



TCAAP Energy Integration and Resiliency Framework



**EVER-GREEN
ENERGY™**



Framework Timeline

- Project Team engaged in August
- Policy White Paper accepted in November
- TCAAP development coordination meeting in January
- Draft Framework circulated for comment March 7th
- Framework finalized March 31st

TCAAP's Energy Vision

TCAAP will be a vibrant development that leverages long-term energy conservation and resilience to attract investment and partnership, and achieves sustainable benefits for Arden Hills and the surrounding community.

TCAAP's Guiding Principles

- Establish TCAAP as a **national model** for development of integrated energy systems.
- Develop a **resilient community** for energy and other utilities.
- Implement **infrastructure** solutions that are **flexible and scalable** over the next 50 years.
- Deliver a model of efficient energy and water usage that **minimizes TCAAP's impact on the environment.**
- Create an **economically competitive** and attractive environment for developers and businesses.

TCAAP Development Plan



Estimated Energy Loads

	Electrical (MW)	Thermal (MMBTU)	Cooling (tons)
TCAAP	8.0	38.9	617
AHATS	3.4	7.3	500
DPS EOC	0.07	0.5	30
RCPW	0.4	4.1	240
<i>Estimated Total</i>	11.9	50.8	1,387

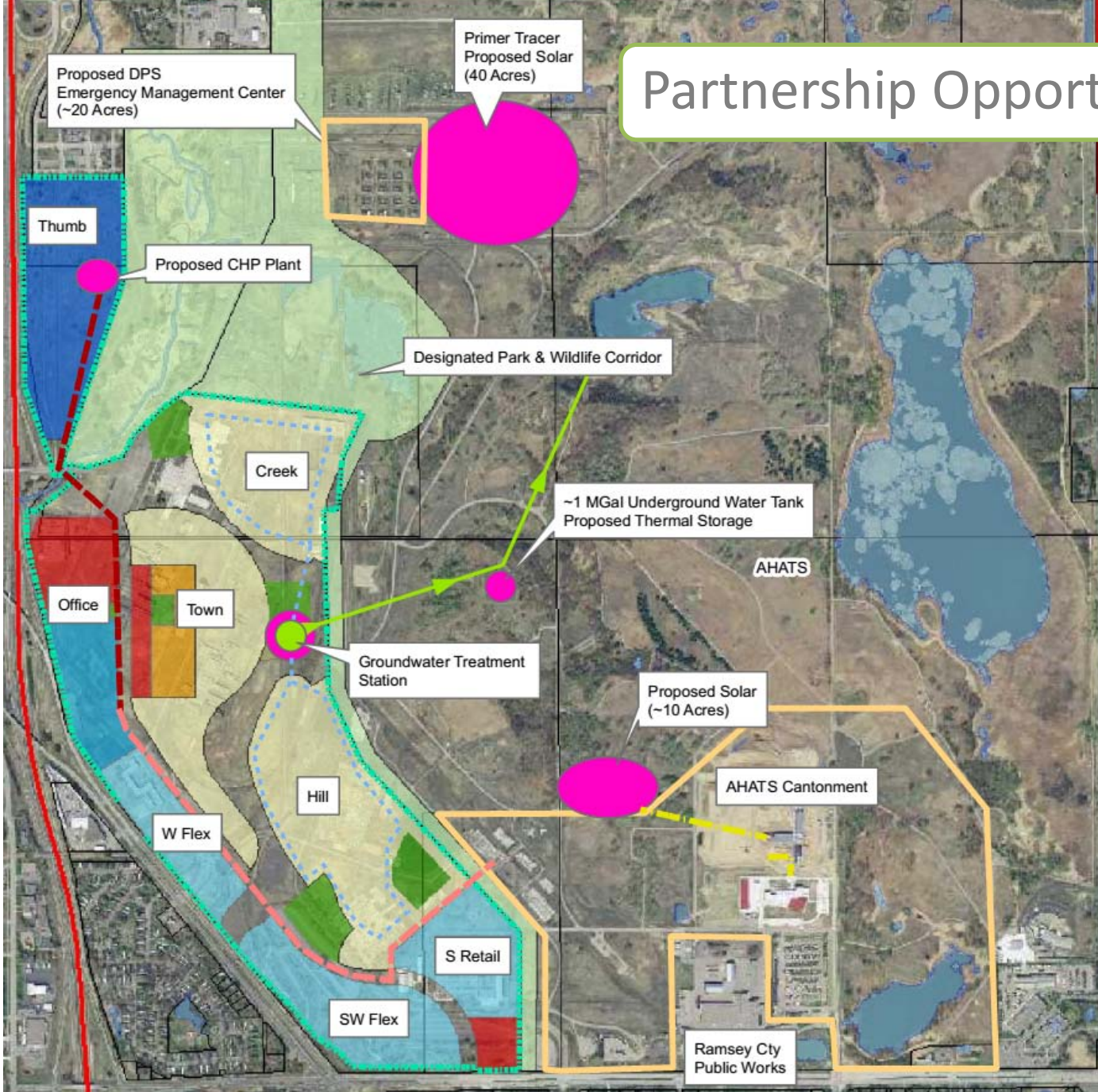
MN National Guard Considerations

- Energy conservation & GHG emission reduction
- Net-zero in energy, water, and waste
- Resiliency in periods of grid outage, including the ability to disconnect from larger grid
- Land-use must provide benefit to AHATS
- Development must not intrude or obstruct from AHATS mission
- Preferred that a third party finances and operates

Xcel Energy Considerations

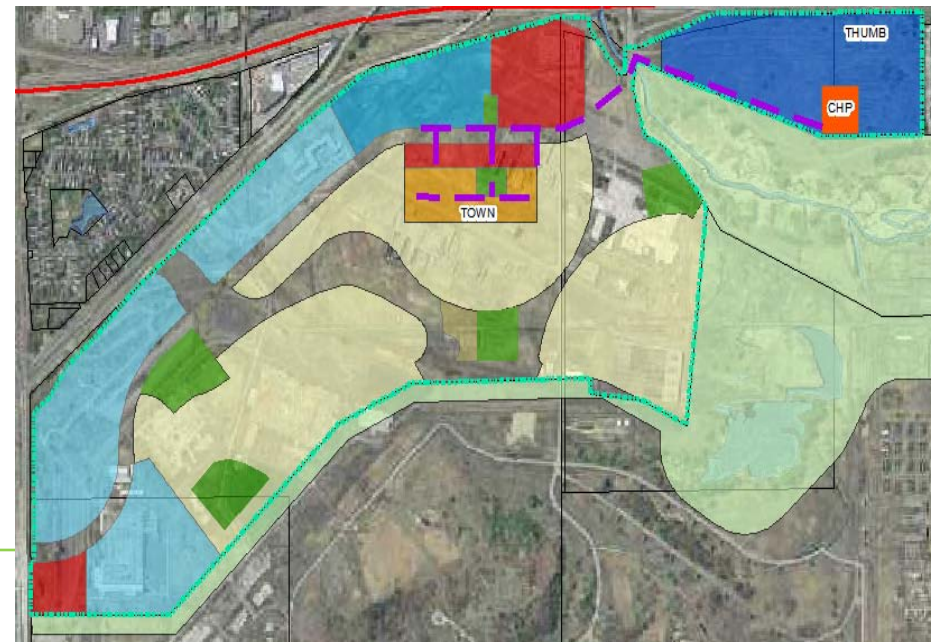
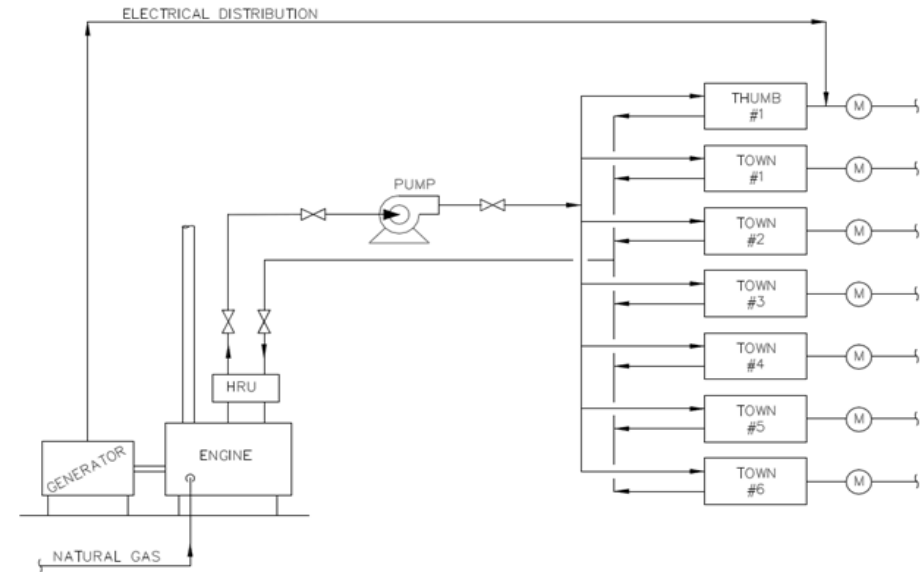
- Gas and electricity provider to the area
- Regulated utility
- Participation could accelerate CHP and solar implementation
- Energy demonstration projects partner

Partnership Opportunities



Combined Heat & Power

- Initial plant could meet the electrical needs of the Thumb
- Provide thermal energy to the Thumb and Town
- Expandable to the south as TCAAP is developed
- Establish a platform for developing a site-wide microgrid



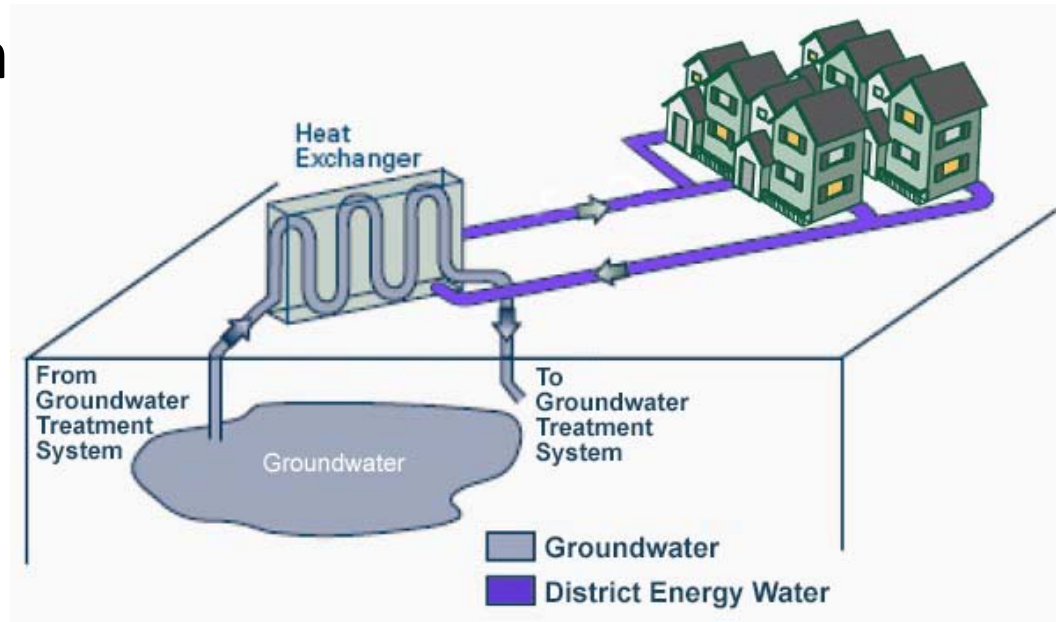
Solar

- Primer Tracer PV
 - ~ 40-60 acres available
 - ~ 8-12 of MW electricity
- Additional PV
 - Areas on AHATS with contaminated soils and limited training usage
 - 1-2 MW of electricity
- Future possible solar thermal integration



Low-Temperature District Energy

- 2 MGD pumping for 25-30 years minimum
- Provide heating and cooling to residential neighborhoods
- Avoid natural gas infrastructure
- Net-zero energy home potential



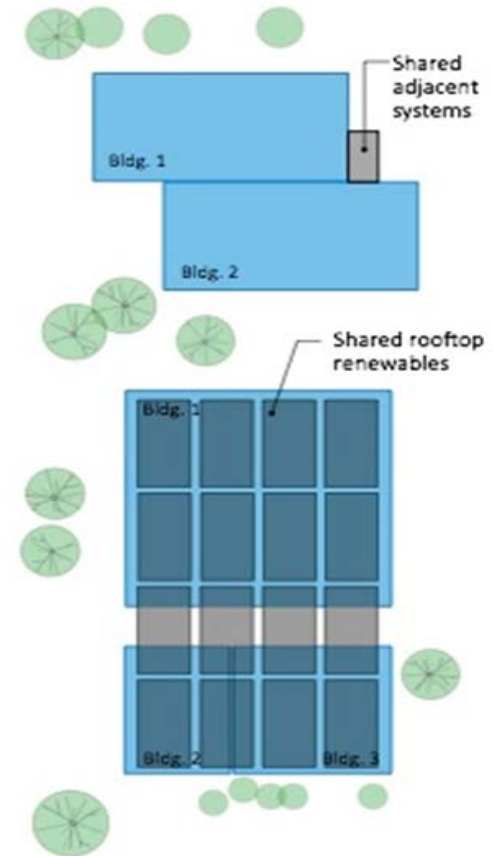
Environmental Benefits

	Traditional Scenario Annual CO₂ Emissions	Recommended Scenarios Annual CO₂ Emissions	Annual CO₂ Reductions	% Reduction
Solar PV	7,524 tons	0 tons	7,524 tons	100%
CHP	3,581 tons	2,905 tons	676 tons	19%
Low Temp District Energy	1,057 tons	747 tons	310 tons	29%
Totals	12,162 tons	3,652 tons	8,510 tons	70%

Equivalent of removing over 1,600 automobiles off the road annually

Energy Conservation through DSM

- High-efficiency commercial buildings (SB-2030)
- Sub-metering
- Strategic building siting and co-location
- Low-load residential development
- Building orientation and passive solar
- High-efficiency streetlights
- Community participation and education
- Demonstration opportunities



Continuing Partnership Discussions

- AHATS/Minnesota National Guard
- Xcel Energy
- US Army
- University of Minnesota Center for Sustainable Building Research
- Minnesota Department of Homeland Security

Next Steps

- Partnership development
- Solar PV RFP
- CHP discussion with Thumb developer
- Low-temp district energy business development
- Energy conservation design standards
- Energy-efficient site planning
- Infrastructure planning
- Funding pursuits
- Outreach and education
- Developer RFP process

Questions and Discussion