Morris Citizen Jury Presentation

Preparing for climate and extreme weather changes at UMM

UNIVERSITY OF MINNESOTA MORRIS

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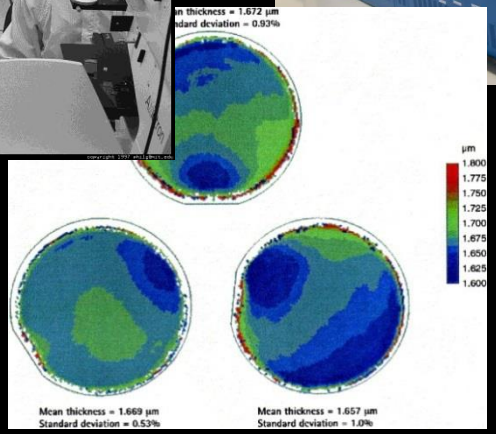
Babbitt


22.01.2013 16:09


µm
1.800
1.775
1.750
1.725
1.700
1.675
1.650
1.625
1.600
Mean thickness = 1.669 µm
Standard deviation = 0.53%
Mean thickness = 1.657 µm
Standard deviation = 1.0%


PRAIRIE PENNY PINCHERS

Concern #1: Extreme weather affects our campus energy supply

Concern #2: Extreme weather affects our campus infrastructure.

Concern #3: Extreme weather affects our campus landscape.

Concern #4: Extreme weather is a by-product of a global warming

Concern #1: Extreme weather affects our campus energy supply

Minnesota does not produce its own fossil fuel.

We are dependent on other places to give us energy.

Hotter/wetter summers require us to use more energy to do cooling.

When it is really cold, our natural gas supply can be curtailed, we need to use large amounts of expensive (and dirtier) fuel oil.

Colder winters require more energy to heat the campus.

w.eia.gov/state/?sid=MN#tabs-3

eia Independent Statistics & Analysis
U.S. Energy Information Administration

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‹ U.S. STATES

MINNESOTA

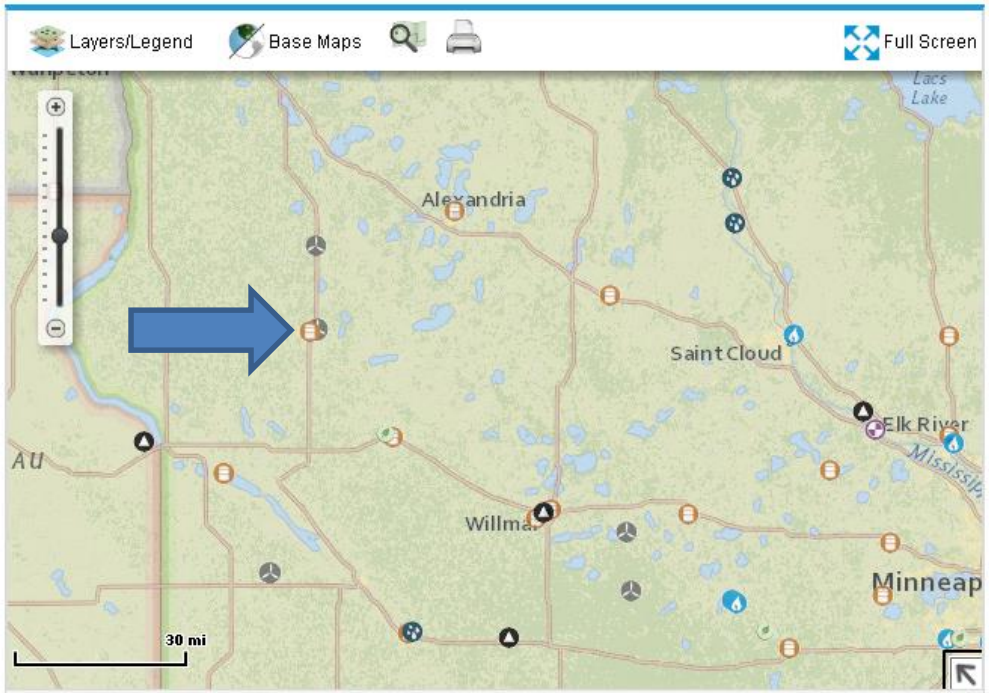
State Profile and Energy Estimates

CHANGE STATE/TERRITORY

OVERVIEW | DATA | ANALYSIS | RANKINGS | COMPARE | FIND | ? HELP

Profile Overview

Print State Energy Profile (overview, data, & analysis)



Map notes and sources

Send map questions, comments and suggestions to: mapping@eia.gov

Minnesota, U.S. Rankings

Consumption	
Total Energy per Capita	18
Expenditures	
Total Energy per Capita	23
Production	
Total Energy	34
Crude Oil	--
Natural Gas	--
Coal	--
Electricity	28
Prices	
Natural Gas	29
Electricity	22
Environment	
Carbon Dioxide Emissions	23

See more rankings ›

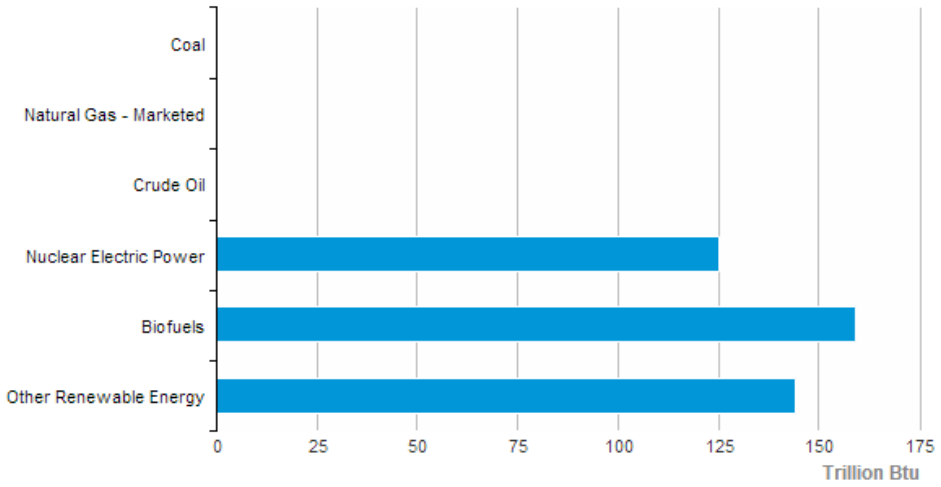
QUICK FACTS

- Minnesota ranked fourth in the nation in ethanol production capacity in 2013.
- Minnesota, 21st in the nation in population in 2011, was 29th in residential per capita energy use despite its very cold winters.
- About 46% of the electricity generated in Minnesota came from coal-fired electric power plants in 2013; most of its coal supply was brought in by rail from Montana and Wyoming.
- Two nuclear power plants near Minneapolis-St. Paul, the Monticello reactor and the Prairie Island I and II reactors, accounted for 21% of Minnesota's net electricity generation in 2013.
- Minnesota ranked seventh in the nation in net electricity generation from wind energy in 2013; its net generation was 8 million megawatthours in 2013, an increase of 5.9% from 2012.

Last updated March 27, 2014.

Consumption by Source | Consumption by Sector | **Production** | Electricity | Prices

Minnesota Energy Production Estimates, 2011



eia Source: Energy Information Administration, State Energy Data System

Concern #2: Extreme weather affects our campus infrastructure

The wind storms in the past year have added expenses to our campus operations. We have had to do more tree removal.

Hail storms in the past two years have damaged buildings.

Extreme rain events have damaged campus infrastructure.

$2M hail damage

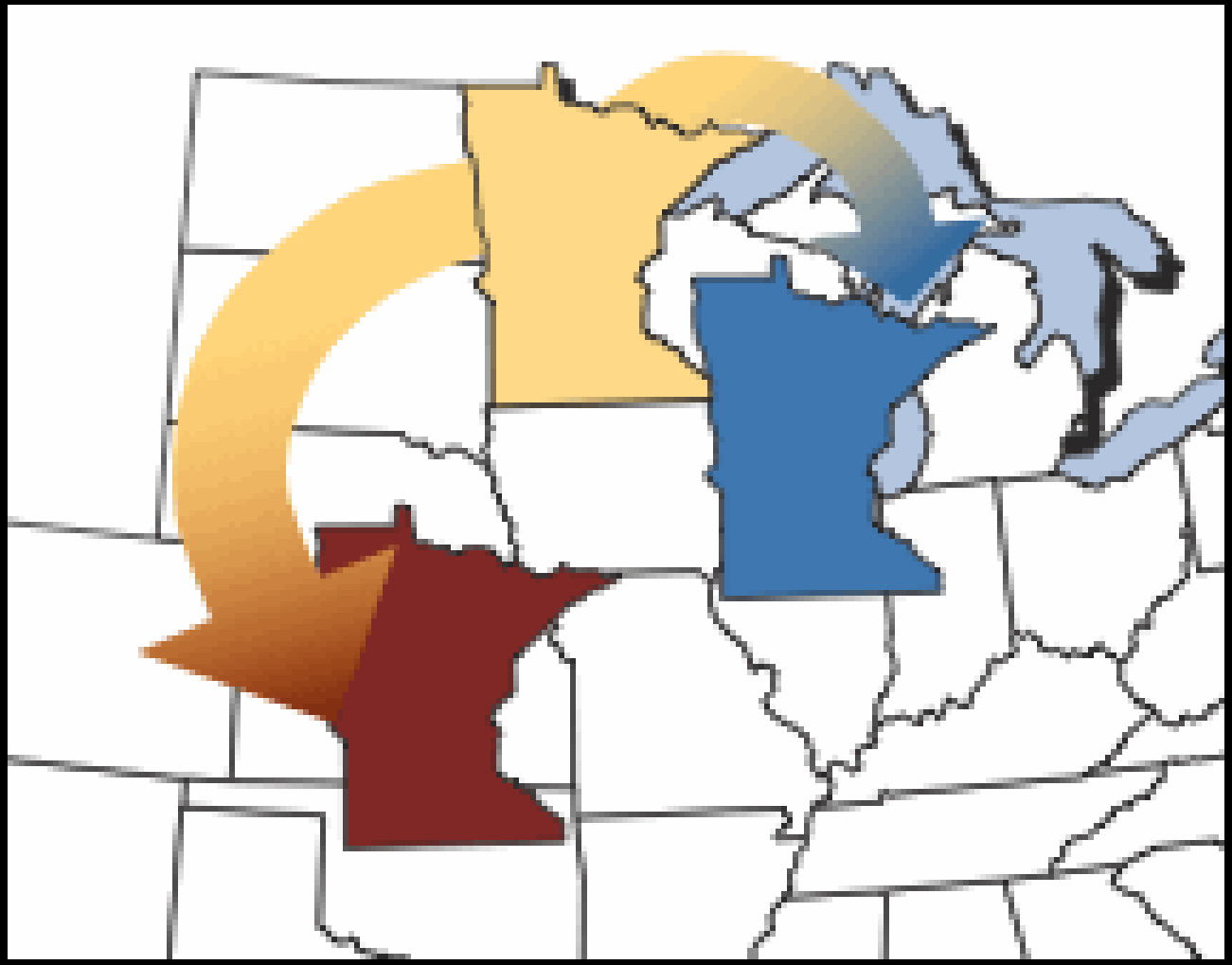
Concern #3: Extreme weather affects our campus landscape.

Long periods of drought affect our trees on campus, our campus yards, and our campus food gardens.

Increased rain volumes mean we send more water, more quickly, to the Pomme de Terre river, instead of having more frequent lower volume rains which can be used more easily by plants and trees.

88 trees


2008/02/18 04:48



HydroClim Minnesota for Early June 2014

A monthly electronic newsletter summarizing Minnesota's climate conditions and the resulting impact on water resources. Distributed on the first Thursday of the month.

State Climatology Office - DNR Division of Ecological and Water Resources, St. Paul
distributed: June 5, 2014

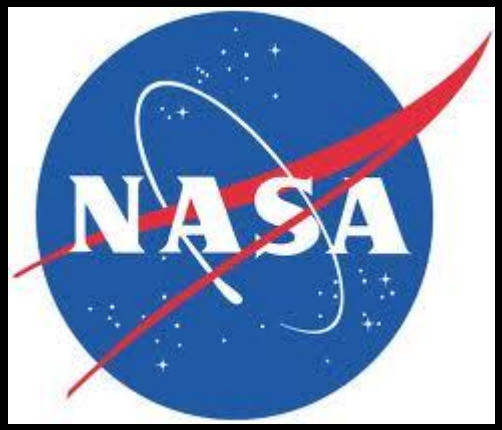
What happened in May 2014:

- May precipitation totals across Minnesota ranged from less than three inches in southeastern counties, to well over five inches in many east central, central, and north central Minnesota locales. In the wetter areas, monthly rainfall totals topped the historical average by two or more inches.
  [see: **May 2014 Precipitation Map** | **May 2014 Precipitation Departure Map** | **May 2014 Climate Summary Table**]
- The month of May ended as a heavy rain event dropped three-day rainfall totals of three or more inches on many Minnesota communities between May 31 and June 2.
  [see: **Heavy Rains of May 31-June 2**]
- Average monthly temperatures for May in Minnesota were near historical averages in most locations. Cool temperatures during the first half of the month were offset by warm temperatures late in the month. Extremes for May ranged from a high of 93 degrees F at Georgetown (Clay County) on the 29th, to a low of 20 degrees F at Brimson (St. Louis County) on the 17th.
  [see: **May 2014 Climate Summary Table**]

Where we stand now:

- Precipitation totals since April 1 are far above historical averages. For large portions of Minnesota, season-to-date precipitation totals rank above the 90th percentile when compared with the historical database during the April-plus-May time period. It was Minnesota's third consecutive meteorological spring (March - May) of exceptionally high precipitation totals. In the Twin Cities, 2014 continued a rather remarkable streak of wet starts to the calendar year. The January 1-through-June 1 precipitation total (16.84 inches) in the Twin Cities was the second highest of the 144-year record. 2012 and 2013 also ranked among the five wettest all-time for that five-month period.
  [see: **Season-to-date precipitation maps**]

http://www.dnr.state.mn.us/hydroclim/hc1406.html


NASA


ipcc
INTERGOVERNMENTAL PANEL ON climate change
WMO UNEP


NATIONAL INSTITUTES OF HEALTH


NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

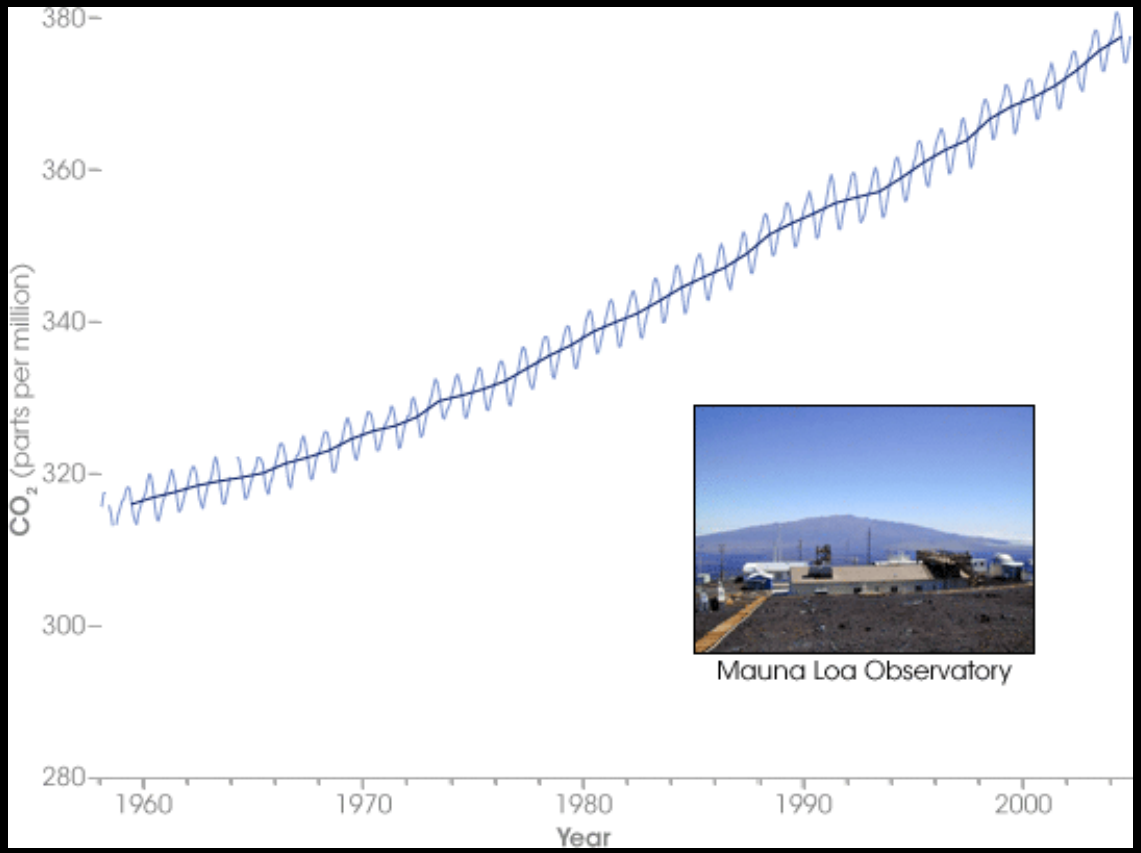

USDA


DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

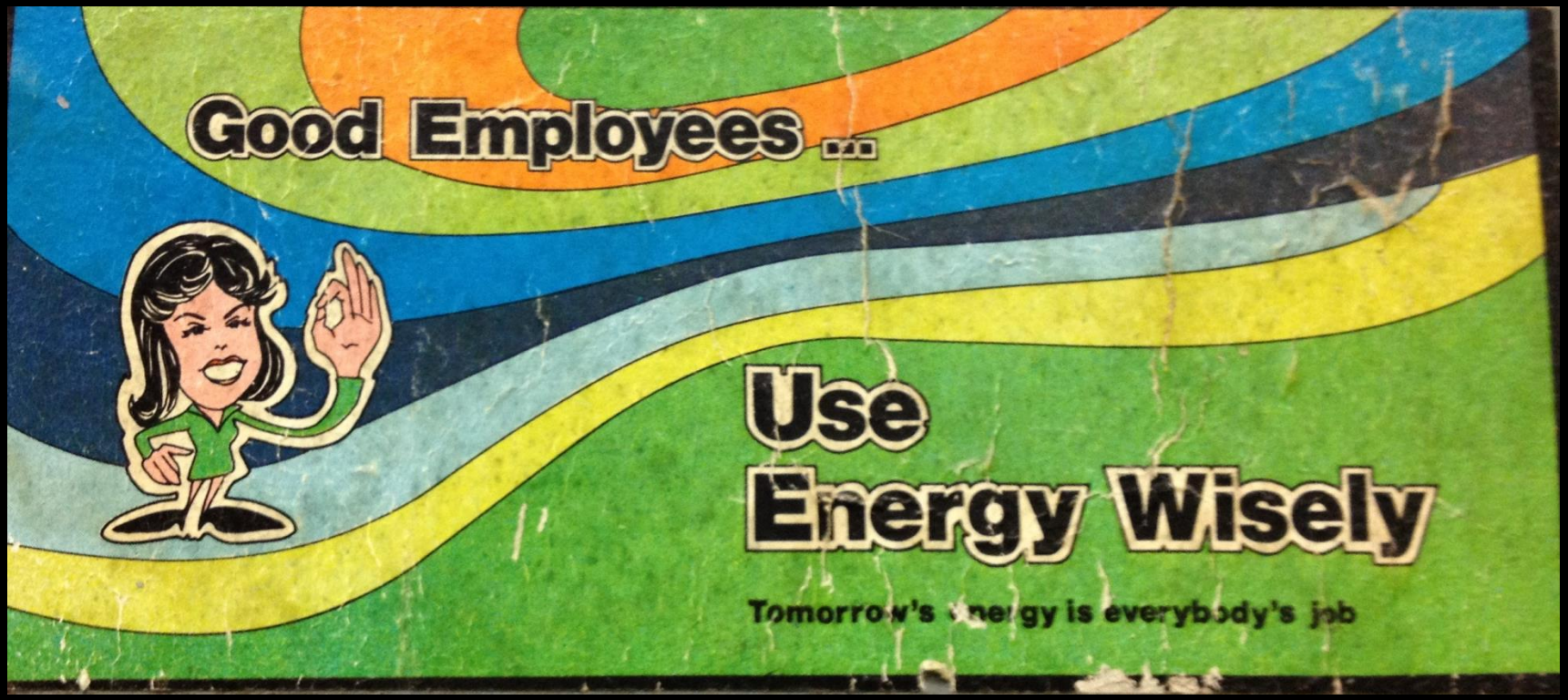

USGS
science for a changing world

Concern #4: **Extreme weather is a by-product of a global warming.**

Burning carbon is leading to more extreme weather. We don't just want to adapt to it (which we will need to do). We also want to try to avoid making it even worse.



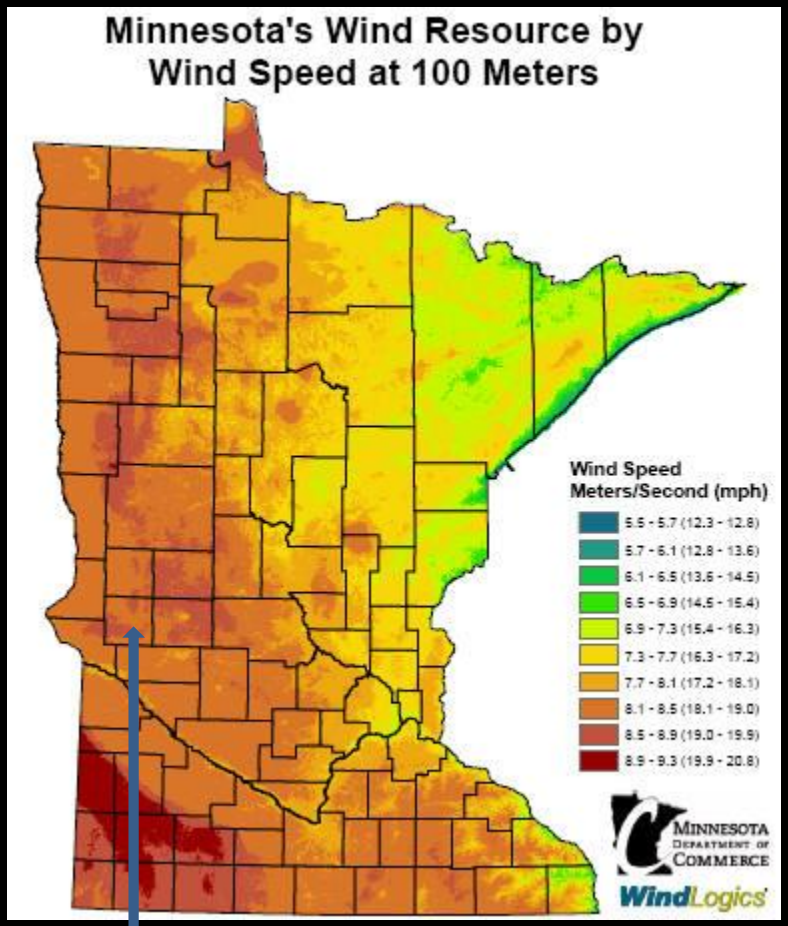
How is UMM responding to these concerns?


Good Employees ...
Use
Energy Wisely
Tomorrow's energy is everybody's job

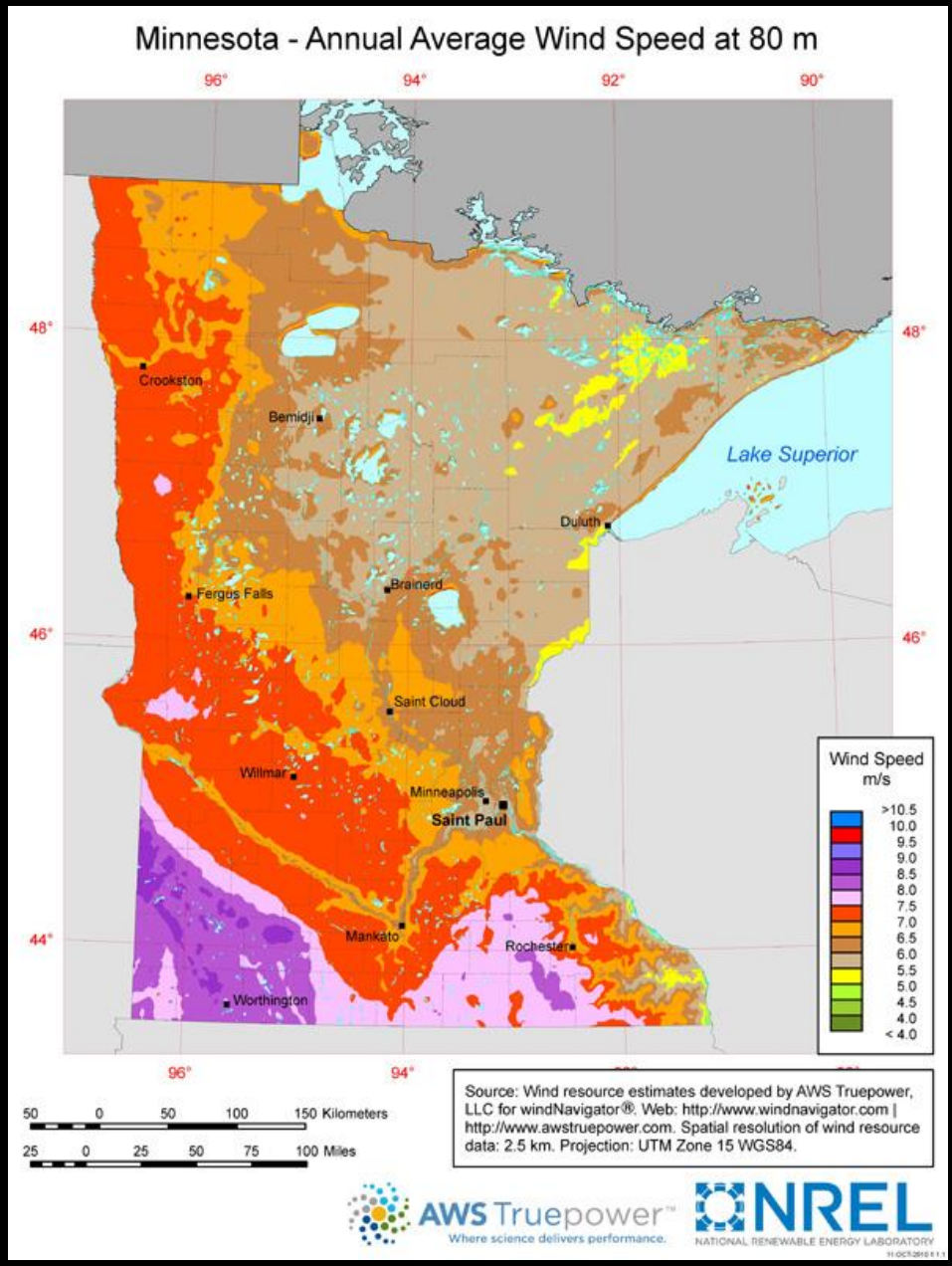
2007 – 2012 = **1,000,000** kWh energy reduction


GRACE


U.S. GREEN BUILDING COUNCIL
LEED GOLD
2012


Minnesota's Wind Resource by
Wind Speed at 100 Meters
Wind Speed
Meters/Second (mph)
5.5 - 5.7 (12.3 - 12.8)
5.7 - 6.1 (12.8 - 13.6)
6.1 - 6.5 (13.6 - 14.5)
6.5 - 6.9 (14.5 - 15.4)
6.9 - 7.3 (15.4 - 16.3)
7.3 - 7.7 (16.3 - 17.2)
7.7 - 8.1 (17.2 - 18.1)
8.1 - 8.5 (18.1 - 19.0)
8.5 - 8.9 (19.0 - 19.9)
8.9 - 9.3 (19.9 - 20.8)
Minnesota Department of Commerce
WindLogics

STEVENS CO.


Minnesota - Annual Average Wind Speed at 80 m
96°
94°
92°
90°
48°
46°
44°
Crookston
Bemidji
Lake Superior
Duluth
Fergus Falls
Brainerd
Saint Cloud
Willmar
Minneapolis
Saint Paul
Mankato
Rochester
Worthington
Wind Speed
m/s
>10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
< 4.0
50 0 50 100 150 Kilometers
25 0 25 50 75 100 Miles
Source: Wind resource estimates developed by AWS Truepower, LLC for windNavigator®. Web: http://www.windnavigator.com | http://www.awstruepower.com. Spatial resolution of wind resource data: 2.5 km. Projection: UTM Zone 15 WGS84.
AWS Truepower
Where science delivers performance.
NREL
NATIONAL RENEWABLE ENERGY LABORATORY


First
Large-scale wind turbine at a
public US university


60%
of Morris's electricity
comes from wind

Twin turbines produce

10.5 million kWhrs

per year

10,500,000 MkWh produced per year

8,500,000 MkWh used by campus per year

2,000,000 MkWh of “extra” energy produced by wind

Some estimations:

1,500 households in Morris

1,500 X 800 kWhr/month = 1.2MkWhr/month used in Morris

12 months/year X 1.2MkWhr/mo= 14MkWhr/year used by Morris

Morris Campus Turbine #2

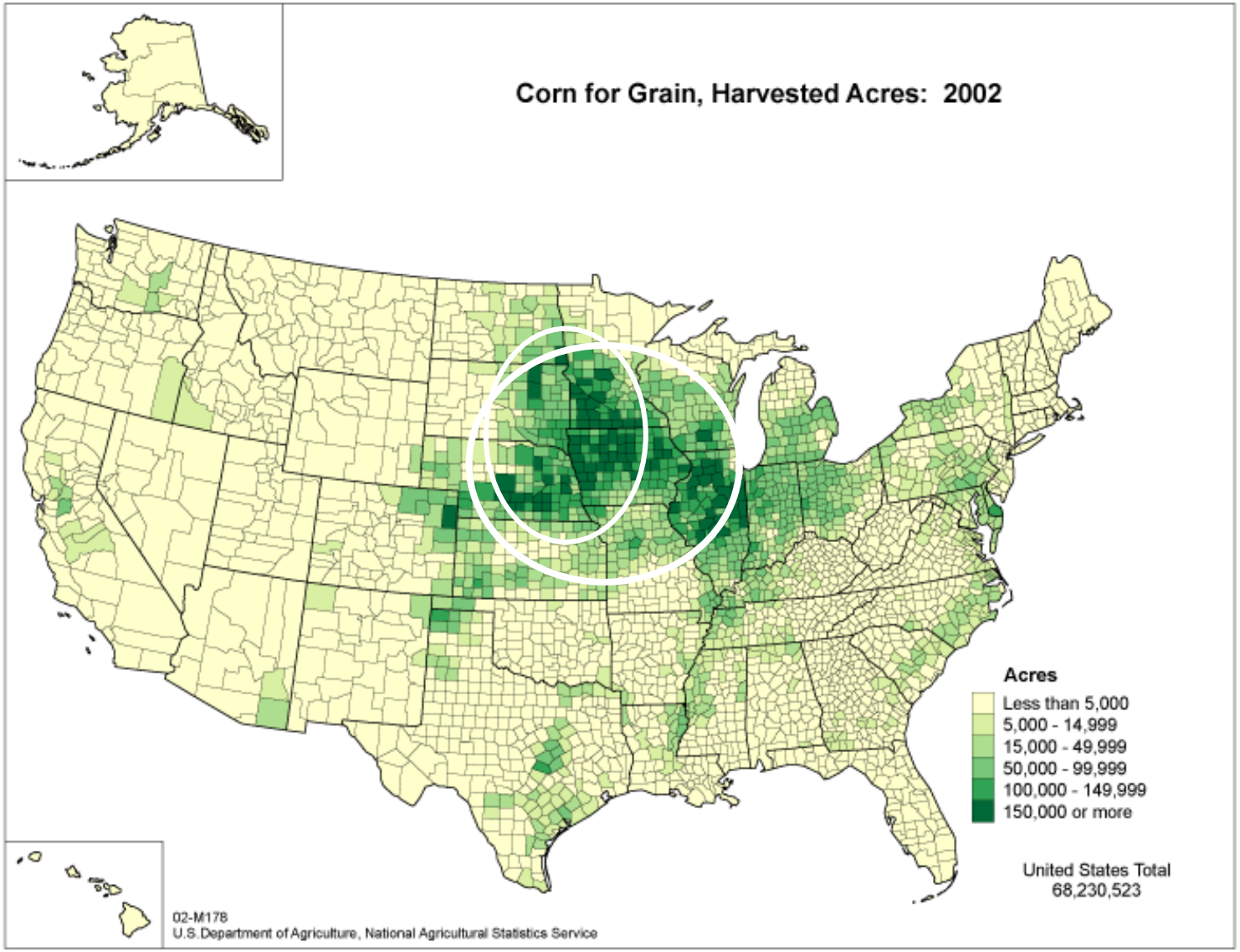
U of M Debt (repaid by UMM)
$3,600,000

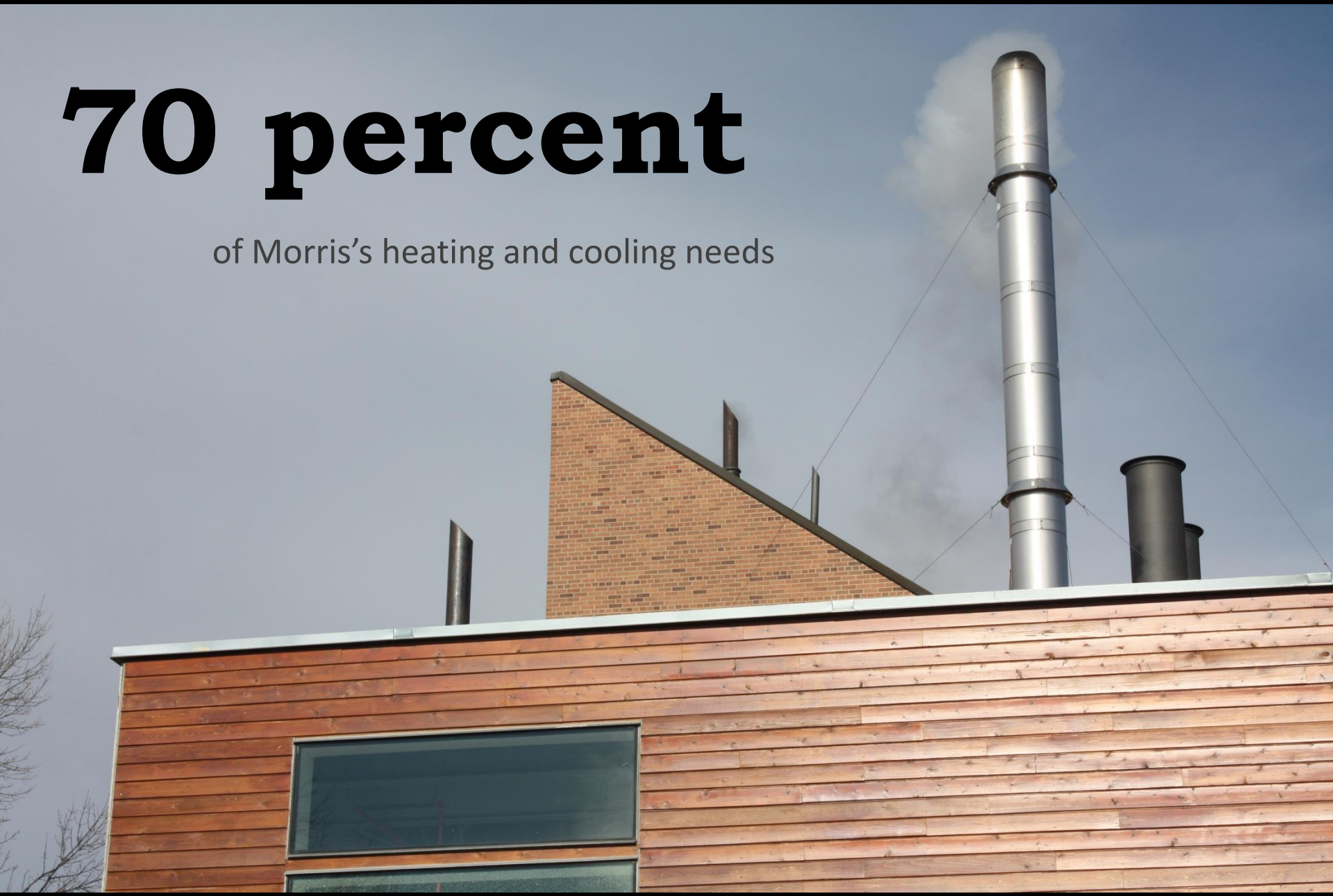
UMM Utilities
$310,372

UMM Internal Loan
$64,028

Morris Campus 2009 HEAPR
$420,000

Total: $4,395,000


Corn for Grain, Harvested Acres: 2002
Acres
Less than 5,000
5,000 - 14,999
15,000 - 49,999
50,000 - 99,999
100,000 - 149,999
150,000 or more
United States Total
68,230,523
02-M178
U.S.Department of Agriculture, National Agricultural Statistics Service


70 percent
of Morris's heating and cooling needs


annually burns
9,000 tons
of biomass

corn cobs

Natural Gas:

Avg price: 5.704 dollars/MMcuft (40 % hedged)

$/MMBTU 5.70 dollars

Corn Cobs:

Avg price: 87.87/dry ton (Three year contract)

$/MMBTU 5.78 dollars

Wood Chips:

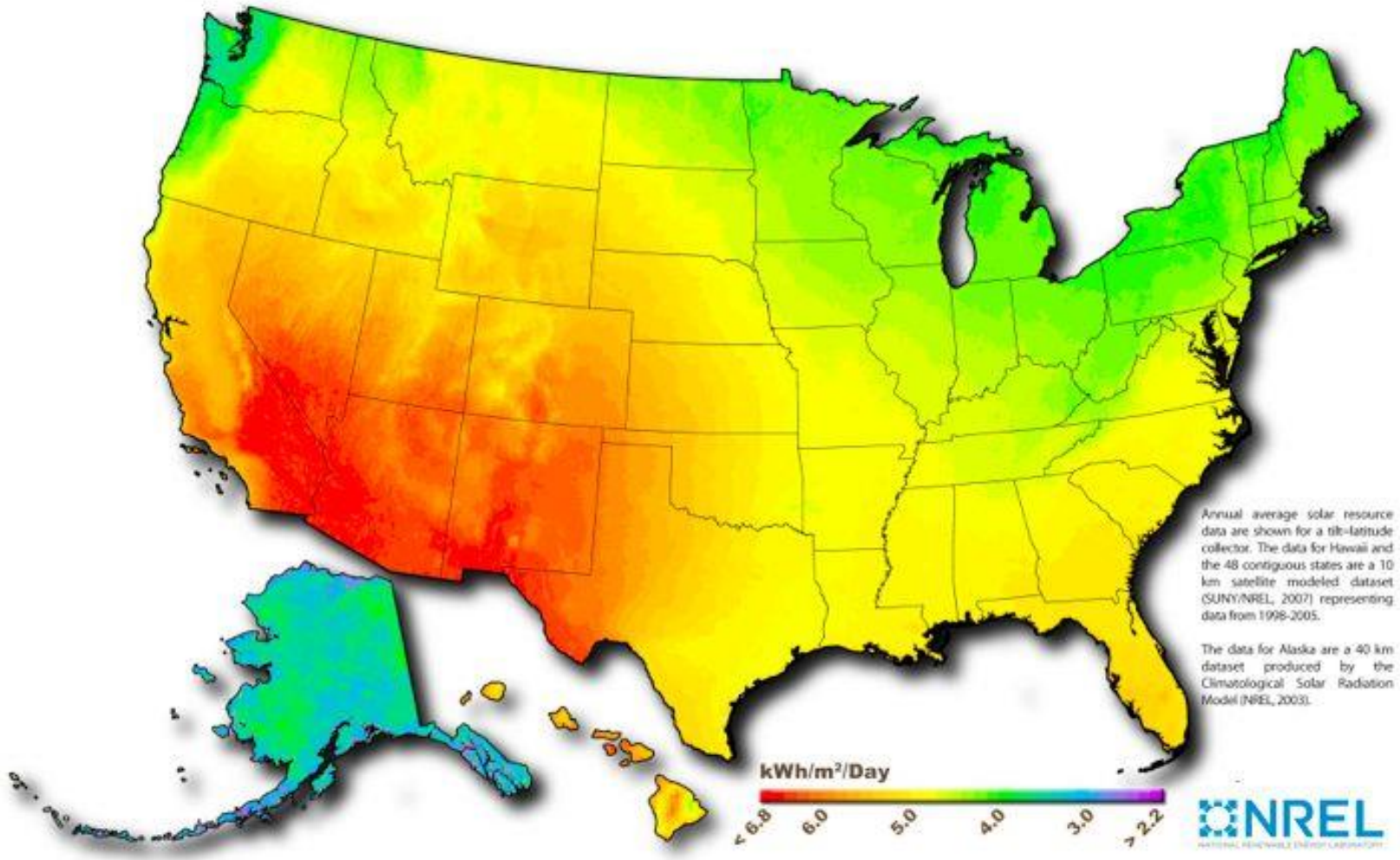
Avg price: 101.08/ton

$/MMBTU 6.35 dollars

**2011/2012

By **David Joles,** Star Tribune

U.S. Photovoltaic Solar Resource

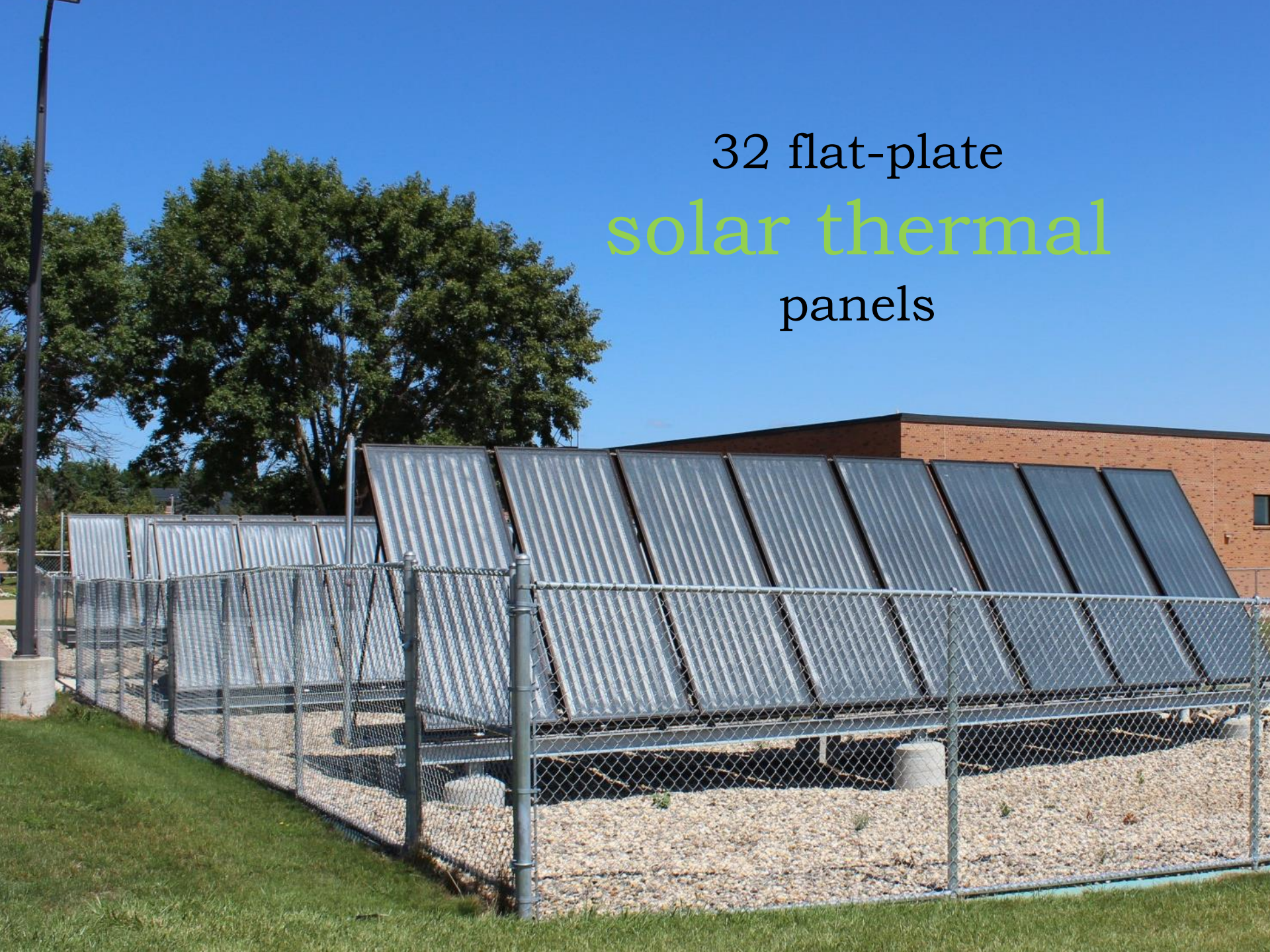


Annual average solar resource data are shown for a tilt=latitude collector. The data for Hawaii and the 48 contiguous states are a 10 km satellite modeled dataset (SUNY/NREL, 2007) representing data from 1998-2005.

The data for Alaska are a 40 km dataset produced by the Climatological Solar Radiation Model (NREL, 2003).

Author: Billy Roberts - October 20, 2008

This map was produced by the National Renewable Energy Laboratory for the U.S. Department of Energy


32 flat-plate
solar thermal
panels


annually offsets
270 MMBtu
of natural gas use


Lipton
Cold Brew

STUDENT

ENERGY IS RENEWABLE AND SUSTAINABLE

Second Nature
CLIMATE LEADERSHIP AWARDS
WINNER
2014
American College & University Presidents' Climate Commitment

TOP 30
ON-SITE GENERATION

EPA
GREEN POWER PARTNERSHIP

The Princeton Review's
THE CENTER FOR GREEN SCHOOLS
GUIDE TO 322 GREEN COLLEGES
Presented in partnership with the Center for Green Schools at the U.S. Green Building Council
2013 Edition

POSSIBLE OPPORTUNITIES

#1: Become a renewable energy destination

#2: Use extreme precipitation events to our advantage

#3: Model construction practices that use less energy and can deal with hail/water events.