APUEA
Asia Pacific Urban Energy Association

Accelerating District Cooling Developments in Thailand

Localizing International District Cooling Best Practices

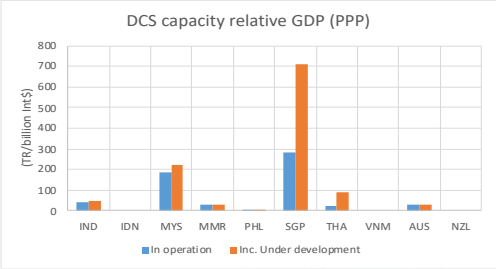
APUEA Secretariat

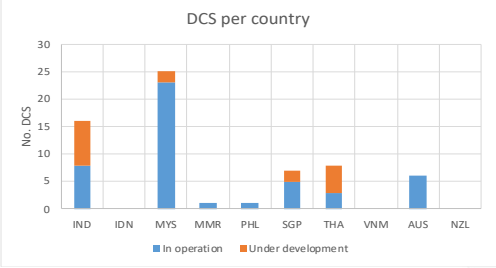
June 2022

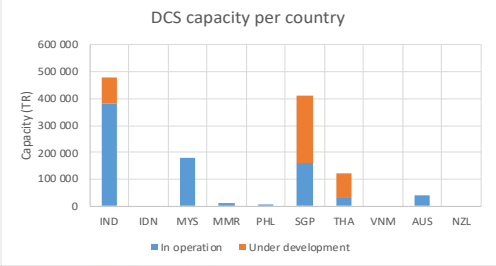
The history of District Cooling

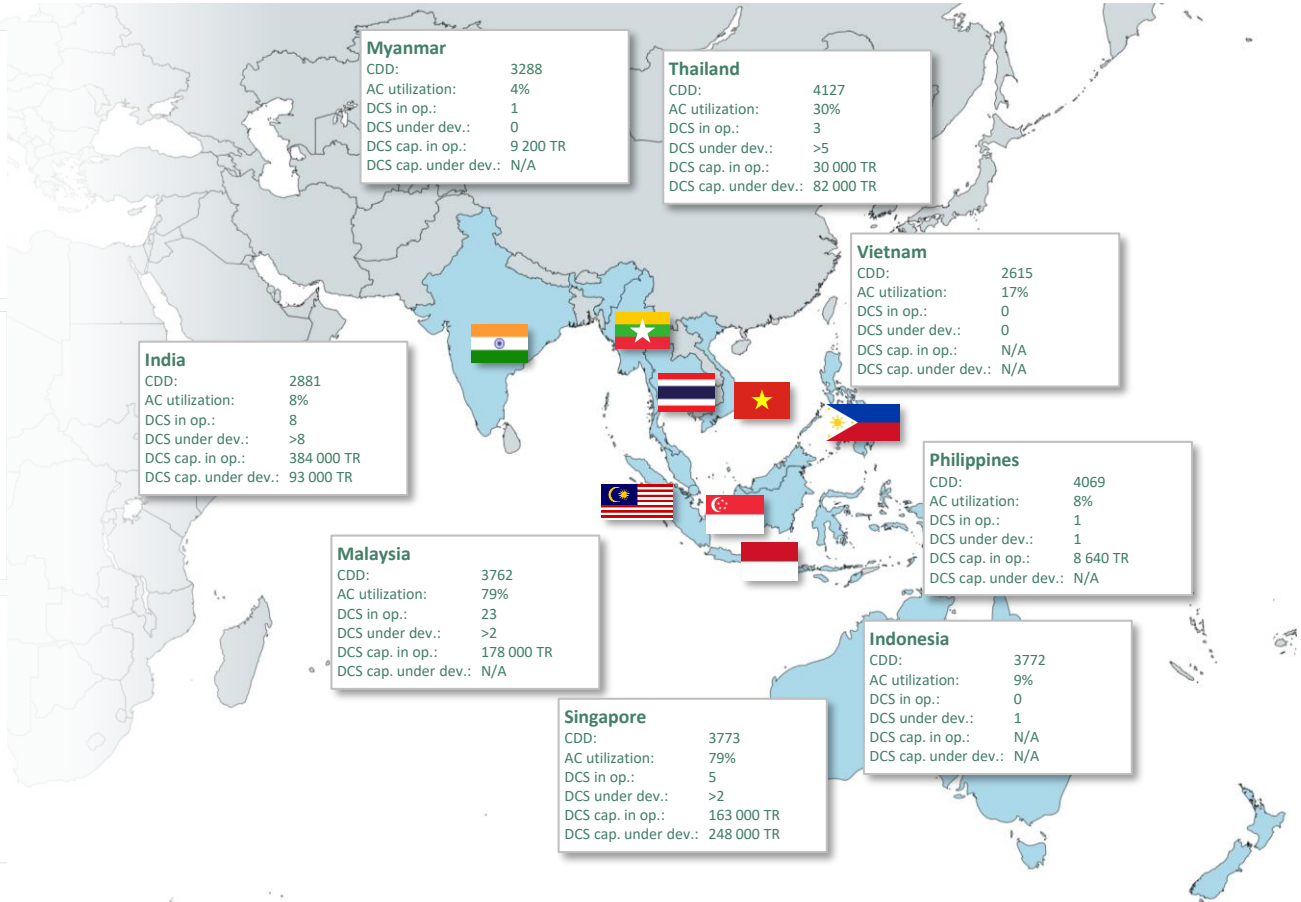
- The first district cooling system in **North America** was established in **1962** in Hartford, Connecticut. Today nearly 400 district cooling systems serve cities and campuses in North America
- The first district cooling system in **Europe** was put into operation in **1967** in Paris, France, supplying cooling (and heating) to the La Défense commercial district. Today about 150 district cooling systems are in operation in Europe.
- The first district cooling (and heating) system in **Asia-Pacific** was set up on the site of the Osaka Expo in **1970**. Today nearly 150 DHCS systems are in operation in Japan alone. In China, approximately 100 District Cooling systems are estimated to be in operation.
- In **Southeast Asia**, approximately 35 district cooling systems are in operation, and more than 10 district cooling systems are under development

Overview of DCS markets in Southeast Asia









District Cooling projects in Thailand

One Bangkok

Samyan Smart City

Forestias

Siriraj Hospital

Suvarnabhumi

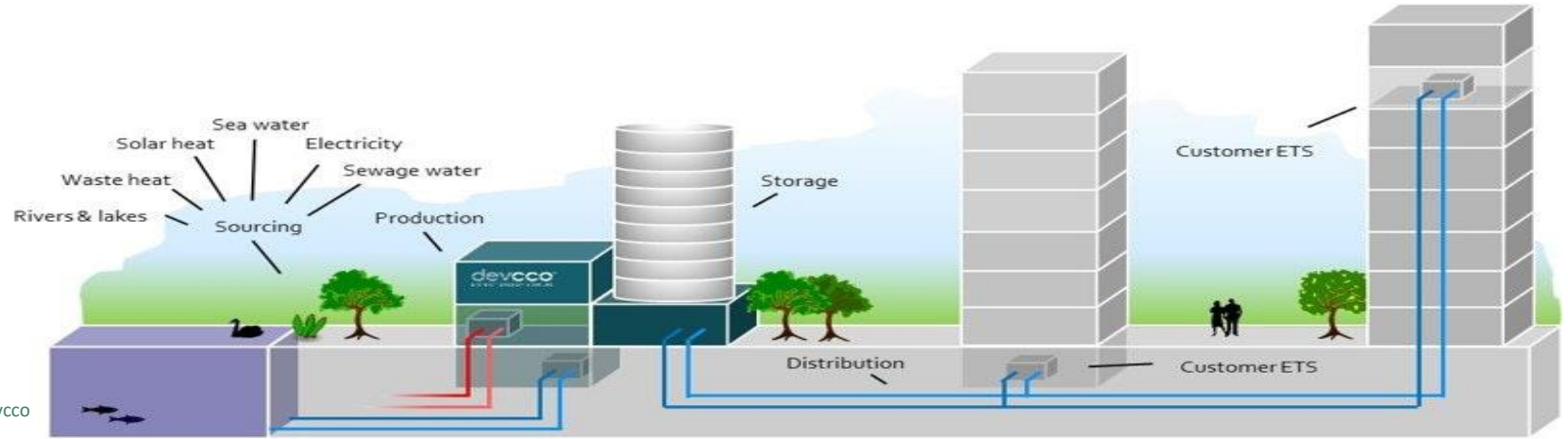
Government Complex

Future District Cooling projects

Challenges (and Opportunities)

- Lack of regulatory framework and favoring policies
- Lack of awareness, and major knowledge and skill gaps
- Skepticism exists – scale, historic failures
- Severe competition from stand-alone solutions
- Lack of Urban/Energy Planning practices
- Front-loaded investment
- Local District Energy utilities are often absent

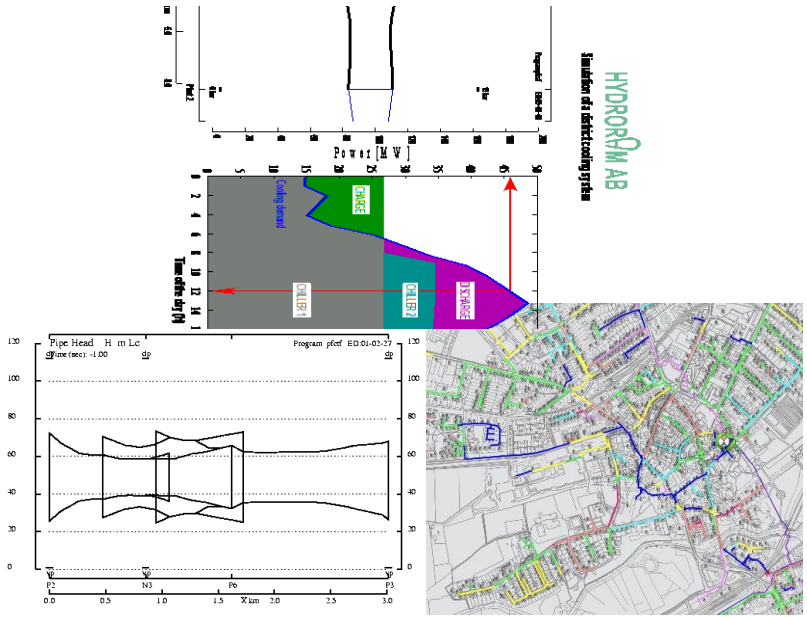
- APUEA continues to grow, establish partnerships, and promote DC together with its members
- APUEA Academy established in 2021
- International DC utilities and solution providers are active in Thailand
- Municipal Cooling Plans (ref. India and Vietnam)
- Investors and financial institutions active in the region
- Several District Cooling projects are developed, and so are local DE utilities



Source: Devcco

Additional own experiences

- Gigantic District Cooling systems proposed instead of feasible District Cooling HUBs
- Oversized systems, implemented at once
- District Cooling is NOT a large HVAC-system, but i) system dynamics matter, and ii) it is a business
- Unsafe system design with exploded pipes as result
- Real estate developers unaware of the District Cooling business case – *”carving out the District Cooling utility”*
- Lack of Business Project Management competences
  - **Finance** – The business model and financing is essential, and far more complex than e.g. a simple PPA-scheme.
  - **Organization** – Depending on the project phase and contracting model, different skills are required.
  - **Technology** – The DCS system can be based on different DCS technologies, and the DCS concept will depend to a large degree on the local conditions. Not off-the-shelf solution.
  - **Market** – The district cooling market needs attention, both in order to attract off-takers but also to maintain satisfied consumers in a natural monopolized market.



Source: GIFT City

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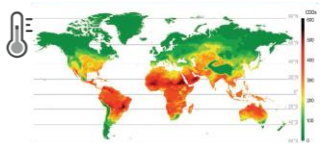
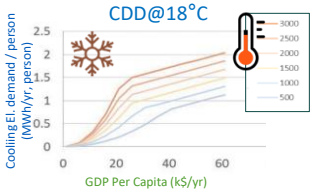
Drivers for District Cooling

- Increasing Cooling Demand
- Economy of scale
- Energy Efficiency
- Systemic Efficiency
- Public sector benefits

Warmer climate



Improved living standard and comfort



Urbanization and Urban Heat Island Effect

Drivers for District Cooling

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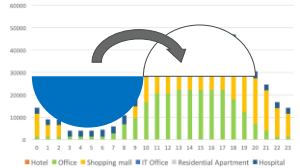
Reduced cooling capacity due to diversity factor
(0.9-0.8 or 10-20% reduction)

$$f_{\text{Diversity}} = \frac{\sum_{i=1}^{n} \text{Individual peak load}_i}{\sum_{i=1}^{n} \text{Max}(\text{Aggregated load}_i)}$$

Reduced cooling capacity by introduction of cold storage
(10-40% reduction)



Industrial-grade equipment and skilled O&M personnel
(increased life-span)

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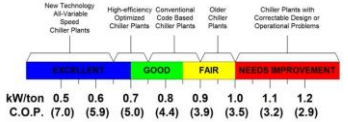
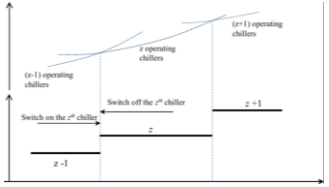
Efficient chillers



Optimal chiller sequence



Optimization tools and skilled O&M personnel

Drivers for District Cooling

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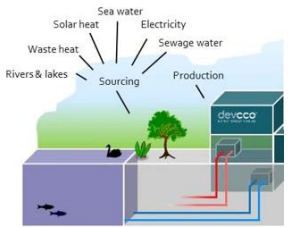
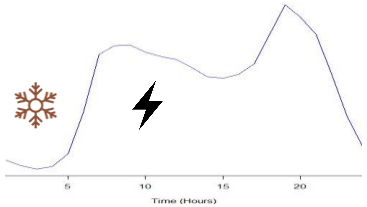
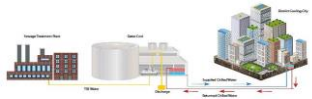
Utilization of local resources and waste energy



Integration to electricity grid and heating grid



Integration to other utilities i.e. grey water, sewage, TSE



Drivers for District Cooling

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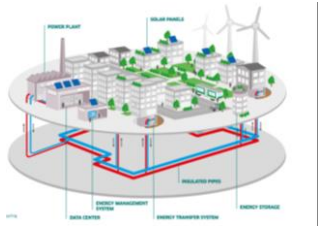
Job creation

New revenue streams

Energy security



APUEA Academy

CAPACITY BUILDING ON DISTRICT COOLING

Professional training for
- Government agencies
- City representatives
- Planners and Policy makers
- Utilities

Vocational training in collaboration with colleges

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THANK YOU

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