



# Review of Modeling Results “Deep Reduction” Scenario

*State of Wisconsin  
Governor’s Global Warming Task Force*

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# Agenda:

1. Description of “Deep Reductions” policy.
2. Effects on Electric Sector
3. GHG Emission Changes
4. Questions?

# Deep Reductions Policy Case

## “Deep Reduction” Scenario (PC10)

**Policy Case 10** – designated as “Deep Reduction” scenario, assumes:

1. The addition of 2,000 MW of zero carbon generation in Wisconsin.
  2. The retirement of all operating coal units in Wisconsin which have a capacity of 150 MW or less (approximately 1400 MW).
- All changes assumed to take effect January 2020.
  - New resources are treated as power purchase agreements with an 85% capacity factor and priced at \$63/ Mwh ( in 2005\$).

# Modeling Assumptions:

**“Deep Reduction” policy modeled on top of all other policies included in PC01 (listed below):**

<b>Policy No.</b>	<b>Policy Title</b>
C&EE 01	Enhanced Energy Efficiency Program
C&EE 02	Residential & Commercial Energy Efficiency & Green Building Codes
C&EE 03	State Appliance Efficiency Standard
C&EE04	Residential Rental Lighting Standard
F&A 01	Urban Forestry
F&A 08	Biomass Use in State Facilities.
Trans 01	CO2 Emission Standards, Commonly Called “California Car” Standards
Trans 02	Low Carbon Fuel Standard
Trans 03	Reform Planning and Funding Policies to Reduce VMT
EG 01	Enhanced Renewable Portfolio Standard

## Electricity Sector (PC10)

- The addition of 2,000 MW of new emission free capacity in Wisconsin results in a 12% reduction in coal-fired generation output. Gas/oil generation falls by half.
- Total in-state generation increases by 6% relative to the Reference Case.
- Total sales are essentially unaffected compared to Policy Case 01; dropping by 18% relative to the Reference Case.
- Wisconsin becomes a net exporter of power, with over 6,600 GWh leaving the state in 2024.
- Power exported from Wisconsin primarily displaces coal generation in the rest of the U.S.

# Electricity Sector (PC10)

## Wisconsin – PC10 Changes from Reference Case:

Sales (GWh)	2010	2015	2020	2024
Residential	(611)	(1,883)	(3,125)	(3,995)
Commercial	(1,125)	(3,453)	(5,232)	(6,335)
Industrial	(1,363)	(4,201)	(6,944)	(8,562)
Street Lights/Misc.	-	-	-	-
Resale	-	-	-	-
<b>Total Sales</b>	<b>(3,099)</b>	<b>(9,537)</b>	<b>(15,301)</b>	<b>(18,892)</b>
Imports	(3,179)	(9,523)	(23,438)	(23,888)

Generation Output (GWh/year)	2010	2015	2020	2024
Gas/Oil	(46)	(37)	(3,301)	(4,503)
Coal	126	336	(6,361)	(6,361)
Nuclear	-	-	7,463	7,463
Hydro	0	(0)	7,463	7,463
Landfill Gas/EFW	-	(48)	346	(990)
Wind	-	(254)	2,508	2,204
Other	-	(12)	19	(280)
<b>Total</b>	<b>80</b>	<b>(14)</b>	<b>8,136</b>	<b>4,996</b>

# “Deep Reductions” Scenario (PC10)

Wisconsin – PC10 Changes from Reference Case:

Generation Capacity (MW)	2010	2015	2020	2024
Gas/Oil Combustn. Turbine	-	-	-	(160)
Gas/Oil Combined Cycle	-	-	-	(800)
Gas/Oil Steam	-	-	-	-
Coal	55	175	(1,405)	(1,405)
Nuclear	-	-	1,000	1,000
Hydro	-	-	1,000	1,000
Landfill Gas/EFW	-	(6)	44	(125)
Wind	-	(81)	772	680
Other	-	(2)	2	(47)
<b>Total</b>	<b>55</b>	<b>85</b>	<b>1,413</b>	<b>143</b>

## “Deep Reductions” Scenario (PC10)

<b>Electricity Prices</b> (2005 \$ per MWh)	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2024</b>
Residential	8.8%	17.4%	11.6%	9.3%
Commercial	10.5%	20.7%	14.1%	11.4%
Industrial	12.3%	24.2%	16.3%	13.1%
Average Retail	10.5%	20.7%	14.1%	11.4%

<b>Total Cost of Energy</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2024</b>
Residential Electricity	5.8%	7.7%	-2.4%	-7.3%
Commercial Electricity	-3.7%	-11.5%	-16.7%	-18.9%
Industrial Electricity	-4.1%	-11.9%	-17.0%	-19.0%

- Electricity rates rise by 10-13% but offsetting efficiency gains help to reduce actual energy costs.
- No changes outside of the power sector relative to Policy Case 01 (All policies except Cap and Trade)

# “Deep Reductions” Scenario GHG Changes

## Wisconsin – PC10 Changes from Reference Case:

GHG Emissions (Mt)	2010	2015	2020	2024
Residential	(0)	(1)	(1)	(2)
Commercial	(0)	(0)	(1)	(1)
Pulp & Paper	(0)	(0)	(0)	(1)
Other Energy Intensive Industr	(0)	(0)	(0)	(0)
Other Industry	(0)	(1)	(1)	(1)
Agriculture	(0)	(0)	(0)	(0)
Passenger Transport	(0)	(5)	(6)	(7)
Freight Transport	-	-	-	-
Power Sector	0	0	(9)	(9)
Waste & Wastewater	-	-	-	-
<b>Total Gross Emissions</b>	<b>(1)</b>	<b>(7)</b>	<b>(19)</b>	<b>(21)</b>
Land Use - Forestry	-	-	-	-
<b>Total Net Emissions</b>	<b>(1)</b>	<b>(7)</b>	<b>(19)</b>	<b>(21)</b>

## Rest of U.S. (excluding WI) – Changes from Reference Case

GHG Emissions (Mt)	2010	2015	2020	2024
Residential	0.0	0.0	(0.0)	(0.0)
Commercial	0.0	(0.0)	(0.0)	(0.1)
Pulp & Paper	0.0	0.0	0.0	0.0
Other Energy Intensive Industr	0.0	(0.0)	(0.0)	(0.1)
Other Industry	0.0	0.0	0.0	(0.0)
Agriculture	-	-	-	0.0
Passenger Transport	-	-	(0.0)	(0.0)
Freight Transport	-	-	-	-
Power Sector	(2.5)	(7.2)	(22.3)	(23.6)
Waste & Wastewater	-	-	-	-
<b>Total Gross Emissions</b>	<b>(2.4)</b>	<b>(7.1)</b>	<b>(22.4)</b>	<b>(23.8)</b>
Land Use - Forestry	-	-	-	-
<b>Total Net Emissions</b>	<b>(2.4)</b>	<b>(7.1)</b>	<b>(22.4)</b>	<b>(23.8)</b>

# “Deep Reductions” Scenario (PC10)

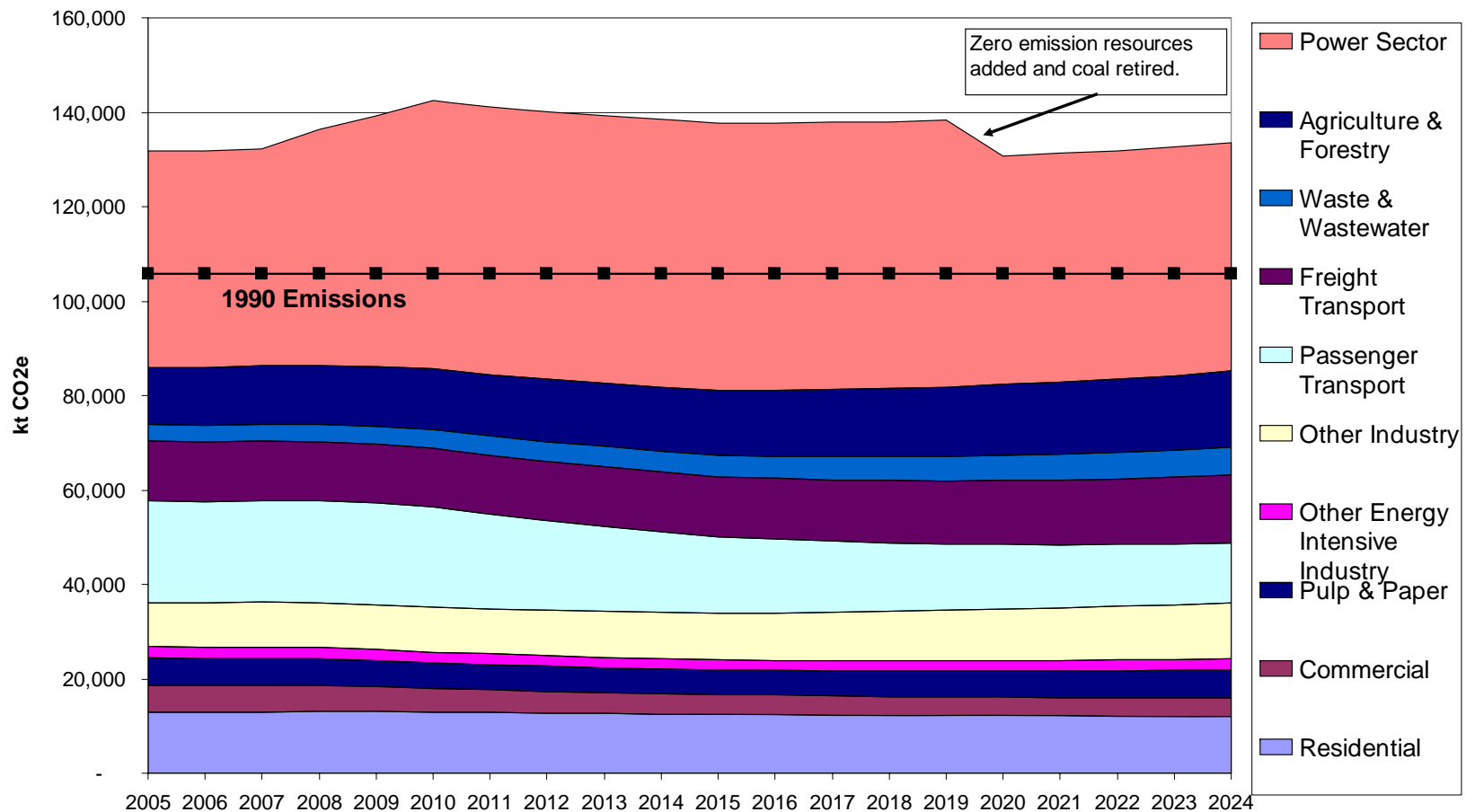
## Wisconsin – GHG Emissions under “Deep Reduction” scenario

GHG Emissions (Mt)	2004	2006	2010	2015	2020	2024
Residential	13.1	12.9	12.9	12.5	12.2	12.1
Commercial	5.9	5.6	5.0	4.2	3.9	3.9
Pulp & Paper	5.6	5.8	5.5	5.1	5.6	5.9
Other Energy Intensive Industry	2.3	2.4	2.3	2.1	2.2	2.3
Other Industry	8.9	9.4	9.5	9.8	10.9	11.8
Agriculture	11.9	12.2	12.9	13.7	15.0	16.1
Passenger Transport	21.6	21.4	21.3	16.3	13.6	12.8
Freight Transport	13.1	12.7	12.4	12.8	13.6	14.4
Power Sector	45.6	45.8	56.8	56.6	48.4	48.4
Waste & Wastewater	3.2	3.5	3.9	4.6	5.3	5.9
<b>Total Gross Emissions</b>	<b>131.3</b>	<b>131.8</b>	<b>142.5</b>	<b>137.7</b>	<b>130.7</b>	<b>133.6</b>
Land Use - Forestry	(8.2)	(8.2)	(8.2)	(8.2)	(8.2)	(8.2)
<b>Total Net Emissions</b>	<b>123.1</b>	<b>123.6</b>	<b>134.3</b>	<b>129.5</b>	<b>122.5</b>	<b>125.4</b>

- Total GHG emission reduction within and outside of state equals 44.8 Mt in 2024.
- The comparable total emission reduction for “All Policies except Cap & Trade” were 27Mt in 2024.
- Reduction split relatively evenly between reductions within and outside of state.
- If out-of-state reductions are subtracted from Wisconsin emissions net would be just under 102 Mt (about 3 Mt below 1990 target).

# Wisconsin GHG Emissions – PC10

## GHG Emissions - Deep Reductions Scenario - Wisconsin



**Note – Graph represents gross emissions – not reduced for sequestration amounts.**

# Questions and Discussion