



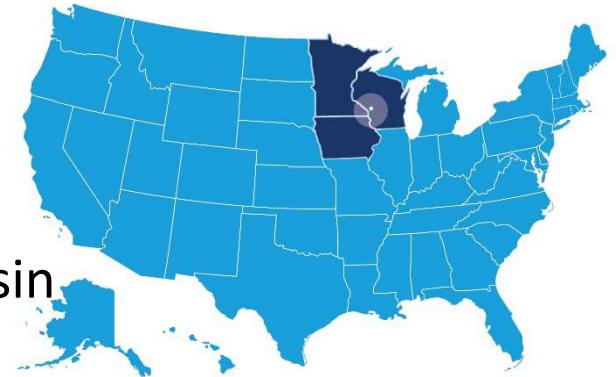
Energizing Healthcare
Achieving Energy Independence

Tim Wilson, Energy Manager
Gundersen Health System
April 22nd, 2021

About us...



- Mission: We distinguish ourselves through excellence in patient care, education, research, and improved health in the communities we serve
- Gundersen Health System
 - Physician-led Integrated delivery system
 - ~800 providers and ~7,600 employees
 - 325 bed tertiary care hospital
 - >60 clinic locations
 - Western Campus of the University of Wisconsin Medical School
 - Residency and medical education programs
 - Multiple Top 100 Hospital & Service Line recognition
 - A variety of affiliate organizations including EMS air and ground ambulance service, rural hospitals, nursing homes, hospice, etc.
 - Health Plan

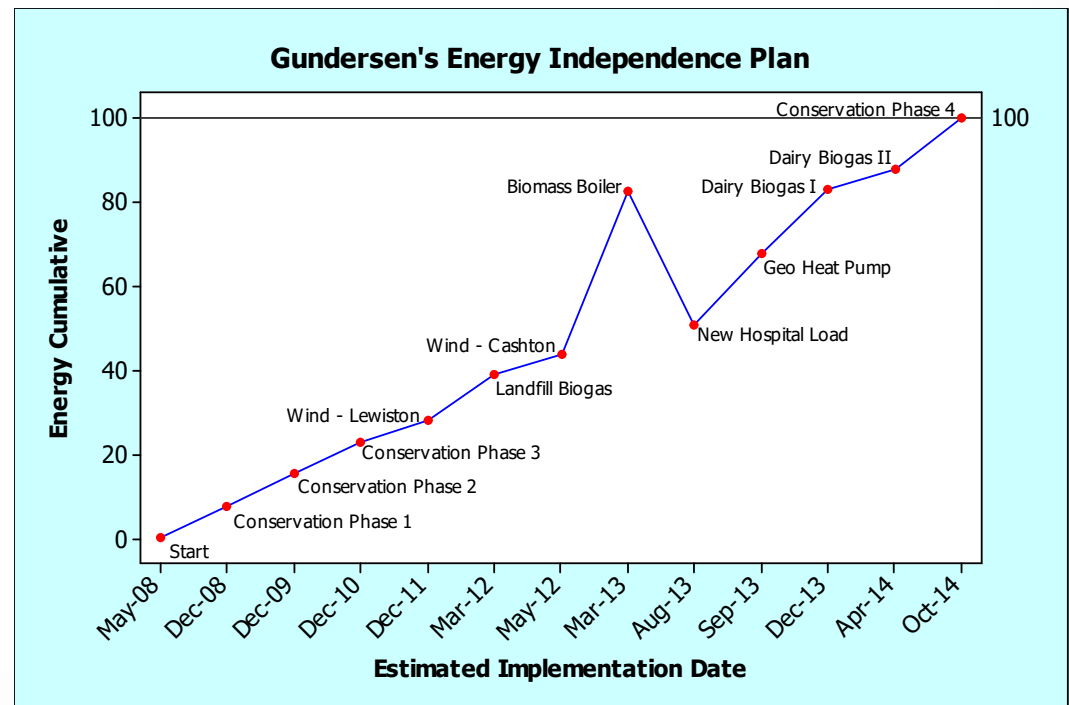


Primary Objective Energy Independence in 2014



Produce more power than Gundersen consumes from fossil fuel source

- Makes our healthcare delivery more affordable to patients
- Benefits human health
- Strengthens our regional economy
- Improves our environment



Why Health Care Providers Should Care About Clean Energy



- Pollutants from the burning of fossil fuels cause:
 - Birth defects¹
 - Negative effects on the kidneys, lungs, & nervous system¹
 - Cardiovascular deaths and stroke²
 - Increased carcinogens contributing to cancer risk
- According to the Department of Energy, hospitals are 2.5 times more energy intensive than other commercial buildings³
 - This is inconsistent with our mission... we are responsible for contributing to disease through our wasteful consumption.
 - US Hospitals spend \$8 billion dollars on energy each year
- 2-sided green is possible: Environmental and Financial



¹Source: American Lung Association, Emissions of Hazardous Air Pollutants From Coal - Fired Power Plants: EH&E Report 17505, March 7, 2011

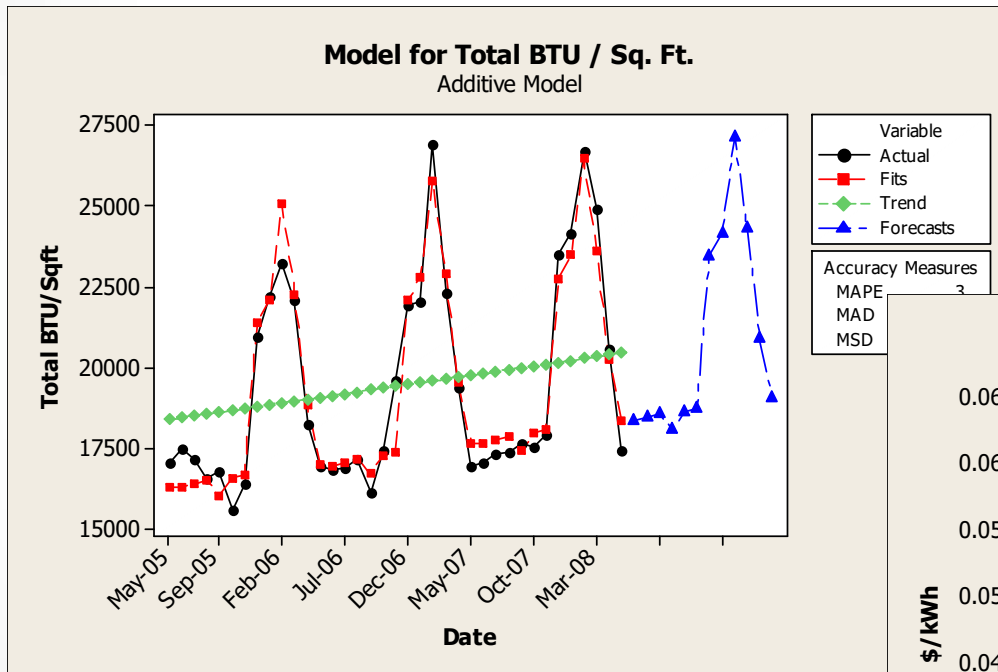
²Source: American Heart Association Scientific Statement: DALLAS, May 10, 2010

³Source: <http://www.energy.gov/news2009/7363.htm>

The Cost of Energy



Energy Use Increasing ~4%

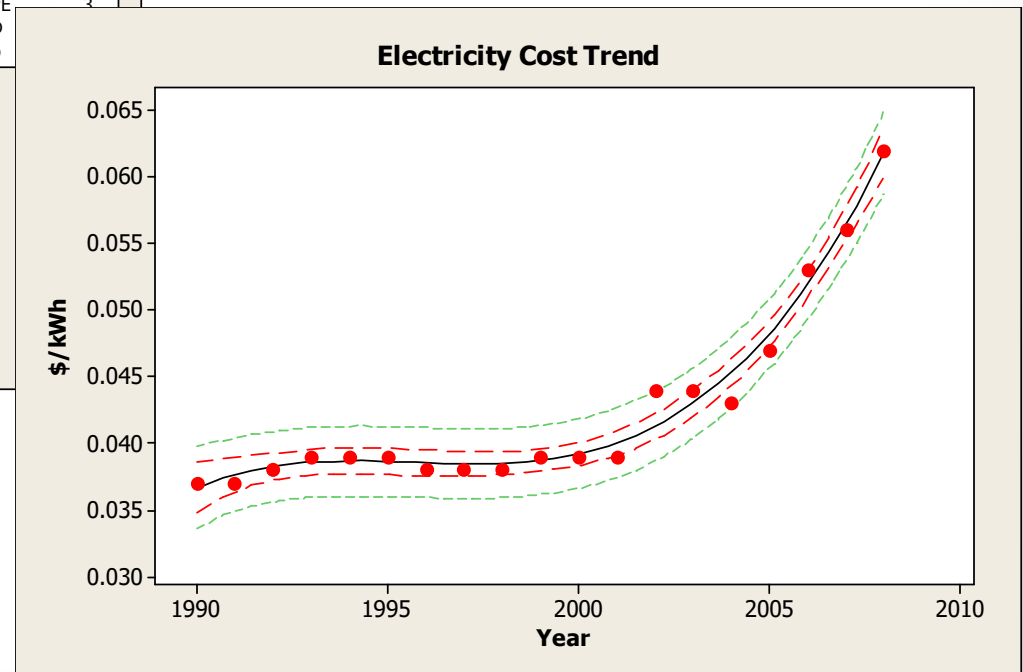


Energy Bill in 2008

\$5,300,000

Price Increasing

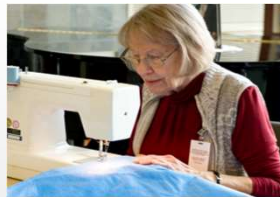
>\$350,000



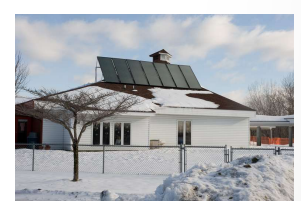
The need for affordable healthcare compels us to address this trend

Envision[®]

Gundersen's Vision for
Energy & Environmental Stewardship



- **Energy Management**
 - Energy Efficiency
 - Renewable Energy
- **Waste Management**
- **Recycling**
- **Sustainable Design**



Energy Conservation



- Best leverage of resources
 - Many conservation measures have paybacks < 2 years
- Immediate benefits to gain momentum
- Reduces the amount spent for renewable energy supply
- Stewardship gains credibility with stakeholders

***20 – 30% energy reduction
can be achieved through conservation measures***



Conservation



Boilers



Chillers



Cooling Tower Fans



Pump Motors



Exhaust Fan Motors



Air Handlers



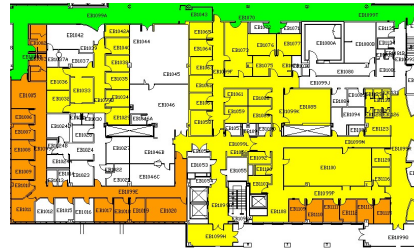
Conservation



Lighting



Occupancy



- 24/365 Operations
- Frequent air exchanges
- High filtration requirements
- Pressure Relationships

Data Centers



Personal Computers



Equipment

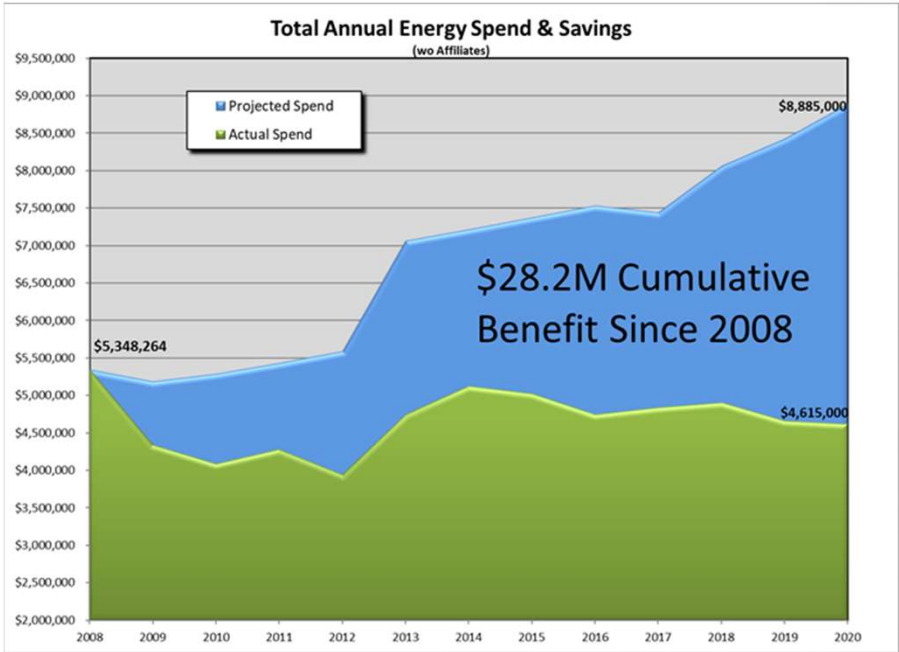
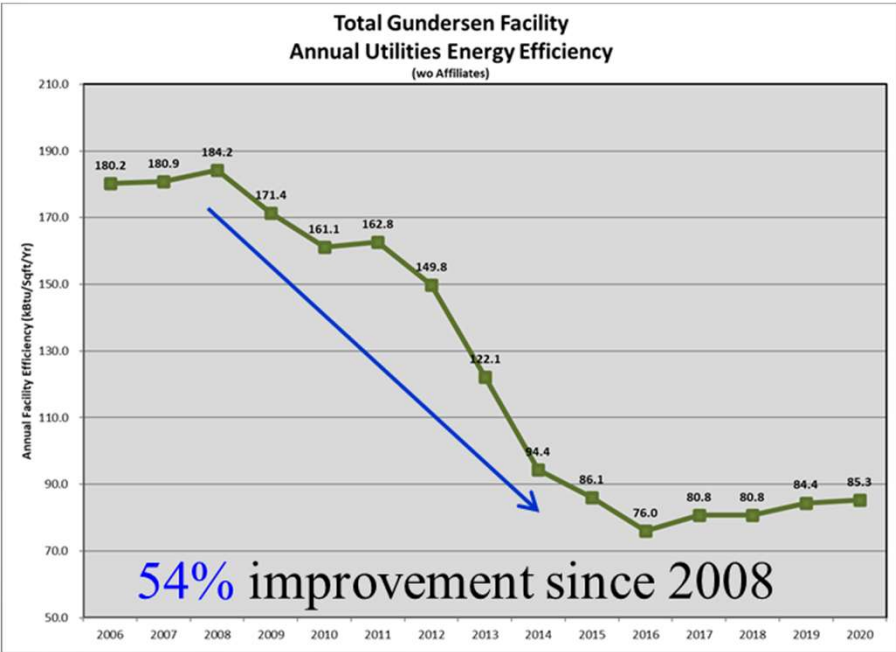


Insulation & steam traps



Results to Date

Aggregated Facilities EUI - Utility Purchased Energy (kBtu per square foot per year)



~2M ft²

~3M ft²

Renewable Energy Supply



You can not reduce yourself to zero

- Proven technologies exist today
- Investment mentality
 - Expect 5-15 year paybacks
 - Hedge against inflation
 - Highly variable depending upon project specific parameters
 - Significant tax incentives exist for those who qualify
 - Larger projects can take years to complete
- Great opportunity to form mutually beneficial partnerships

Wind

Biogas

Biomass

Hydro

Solar

Geothermal

*We will always need to consume some energy to fulfill our mission.
Clean, renewable sources of energy can offset this consumption.*

Renewable Energy



7 Solar Projects



2 Wind Sites



1 Biogas Landfill Project



2 Biogas Digesters
(divested October 2020)



1 Biomass Boiler



Multiple Geothermal Sites

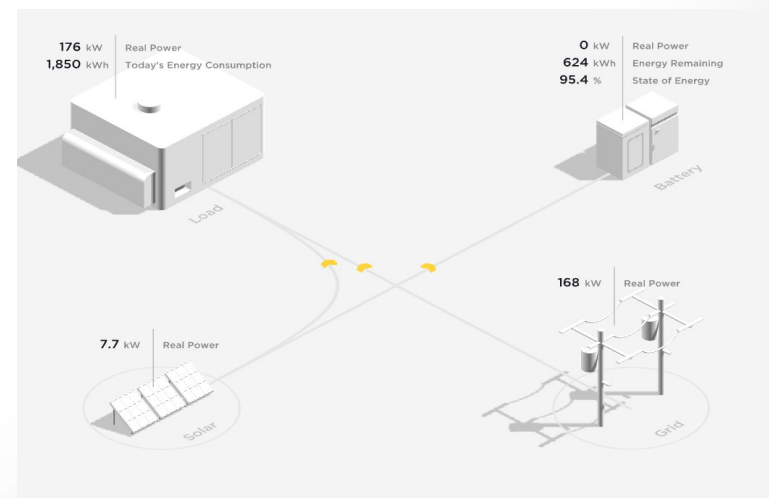


Microgrid Site Based Energy Independence



Microgrid with backup battery power – Tomah, WI

- Ultra efficient design
 - Facility was designed to use 45 kBtu/sq ft – 50% less than the avg clinic
- 90 geothermal wells
 - Offsetting most of the building's gas consumption
- 240kw roof top solar
 - Solar system will produce 30% of buildings annual power needs
- 425kw Tesla battery & controls
 - Provides 4 hours of emergency power during electrical outage
 - Avoided relying on a gas burning backup generator
- Installed in August 2019



Results



2008 – 2020 Emissions Reductions

Carbon Dioxide	85%
Particulate Matter	83%
Mercury	79%

2020 asthma attacks avoided: 55

GUNDERSEN REACHES FIRST DAYS OF ENERGY INDEPENDENCE

OCTOBER 2014

LEARN MORE ▶

Sustainable Design



Energy Intensity (kBtu/sqft/yr)

130

260

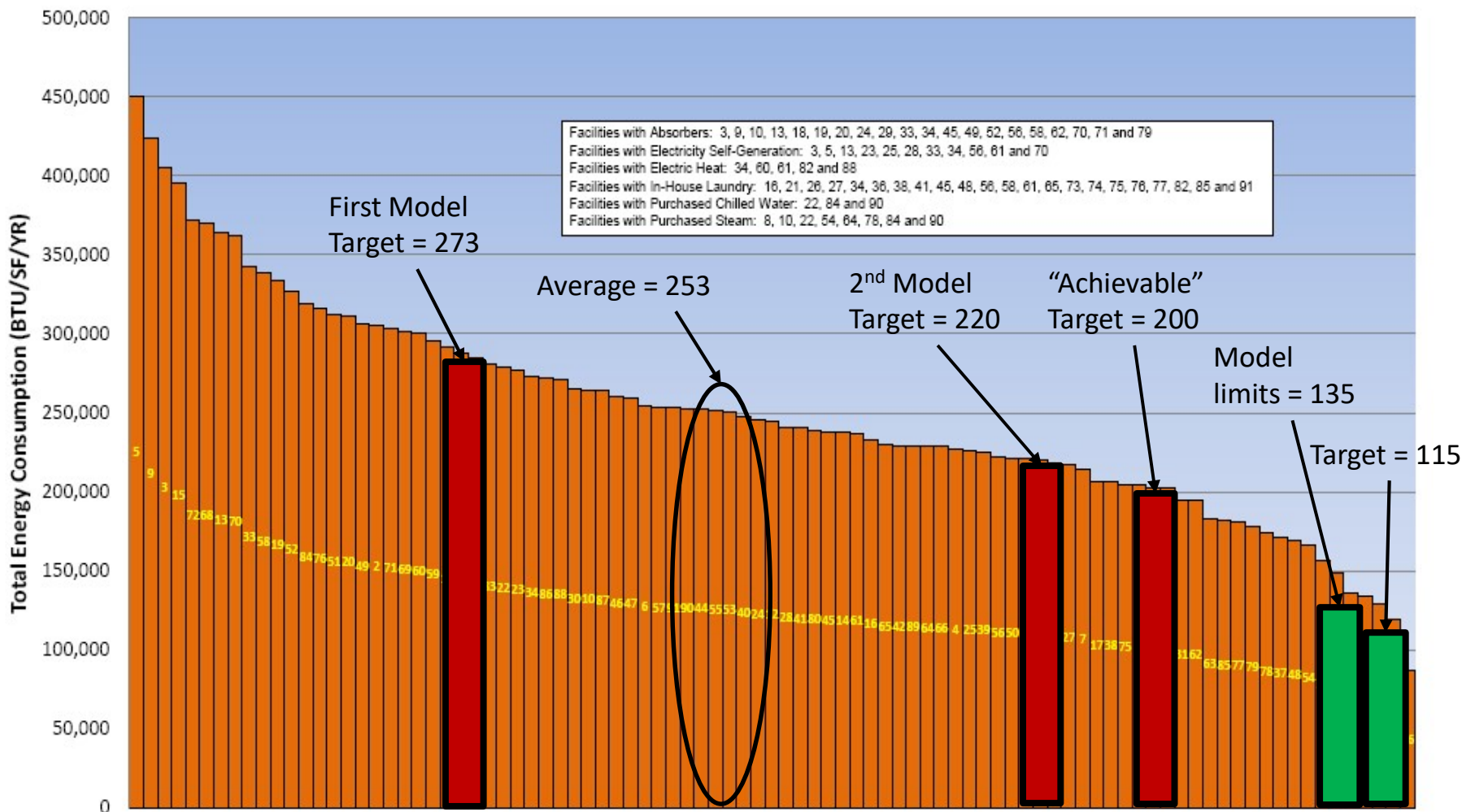


60

200

~\$650k Savings/year

New Hospital Energy Target



What Next....



Sparta Clinic Zero Energy Design

1. Geothermal wells (40 x 300 feet)
2. Decentralized heat pumps
3. Rooftop solar (100 kw)
4. Spray foam insulation
5. Thermal break doors and windows
6. Double pane windows
7. LED Lighting
8. Occupancy sensors
9. Heat recovery vent system
10. Solar Garden with Xcel (220 kw)

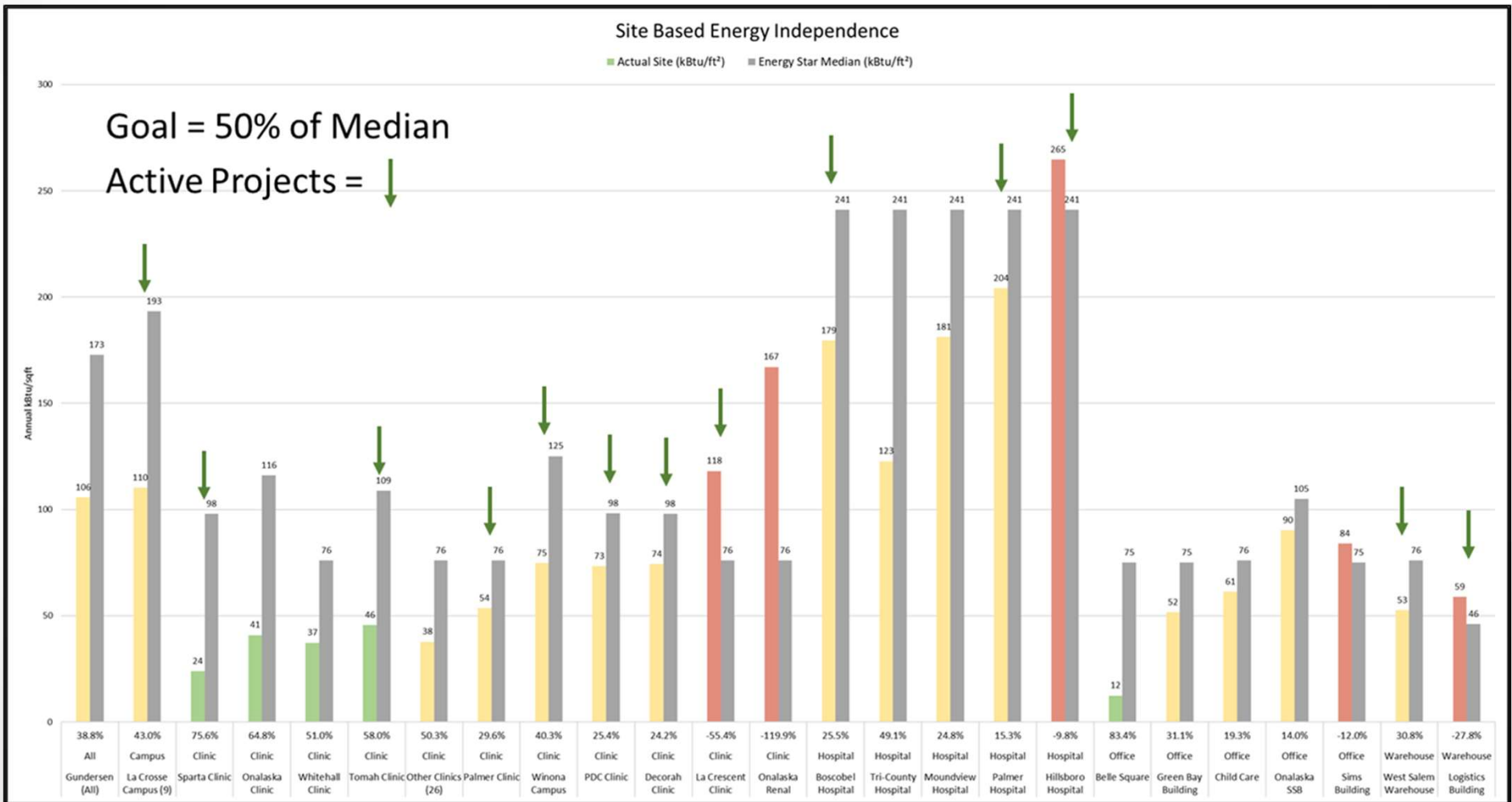


Tomah Clinic Zero Energy Design

1. Geothermal wells (90 x 306 feet)
2. Rooftop solar (280 kw)
3. Spray foam insulation
4. Thermal break doors and windows
5. Double pane windows
6. LED Lighting
7. Occupancy sensors
8. Solar Garden with Xcel (180 kw)
9. Offsite solar at SSB, Decorah (215 kw)
10. Battery Storage + peak shaving
11. Ground Mount Solar (175kw)

Zero Energy New Construction

What Next....



Site Based Energy Independence

Questions or Comments?





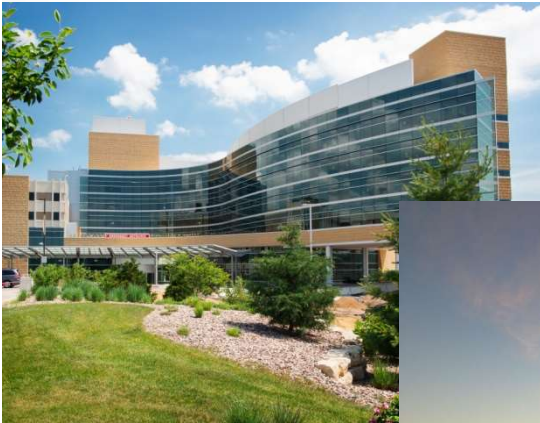
Envision®
Gundersen Health System

www.gundersenenvision.org

Envision[®] Services



New Facility Energy Design Reviews



Renewable Energy Planning



Energy "Check-Up" Kaizens



Engaged Leadership Workshops



Seminars





Appendix

Solar – Photovoltaic



Underground parking garage - La Crosse, WI

- 56.4 kW
- First LEED certified parking garage in U.S.
- Installed in July 2008



Sparta Clinic - Sparta, WI

- 100 kW
- 220 kW Xcel Energy Community Solar Garden
- Installed in November 2016



Onalaska Clinic - Onalaska, WI

- 300 kW
- Installed equipment to ensure no export to the grid
- Installed in June 2017



Behavioral Health – La Crosse, WI

- 135.8 kW
- Excess wired to the power plant and consumed on campus
- Installed in June 2018



Solar – Photovoltaic



Tomah Clinic – Tomah, WI

- 240 kW
- Produces 30% of buildings annual power needs
- Installed in August 2019

Support Services Building – Onalaska, WI

- 162.2 kW
- Produces 10% of buildings annual power needs
- Installed in August 2019

Decorah Clinic – Decorah, IA

- 55 kW
- Light upgrade and solar reduced energy consumption by 30%
- Installed in January 2020



Wind



Wholesale project - Lewiston, MN

- First community wind project in the county of Winona
- 2 x 2.475 MW Turbines with 80 meter towers
- Sell to MISO through utility
- Project offsets about 6% of total goal
- Started production in December 2011



Wind



Community project - Cashton, WI

- First community wind project in state of Wisconsin
- 50/50 joint venture with Organic Valley
- 2 x 2.499 MW turbines with 100 meter towers
- Sell to local municipalities
- Project offsets about 6% of total goal
- Started production in May 2012



wind_turbine_for_GL.wmv



Biogas – Landfill



La Crosse County Landfill Gas - Onalaska, WI

- Partnered with La Crosse County Solid Waste Department
- Project offsets 100% of Onalaska campus energy needs 12% of total goal
- Started production in March 2012
- Added absorption cooling in 2016
- **The first known, Energy Independent Healthcare Campus in the U.S.**

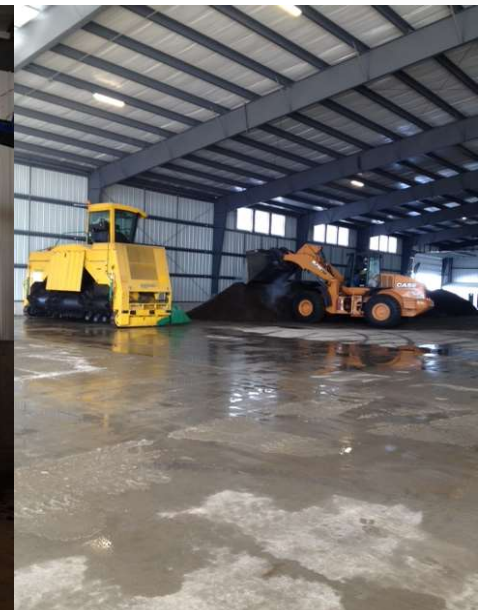


Biogas – Dairy Manure



Community Digester - Middleton, WI

- 3 participating farms, 1 direct pipe and 2 truck in manure
- Project offsets about 15% of total goal
- Removes phosphorous from groundwater in watershed
- Solids are composted & sold as a soil amendment or bedding
- Started production December 2013, divested October 2020
- Planning to convert to bioCNG



Biogas – Dairy Manure



On Farm Digester - Sun Prairie, WI

- 1 participating farm on the farm site
- Project offsets about 5% of total goal
- Solids used as bedding for cows
- Started production April 2014, divested October 2020
- Planning to convert to bioCNG



Biomass



Biomass boiler with electrical generation (CHP) - La Crosse, WI

- Locally sourced wood chip fuel
- 800 HP boiler
- Produces the majority of heat/steam used by the health system
- 400 kw back pressure steam turbine for electrical production
- Project offsets about 38% of total goal
- Started production in March 2013



Geothermal



Building thermal first, then Geothermal - La Crosse, WI

- Geothermal heat pump provides most of the heating/cooling needs of the new Hospital
- Started production in 2012 by serving the new Behavioral Health Center
- 156 wells 400 feet deep under a parking lot
- New Hospital 115 KBTU/sq. ft.



Renewable Energy Feedstock



Fuel payments That Previously Went to Other States and Nations

County Landfill Gas to Energy



Approximate Annual Biogas Payment
to La Crosse County Tax Payers

\$250,000

Biomass Boiler/CHP



Approximate Annual Fuel Payments
for Regional Wood Chip Suppliers

\$650,000

Plus land lease payments to local land owners