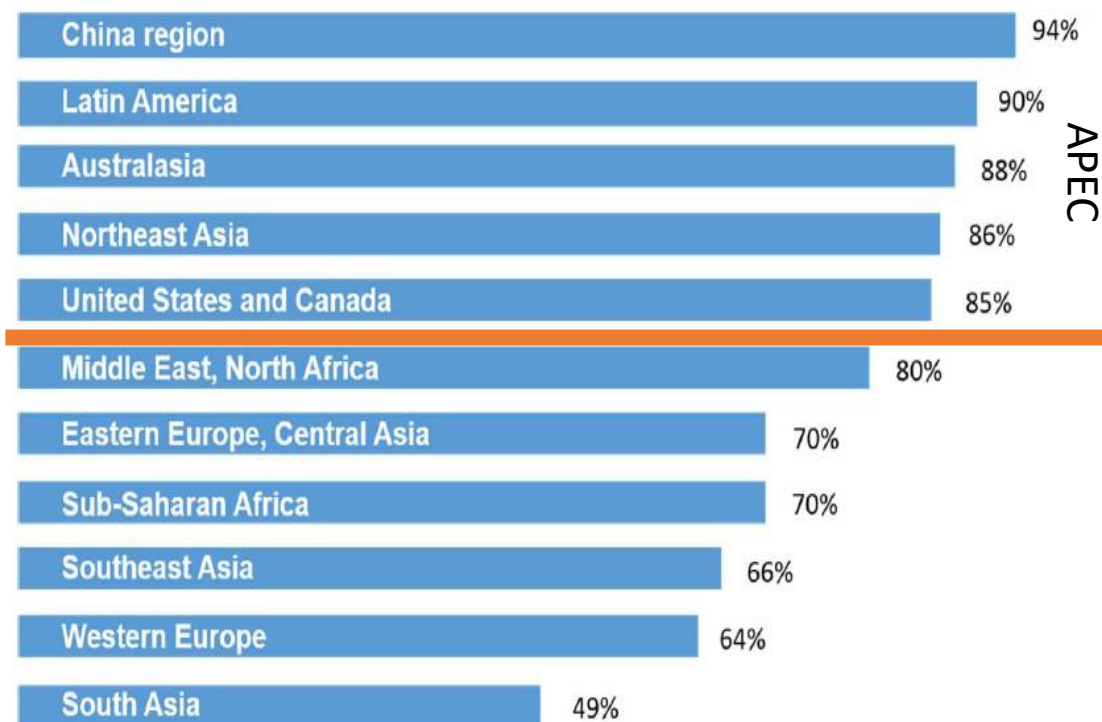
Urbanized yet poor countries



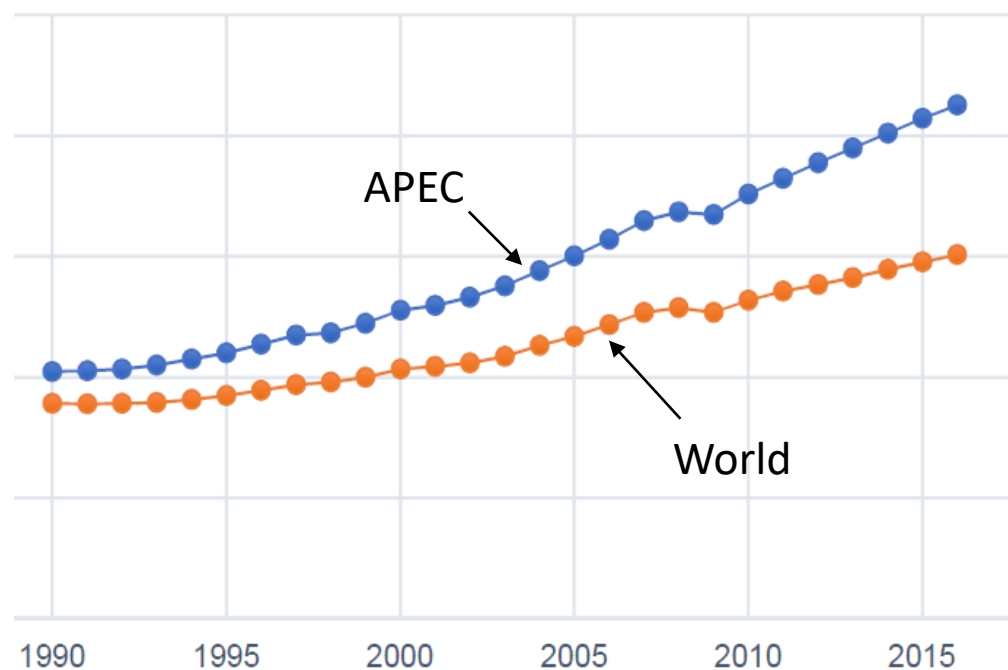
Per capita GDP vs % urban population (World Bank)

Cities are Engines of Economic Growth

APEC: > 85% contribution of cities to GDP growth



More than average growth in APEC

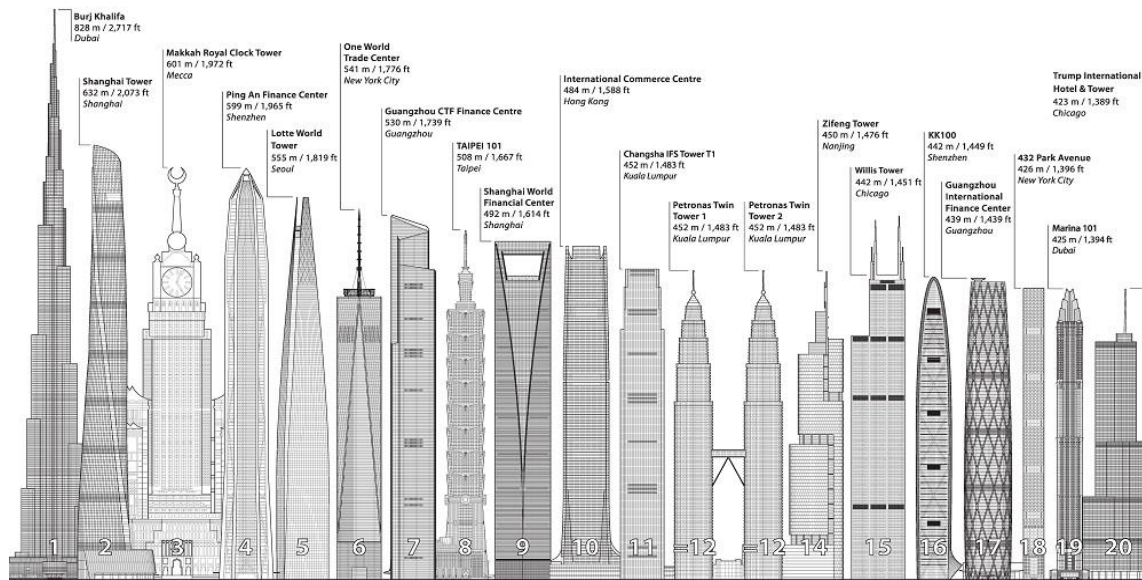


Per capita GDP 1990 - 2015

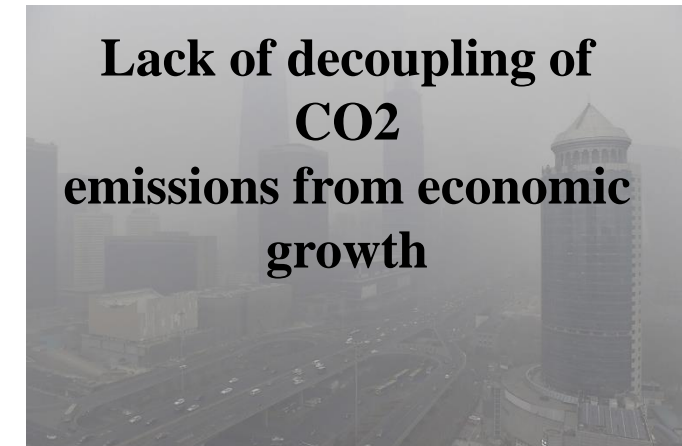
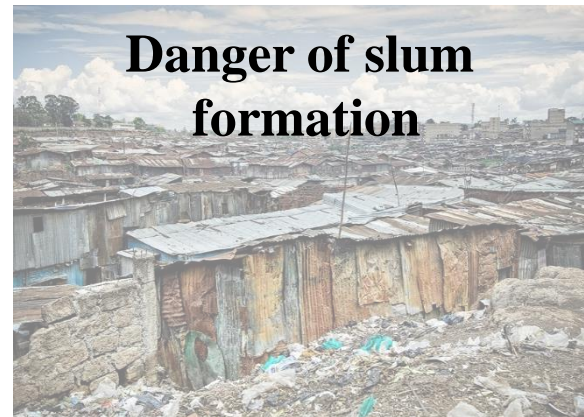
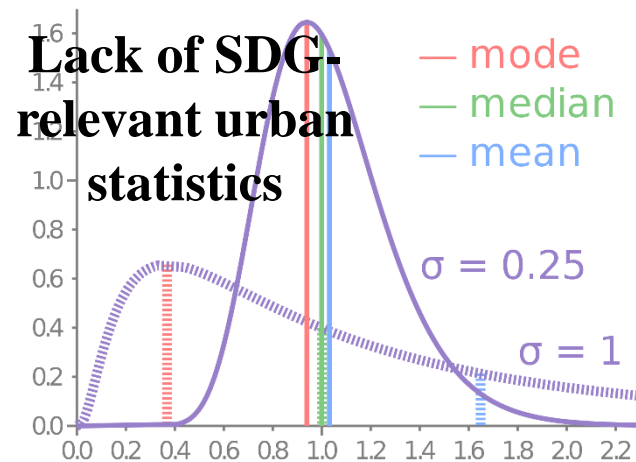
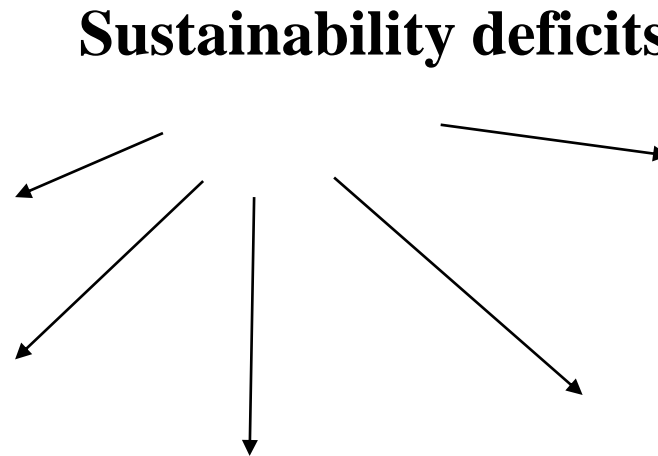
Problems to manage Economic Growth and Concentration

>90% of existing, being constructed, planned or envisioned high-rise buildings (>300 m) are in APEC cities

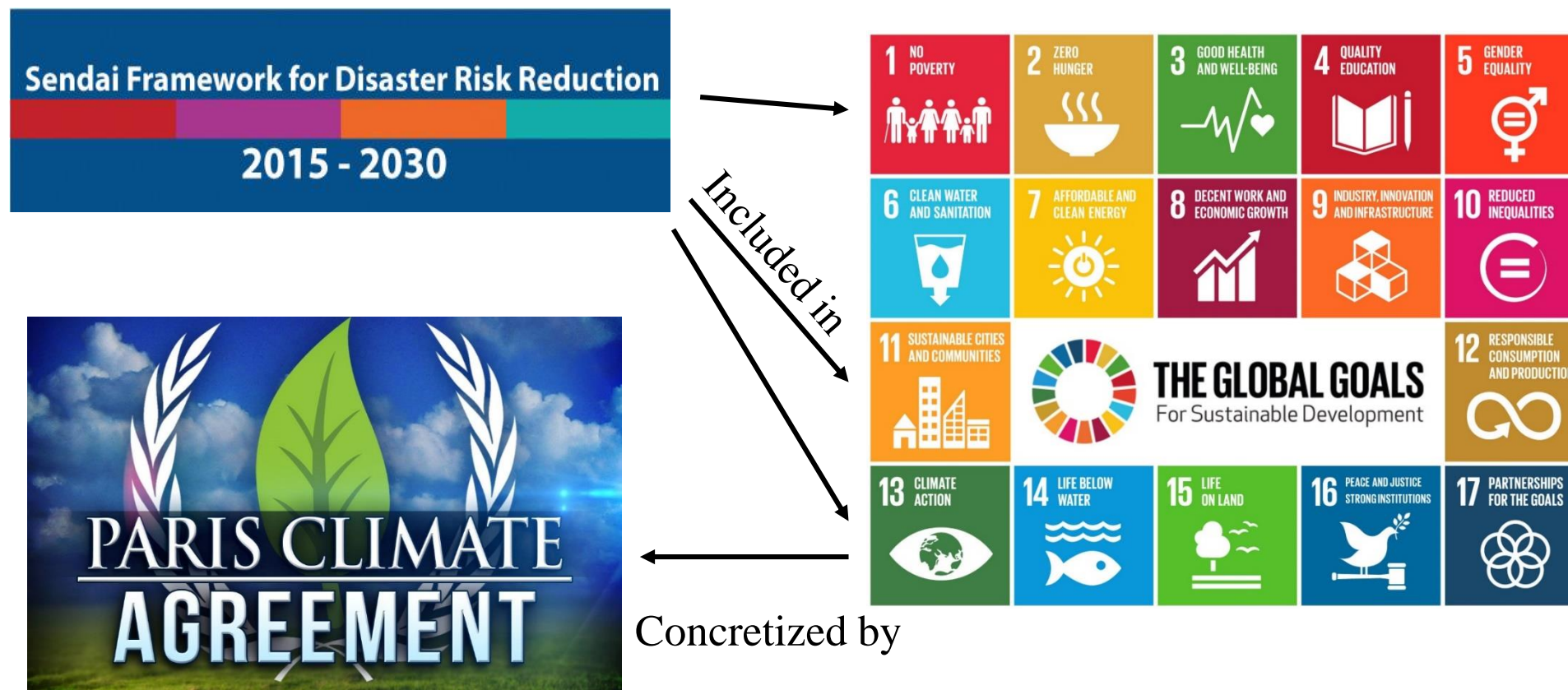
Adding traffic lanes does not necessarily diminish congestions (Braess' Paradox)



Five sustainability deficits of APEC cities



Synopsis of the Policy Responses by the UN



APEC Policy Responses on Energy 2000 - 2010

Extracts from APEC Leaders' Declarations on Energy Policy Cooperation



APEC Low Carbon Model Towns (LCMT, since 2010)

Low Carbon Town Indicator System LCT-I

Tier 1	Tier 2	Tier 3
Demand	1. Town Structure 2. Buildings 3. Transportation	1. Adjacent Workplace and Residence 2. Land use 3. TOD 1. Energy Saving Construction 2. Green Construction 1. Promotion of Public Transportation 2. Improvement in Traffic Flow 3. Introduction of Low Carbon Vehicles 4. Promotion of Effective Use
Supply	4. Area Energy System 5. Untapped Energy 6. Renewable Energy 7. Multi-Energy System	1. Area Energy 1. Untapped Energy 1. Renewable Energy 1. Multi Energy
Demand & Supply	8. Energy Management System	1. Energy Management of Building / Area
Environment & Resources	9. Greenery 10. Water Management 11. Waste Management 12. Pollution	1. Securing Green Space 1. Water Resources 1. Waste Products 1. Air 2. Water Quality 3. Soil
Governance	13. Policy Framework 14. Education & Management	1. Efforts toward a Low-Carbon Town 2. Efforts toward Sustainability 1. Life Cycle Management

LCMT Task Force



Yujiapu/Tianjin
China



Koh Samui
Thailand



Da Nang Viet
Nam



San Borja,
Lima Peru



Bitung, North
Sulawesi Indonesia

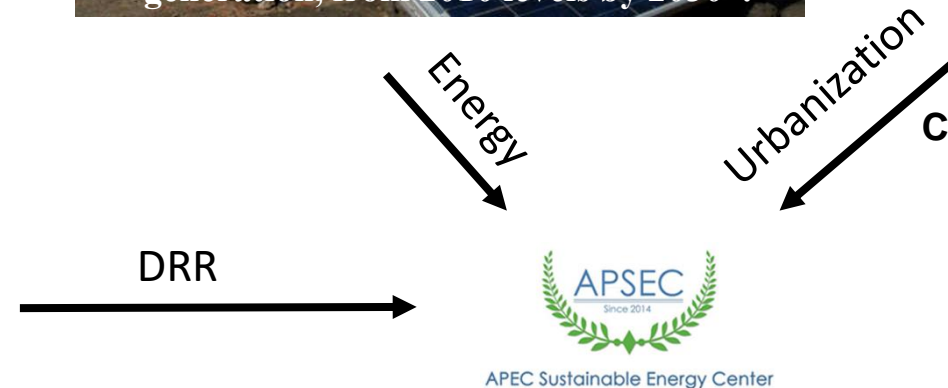
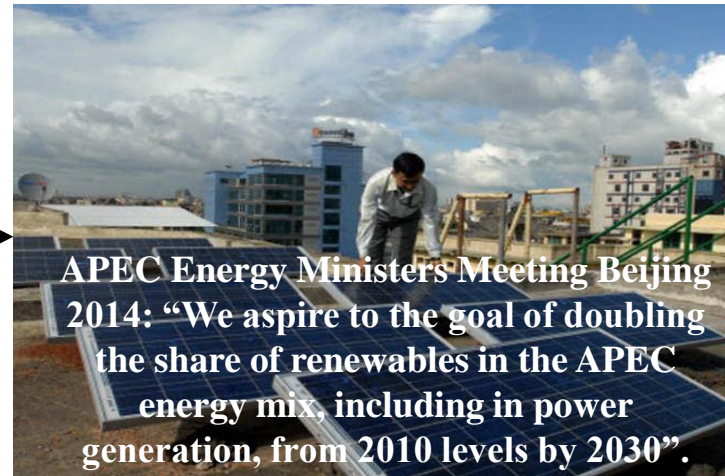


Mandaue, Cebu
Philippines



Krasnoyarsk Russia

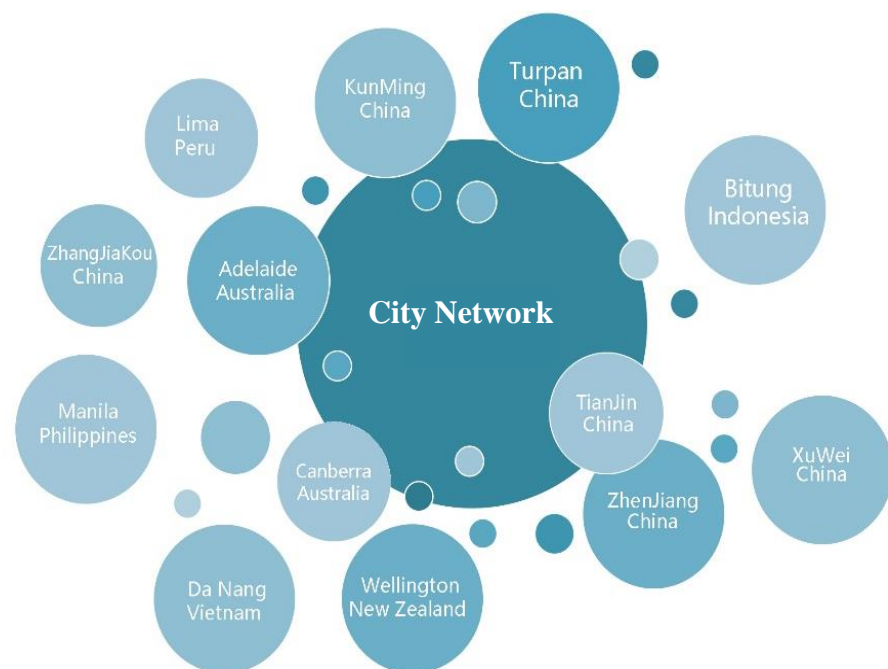
APEC Policy Responses since 2011



+ 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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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

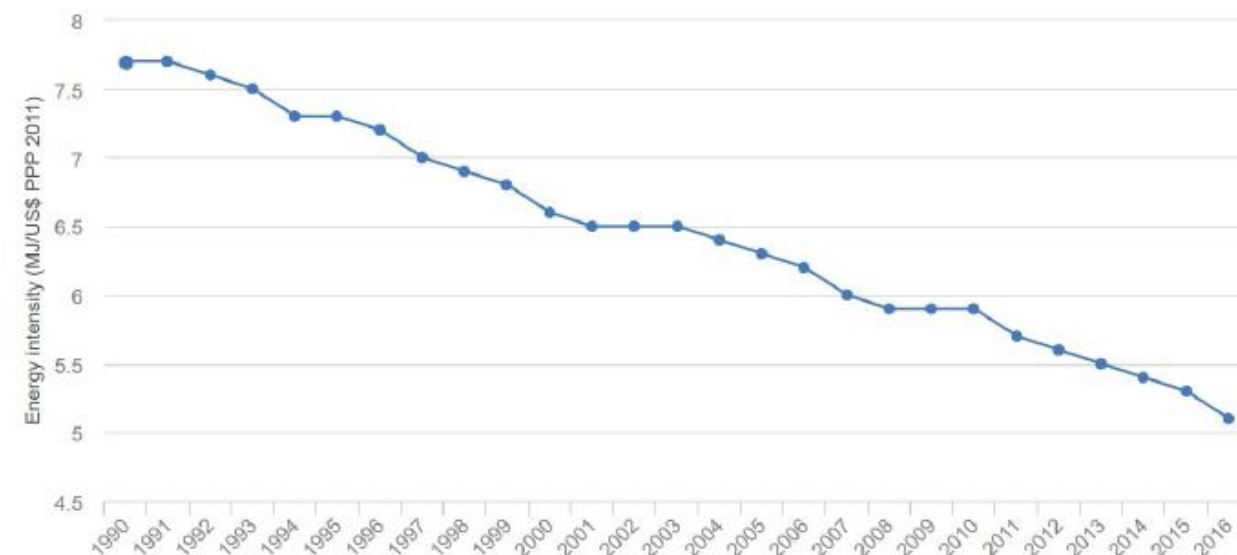
CNSC platform operator calculates and publishes 3 local SDG indicators on the urban SDG tracker:

SDG indicator	Local equivalent indicator
7.3.1	Local energy intensity measured in terms of local energy consumption and local GDP
8.1.1	Annual growth rate of local real GDP per capita
9.4.1 or UNFCCC INDC	Local CO2 emission per unit of value added locally

Partial inclusion of:



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

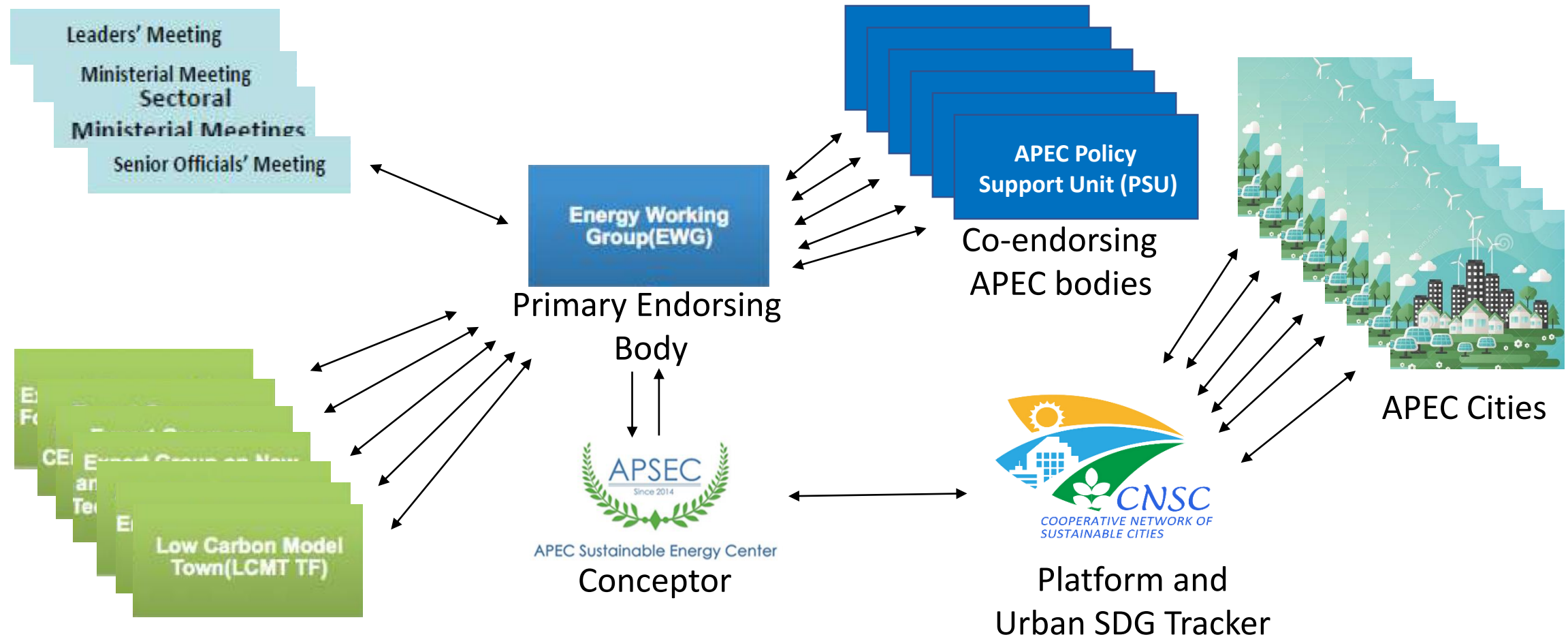


© International Energy Agency (IEA), and United Nations Statistics Division (UNSD)

Global energy intensity 1990 – 2016, taken as example

Source: Official SDG 7 tracker (World Bank 2019)

APEC internal decision scheme



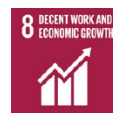
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2050 Vision and 2030 Targets

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.**

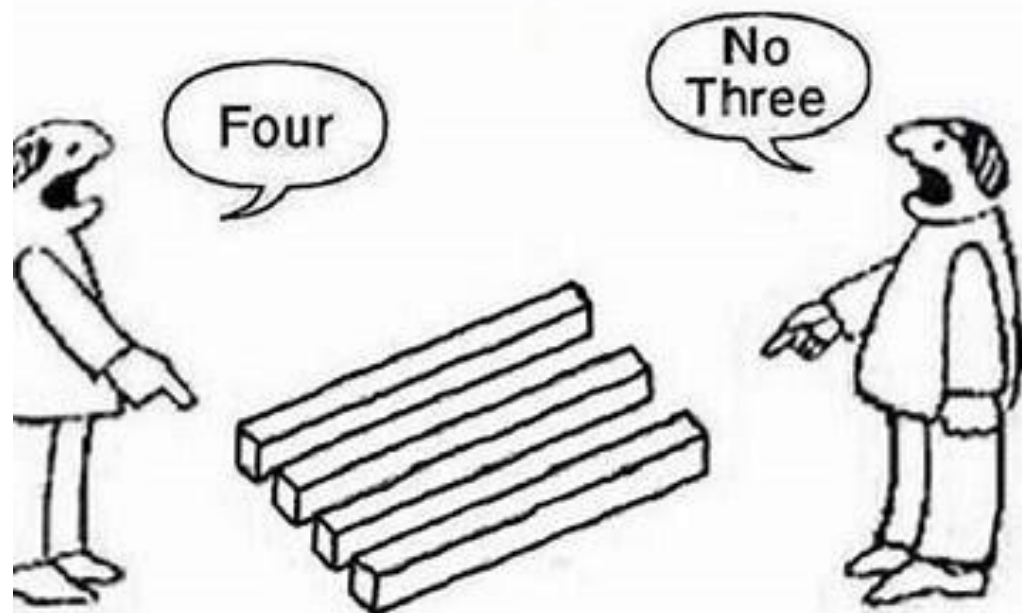


SDG	Local equivalent indicator
7.1.1	Proportion of local population having access to electricity
7.1.2	Proportion of local population with primary reliance on clean fuels and technology
7.2.1	Local renewable energy share in local total final energy consumption
9.2.1	Local manufacturing value added as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

Objective: Allowing APEC communities to progress fast

Holistic Analysis and Results-oriented Leadership

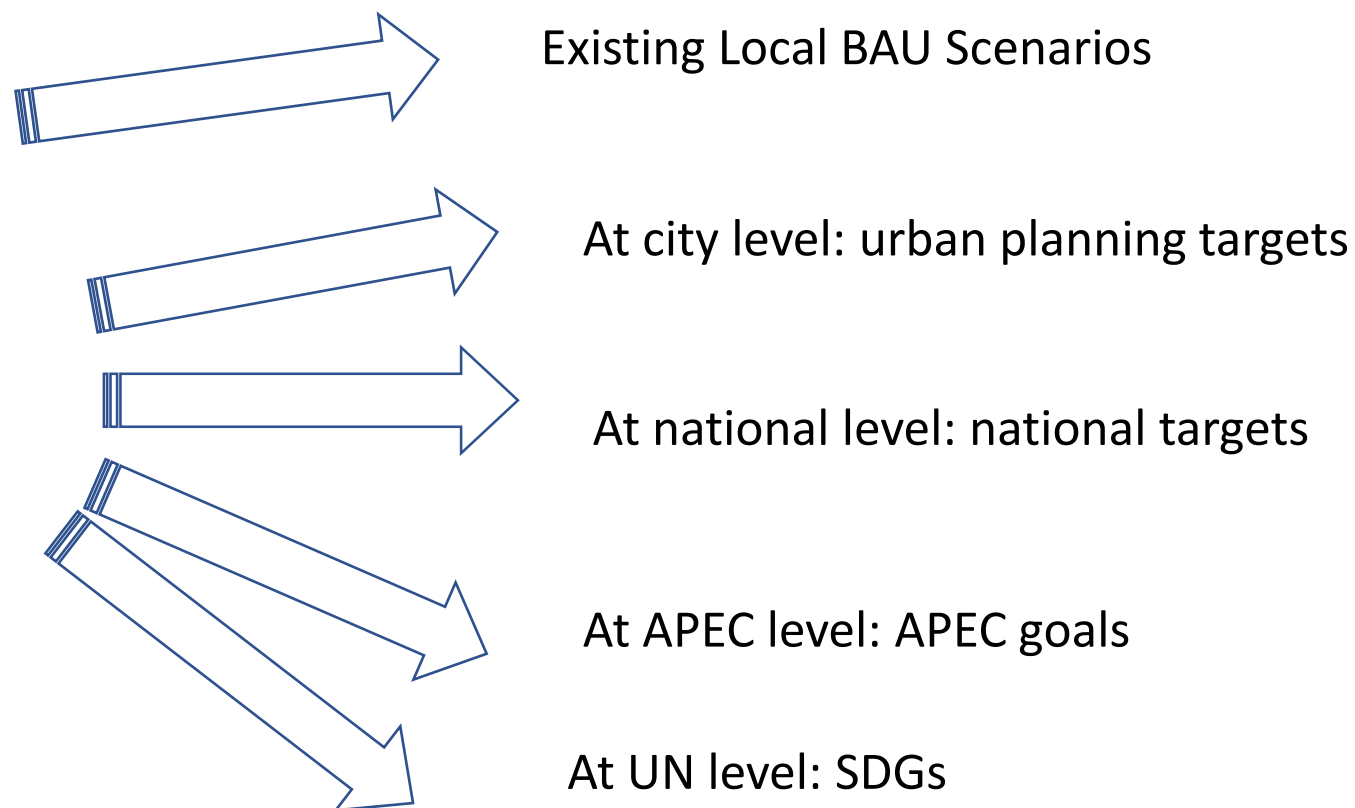
Need for pro-active holistic science-based information



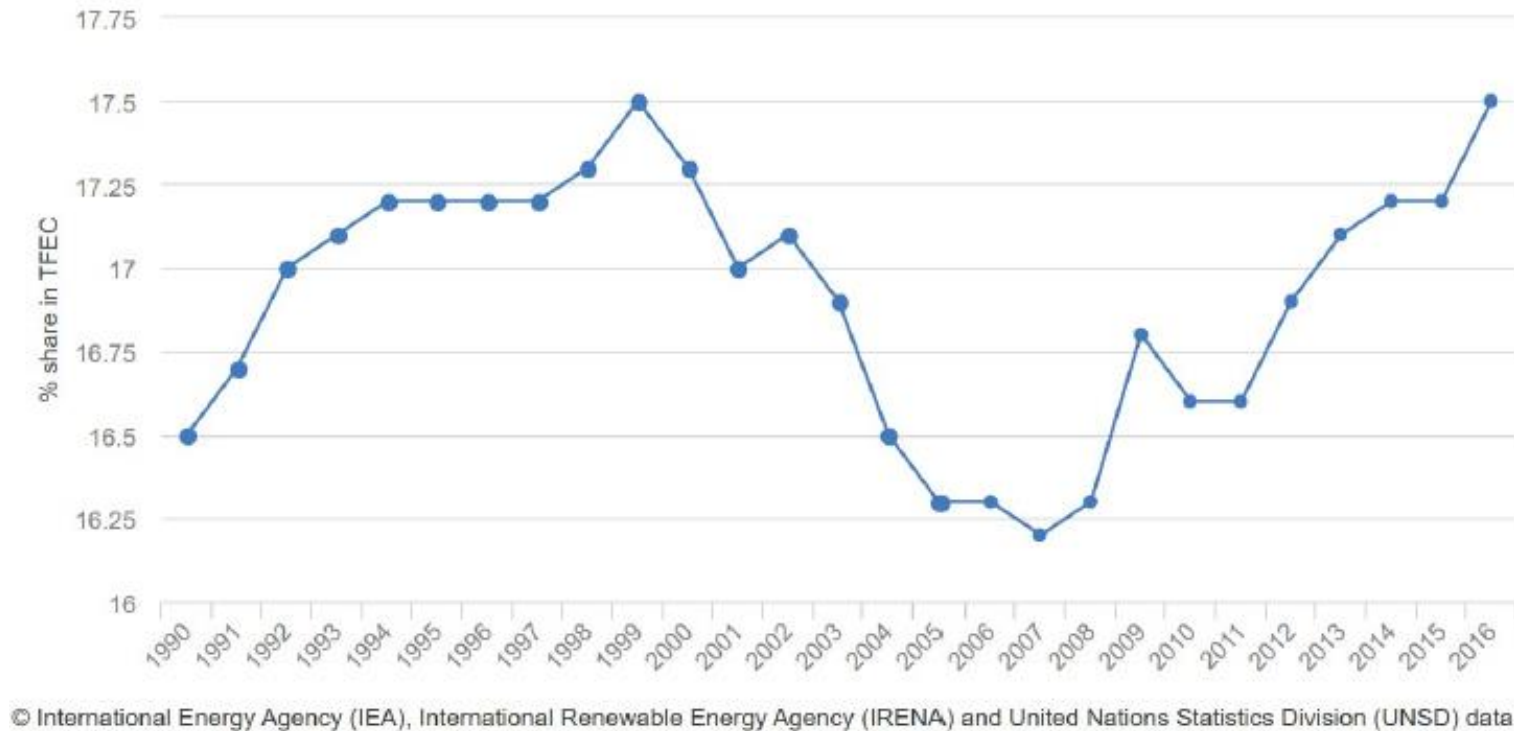
Results-oriented leadership and stakeholder mechanism to answer the following questions:

- 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



Tracking SDGs Requiring Action



Global share of renewable energy, taken as example

Source: Official SDG 7 tracker (World Bank 2019)

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)

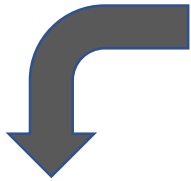
Very little BES exists at present

⇒ Needs **17 to 38-fold increase** of BES (170 – 340 GWh), depending on EVs

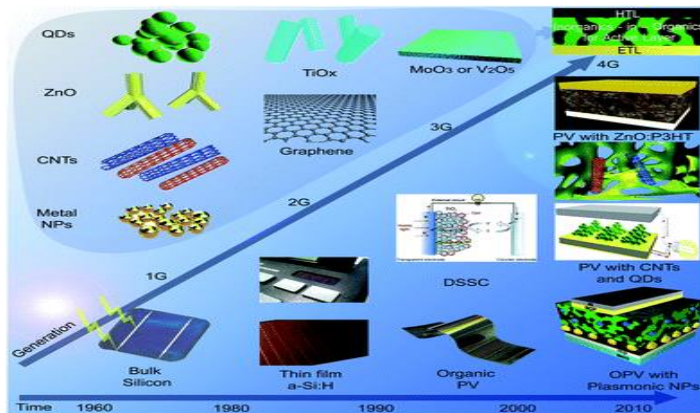
⇒ **About half of it in APEC cities**

Readiness to Make Local Pilot Projects

Scaling
up

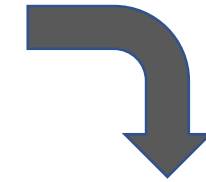


3rd and 4th Generation PV



**Plus-Energy Districts
cover domestic energy
needs plus mobility needs**


Scaling
up



Waste(water)-to-Energy



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Integrated Urban Policies and Planning

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.

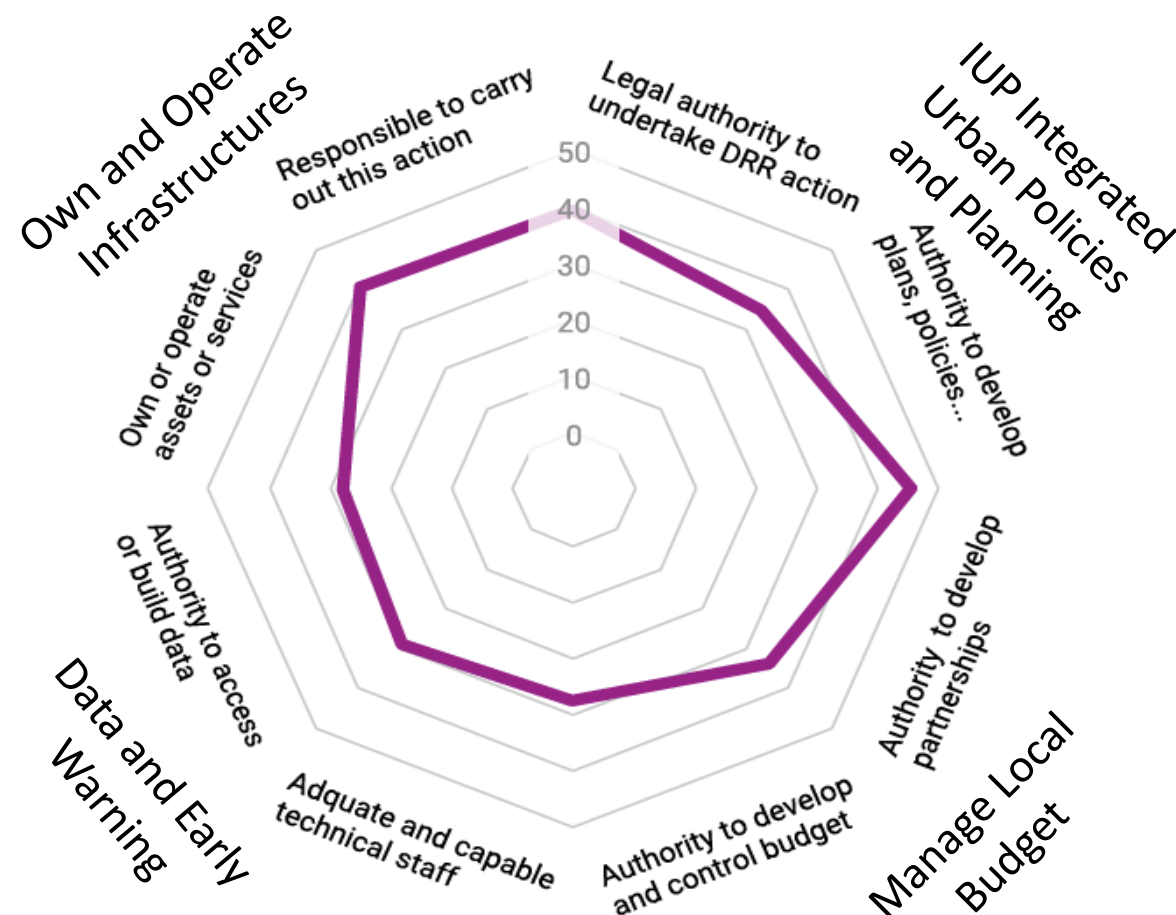
Large icon (SDG 7 and SDG 11): Comprehensive inclusion

Small icon: Partial inclusion, may also depend on country and city



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)



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Thanks
for your attention!

"Joining Hands Toward Sustainable Energy Development in the Asia-Pacific Region."