



DISTRICT ENERGY SOLUTIONS FOR GROWING CITIES

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November 06, 2025

1. The Energy Challenges of Growing Cities
2. District Energy: The Scalable Infrastructure Solution
3. (Back to) the Future

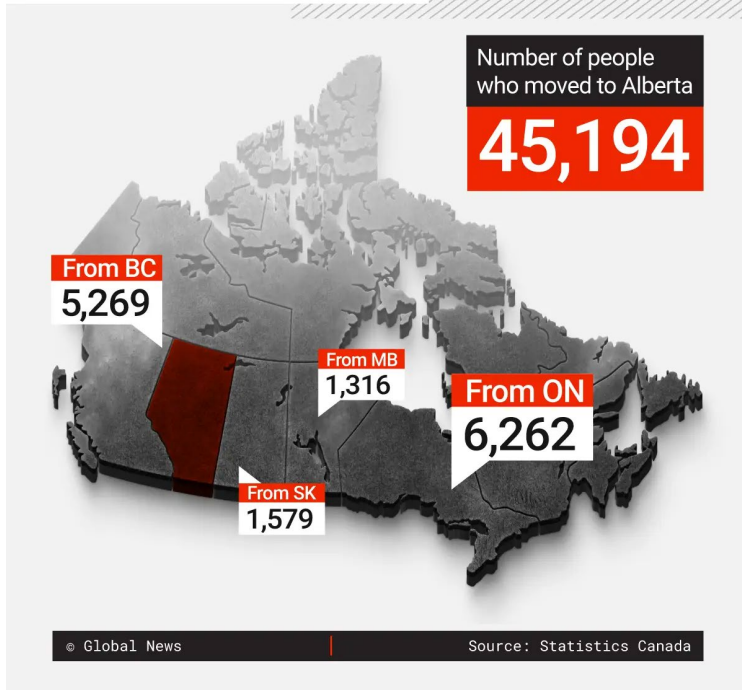
1.

CHALLENGES OF GROWING CITIES



PLENTY OF CHALLENGES (GROWING PAINS)

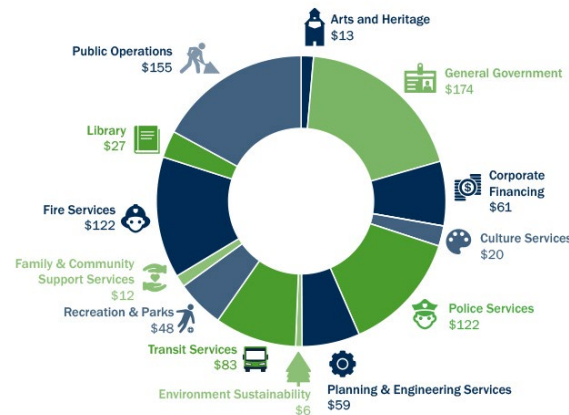
Inter-provincial Migration to Alberta



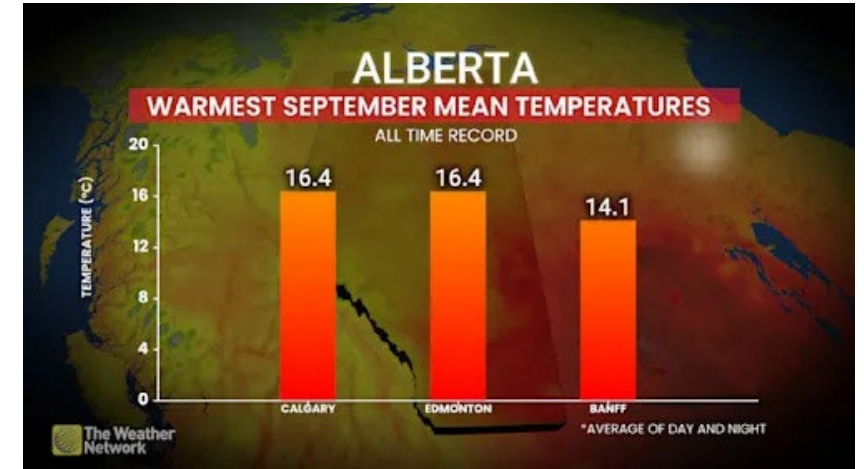
Population Growth & Demand



Building Homes & Offices



Local Government Budgets



Climate Change Impacts



Mixed-Use Developments

ENERGY CHALLENGES IN ALBERTA

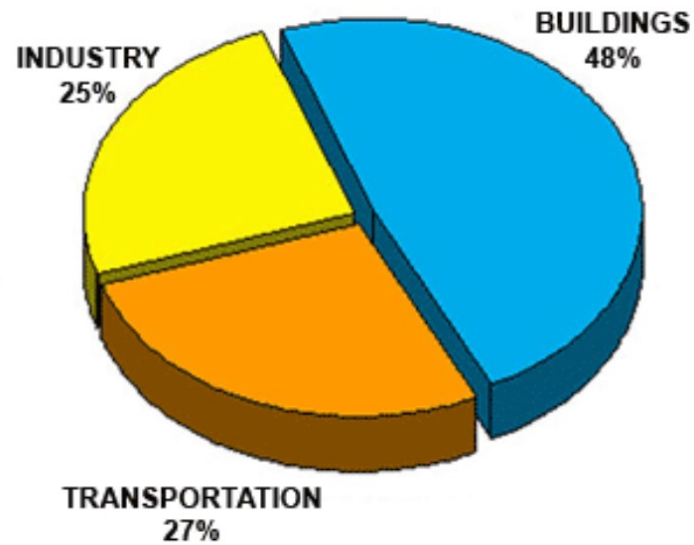


Environmental, carbon emissions, tax policy

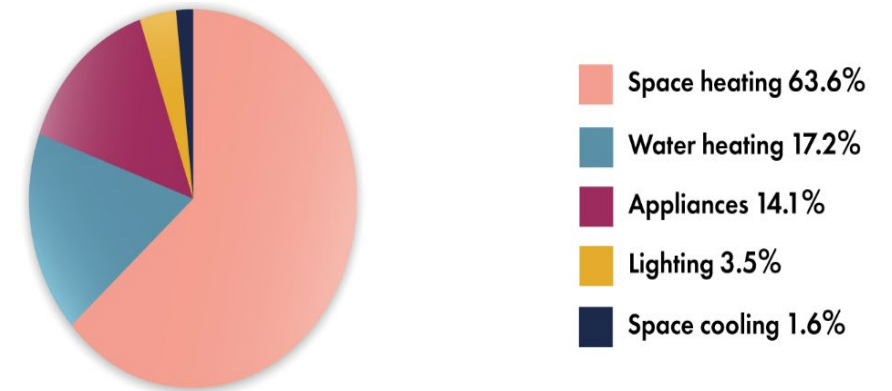


Pause on renewables energy projects in AB

BUILDING ENERGY USE



Global energy demand by sector in 2005

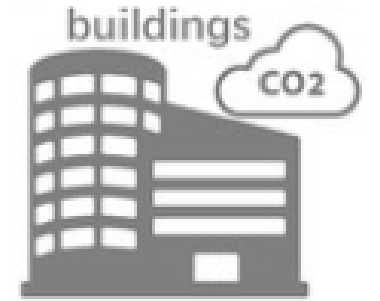


Distribution of residential energy use in Canada 2019, Natural Resources Canada

BUILDING ENERGY USE

Urban growth creates energy challenges (and opportunities)

- Rapid urbanization promotes density (energy use and solutions).
- Buildings face limits in space, capital cost, O&M, and emissions.
- Modern cities need integrated, reliable, energy solutions.



Building Emissions



Urban growth



O & M



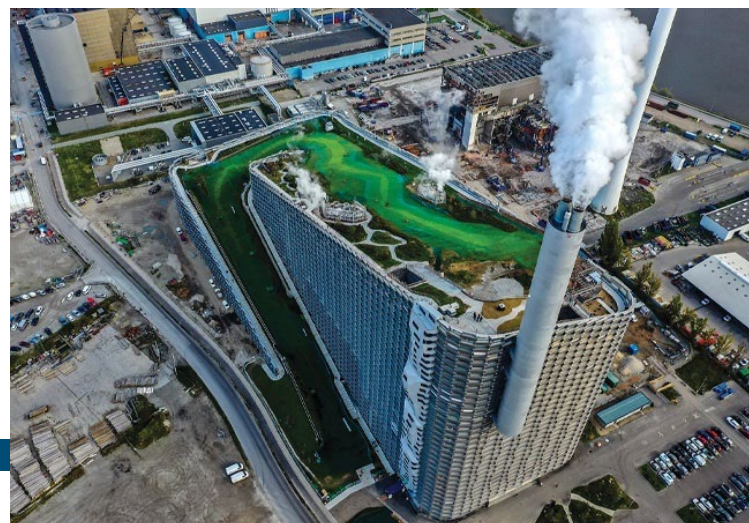
Capital Cost



Energy Solutions

2. DISTRICT ENERGY

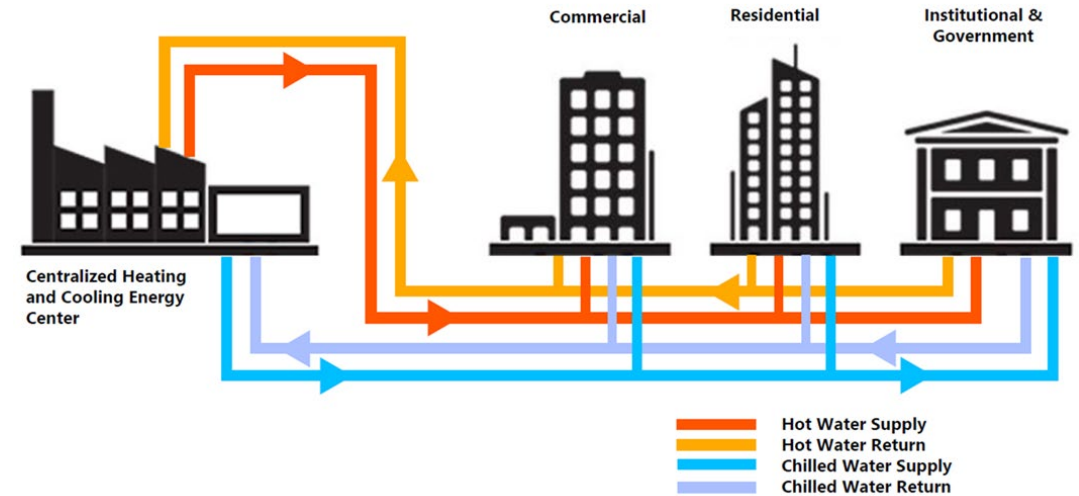
“ALONG FOR THE INFRASTRUCTURE RIDE”



WHAT IS DISTRICT ENERGY?

Thermal Energy Grids for Cities

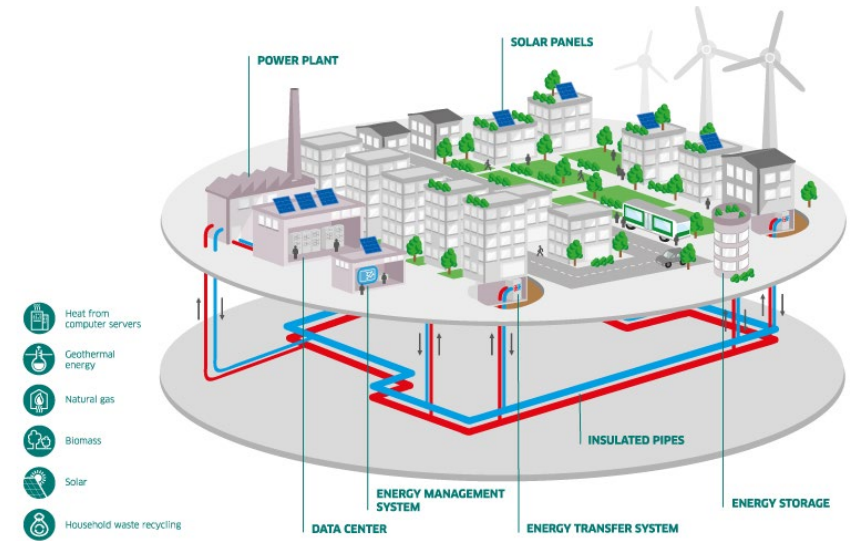
- Centralized heating and cooling production.
- Distribution via hot or chilled water.
- Energy-as-a-Service – simplifying building operations.
- Utility-grade reliability (99.99%)
- Professionally trained staff, with singular focus – to deliver energy to customers.



WHAT IS DISTRICT ENERGY?

Centralized Energy Systems for Urban Efficiency

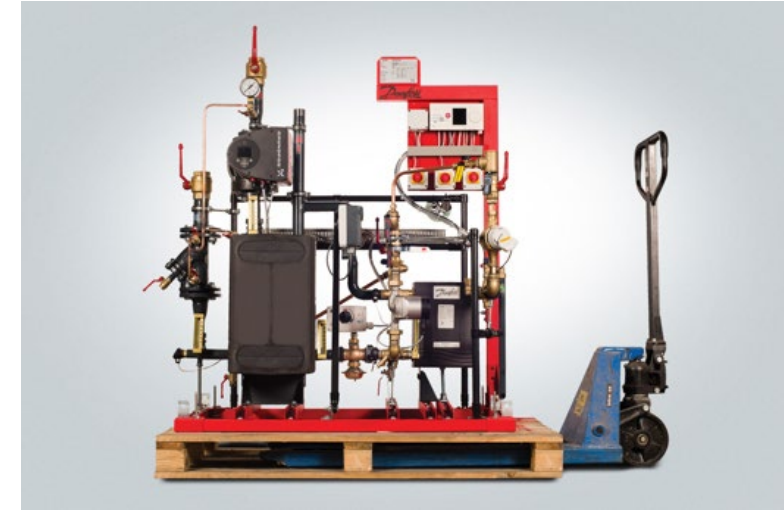
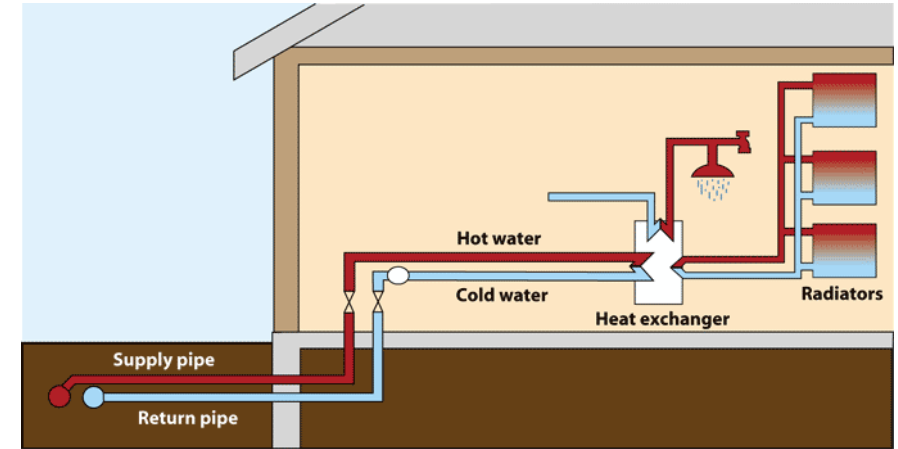
- Suitable for alternative technologies at-scale.
- GHG reduction
- Fuel switching capabilities.
- Enables integration of diverse energy technologies and storage.



WHAT IS DISTRICT ENERGY?

Energy Transfer Station

- Building HVAC interface with district energy utility
- No complicated technology
- Real-time data monitoring, trending and energy management
 - What gets measured, gets managed!



DISTRICT ENERGY GROWS WITH CITIES

Temporary Energy Plant with
traditional fuels



Connect more customers
Stabilize operations & finances



Permanent Energy Plant

- Low Carbon Technology for
base load energy
- traditional fuels for
peaking/backup energy



GROWTH OF DISTRICT ENERGY



THE “UTILITY” OF DISTRICT ENERGY

Analogies of the utility mindset

- Diversification
- Energy-as-a-service
- Outsourcing the hard stuff
- Energy storage
- Progression of what is normal



Consider a new perspective on building energy solutions!

ANALOGY: DIVERSIFICATION

Electrical grids – generator and wire resources

- Actual Load / Sum of individual non-coincident peak loads

Water distribution networks

- Diversification – size and install infrastructure to optimize capital spending.

Thermal grids / networks?

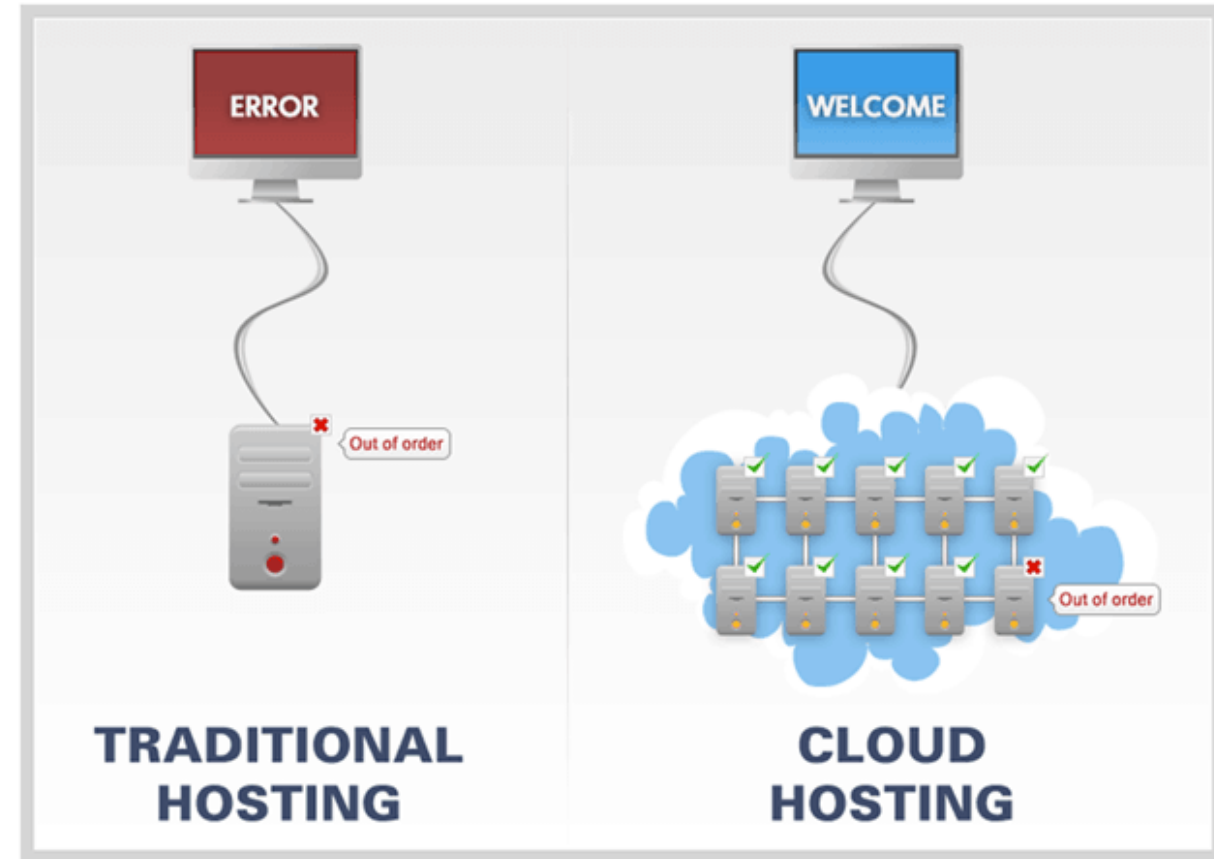
- We do this with hydronics at the building level...but beyond?
- District energy applies this concept at scale...beyond building level.

Number of downstream consumers	Diversity factor (ks)
2 to 4	1
5 to 9	0.78
10 to 14	0.63
15 to 19	0.53
20 to 24	0.49
25 to 29	0.46
30 to 34	0.44
35 to 39	0.42
40 to 49	0.41
50 and more	0.38

ANALOGY: DATA AS A SERVICE

Cloud data storage

- Remember when every home or company had their own server room.
- We now “trust” outsourced data storage and the interconnected communication networks.
- Offers 99.99% reliability, centralized administration and high security.



ANALOGY: OUTSOURCING THE HARD STUFF

What's in a typical modern home or office?

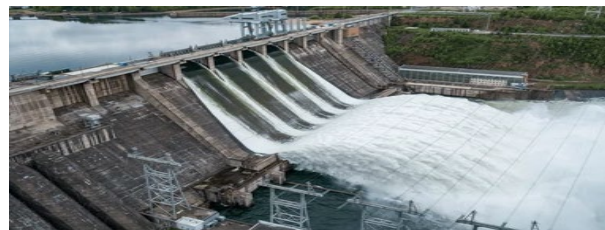
- Electricity generation
- Water purification
- Wastewater treatment
- Why should a modern office be responsible for the conversion of raw fuels into of heating & cooling?
Safety, complexity, staffing? Outsource!
 - Combustion fuels
 - Refrigerants



ANALOGY: UTILITY-SCALE ENERGY STORAGE

Electrical vs. Thermal

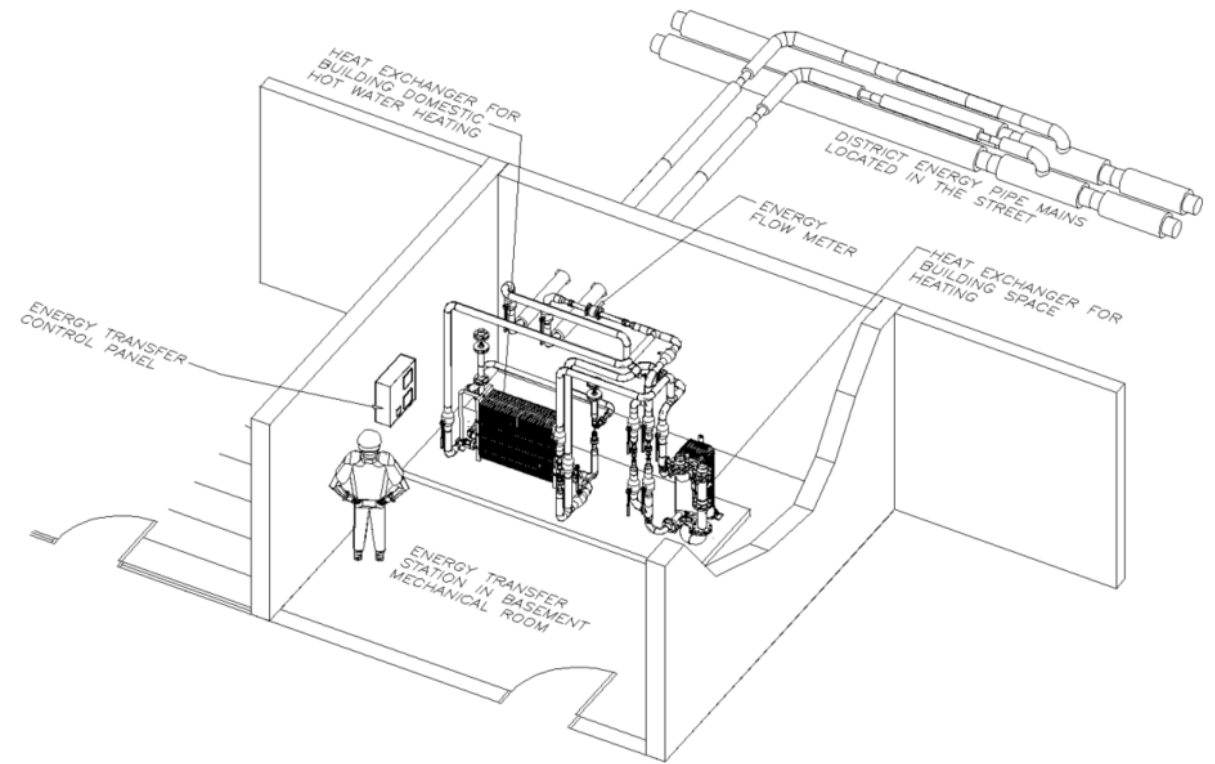
Characteristics	Electrical Storage	Thermal Storage
Complexity	High-tech	Low-tech
History	New	Old, 100(0)+ years
Cost/kWh (relative)	Expensive	Cheap
Resources	Rare earth metals, chemicals	Water



ANALOGY: KEEPING THE EASY STUFF

Typical building heating interface (aka substation)

- Water-to-water heat exchanger
- Control valves
- Heat meter
- Communication and data trends



ANALOGY: PROGRESSION OF WHAT IS NORMAL

Solar PV

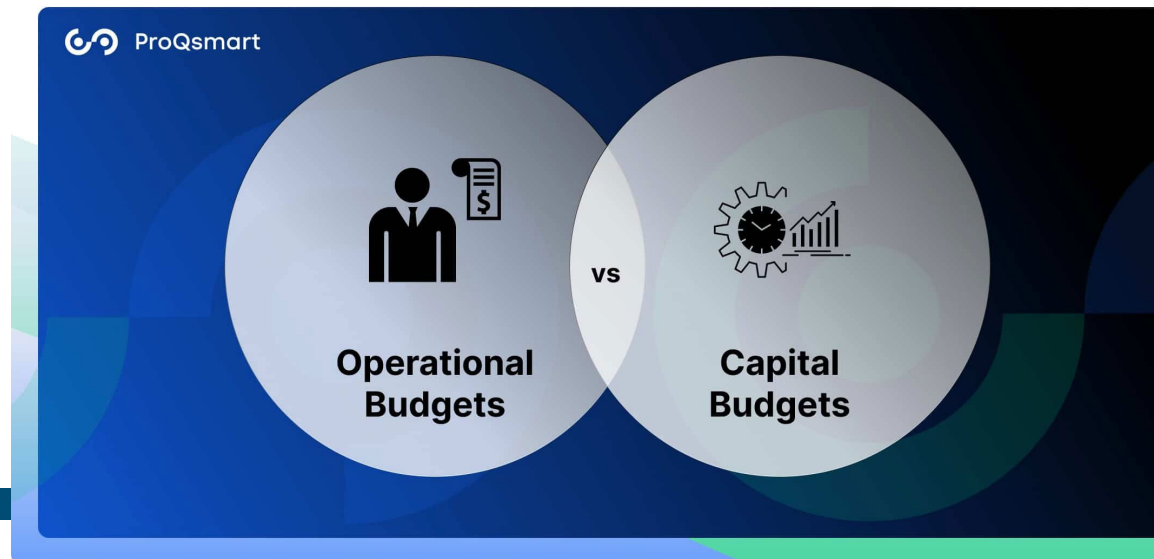
- 25 years ago...
 - Bi-directional metering
 - Cost of panels
 - Grid interconnection
 - Public perception
- Today...
 - Very different!



DATA TRENDING IN MODERN DES

Engineers love data!

- Heating and cooling loads
- Supply and return flow, temperature & pressure
- Heating energy profiles – daily, monthly, seasonal
- Aggregate data trends help district energy utilities make informed decisions



RECAP: DISTRICT ENERGY IS SMART INFRASTRUCTURE FOR MODERN CITIES



The Hidden Backbone of Sustainable Urban Development

- Centralized: generates heating and cooling efficiently to serve multiple buildings.
- Long-Term: underground piping and core infrastructure last 50–100 years.
- Scalable: grows in step with new development and building infrastructure.
- Flexible: caters to a range of building HVAC and process applications
- Capital savings: reduces building-level equipment (often oversized with backup).
- O&M savings: simplified building-level operations and fewer systems to maintain.

RECAP: DISTRICT ENERGY IS SMART INFRASTRUCTURE FOR MODERN CITIES



The Hidden Backbone of Sustainable Urban Development

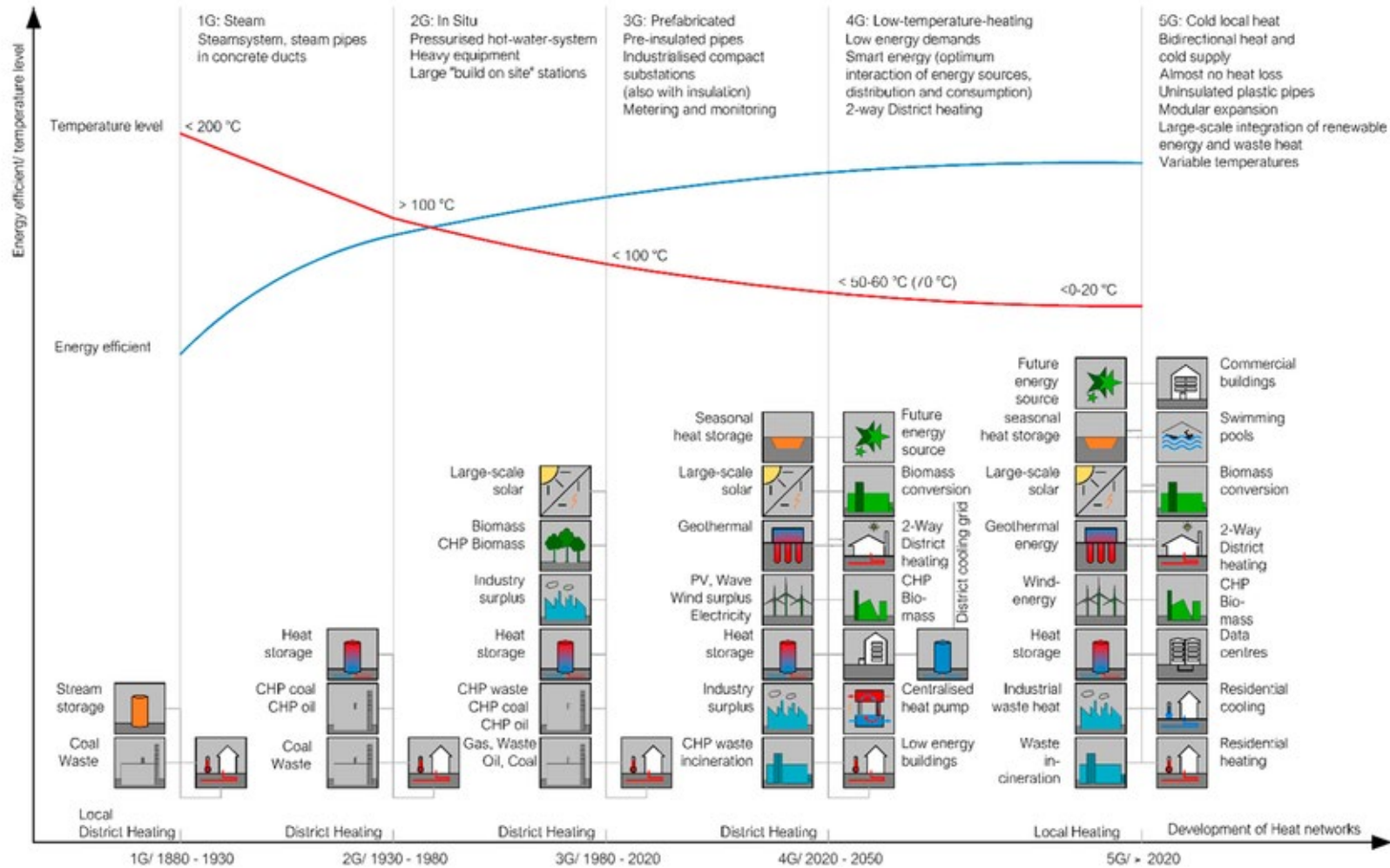
- Digitally Enabled: real-time monitoring and trend analysis constantly improve efficiency and reliability.
- Carbon Reduction Pathway: Enables transition to renewable and low-carbon energy sources.
- Fuel-switch / Electrification-Ready: Compatible with legacy, existing, and future fuel technologies (i.e. heat pumps, renewables, and thermal energy storage)

3. (BACK TO) THE FUTURE

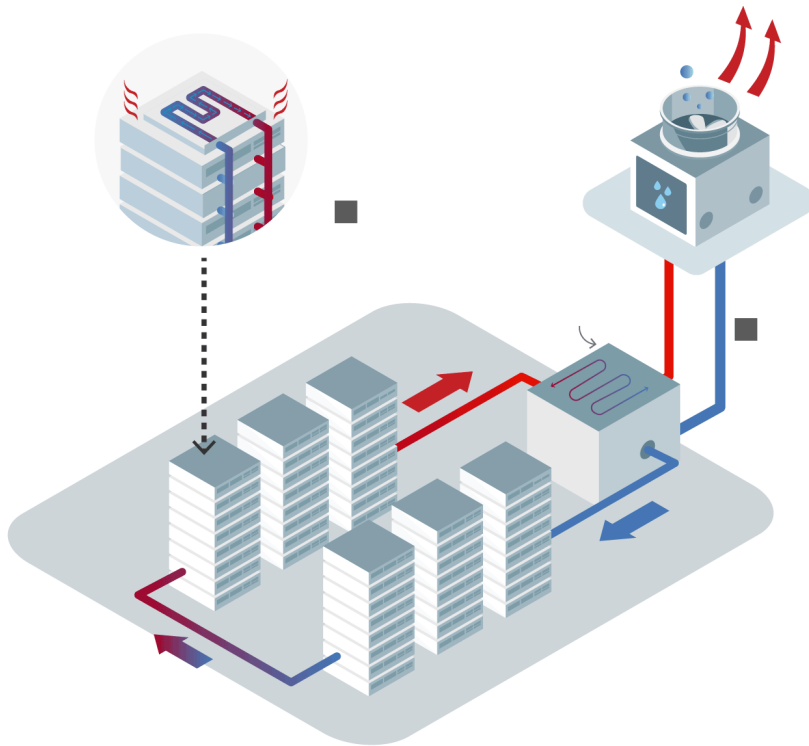
Industry Trends



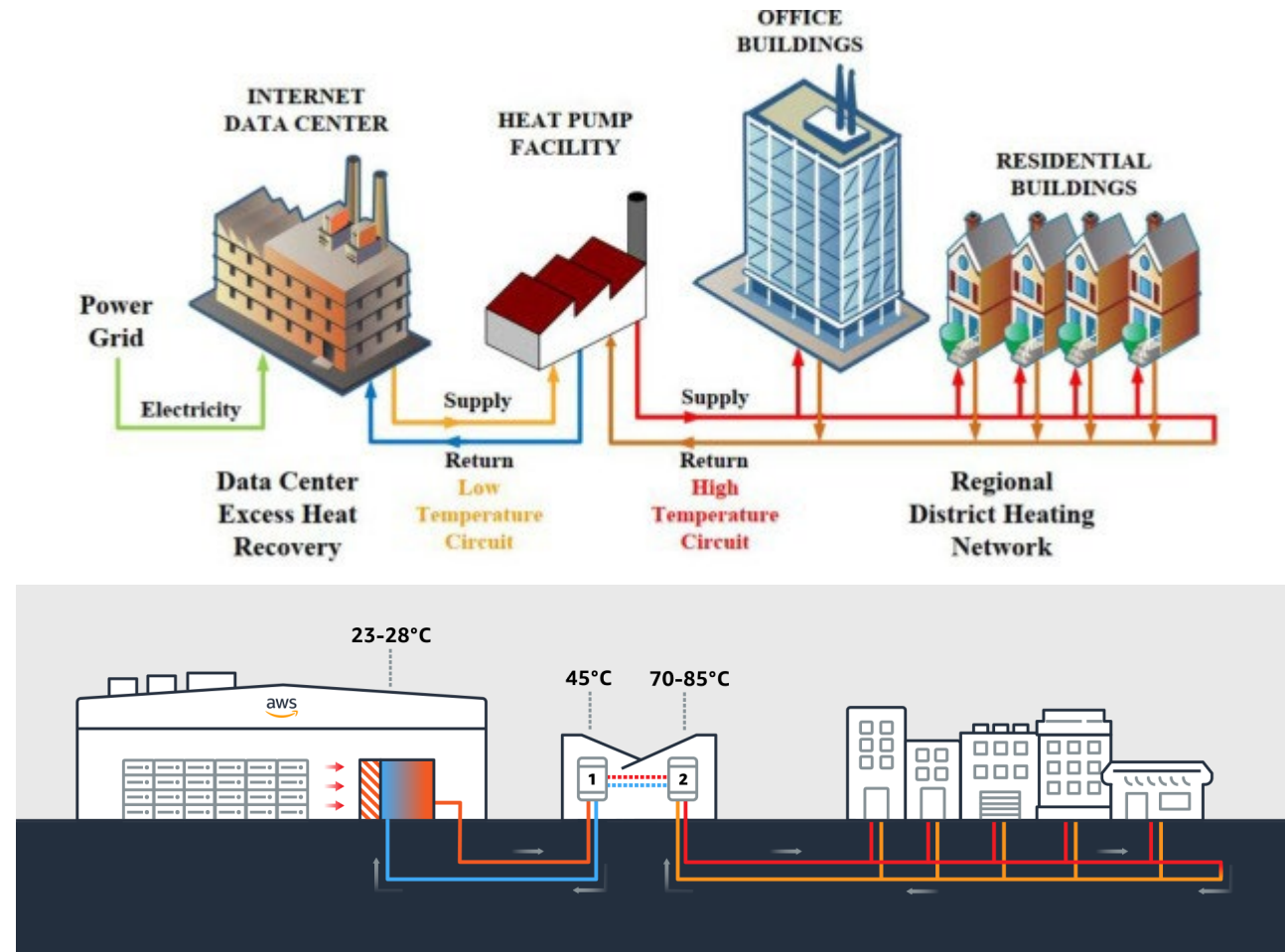
GENERATIONS OF DISTRICT HEATING



DATA CENTRES



Conventional heat rejection

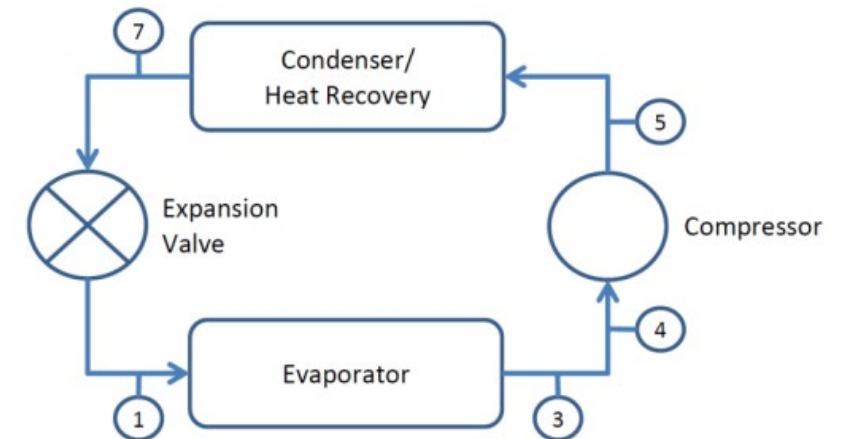


District heating heat rejection

SUPERMARKET REFRIGERATION WASTE HEAT RECOVERY

In the supermarket, the refrigeration system generates heat that is otherwise wasted. This heat can be harnessed to:

- Heat up the building
- Provide hot tap water
- Sell to the local district heating grid



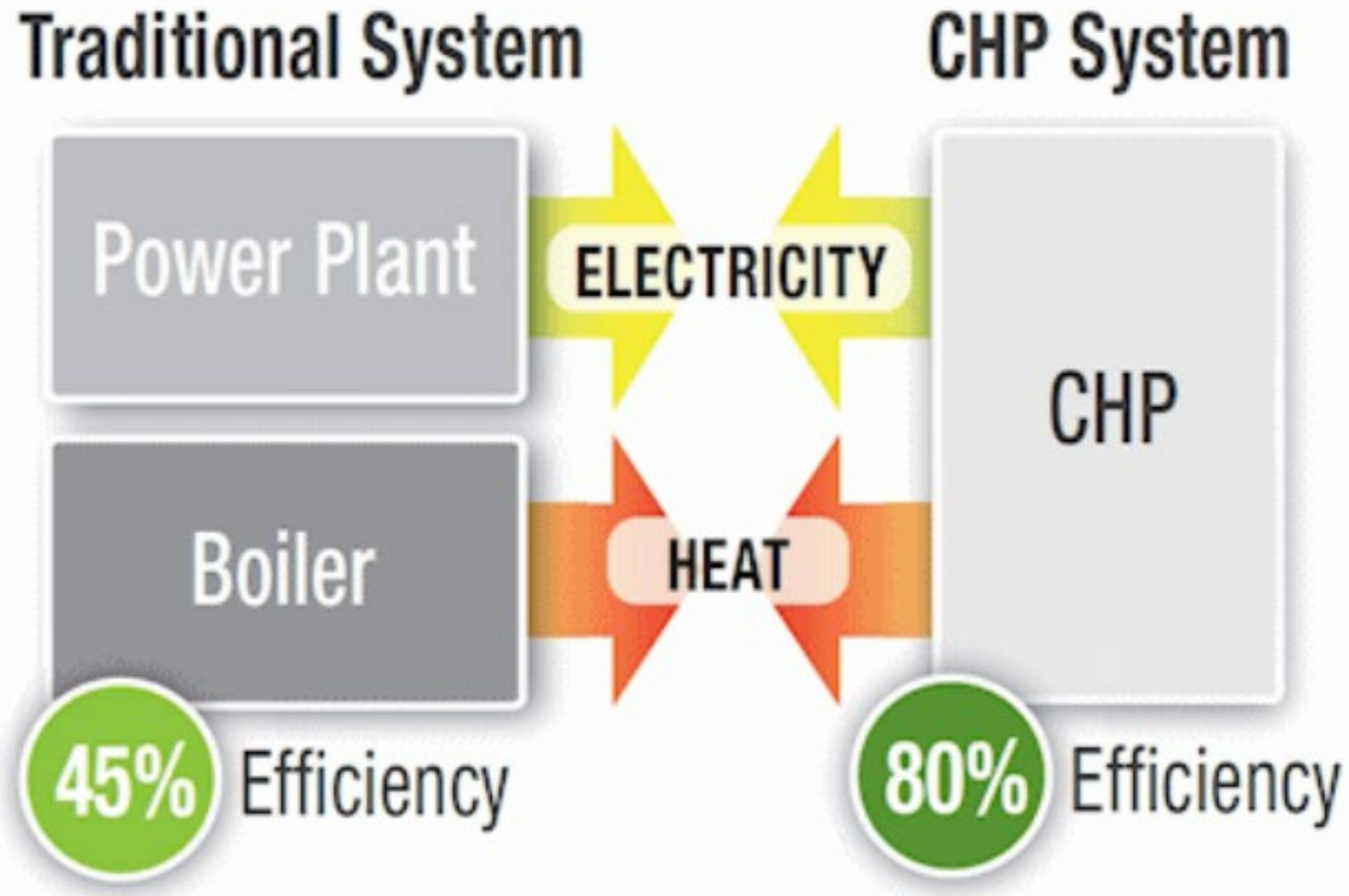
SEWAGE HEAT RECOVERY



World's largest
wastewater energy
transfer project located in
Markham, ON.

The 18.75 MWt project
integrates into the
Markham District Energy
system and will instantly
help lower the carbon
footprint of over 13M sq.
ft. of building area.

TRADITIONAL Vs CHP POWER GENERATION

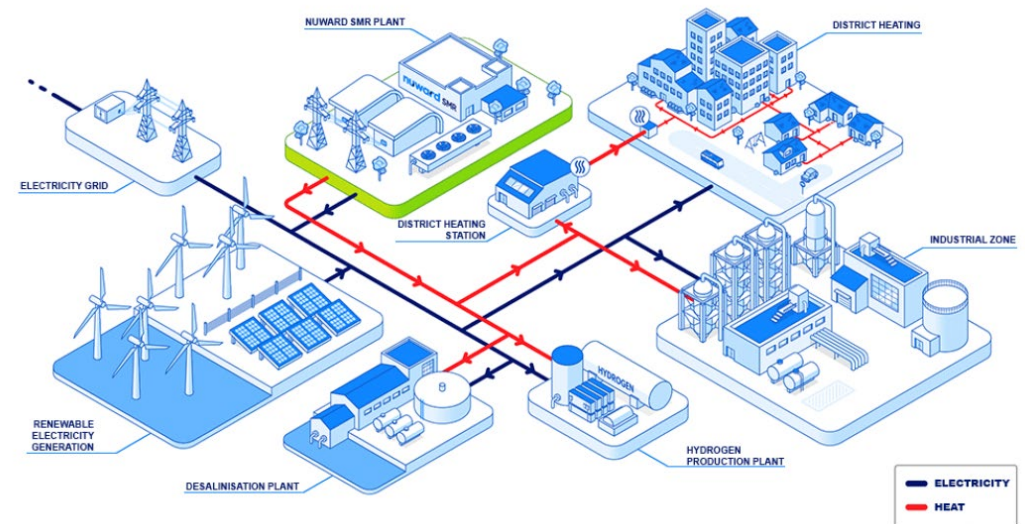
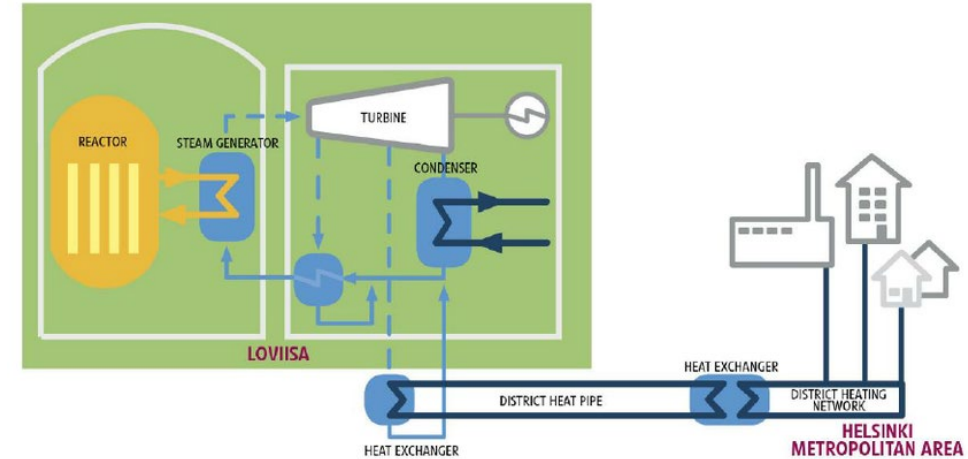


A district heating system provides a home for the heat!

NUCLEAR COMBINED HEAT AND POWER

Traditional nuclear power and SMR nuclear power with district heating (CHP)

- SMRs represent the next round of nuclear CHP
- SMRs could be located closer to heating needs, and this improves the economics for power and heat
- Sector coupling



RENEWABLE ENERGY



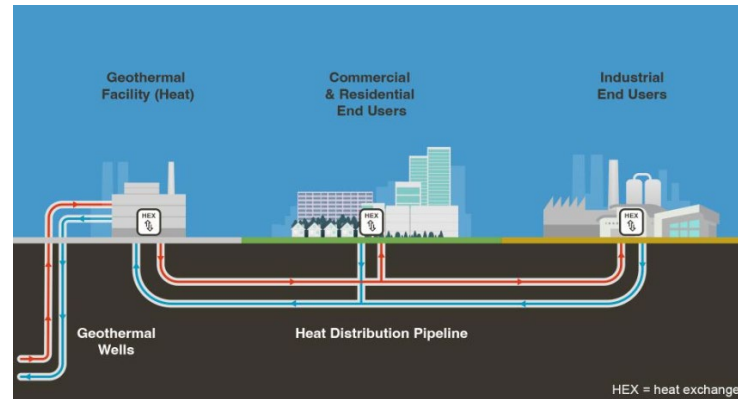
Solar Thermal Energy



Wind Energy



Biomass Energy

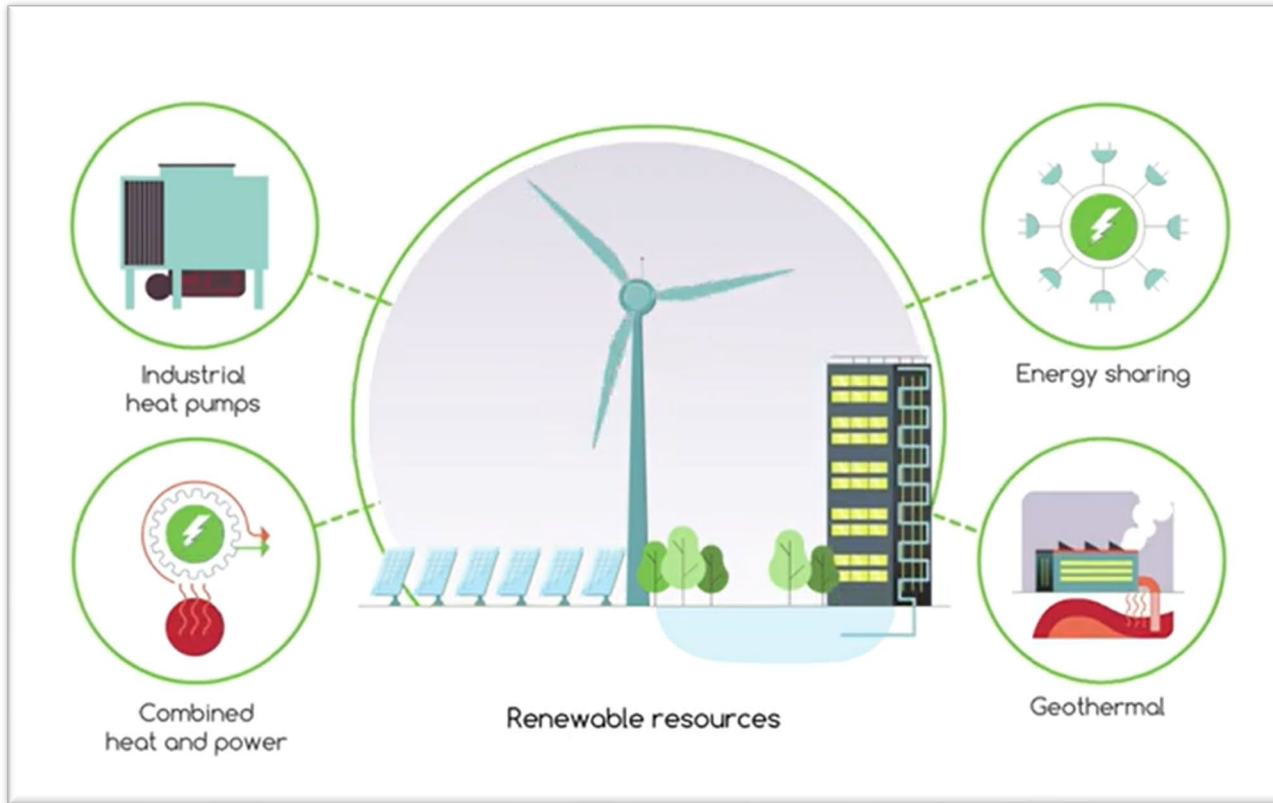


Geothermal Energy

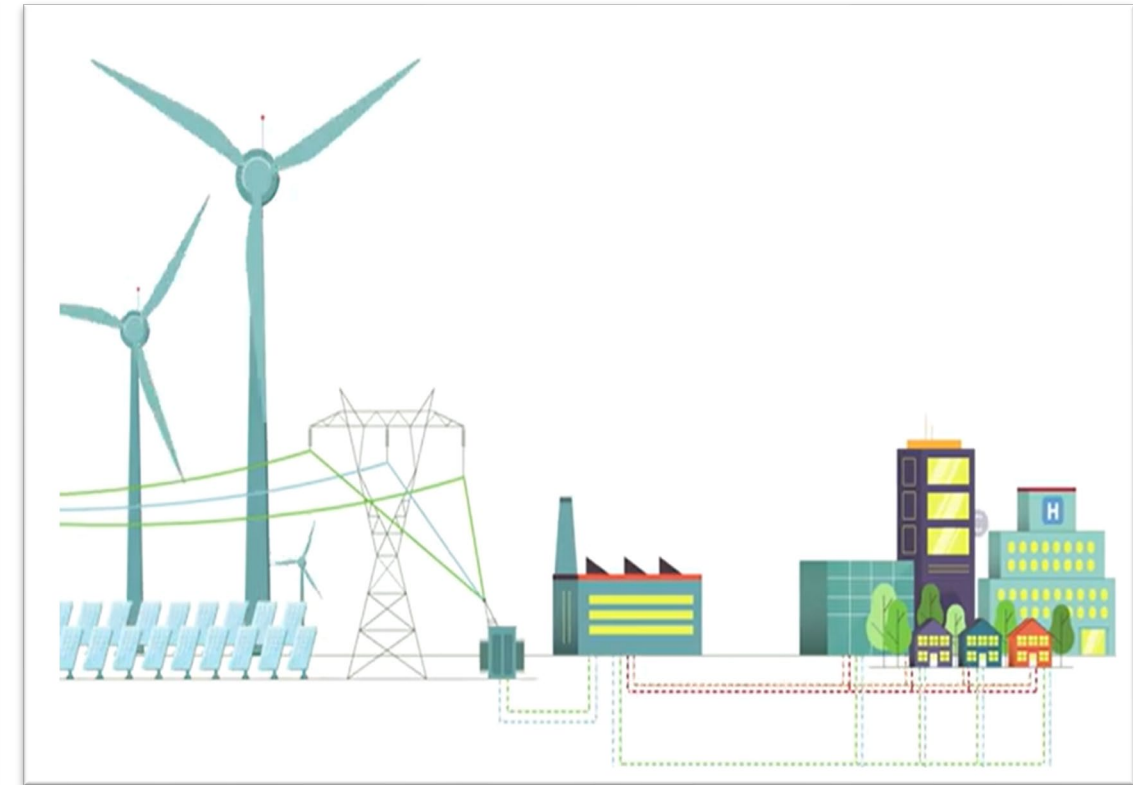
**Thermal
Energy
Storage**

Energy Storage

DECARBONIZATION & ELECTRIFICATION



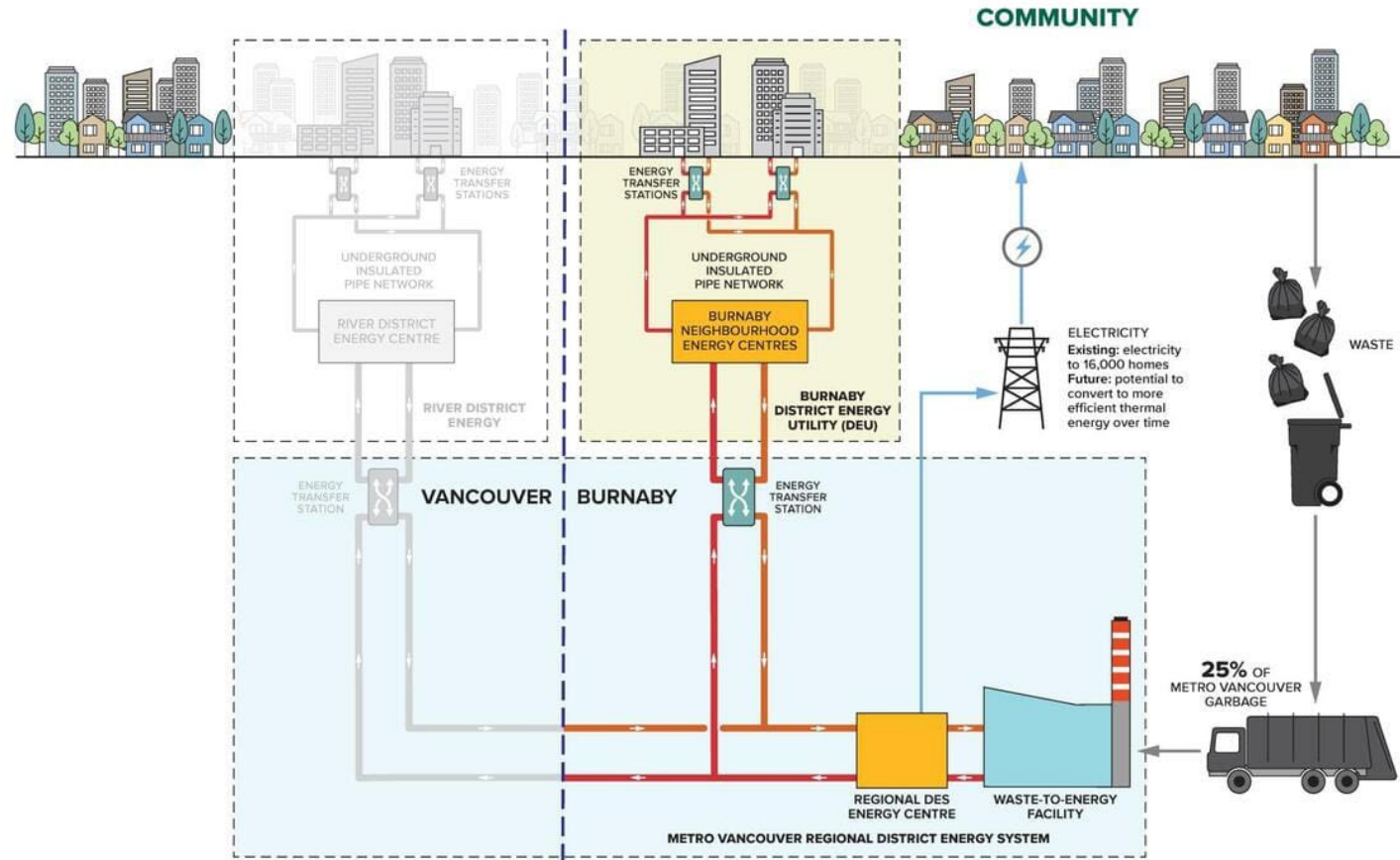
Decarbonization Via District Energy



Electrification Via District Energy

SECTOR COUPLING AND TRANSMISSION

Different industries and jurisdictions working together



THE FUTURE VISION

District Energy is part of the infrastructure solution

- District Energy can integrate all fuel types – past, present, and future.
- Flexible, scalable, and reliable infrastructure.
- Enables cities to grow sustainably.



“District energy is the quiet engine driving sustainable growth in the world’s leading smart cities.”



Thank You



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