Title:

The Electric Throttle for our Energy Transition

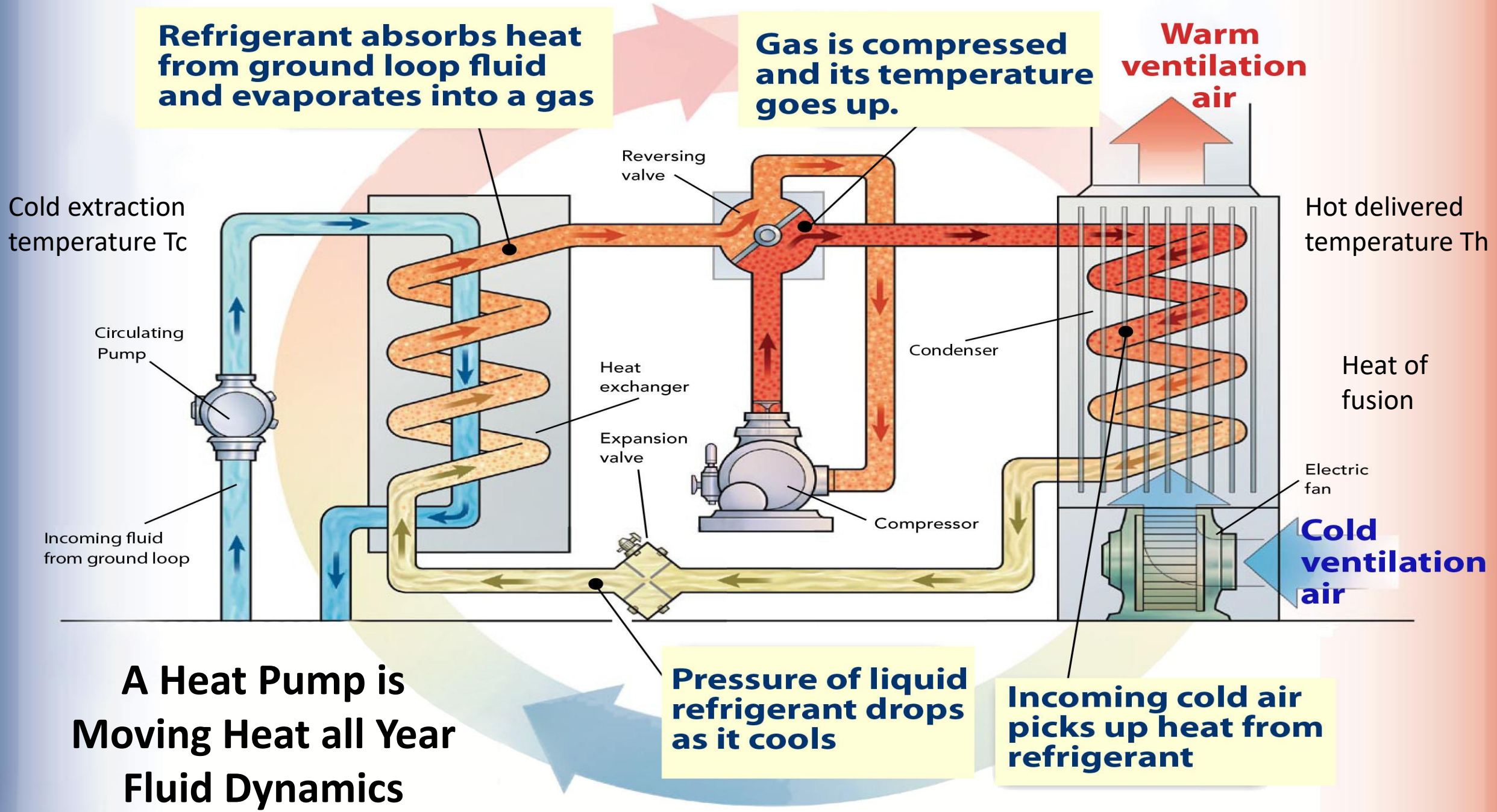
20 Advantages of Community Microgrids

Introduction: After nearly a decade of study, design, development, operations and living in a single home microgrid while interacting with grid managers and delivering presentations, the presenter continues monitoring the world as it makes exponentially growing advances in electrifying everything. Aggregation of multiple single building microgrids leads to community microgrids. The four major technologies of a typical community microgrid are:

1 – Building energy supply increase (renewable solar and wind) and demand efficiency (passive and active)
2 – Near infinite Geothermal heating and cooling using heat pumps
3 – Storage of Electricity (batteries) and Heat Energy (ground)
4 – EVs (electric vehicles as mobile batteries and for transportation)

These technologies, when operating as a single system, are leading the energy transition off fossil fuels while delivering sustainable abundance (20 very significant community benefits). Many benefits are not financial, but they deliver very significant cultural and social value to community residents. There is a significant mismatch between benefits and costs. Microgrids provide a substantial simultaneous winning outcome for the stakeholders - building owners, energy as a service investors (like OREC), community residents and the utility managers.

These are the concluding remarks to the hour-long presentation "**The Electric Throttle for our Energy Transition**."
Microgrid Presentation to the CFLA - Canadian Association for the Club of Rome (canadiancor.com)



A Heat Pump is Moving Heat all Year Fluid Dynamics

Carnot Cycle Coefficient of Performance = 1/(1-Tc/Th)

Moving heat all year

Example COP --- target moving energy at temperature Tc closer to the destination temperature of Th

- **Winter** Tc = 0C = 273K
- Th = 45C = 328K
- COP = 5.9 = 590% efficient (theory)
- Actual COP seen = 4.2

the 2nd Law of Thermodynamics

- 1 kilowatt electrical power equals 4.2 kilowatts heat addition power

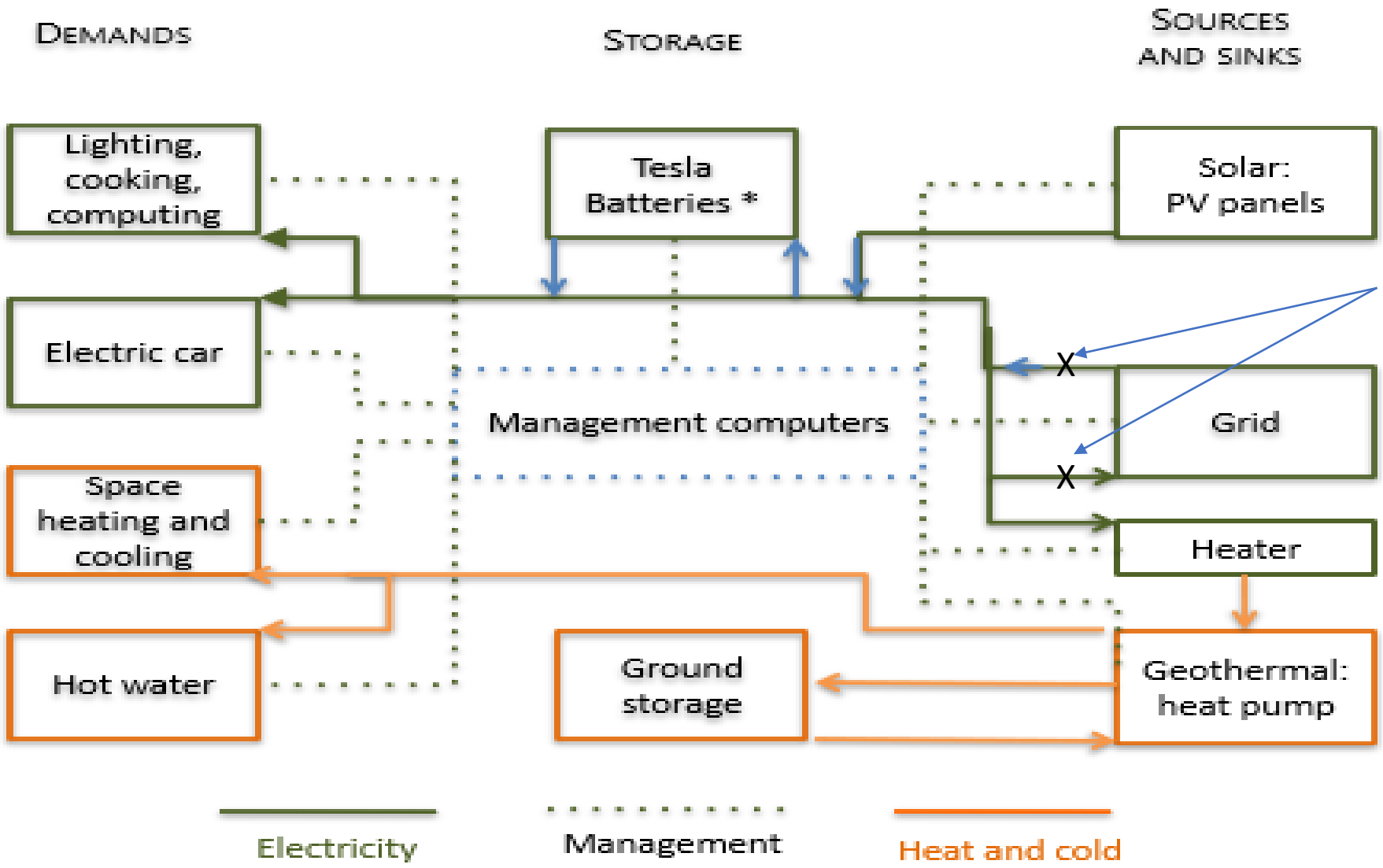
- **Summer** Tc = 0C = 273K
- Th = 15C = 288K
- COP = 19.2 = 1,920% efficient (theory)
- Actual COP = 13

the 2nd Law of Thermodynamics

- 1 kilowatt electrical power equals 13 kilowatts heat removal power

A Microgrid will Digitize, Electrify, Decarbonize

Demand Energy = 82% **Thermal** + 18% **Electricity**



Island switch either manual, automatic or telephone app

* 2021 Tesla 3 triples the storage

20 Advantages of Community Microgrids

1. Farming the sun and geothermal energy available everywhere will lower energy supply and operating costs for owners, consumers, utilities, microgrid technology industry, and a need for government subsidies,

2. Reduce poverty by isolating from energy inflation pressures -- cost growth avoidance, maintain stable predictable cost (say 50 to 70% lower than utility and still trending lower),

3. Expand social and wealth equity (bias free jobs & homes) and safe healthy families (toxic food, air, water),

4. Save lives and human suffering through supply reliability for a secure energy future and improved shelter safety/survivability (investment insurance value). Continuing atmospheric heating is a certainty.

5. Improve social resilience and liberation from the fragile utility and climate fueled disasters (grid outages => fear, frustration, inconvenience, and damage - food spoilage, flooding, health impacts and even death) by replacement with safer infrastructure,

20 Advantages of Community Microgrids (continued)

6. Increase energy awareness and deliver on the exponentially growing expectations of residents. They have knowledge of continual decrease in microgrid energy costs and in livelihood opportunities,

7. Provide an opportunity for communities to generate their own distributed technology-based electricity and to join local virtual power plants using blockchain trading,

8. Encourage innovation and neighbour assistance without the use of commodity-based fossil fuel generators (noise & smell),

9. Allow communities to manage their own energy consumption and reinvestment of profits for flexibility, independence and freedom from centralized politically driven energy decisions,

10. Promote community pride in their energy democracy by delivering long-term livability and local economic development,

20 Advantages of Community Microgrids (continued)

11. Enable communities to sell surplus energy back to the utility to strengthen the grid (energy arbitrage),

12. Provides utility stability as will as update deferral (delay congestion) and utility repair cost avoidance (weather extremes),

13. Provide opportunities for communities to trade energy with other communities, to make a community of communities,

14. Reduce pollution and encourage compatibility with a thriving ecosphere - do no harm and help nature. Stop destruction of Nature,

15. Ability to expand operational versatility including as a haven or a culture center during and after disasters. Prepare to survive.

20 Advantages of Community Microgrids (continued)

16. Reduce greenhouse gas emissions (no burning fuels) – for carbon sensitive residents seeking climate disaster mitigation simultaneously with adaptation,

17. Improve shelter security (doorbell, active alarms and cameras) and protect against cyber attacks,

18. Contribute to sustainable development including EV Vehicle to Grid connectivity (distributed batteries and blockchain trading can provide future ROI),

19. Isolate and protect microgrid power quality from aging utility infrastructure (voltage spikes damage TV sets, computers, electronics).

20. Improve the community image, quality of life and well-being (Maslow's hierarchy of needs, mental stress, loneliness, isolation, values)

References

- The main reference below was terminated early due to a computer failure, but the presentation was almost concluded.

- The second reference, included in the link below, are the conclusions called “20 Advantages of a Community Microgrid (this presentation).

- Microgrid Presentation to the CFLA - Canadian Association for the Club of Rome (canadiancor.com)