

Modeling Work Group  
Recommendations and Options on  
Follow-Up BAU Items

EIPC-SSC Meeting

April 11, 2011

# Today's Presentation

- Concerns Raised from 1<sup>st</sup> BAU Run
  - Environmental Regulations Update
  - High Coal Retirements in 2015
  - Large Amount of CC/CT Additions in Concentrated Areas of MISO
  - Disproportionate Wind Additions Among NE/SPP
  - Other Small Corrections and Adjustments
- Other Futures/Sensitivities Input
  - Hydro Potential Adjustment
  - Offshore wind (informational only)
  - Future 4 Distributed Generation
  - Extra High Natural Gas

# Overview of Environmental Regulations Changes

- Utility MACT - Revised
- 316(B) - Revised
- Coal Combustion Residuals – No Change
  - \$15 per ton (2010 dollars) of ash waste added to operating costs of coal plants by 2018
    - estimated to be approximately \$0.63/MWh adder to VOM
- Transport Rule – No Change
  - Rendered non-binding because the Utility MACT Rule requirements are more stringent
- Existing Regulations - Revised

# Utility MACT

## Environmental Regulations

### **1<sup>st</sup> BAU Run**

- All U.S. coal units must have wet scrubbers (i.e. wet FGD) by 2018;
- All U.S. coal units must have sorbent injection and fabric filters by 2018

### **Revised BAU Run**

- All coal units larger than 600 MW without scrubbers must have dry FGD by 2018
- All other coal units without SO<sub>2</sub> controls must have DSI by 2018
- All coal units larger than 200 MW without PM controls must have fabric filters by 2018
- All coal units larger than 200 MW with ESP and without FF and all coal units smaller than 200 MW must have ESP upgrades by 2018
- All coal units larger than 200 MW without ACI and without both FGD and SCR must get ACI by 2018
- All coal units smaller than 200 MW must get ACI by 2018

# 316(b)

## Environmental Regulations

### **1<sup>st</sup> BAU Run:**

- All nuclear generating units and all coal generating units larger than 200 MW employing once-through cooling systems will be required to replace their cooling water systems with closed-loop cooling systems by 2020. Compliance costs and capacity penalties will be based on the NERC report
- All coal generating units smaller than 200 MW and non-nuclear steam generating units will be required to install an alternative compliance technology valued at 90% of the cost of fine-mesh screens

### **Revised BAU**

- All nuclear generating units and all coal generating units larger than 500 MW without cooling towers will be required to install a compliance technology valued at 25% the cost of cooling towers
- All coal generating units smaller than 500 MW and non-nuclear steam generating units will be required to install an alternative compliance technology valued at 90% of the cost of fine-mesh screens

# Existing Regulations

## Environmental Regulations

### 1<sup>st</sup> BAU Run

- SCR retrofits added for all coal units greater than 200 MW and that do not have SCRs by 2018

### Revised BAU Run

- CAIR NO<sub>x</sub> rule modeled to determine need for SCR retrofits

# Concerns Over High Coal Retirements in 2015

- MWG considered
  - Increasing Reserve Margin
  - Not Allow Economic Retirements in 2010
- MWG does not recommend either approach
  - Reluctant to change selected inputs to force an outcome
  - Reluctant to establish a precedent
  - Sensitivities will address some of these issues
  - Phase I report will include explanation and interpretation of modeling results

# Concerns Over Large Amount of CC/CT Additions in Concentrated Areas of MISO

- MWG Considered
  - Averaging MISO Regional Multipliers
  - Averaging MISO Regional Multipliers and Natural Gas Prices
- MWG does not recommend either approach
  - Reluctant to change selected inputs to force an outcome
  - Reluctant to establish a precedent
  - Sensitivities will address some of these issues
  - Phase I report will include explanation and interpretation of modeling results
- Transmission Sensitivities may Need to be Adjusted
  - Methodology to select hard transfer limits currently being developed may need to be adaptable to counter-balance what appears to be anomalous concentrations of generation.



# Concerns Over Disproportionate Wind Additions In Nebraska and SPP

- Possible Causes
  - Differences in Reserve Contribution
  - Differences RPS Contributions (No Strong Opinions - Some MWG members wanted EISPC input)
- Reserve Contribution Options
  - Option A - No change
    - 15% NE
    - 6% SPP
  - Option B - NE reduced to 6%
  - Option C – SPP increases to 15%
- RPS Contribution Options
  - Option A – No adjustment 50% of wind SPP\_S count toward their RPS
  - Option B – Equalize NE, SPP\_N, SPP\_S wind contribution to 100%

## Other Small BAU Corrections and Adjustments

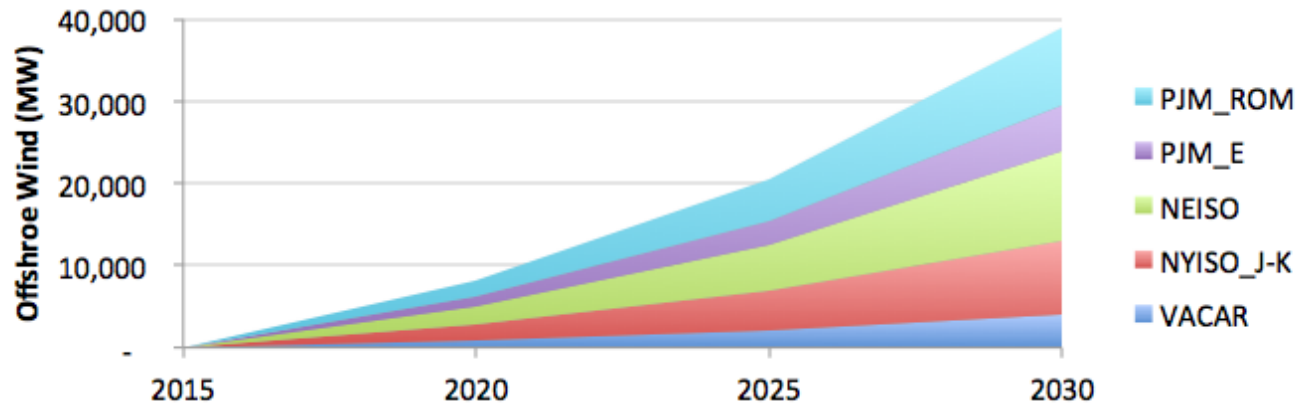
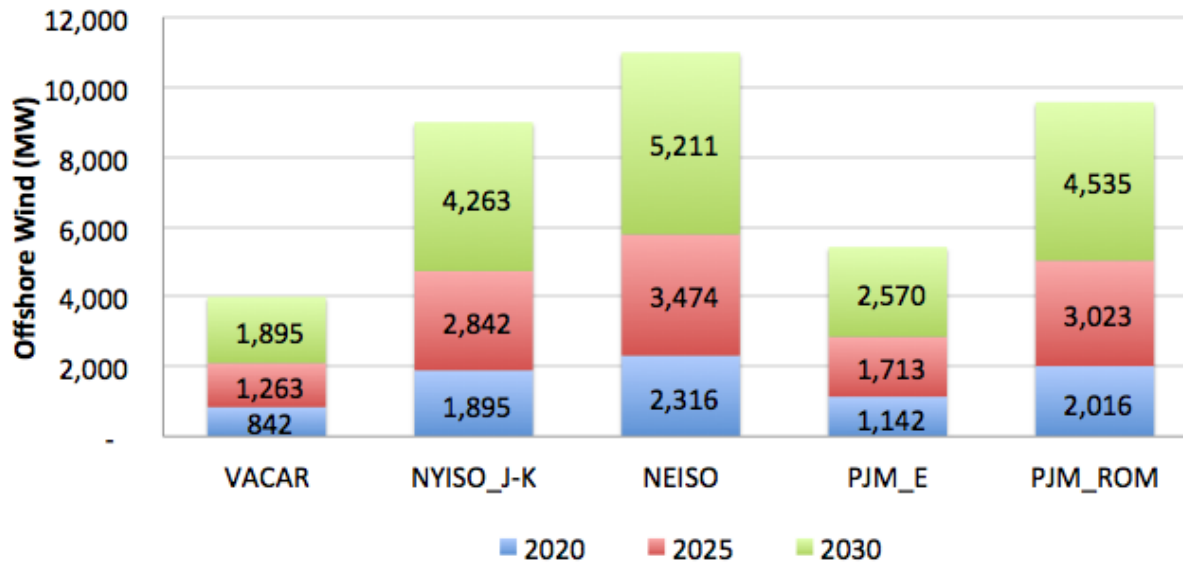
- Use updated EPA LFG data that has lower potential
- Relocate the Coal Creek plant from MAPP\_US to MISO\_W
- Add \$0.001/MWH on lines with counter flows

# Hydro Potential Adjustment

- Eliminate 50% of the hydro potential from the comprehensive list beginning with the smallest dams
- Assign remaining potential to NEEM region
- This will result in some regions with more than 50% reduction, while other will have less

# Offshore Wind Sensitivity (F5 & F6)

## Forced Capacity Additions - Strawman

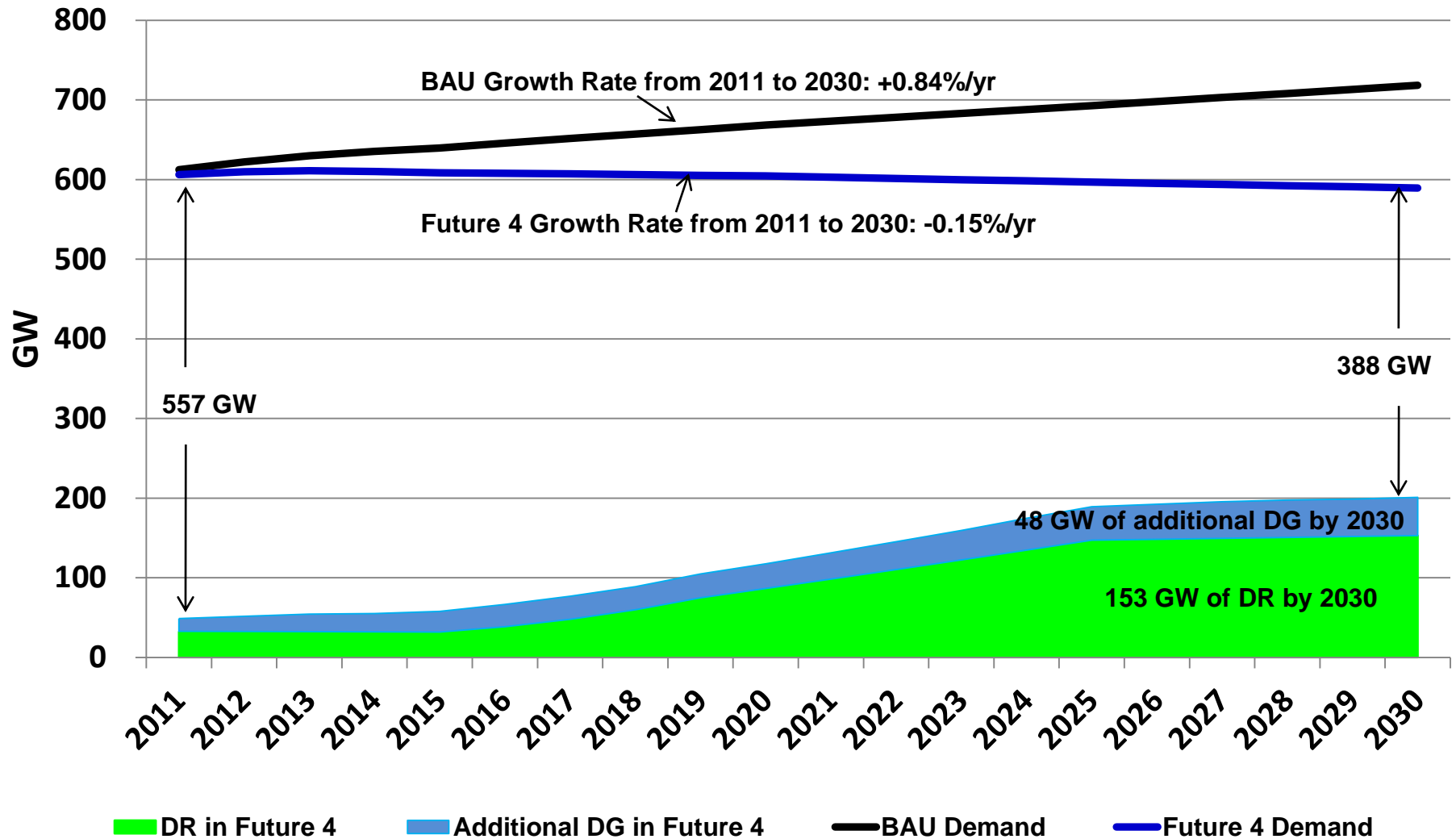


# Future 4 Distributed Generation

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- Both BAU and Future 4 Demand Forecasts already include some level of behind the meter distributed generation (DG)
  - DG level in AEO 2011
- Aggressive level of renewable DG in Future 4
  - MWG consensus to include additional renewable DG at 2x AEO 2011 on top of what already embedded in the demand forecast
  - Total DG at 12% of peak demand

# Future 4 Aggressive EE/DR/DG/Smart Grid



# Concerns with the Natural Gas Price

- The SSC expressed concerns that the build schedule may be different as the natural gas price increases
  - Higher gas price may result in lower coal retirements and different distribution of new combine cycle and wind
- The SSC requested an extra high natural gas price to be developed for their consideration
  - The Fuels subteam estimated the natural gas price where new combined-cycle costs and combustion turbine costs are less competitive than existing coal and wind costs

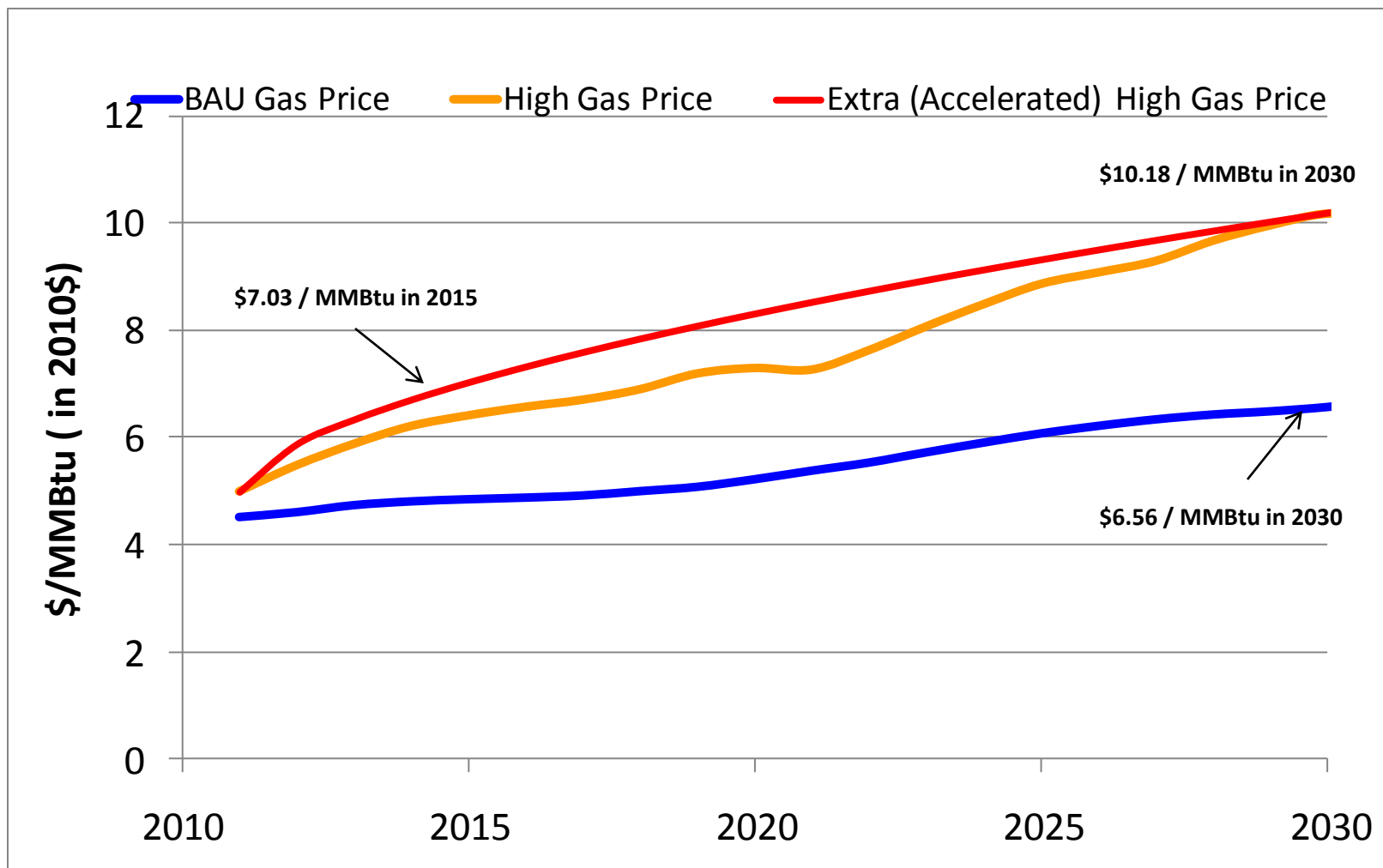
# Considerations for an Extra High Natural Gas Price

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- For non-gas resources to be economical, natural gas prices on the order of \$7/MMBtu would be required
- New combined cycle units at BAU natural gas price appears to be competitive with existing coal, especially if environmental retrofit is required
- High natural price case does not reach \$7/MMBtu until 2019
- BAU natural gas price never reaches \$7/MMBtu over the planning period through 2030



# Alternative Natural Gas Prices



# Extra High Natural Gas Price

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- Option 1 (recommended)
  - Replace the high natural gas price case (already approved by SSC at February 7&8 meeting) with the extra high natural gas price curve
  - Avoids using additional sensitivities for the extra high natural gas case
- Option 2
  - Keep the extra high natural gas price curve as separate sensitivity from the high natural gas price case