

Maine Electricity and Solid Waste Policies to be Modeled and Inputs

The Center for Clean Air Policy

April 8, 2004



Presentation for Stakeholder Group Meeting #3

- Discussion of policies to be modeled with NEMS
- Issues for stakeholder consideration
 - **Natural gas prices**
 - **Population and economic forecast for electricity demand**
 - **Production vs. consumption emissions**



Policies/Cases to be Modeled

- The potential cases suggested for modeling are listed in the following slides
- The specific policies and the total number of cases to be modeled are still under development, and may change based on stakeholder input, modeling capabilities, or budget/timing constraints



Renewable Energy Policies

- **Maine Renewable Portfolio Standard**
 - **Maine RPS set at 5% of demand in 2010, 10% in 2020**
 - **Includes new wind, landfill gas, solar units**

- **Maine System Benefit Charge**
 - **SBC set at 0.5 mills/kWh (current level in MA)**
 - **Will fund new wind, landfill gas, solar units**

- **State Green Power Purchase Program**
 - **Increase state government purchase of power from 100% renewable sources from 30% baseline level to 50% in 2010 and 60% in 2020**



Biomass and Energy Efficiency

- Standalone Biomass Generation
 - **Restart of units currently not in operation**
 - **Continue operation of economically uncertain existing units through 2020**

- Energy Efficiency: Estimate impact of package of demand-side energy efficiency measures in the residential, commercial and industrial sectors (developed in the BFM WG)

- Combined Heat and Power (CHP): Encourage development of new CHP units based on estimated potential (about 130 MW) in state



Emission Limits

- Emission Standard: Implement a generation performance standard of 1,450 lb CO₂ / MWh for all fossil-fired Maine plants
- Emission Offsets: Require all new fossil-fired Maine plants to offset 100% of emissions
- Regional Cap and Trade Program: Cap total CO₂ emissions from 10 eastern states at 1990 levels in 2010, 10% below 1990 levels in 2020



Solid Waste

- Landfill Methane
 - **Install landfill gas-fired electric generating units at four landfills (16 MW total)**
 - **Require flaring of methane at landfills that lack gas collection systems**

- Resource Recovery Facility: Increase total volume of waste incinerated annually to produce electricity at municipal solid waste (MSW) facilities

- Recycling/Source Reduction: Increase state recycling rate from current 37.3% to 45% in 2010 and 50% in 2020



Preliminary Reference Case Results

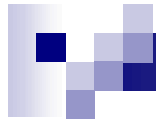
- The following slides present a summary of the preliminary reference case results
- These results are preliminary estimates, and are subject to change pending further modeling and refinements



Preliminary Reference Case Results: Emissions and Capacity

- CO₂ Emissions (Consumption-Based)
 - **2010: 4,020 thousand MTCO₂e**
 - **2020: 4,890 thousand MTCO₂e**

- New Capacity 2004 – 2020 (Cumulative MW):
 - **Gas combined cycle: 211 MW**
 - **Wind: 100 MW**
 - **Total: 311 MW**



Preliminary Reference Case Results: Generation Mix

Maine Generation Mix		
Fuel	2010	2020
Coal	7%	6%
Oil	12%	18%
Gas	39%	40%
Hydro	27%	22%
MSW	3%	2%
Wood/Biomass	11%	9%
Wind	2%	2%

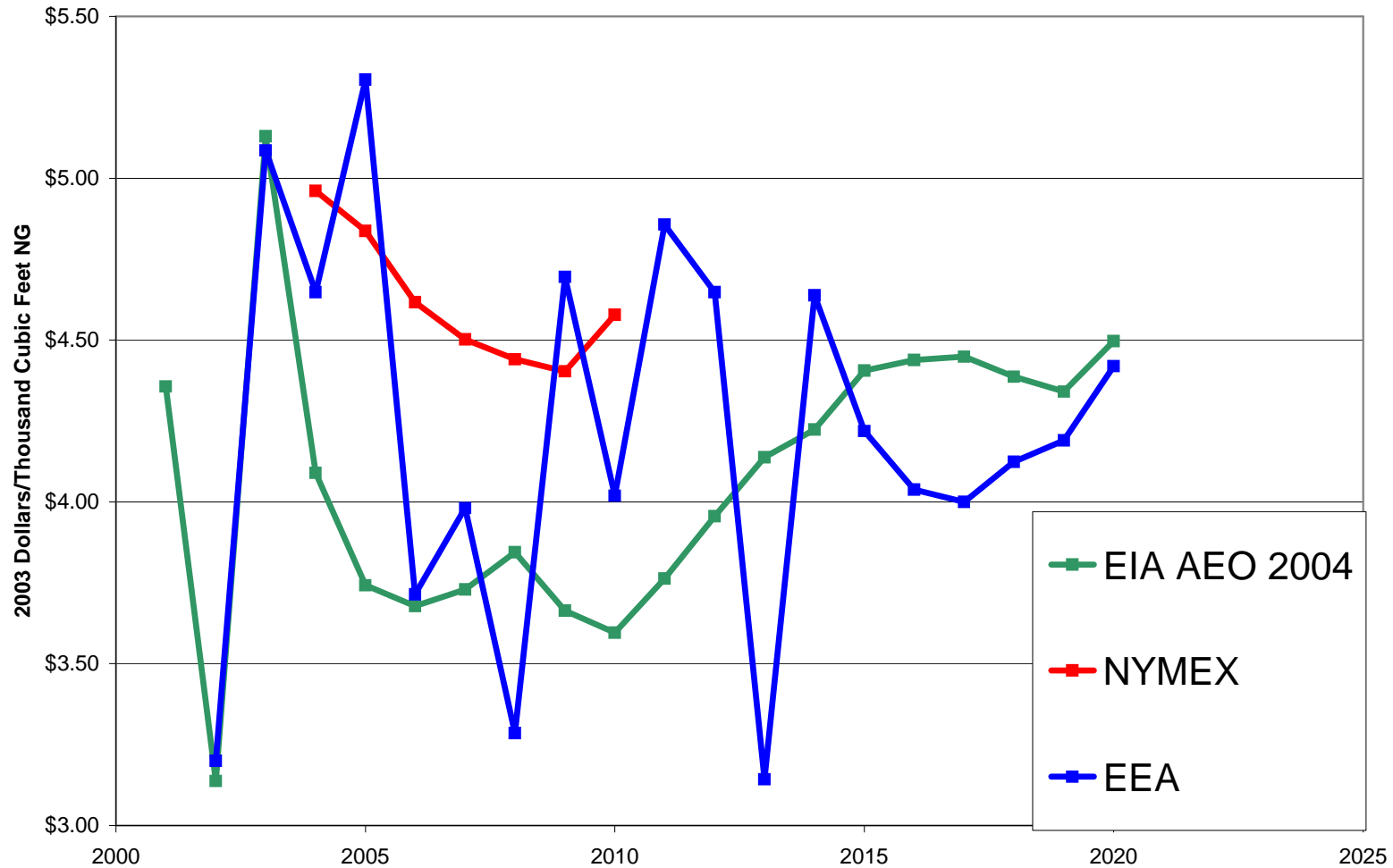


Natural Gas Prices

- The following slides display natural gas price forecasts (adjusted to Henry Hub value) from:
 - **EIA's Annual Energy Outlook 2004**
 - **Energy and Environmental Analysis, Inc.**
 - **New York Mercantile Exchange (NYMEX)**
- The EIA AEO 2004 prices are the values currently forecast by the National Energy Modeling System (NEMS) in the EIA reference case.
- The ESW Working Group decided to use the current EIA prices for modeling Maine. However, to analyze the impact of higher gas prices, an additional sensitivity case will be run with prices set at or above NYMEX levels.

Natural Gas Price Forecasts

Henry Hub Natural Gas Price Projections





Natural Gas Price Forecasts

2004 Natural Gas Prices (2003 \$ per thousand cubic foot)			
Year	EIA AEO 2004	EEA	NYMEX
2002	\$3.14	\$3.20	
2004	\$4.09	\$4.65	\$4.96
2006	\$3.68	\$3.71	\$4.62
2008	\$3.84	\$3.29	\$4.44
2010	\$3.60	\$4.02	\$4.58
2012	\$3.96	\$4.65	
2014	\$4.22	\$4.64	
2016	\$4.44	\$4.04	
2018	\$4.39	\$4.12	
2020	\$4.50	\$4.42	
2004-2010 avg an growth	-2.12%	-2.39%	-1.33%
2004-2020 avg an growth	0.60%	-0.31%	n/a



Maine Electricity Demand Allocation

- NEMS model provides results only at the regional level, so demand must be allocated to states
- Tellus Institute algorithm allocates electricity demand from region to state using state share of regional population (for residential and private transportation) and gross state product (for commercial and industrial sectors and freight transport)
- Maine state demand in the model output will therefore depend upon the population and gross state product inputs (i.e. growth rates) assumed for the state and New England



Maine Economic and Population Forecasts

- Specific Maine forecasts of population and economic growth rates after 2004 have been developed by Charles Colgan, Univ. of Southern Maine, and the Maine State Planning Office. These will be discussed in the afternoon session.
- Sample New England-to-Maine allocation shares have been developed using these forecasts (see next slide). These are presented here for illustrative purposes only; the actual shares used in the modeling will depend upon the growth rates and initial base year data used.

Driver	Avg Annual Growth Rate	
	Maine (Colgan Mid-level)	New England
Gross Product	3.5%	3.1%
Population	1.15%	0.5%



Maine Economic and Population Shares

Population Forecast	2005	2010	2015	2020	2005	2010	2015	2020
New England	13,843,000	14,194,500	14,546,000	14,934,000	Maine Percent of NE Total			
Maine Low (Colgan)	1,331,973	1,399,917	1,471,327	1,546,379	9.6%	9.9%	10.1%	10.4%
Maine Med (Colgan)	1,335,932	1,414,536	1,497,764	1,585,889	9.7%	10.0%	10.3%	10.6%
Maine High (Colgan)	1,339,898	1,429,285	1,524,636	1,626,347	9.7%	10.1%	10.5%	10.9%
Maine Med (ME Pln Of)	1,324,072	1,371,068	1,419,732	1,470,123	9.6%	9.7%	9.8%	9.8%

New England Population through 2020 taken from EIA AEO 2004. Maine population projected from 2003 estimate from Census Bureau.

Economic Forecast (Million 2003 \$)	2005	2010	2015	2020	2005	2010	2015	2020
New England*	662,032	779,310	909,433	1,047,200	Maine Percent of NE Total			
Maine Low (Colgan)	47,445	55,001	63,762	73,917	8.1%	7.9%	7.9%	7.9%
Maine Med (Colgan)	48,373	57,451	68,234	81,041	8.2%	8.3%	8.4%	8.7%
Maine High (Colgan)	49,314	59,998	72,997	88,812	8.4%	8.7%	9.0%	9.5%
Maine Med (ME Pln Of)	47,169	54,285	62,474	71,898	8.0%	7.8%	7.7%	7.7%

*Gross Product for New England through 2020 from Economy.com. Gross State Product for Maine projected from 2001 estimate from economagic.com



Production vs. Consumption Standard

- Production emissions are based on total state electricity generation, estimated by taking 100% of emissions from all electric generating units located within the state.
 - **Employs a direct, widely accepted methodology**
- Consumption emissions are based on total state electricity demand, and account for exports and imports of power to and from other states or regions.
 - **Allows a state to estimate and account for all and only those emissions associated with in-state electricity use.**



Production vs. Consumption Standard (cont.)

- GHG reduction measures undertaken in a given state will often affect emissions in surrounding areas.
 - **e.g., a state renewable portfolio standard may encourage the development of new out-of-state renewable plants hoping to sell power to the state.**
- ESW Working Group was concerned that the standard used be able to capture the full emissions impact of GHG measures undertaken in Maine, and that Maine be able to track and claim credit for resulting reductions out-of-state.
- Working Group decided to recommend the use of a consumption emissions standard, tracked using the ISO New England Generation Information System (GIS). One member supported the use of a production standard.