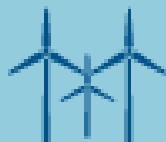




# Climate Solutions and Economic Opportunities

Will Seuffert, Executive Director  
Environmental Quality Board



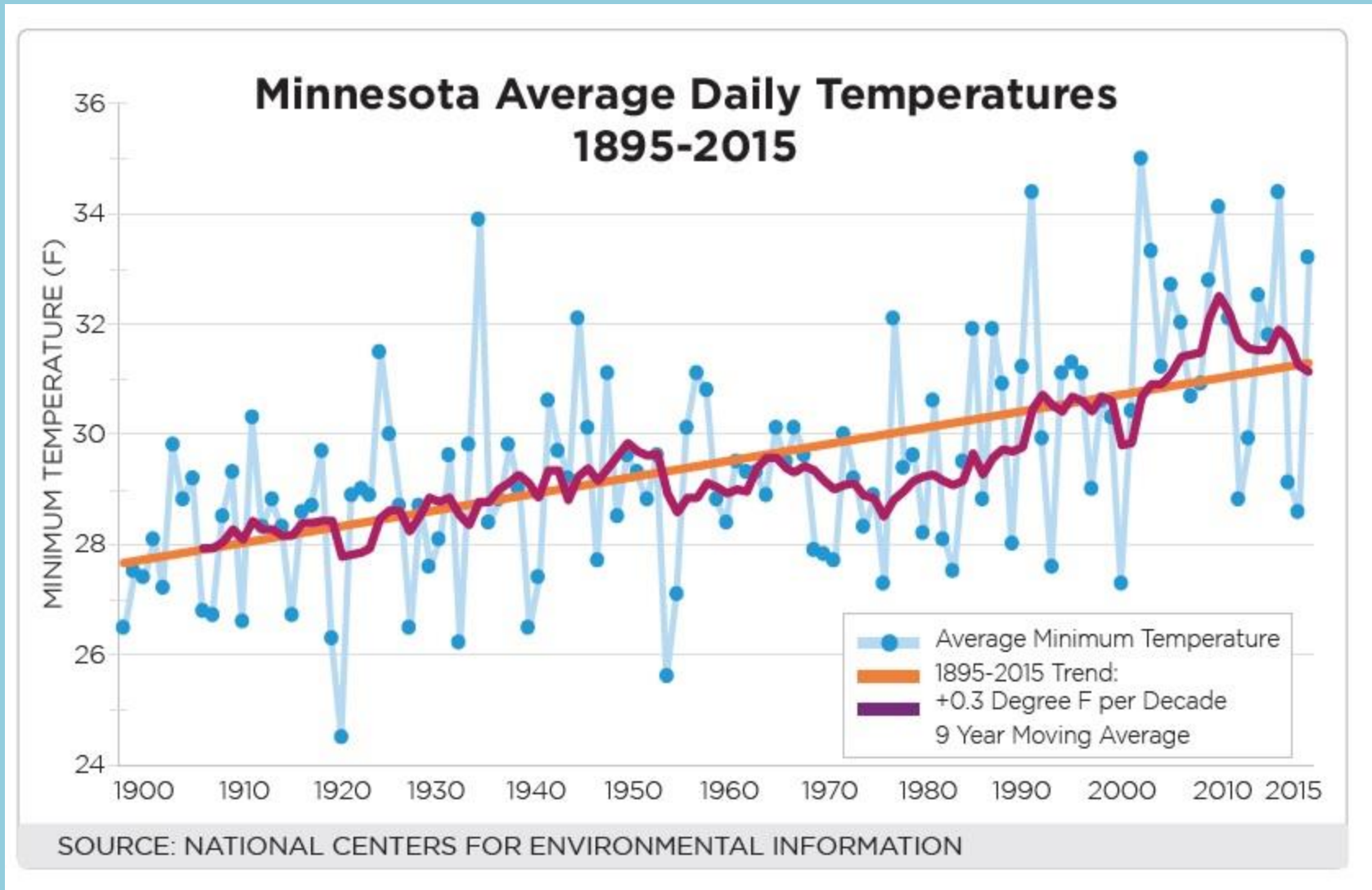


# The Environmental Quality Board



- Governor's office
- Five citizen members
- Board of Soil and Water Resources
- Department of Administration
- Department of Agriculture
- Department of Commerce
- Department of Employment and Economic Development
- Department of Health
- Department of Natural Resources
- Department of Transportation
- Metropolitan Council
- Pollution Control Agency

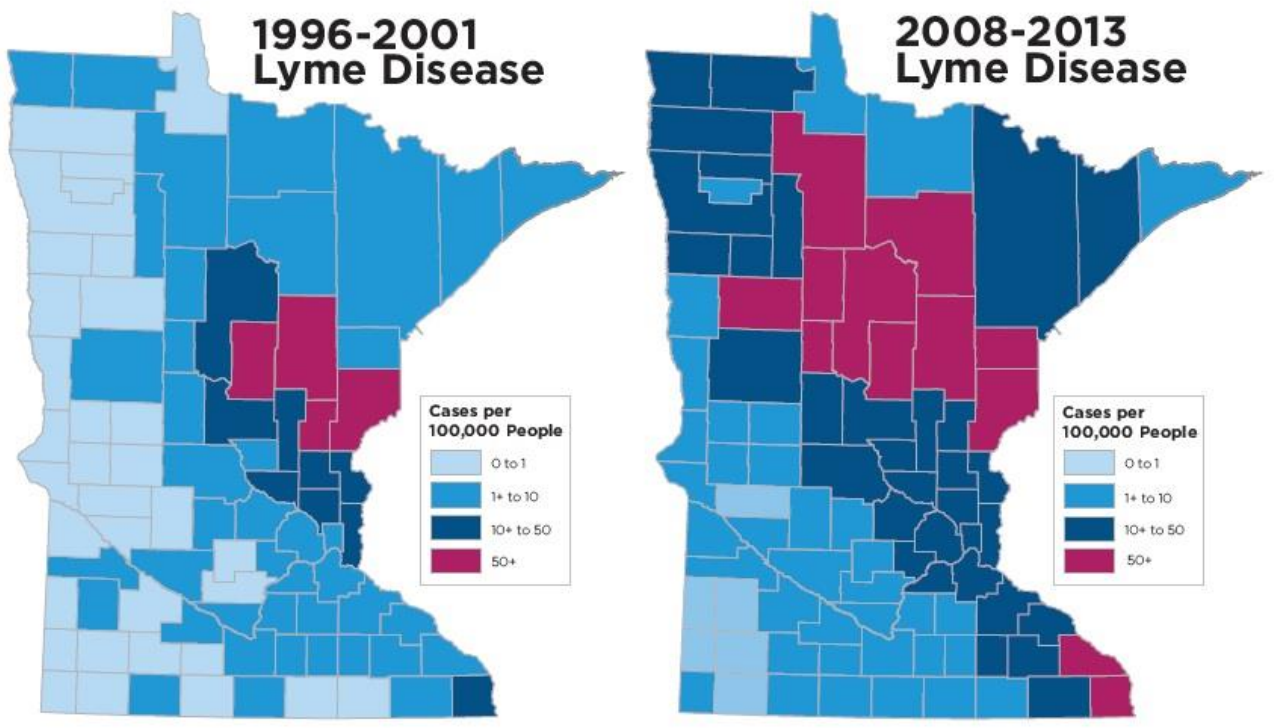
# Cold temperatures warming fastest





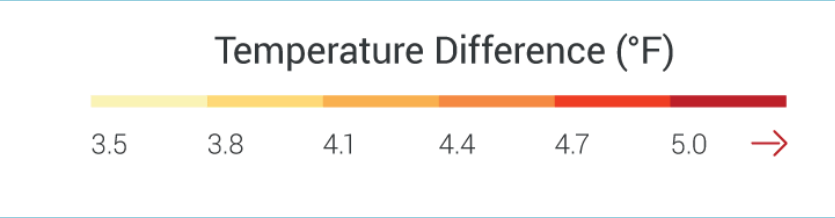
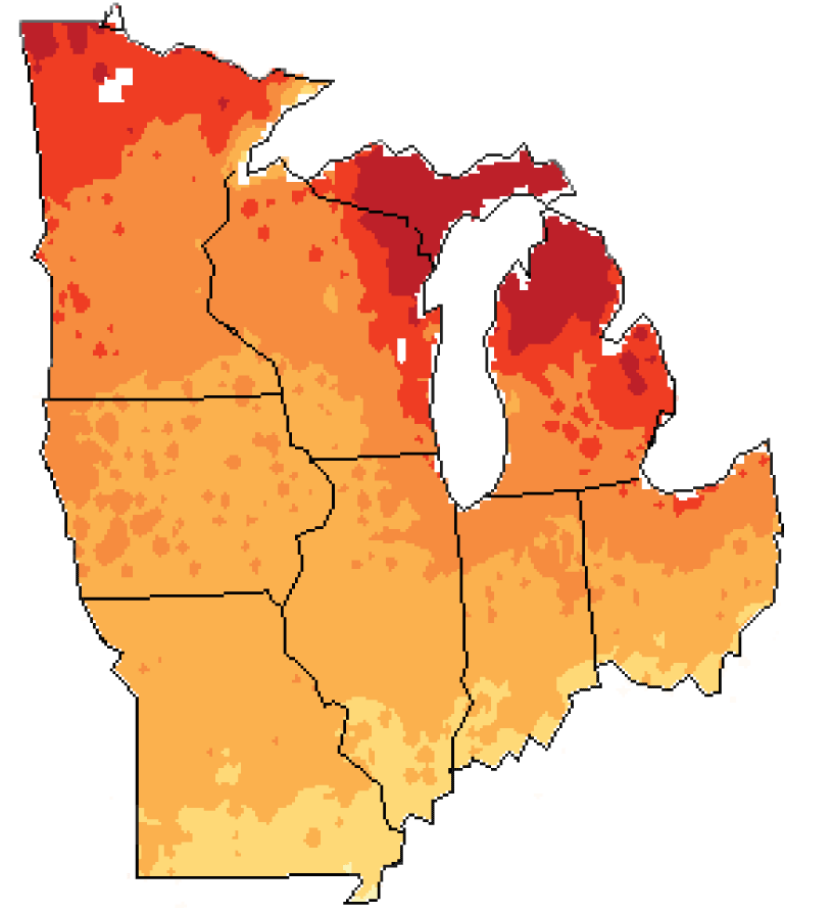
## The range of Lyme disease is expanding as Minnesota warms:

A warming climate is one factor leading to an increased distribution of ticks in Minnesota and thus greater chance of exposure to tick-borne diseases.





“Extreme heat, heavy downpours, and flooding will affect infrastructure, health, agriculture, forestry, transportation, air and water quality, and more. Climate change will also exacerbate a range of risks to the Great Lakes.”





# Minnesota is already paying a price for climate change



\$4.3 Billion

*Estimated damages to property in Minnesota due to extreme weather between 2000 and 2012.*



Timeline of Minnesota's historic mega-rain events 1866-2014



**1866-1965**  
Four mega-rains  
in 100 years

**1966-1999**  
Three mega-rains  
in 33 years

**2000-2014**  
Five mega-rains  
in 14 years



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UN CLIMATE CHANGE CONFERENCE  
COP21·CMP11



Our school pledges to  
accelerate the transition to  
low-carbon energy  
while enhancing sustainable  
& resilient practices  
across our campus

American Campuses Act on Climate Pledge



PROUD U.S. BUSINESS  
*for* **CLIMATE ACTION**



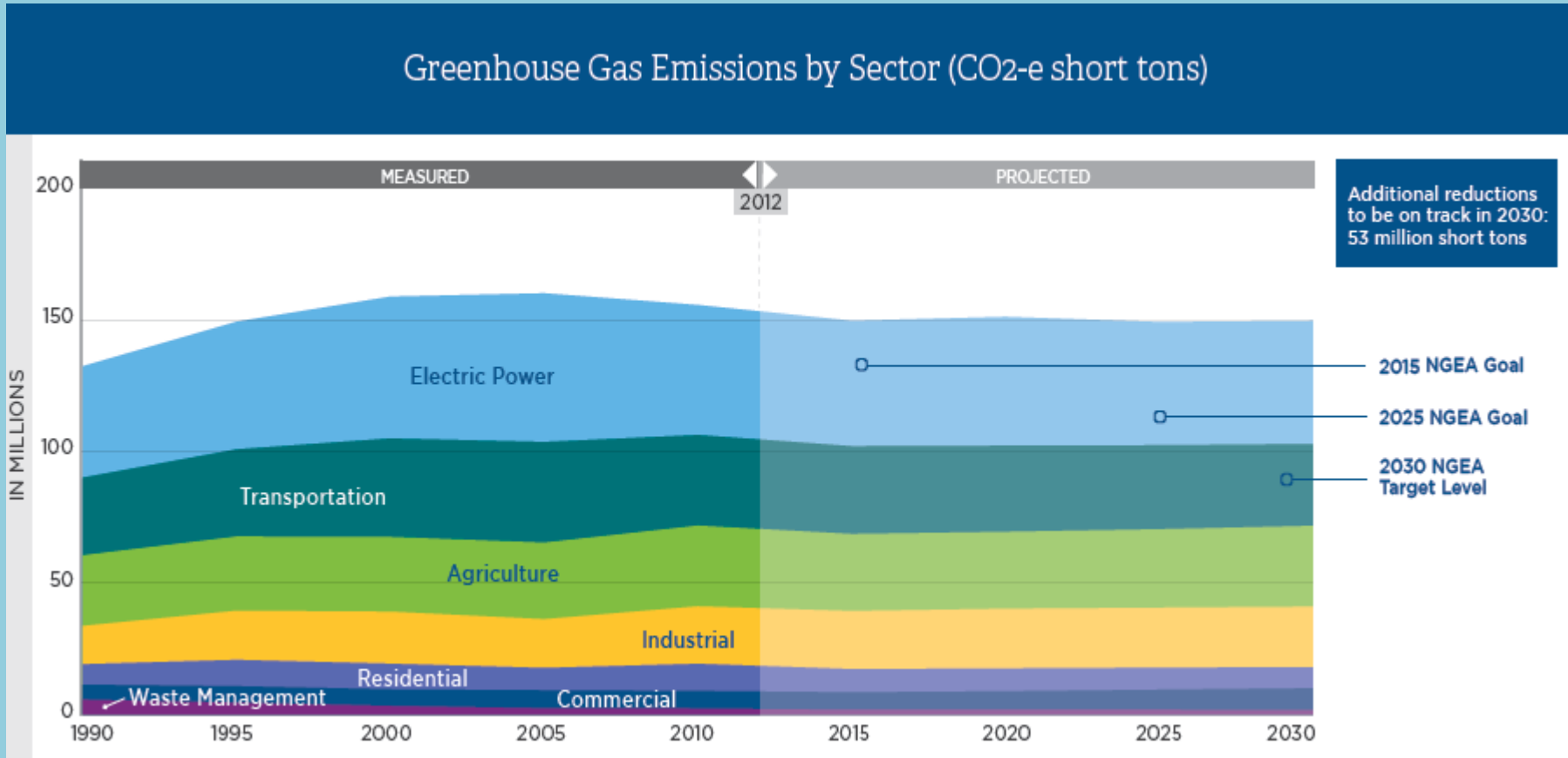
# Minnesota state policy

- Reduce energy use 1.5% a year through cost-effective efficiency measures
- 25% of states energy be derived from renewable energy resources by the year 2025
  - 1% solar mandate/ 10% goal
- Reduce statewide greenhouse gas emissions:
  - ✓ 15 percent by 2015
  - ✓ 30 percent by 2025
  - ✓ 80 percent by 2050

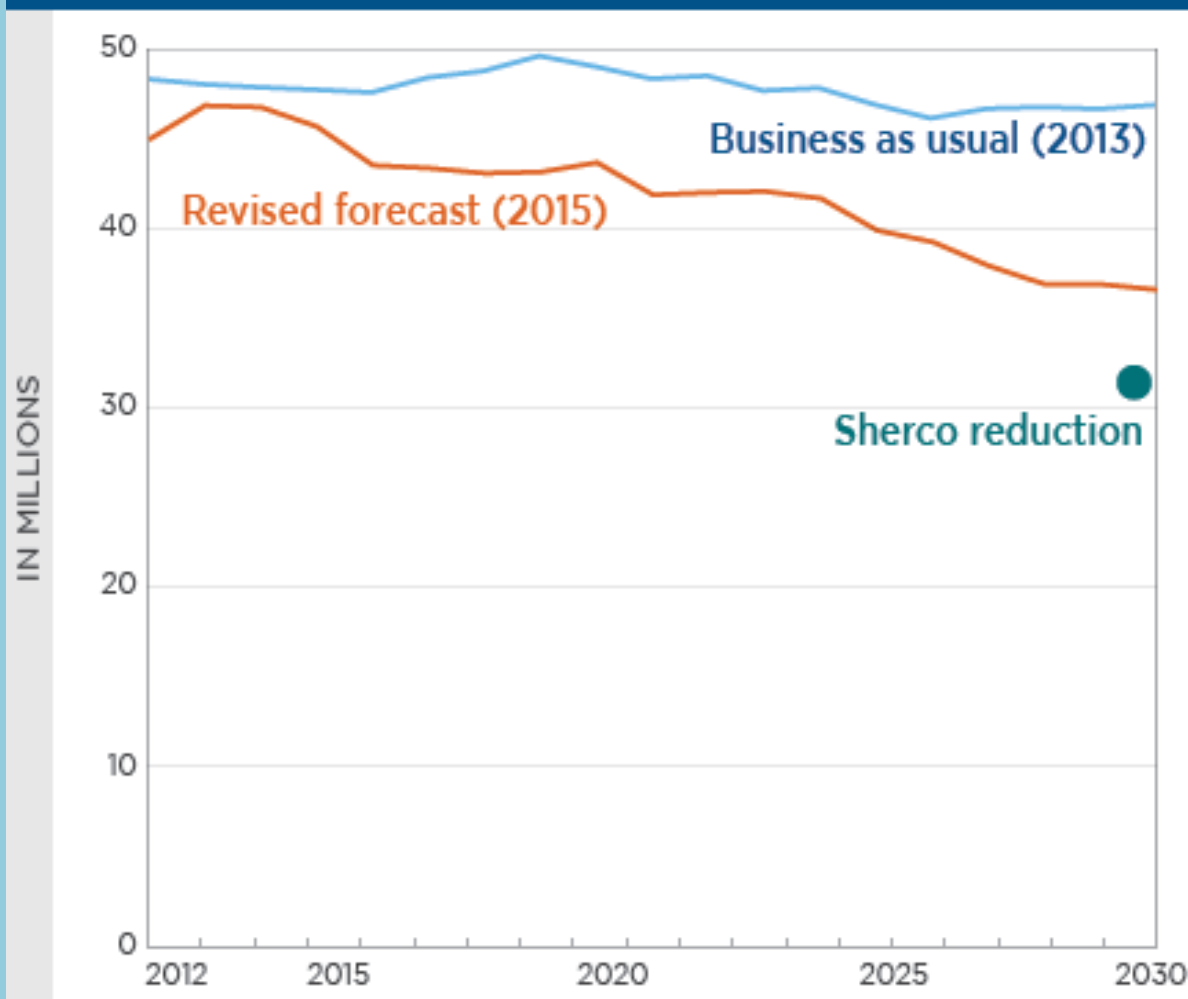




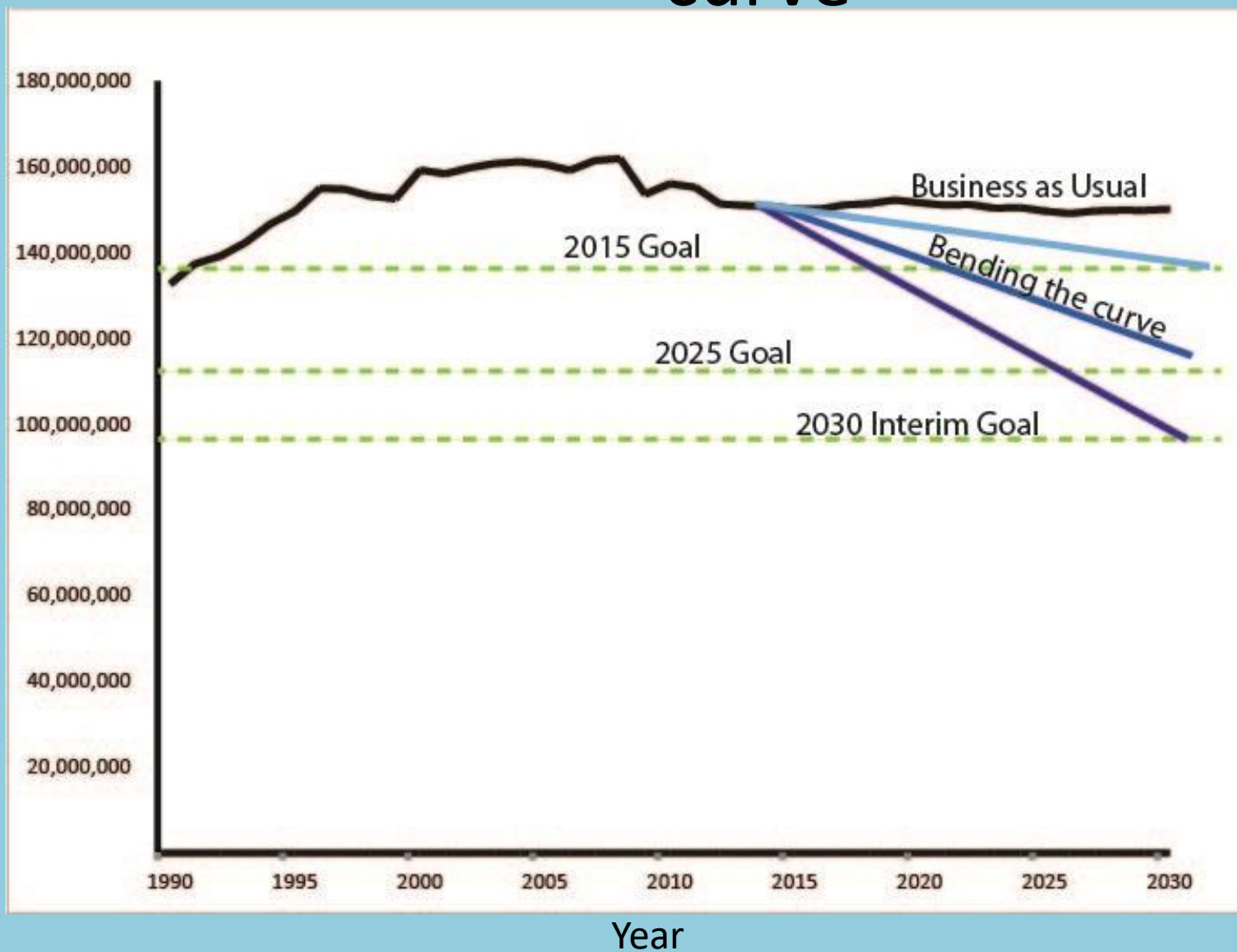
# Where Do Our Emissions Come From? (2013)



## Revised Electricity Sector Forecast (CO<sub>2</sub>-e short tons)



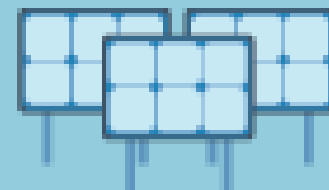
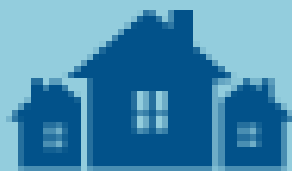
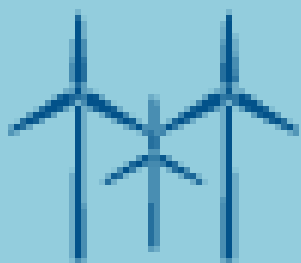
# What is next: Identify strategies to bend the curve



~50 million  
metric tons



# Immediate Impact Policies





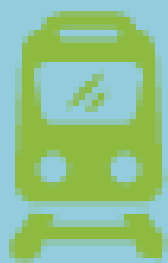


**Immediate Action** – These policies result in immediate reduction of greenhouse gas emissions. They account for 64 to 79% of the emissions reductions that could be made between now and 2030. All the immediate action policies focus on the electric sector.

Policy options	2030 annual in-state GHG reduction (CO <sub>2</sub> e-tons)	% Reduction towards 2030 target	NPV costs/savings 2015-2030 (\$2014MM)	Average annual employment (full- and part-time)
Increase the renewable electricity standard to 50%	14	27	-404	1,820
Increase the renewable electricity standard to 40%	8	15	-620	1,510
Retire and repower coal plants	7	13	752	310
Increase energy efficiency requirements 2.5%	5	10	-1,882	1,560
Increase energy efficiency requirements 2%	4	7	1,272	N/A
Combined heat and power (CHP)	5	10	-1,112	2,330
Zero energy building codes (SB2030)	10	19	-2,050	2,750
Wastewater treatment facilities energy efficiency	0.07	0.14	-56	80



# Long Term Strategies to Start Now



**Long-term Strategies** – These policies are critical for reaching Minnesota’s 2050 goals, but they require more time for development. Generally, these policies reduce the use of single-occupancy internal combustion vehicles and protect or increase carbon stores in soils and trees.

Policy options	2030 annual in-state GHG reduction (CO <sub>2</sub> e-tons)	% Reduction towards 2030 target	NPV costs/savings 2015-2030 (\$2014MM)	Average annual employment (full- and part-time)
Transit and multimodal travel	0.28	1	-330	450
Compact development in urban areas	1	2	-425	220
Electric vehicles on 100% renewable energy	1	3	3,000 *	-1,220
Community and urban forests	1	1	1,806	4,180
Forest health	2	4	187	-210
Increased conversion of row crops to perennial crops	2	3	-2,104	-490
Increased use of cover crops	1	1	-1,346	230
Re-use, composting, and recycling	0.17	0.31	-817	2,750
Source reduction	0.06	0.12	-277	60

\*assumes little change in the price of an electric vehicle



# Pilot Projects to Develop



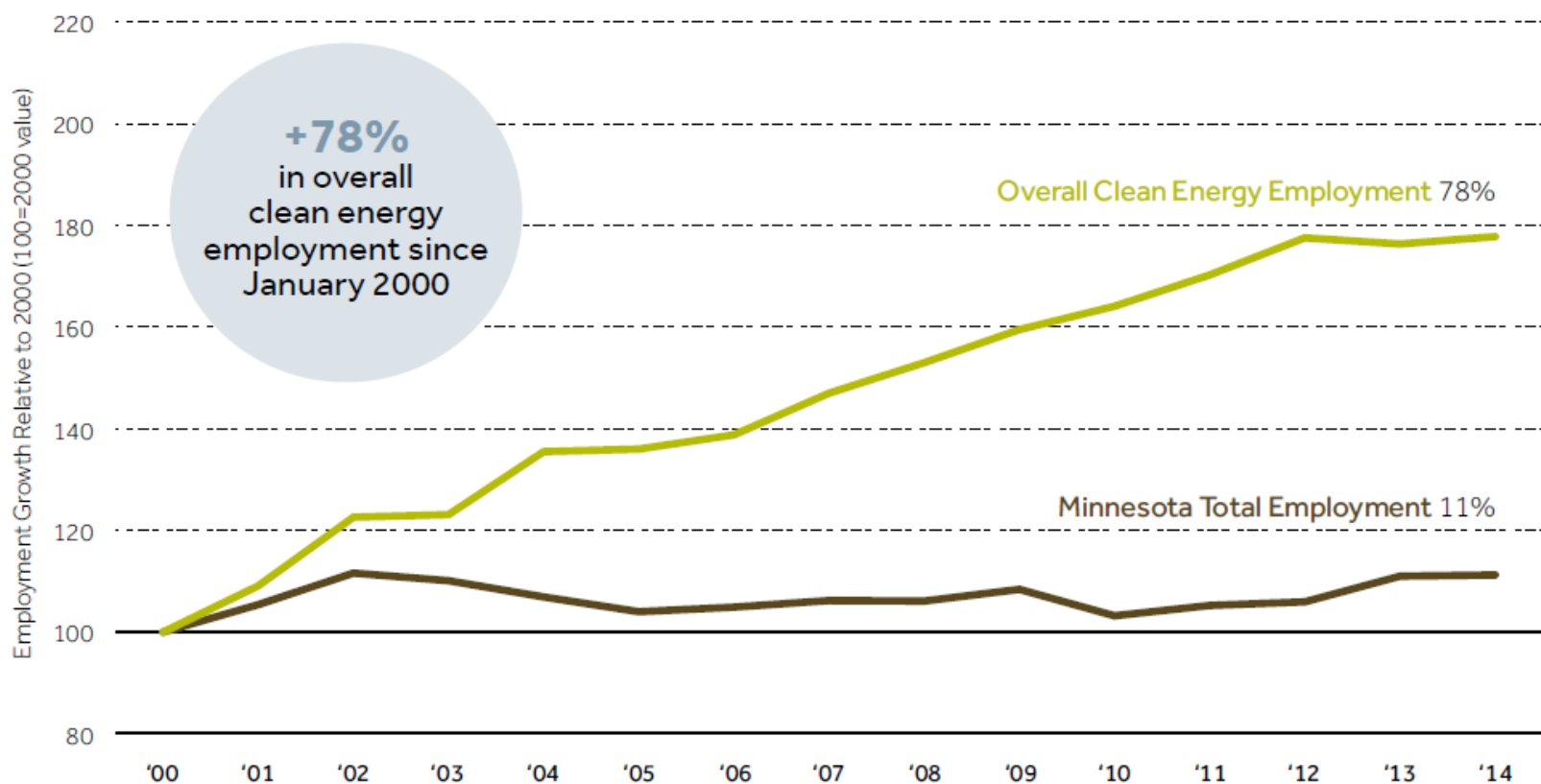




**Pilot Programs** – These policies have high potential to reduce emissions; however, they involve new programs or technologies that need to be explored and tested before they can be implemented at a large scale. These policies include transportation options, distributed renewable energy for direct heating and cooling, and agriculture practices.

Policy options	2030 annual in-state GHG reduction (CO <sub>2</sub> e-tons)	% Reduction towards 2030 target	NPV costs/savings 2015-2030 (\$2014MM)	Average annual employment (full- and part-time)
Advanced and conventional biofuels	0.19	0.35	462	3,420
Transportation pricing cumulative	2	4	2,718	8,230
Transportation pricing: PAYD insurance component	1	2	-2,160	N/A
Transportation pricing: carbon tax component	1	1	1,898	N/A
Transportation pricing: fuel tax component	0.46	1	2,980	N/A
Thermal renewable energy	3	6	872	-690
Nutrient management in agriculture	0.15	0.29	-131	-200

# Clean energy jobs have grown much faster than overall state employment



Data Source: National Establishment Time Series Database (NETS), IEGC, MN DEED Economic Analysis Unit Survey-July 2014  
Analysis: Collaborative Economics



# Going Forward...

- How do we value and account for co-benefits and cross-sector outcomes?
- How do we partner with local governments to maximize the reach of our policies and tailor them to communities?
- How do we partner with the private sector to support partnerships that can maximize mitigation benefits?
- How do we best align strategies?
- How can we hold ourselves accountable?

