APUEA
Asia Pacific Urban Energy Association

Unlocking the potential of District Cooling

International workshop on energy efficient cooling

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Energy Consumption in Cities

- Cities occupy only **two percent** of the world's **landmass**
- Cites consume over **two-thirds** of the world's **energy**
- Cites account for more than **70%** of **global CO_2-emissions**



Current and Future Megacities (2018 – 2030)

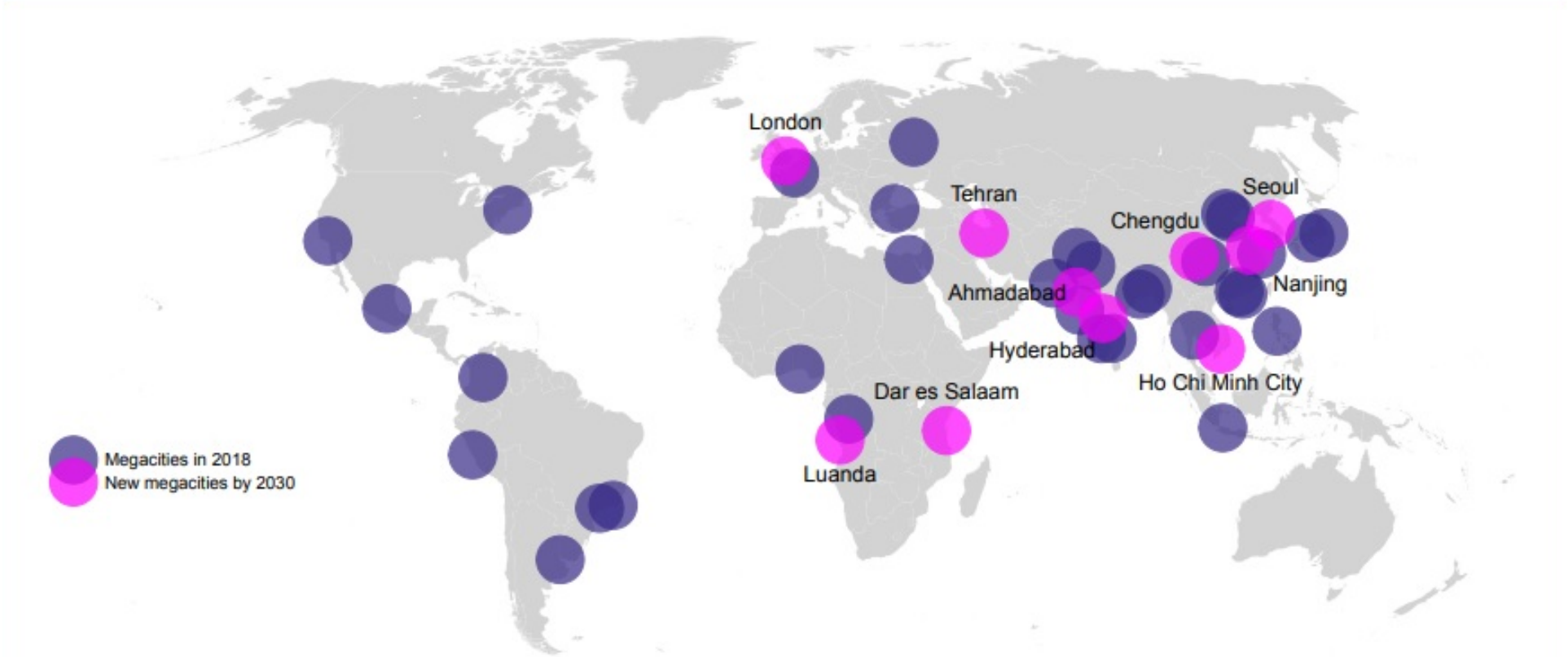


Image source: World Urbanization Prospects: The 2018 Revision

Trends & Developments in the Energy sector

Trends influencing the energy sector

- Urbanization
- Digitalization

Development trends in the energy sector

- Electrification
- De-carbonization
- De-centralization
- System integration –Multi Energy Systems



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

- District Energy
  - District Heating (DH) & **District Cooling (DC)**
- Distributed Energy
  - Co-generation (CHP) & Tri-generation (CCHP)
- Combined Heating & Cooling (DHCS)
- Smart Grids

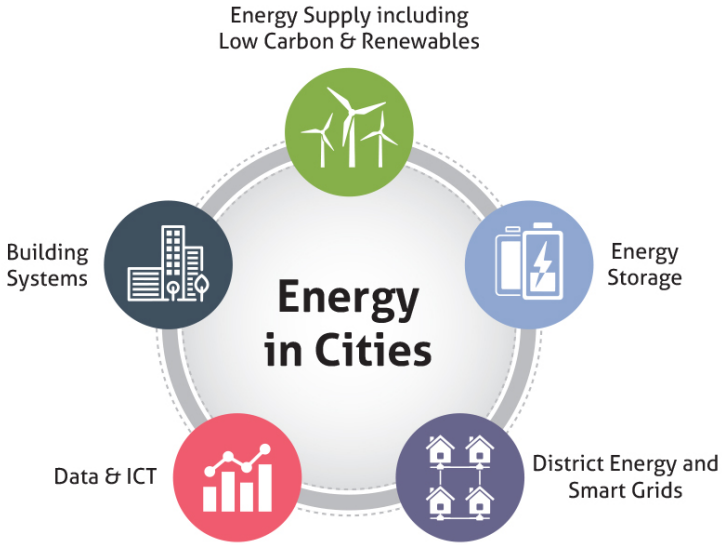
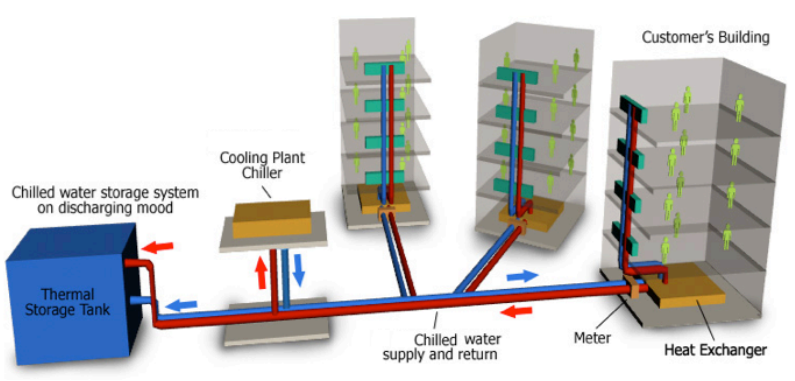


Image Source: Arup – Five minutes guide: Energy in Cities (www.arup.com)

Introducing the potential of District Cooling

District Cooling offers:

- Reduced energy demand, DC systems are **up to 50% more efficient** than conventional cooling systems.
- More efficient capacity use, **DC systems use approx. 15% less capacity** than individual cooling systems.
- **Integration** of multi energy sources, such as intermittent **renewable electricity, waste energy and natural cold sources**
- Thermal Energy Storages (TES) enables **the potential to reduce peak loads.**
- A vital role to **mitigate global warming 0,5-1°C** (High Efficiency & phasing out HFC-refrigerants).
- **Reduced heat urban island effect**
- **Long lifespan, up to 50 years**
- **Huge market potential**, (Not least for CBD/TOD areas, Industries and Industry zones, Airports, Hospitals and Data Centers)



District Cooling System

Image Source: International Energy Administration (IEA) District Heating and Cooling.

District Cooling at Kai Tak Development



Image source: https://www.ekeo.gov.hk/en/key_projects/index.html

- 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 m^2)
- 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 CO_2
- Consumer cost comparable to water cooled AC-systems (Cooling Towers)
- Three phases with expected completion in 2025

District Cooling at Kai Tak Development (Additional)



Image source: https://www.ekeo.gov.hk/en/key_projects/index.html

- Additional District Cooling capacity is needed to meet the projected cooling demand.
- Capacity, **+178 MWr (+811,000 m^2)**
- 35 % more efficient than air-cooled Air Condition Systems
- Annual savings: 53 million kWh in electricity consumption, equivalent to the reduction of 37,000 tonnes of CO_2
- Consumer cost lower than water cooled AC-systems (Cooling Towers)
- “Fourth” phase is expected completion in 2028

Challenges & Opportunities for District Cooling

- Lack of incentives and regulations
  - High initial cost (Front loaded investment)
  - Delayed load ramp-up and occupation ratio
- Lack of large Cooling utilities
- Cooling strategies and action plans (National, local governments and SOE)
- Energy planning as a natural part of urban planning (Enable system integration to increase efficiency and environmental benefits)

Asia Pacific Urban Energy Association (APUEA)



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.

APUEA Members

Founding Members

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International District Energy Association (IDEA)

Euroheat & Power (EHP)

Alliance to Save Energy

SIVECO China

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

China District Heating Association (CDHA)

Danish Board of District Heating (DBDH)

International Institute for Energy Conservation (IIEC)

Northeast Clean Energy Council (NECEC)

International Partnership for Energy Efficiency Cooperation (IPEEC)

District Energy in Cities Initiative

DEVCCO

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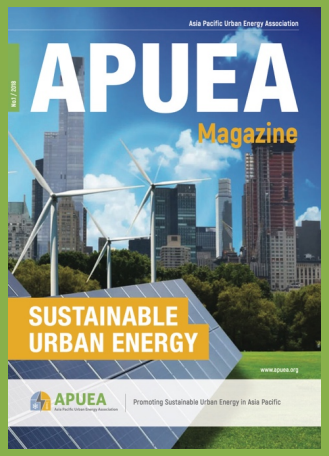
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Swedish Environmental Research Institute

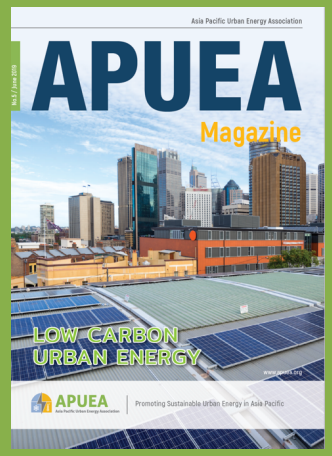
Partners and Supporting Organizations: Asian Development Bank (ADB), International Energy Agency (IEA), Sustainable Energy for All (SEforALL), United Nations Environment













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THANK YOU

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