

Multi Energy Systems for Sustainable Cities in the Asia Pacific

Energy For Our Future Generations

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Asia Pacific Urban Energy Association (APUEA)

Hong Kong, May 9th 2019

Supported by



DBDH



**EUROHEAT
& POWER**



**INTERNATIONAL
DISTRICT ENERGY
ASSOCIATION**



IIEC
International Institute for Energy Conservation

Energy Consumption in Cities

- Cities occupy only two percent of the world's landmass
- Cities consume over two-thirds of the world's energy
- Cities account for more than 70% of global CO₂-emissions.



Current and Future Megacities (2015 – 2030)



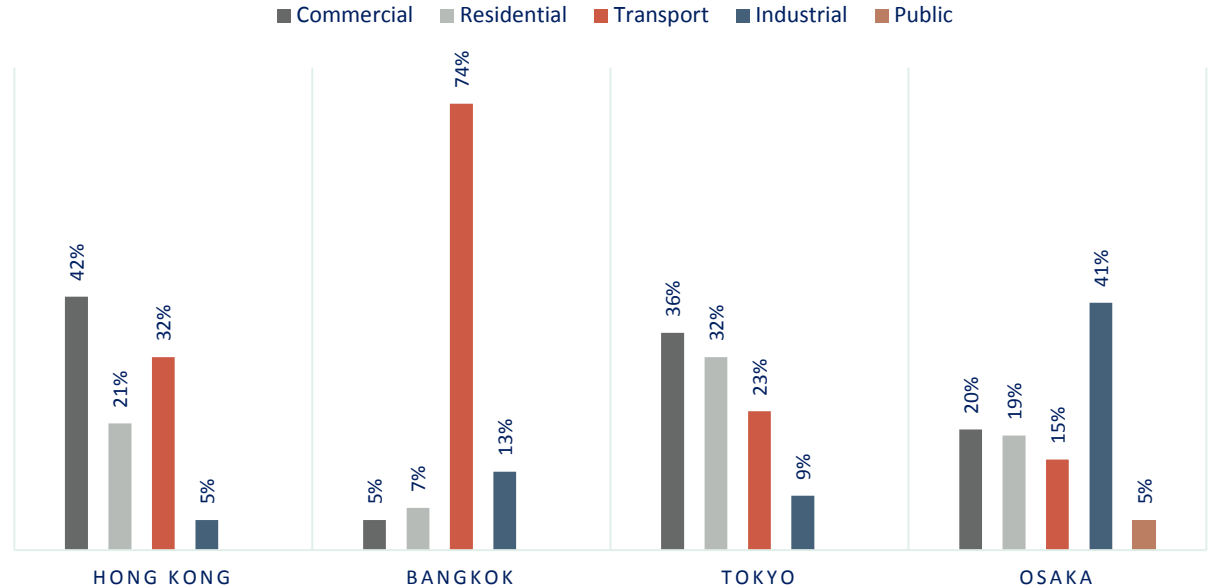
Sectoral Energy Consumption

Within cities, the proportion of energy use by various sectors differ by economy.

Cities in Asia Pacific region require different urban energy solutions depending on climate and dominant sectoral consumption:

- Hong Kong - Commercial
- Bangkok - Transport
- Tokyo - Commercial
- Osaka - Industrial

SECTORAL ENERGY CONSUMPTION



Energy Consumption in Buildings

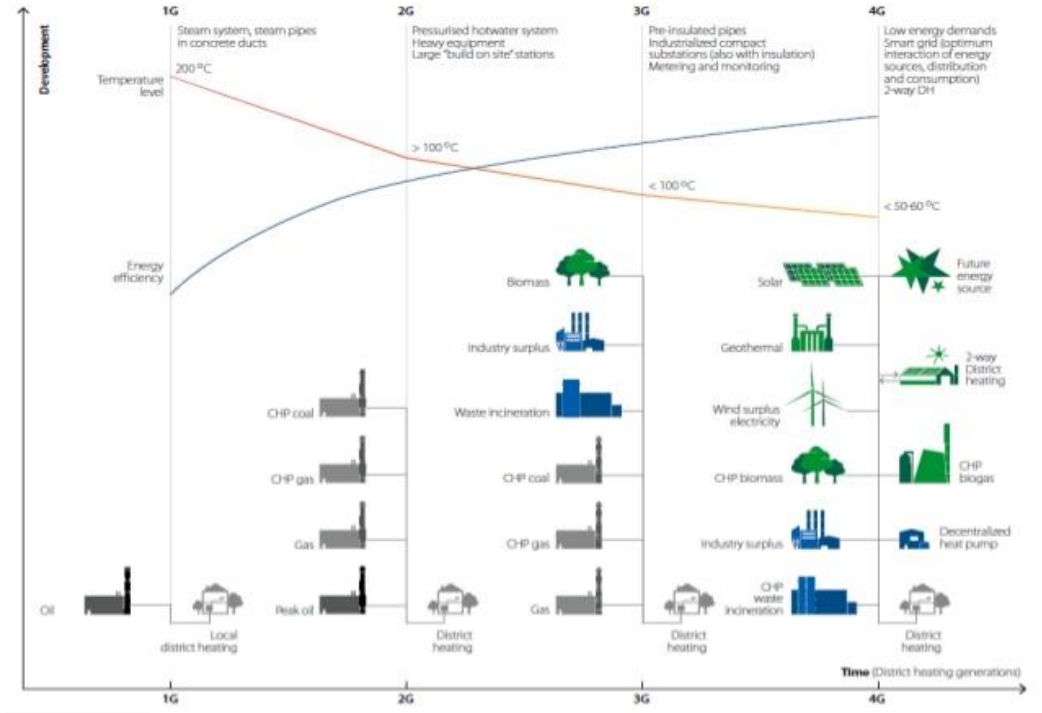
- Buildings account for a large part of GHG-emissions in cities.
- Space cooling is the fastest-growing use of energy in buildings.
- Cooling accounted for 18.5% of total electricity use in buildings, (13% in 1990).



What is Multi Energy Systems (MES)?

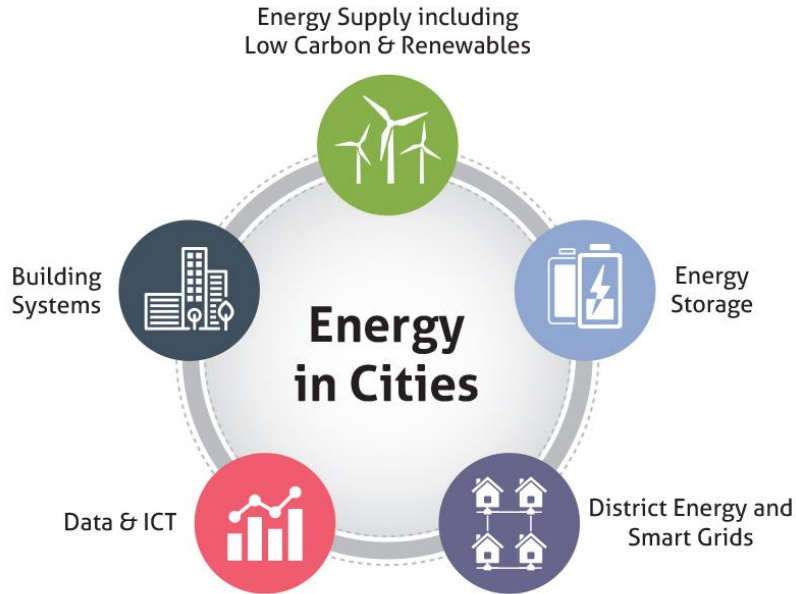
- District Energy
 - District Heating (DH) – 1-4GDH
 - District Cooling (DC)
- Combined Heating and Cooling (DHCS)
- Distributed Energy
 - Co-generation (gas CHP)
 - Tri-generation (gas CCHP)

District heating from 1G to 4G



Sustainable Urban Energy

Multi (Fueled) Energy Systems – A key to sustainable cities



Advantages over traditional energy systems:

- Adaptability to changes in fuel availability
- More effective utilization of low-value surplus energy and renewable energy
- Flexible integration of intermittent renewable energy (e.g., through energy storage and co-/tri-generation)
- Reduction in peak loads.

Indisputable trends in the energy sector

- *Urbanization*
- De-centralization
- De-carbonization
- Digitalization
- Electrification (and liberalization of electricity markets)

Is the age of thermal energy systems over?

What is District Energy today?

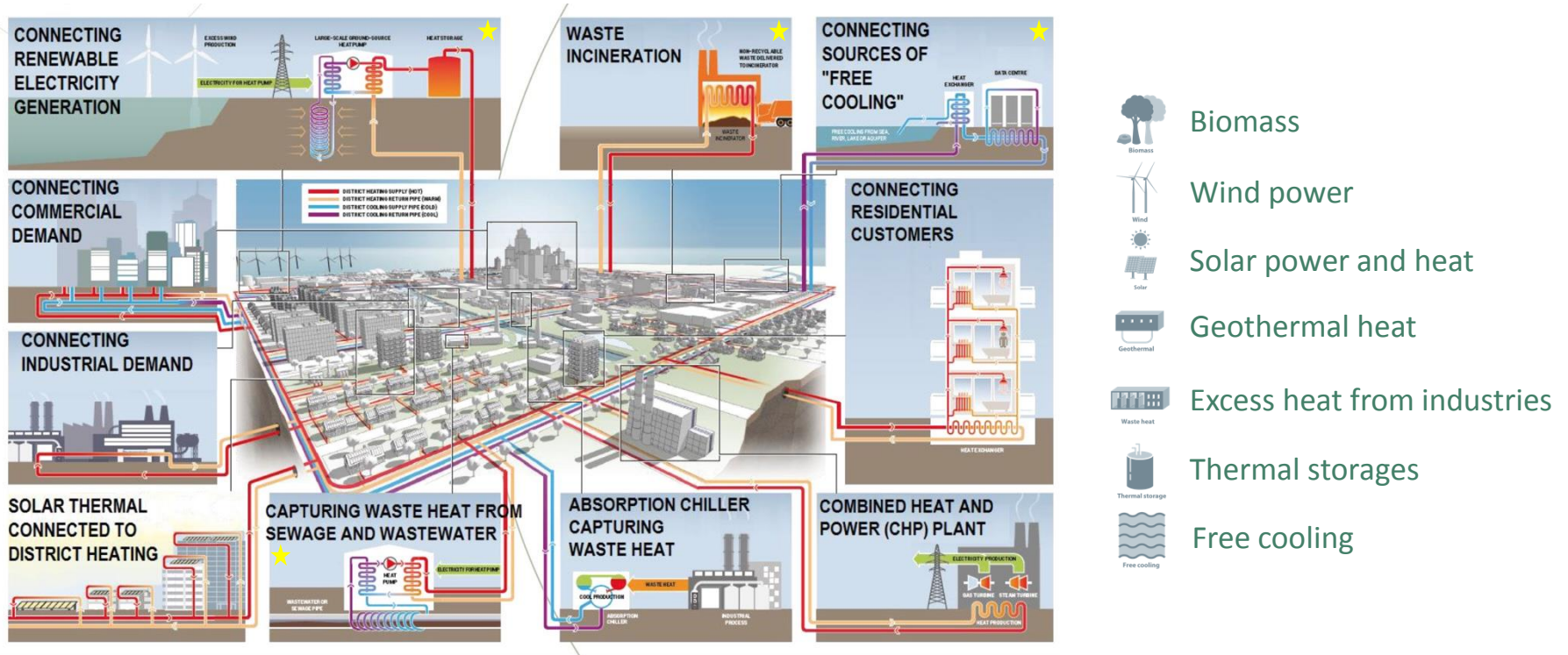
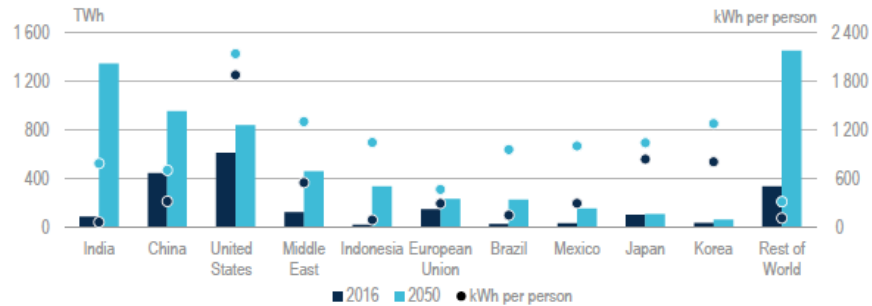


Illustration: UNEP – District Energy in Cities Initiative (DES)

District Cooling

A not-in-kind solution for HFC phase-down

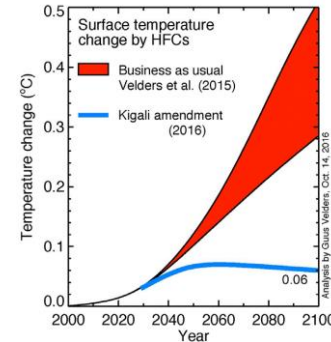
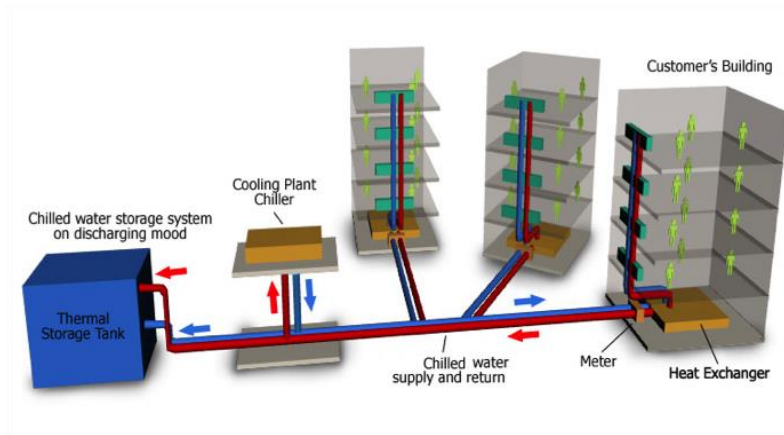


The Kigali amendment:

- Up to 0,5 °C from HFC phase down and
- 0,5 °C due to energy efficiency improvements
- Total potential 0,5 – 1 degree C

District Cooling is recognized by UN to have a key role to meet both targets!

As the solution for up to 25% of the global cooling demand



District Cooling at Kai Tak Development



- DCS, the most efficient AC system suitable for the area
- First-of-its-kind DCS in Hong Kong,
- Capacity, 284 MWr (50 consumer buildings, tot. 1,73 million m²)
- 35 % more efficient than air-cooled Air Condition Systems
- Annual savings: 85 million kWh in electricity consumption, equivalent to the reduction of 59,500 tonnes of CO₂
- Consumer cost comparable to water cooled AC-systems (Cooling Towers)
- Cost recovery: 30 years

Challenges and Opportunities for District Energy

Challenges / Lessons learned

- Terminologies and buzzwords
- Regulatory differences (DC vs DH)
 - Market regulations
 - Economic regulations
 - Social regulations
- Geographic diversity
- Need for cross-sectoral planning
- High initial costs (front-loaded investments)
- Lack of incentives and regulations
- Customer protection in terms of pricing and quality of services
- Experience gaps along the project value chain
- Delayed load ramp-up and occupation ratio

Opportunities

- Increased energy efficiency by 25%–50%
- Improved environmental efficiency
- Long lifespan of up to 50 years (low maintenance cost and improved management)
- Increased public and governmental awareness – Global initiatives (inc. APUEA and UNEP DES)
- A wide range of suitable technologies for projects with different pre-conditions
- Huge market potential (Not least for CBD/TOD areas, Industries and Industry zones, Airports, Hospitals and Data Centers)
- Recognized energy supply concept globally
- Available Financing and Business models

Asia Pacific Urban Energy Association (APUEA)

The Asia Pacific Urban Energy Association (APUEA) is an initiative of International Institute for Energy Conservation (IIEC), supported by Euroheat & Power and Danish Board of District Heating (DBDH).

Rationale:

- Similar Associations in North America and Europe but none in Asia Pacific region
- IIEC approached by development agencies and industry stakeholders to host an Association

IIEC is a not-for-profit organization established in 1984 with a mission to promote sustainable energy in developing and emerging economies. The APUEA fits with IIEC's mission and propose to host the Association at its Asia Regional Office in Bangkok

Mission

To actively promote the development of sustainable urban energy systems in the Asia Pacific region.

Objectives:

To be a platform that:

- Convenes cross-sectoral stakeholders focusing on sustainable urban energy;
- Promotes market development for sustainable urban energy systems;
- Shares global and regional experiences and best practices; and
- Support sustainable urban energy project alliances.

Tracks, Geographical focus & Membership Benefits

APUEA Tracks

- I. District Energy
- II. Smart Grids
- III. Energy Storage
- IV. Renewable Energy and Energy Efficiency
- V. Consumers and Prosumers
- VI. Financing, Policies and Regulatory Frameworks

Geographical focus

- East Asia (China, Japan, Korea)
- South East Asia
- South Asia (India)

Member Benefits

- Newsletter: APUEA-eNews
- Website/Online Portal with access to;
 - News
 - Trends
 - Reports
 - Statistics
 - Policies and Standards
 - Relevant contact information
 - Other relevant links etc.
- Quarterly APUEA Magazine
- APUEA Publications
- Invitations to regional and international events in Asia-Pacific countries (incl. the APUEA Annual General Meeting)
- Direct Assistance
- APUEA Governance (Active Members)

APUEA Members

Founding Members



ABB



Engie



Johnson Controls

Members



International District Energy Association (IDEA)



China District Heating Association (CDHA)



DEVCCO



重庆市可再生能源学会
CHONGQING RENEWABLE ENERGY SOCIETY
Chongqing Renewable Energy Society



Euroheat & Power (EHP)



Danish Board of District Heating (DBDH)



Xian District Heating Company



Lux Research



Alliance to Save Energy



International Institute for Energy Conservation (IIEC)



Thai ESCO Association



Aden



Capital Heat



Northeast Clean Energy Council (NECEC)



Overseas Environmental Cooperation Center (OECC)



Qatar Cool



International Partnership for Energy Efficiency Cooperation (IPEEC)



SPX FLOW



Tianjin Euro Energy Technologies Co., Ltd. (TEET)



District Energy in Cities Initiative



Solar Turbines

Partners and Supporting Organizations: Asian Development Bank (ADB), International Energy Agency (IEA), Sustainable Energy for All (SEforALL), United Nations Environment

APUEA Event Calendar 2019

- 12-16 March, New Delhi (India), **India Smart Utility Week** *(Supporting organization)*
- 28 March, Shanghai (China), **Future Energy and Tech Investment Forum** *(Supporting organization)*
- 6-8 May, Nantes (France), **Euroheat and Power Congress 2019** *(Supporting organization)*
- 9 May, Hong Kong, **Seminar: Energy For Our Future Generations** *(Supporting organization)*
- 5-8 June, Bangkok (Thailand), **ASEAN Sustainable Energy Week** *(Supporting organization)*
- 17-21 June, Manila (Philippines), **Asia Clean Energy Forum & APUEA2019 AGM** *(Hosting organization)*
- 24-27 June, Pittsburgh (USA), **IDEA2019 Annual Conference and Trade Show** *(Supporting organization)*
- 3-4 September, Kuala Lumpur (Malaysia), **Asian Utility Week 2019** *(Hosting organization)*
- September, Nanjing (China), **District Energy and Distributed Energy Conference** *(Hosting organization)*
- TBD October, TBD Chennai (India), **Asia Pacific Cooling Summit** *(Hosting organization)*
- 29 October to 1 November, Singapore, **Singapore International Energy Week (SIEW)** *(Supporting organization)*
- December, Shenzhen (China), **District Cooling Conference** *(Hosting organization)*

APUEA Secretariat



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THANK YOU

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