

Leveraging Aquifers to Support Sustainable Energy Infrastructure

Ever-Green Energy leverages industry-leading expertise to study, develop, own, and operate resilient energy systems that integrate local, sustainable, and effective technology solutions

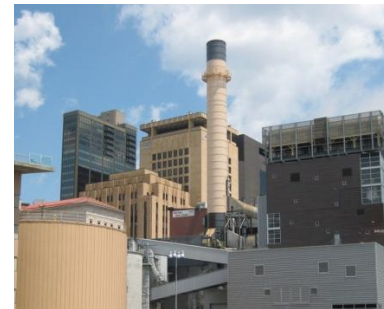


Study &
Develop

Engineer
&
Construct

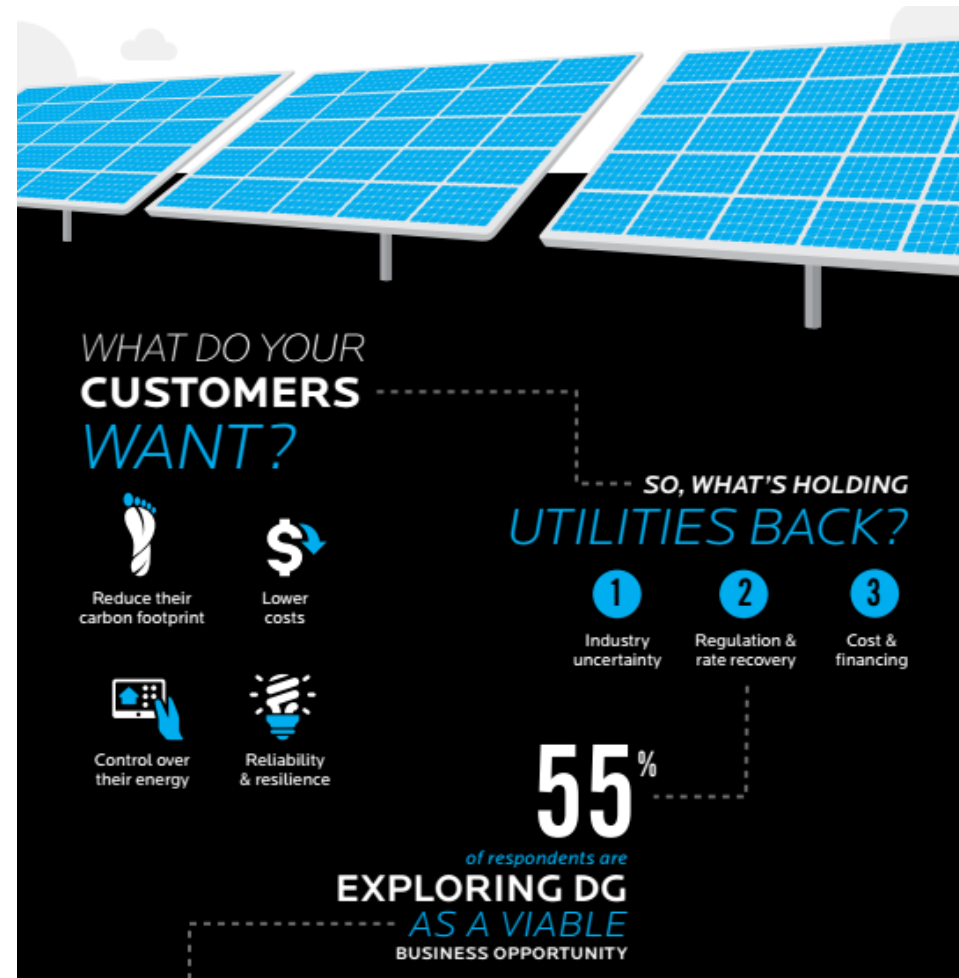


Operate &
Manage



The Changing Energy Industry

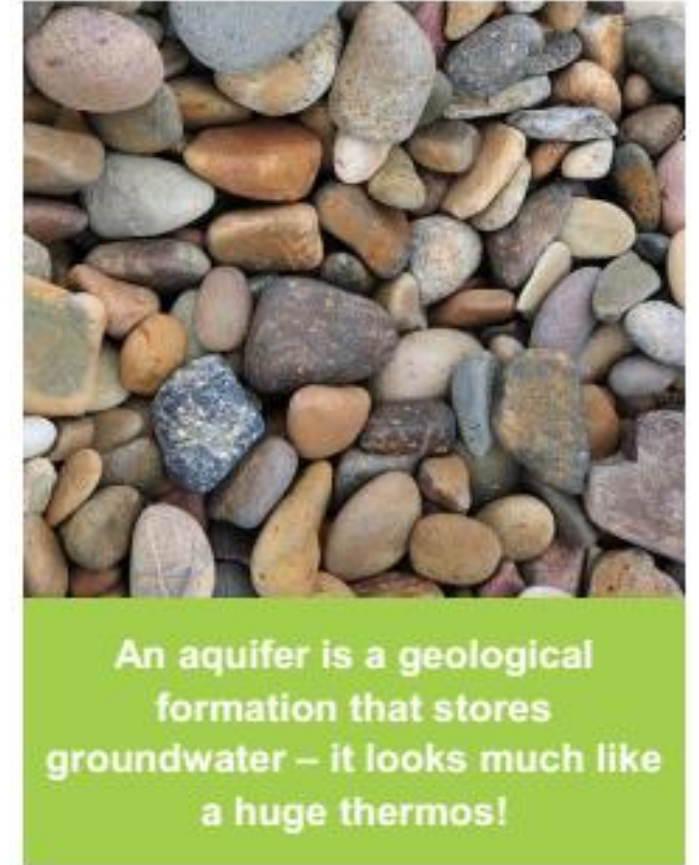
- Smarter buildings
- Smarter customers
- Technology advancements favoring decentralization
- Localization of energy sources
- Sustainability
 - Decarbonization
 - Reduced water consumption
- Low cost energy alternatives



Source: Black & Veatch

Aquifer Thermal Energy Storage (ATES)

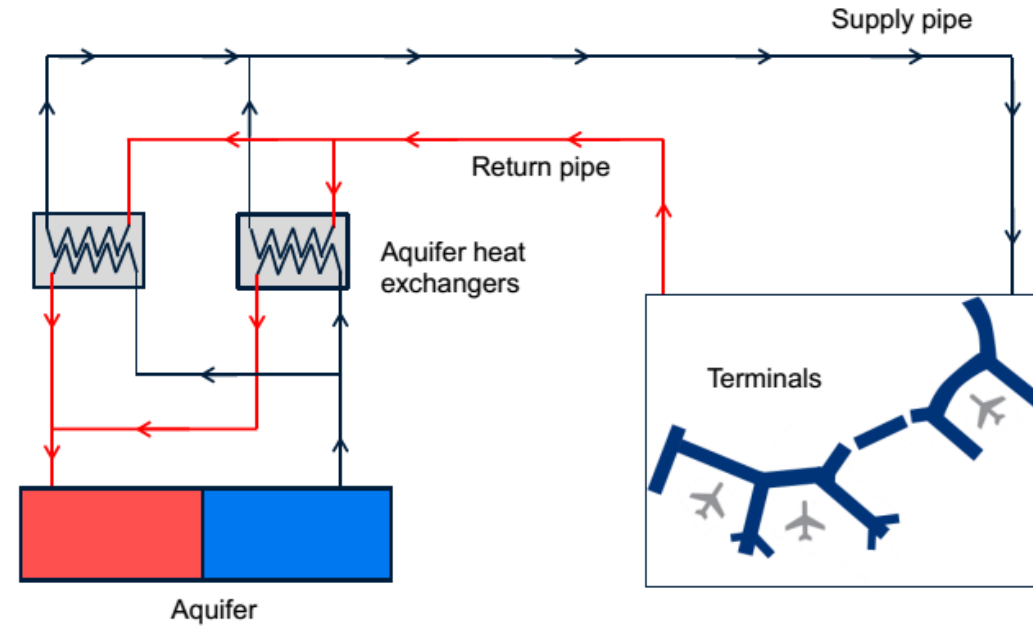
- Aquifer technology has existed for ~25 years
- Well-established in the Netherlands – over 2,500 projects
- Optimal in climates with cold winters and hot summers
- Requires low groundwater velocity
- No groundwater consumed
 - Balanced injection and withdrawal rates
- Heat stored in the aquifer in the summer
- Heat extracted from the aquifer in the winter



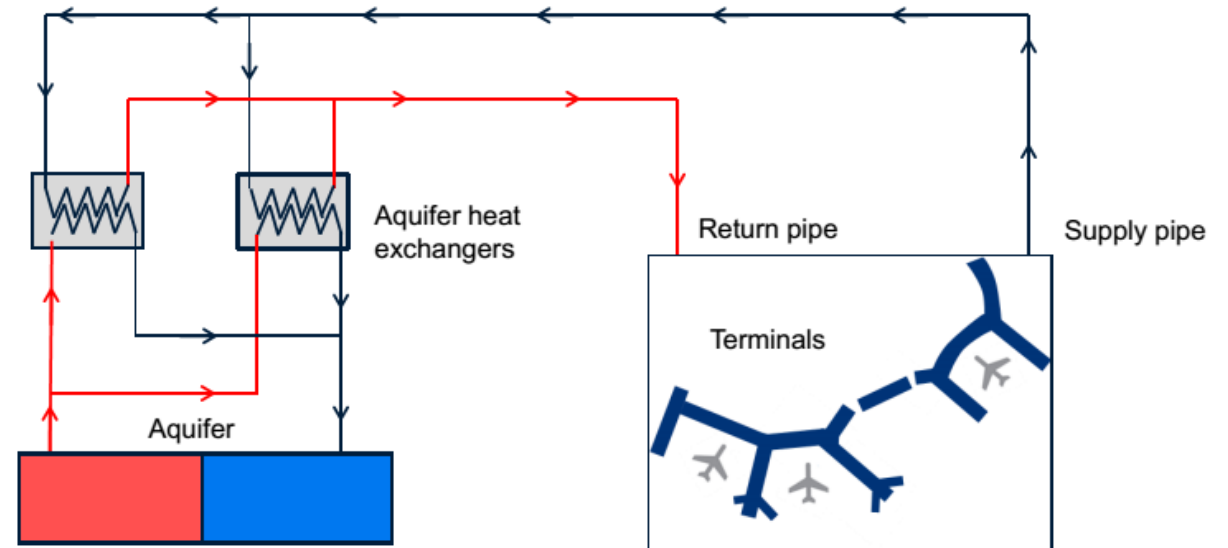
Courtesy Swedavia Energy AB

ATES – How it Works

Summer Cooling



Winter Heating



Images Courtesy Swedavia Energy AB

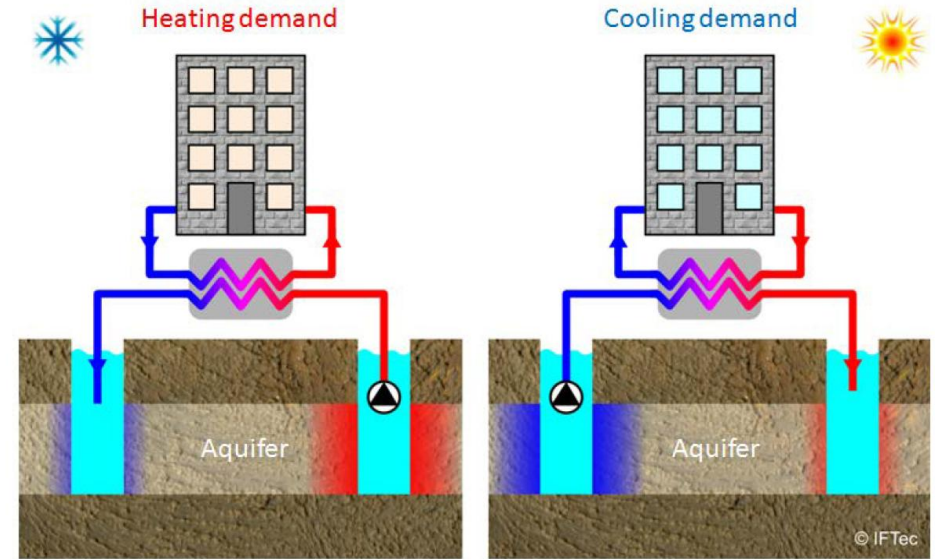
Ford Site Redevelopment (St. Paul)

- 135 acre site
- Roughly 5 million square feet of commercial, retail, and residential
- Net-zero carbon goals
- Coordinated discussions between City, land owner, developer, and local utilities



Proposed District Energy System

- ~5,000 GPM aggregate flow
- Heating and cooling site buildings
- Fresh water district energy loop serves the buildings
- Focus on commercial and multi-family residential
- Potential of adding single-family homes
- Phased approach to coincide with site development
- Sets the foundation for net-zero carbon development



Financial Benefits

- Third-party financed – 100% debt financing
- Equivalent first-installed costs for developers
- Lower life-cycle costs for building owners
 - Reduced maintenance
 - Reduced labor costs
 - Smaller building footprint
 - Simpler mechanical systems
- Lower tenant energy costs

Environmental Benefits

Xcel Current Profile - 881 lbs CO2/MWh

<i>Scenario</i>	<i>EUI Basis</i>	<i>Tons of CO2</i>	<i>% Savings</i>
Business as Usual	Code	9,261	37%
ATES	SB2030 - 80%	5,852	

Xcel 2030 Profile - 521 lbs CO2/MWh

<i>Scenario</i>	<i>EUI Basis</i>	<i>Tons of CO2</i>	<i>% Savings</i>
Business as Usual	Code	8,543	59%
ATES	SB2030 - 80%	3,461	

Broader Site Energy Initiatives

- Solar PV
- Electric vehicles
- Enhanced building design
- District energy & strategic electrification
- Zero energy homes
- Smart metering
- Monitoring, reporting, and recommissioning
- Energy integration plan
- Battery storage
- Microgrid opportunities

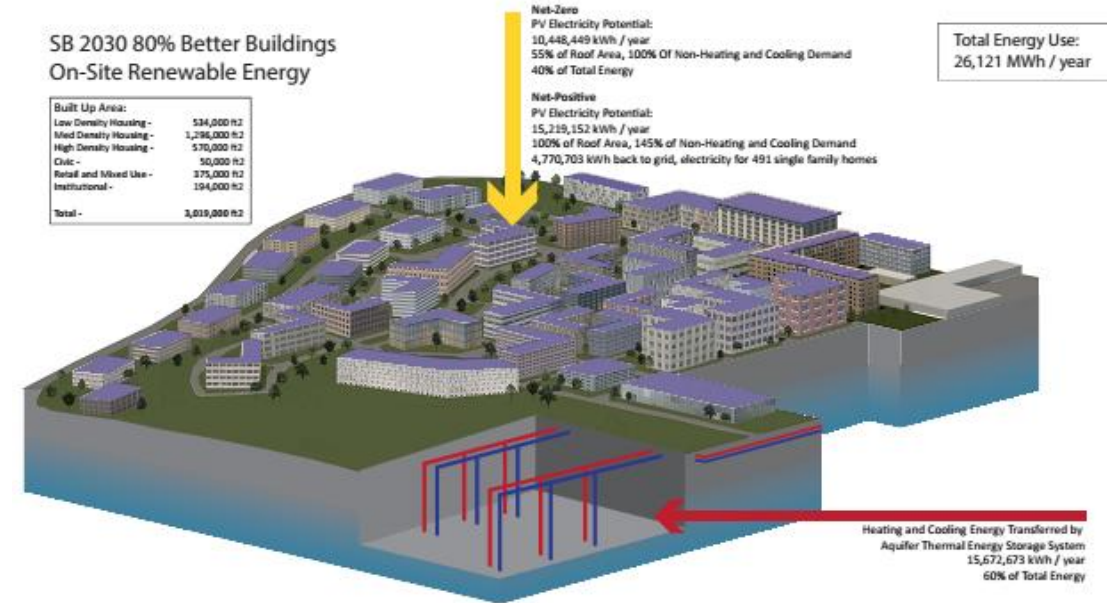
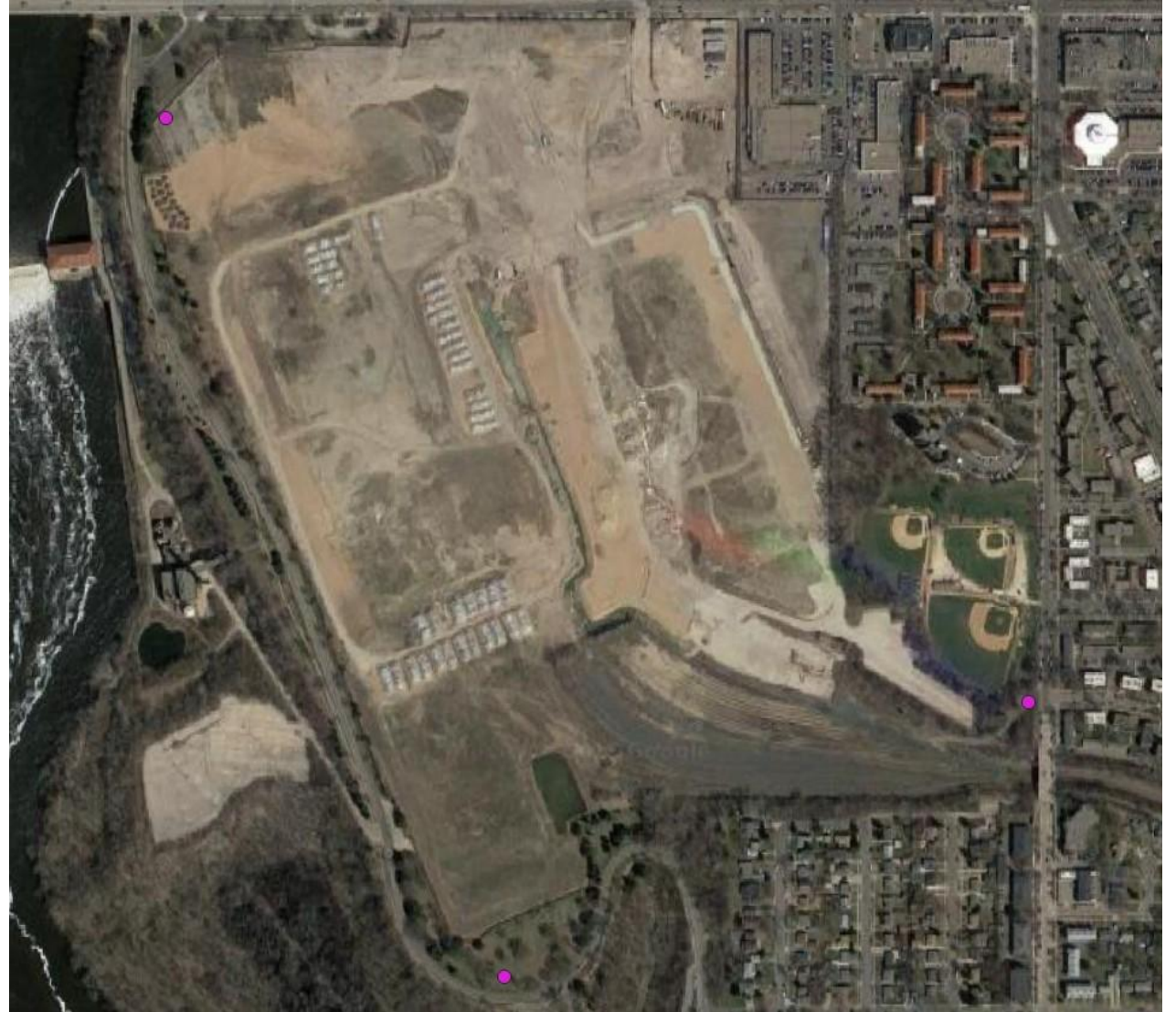


Image Courtesy of University of Minnesota Center for Sustainable Building Research

Next Steps

- Test wells
- Site design standards
- Detailed engineering
- Permitting
- Energy service agreements
- District energy business development
- Outreach & engagement



Thank You

Michael Ahern
SVP, System Development
michael.ahern@ever-greenenergy.com