

WORKING GROUP PRESENTATION FOR DISCUSSION PURPOSES  
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August 23, 2016

MEMORANDUM FOR:  
IAN MEAD  
ASSISTANT ADMINISTRATOR FOR ENERGY ANALYSIS

PAUL HOLTBERG TEAM LEADER  
ANALYSIS INTEGRATION TEAM

JAMES TURNURE DIRECTOR  
OFFICE OF ENERGY CONSUMPTION & EFFICIENCY ANALYSIS

LYNN WESTFALL DIRECTOR  
OFFICE OF ENERGY MARKETS & FINANCIAL ANALYSIS

FROM: INDUSTRIAL ENERGY CONSUMPTION & EFFICIENCY ANALYSIS TEAM

SUBJECT: First AEO2017 Industrial Working Group Meeting, presented August 16, 2016

Attendees:

Nate Aden  
Bob Adler  
Vipin Arora  
Mark Bahner  
Carl Bozzuto  
Chris Doleman  
Kevin Dubina  
Paul Friley  
Robert Hershey  
Keith Jamison  
Skip Laitner  
Tom Lorenz  
Jan Mares  
Colin McMillan  
Ian Mead  
Francesco Memoli  
William Morrow  
Brett Smith  
Yannick Tamm  
Walt Tunnessen  
David Turpin  
Douglas Vine  
Frances Wood

Presenters: Kelly Perl, Susan Hicks, Paul Otis

## Industrial Model Updates

AEO2017 will be a “light” AEO with few model improvements. Some improvements that will be implemented include:

1. Extending the model to 2050
2. Code refinements and added features for the industries using the technology choice model. More details below.
3. Refinements to benchmarking
4. Usual yearly updates including:
  - a. Macroeconomic data updates
  - b. Historical data updates
  - c. Benchmarking updates
5. There will be limited side cases in this light AEO year. Right now the side cases slated to run include: high/low macro and high/low price.

## Industrial Model Updates to the “Technology Choice” Industries

The industrial model classifies industries as either “end-use” or “tech-choice” for modeling purposes. End-use industries use a model structure that classifies energy consumption based of the end use of that energy. For example, end-uses of energy could include energy consumed for heating and cooling buildings, energy for process and assembly as well as steam consumption, and energy consumed for boilers, steam and cogeneration (BSC). Tech-choice models also include some aspects of end-use models. Tech-choice models separate out energy consumption for buildings and BSC, but also include a slate of technology choices for the process and assembly component. Following are a list of refinements made to the model affecting tech-choice industries:

1. Fortran code was refined and cleaned up to make it more generic and maintainable for future analysts. As a result there are subroutines used by all of the process flow models that allowed elimination of a significant amount of existing code.
2. Model output for cement and lime, aluminum, and glass has now been calibrated to MECS, as it is for all other industries.
3. The code was modified to allow for more direct control over technologies through a technology obsolescence parameter. For the steel industry, this will phase out some technologies and force more utilization of continuous processing and electric arc furnaces.
4. Input and output files were refined to make them easier to use and read. This includes moving data related to the process flow models from text files to the excel input file of ironstlx.xlsx

## Discussion questions

1. Do you work with IEA? Don't they do similar models? Answer: The NEMS Industrial Demand Module is a bottom up model. We model energy use by industry and end use or technology choice. The input data for the model comes from surveys of energy consumption. IEA does not disaggregate by industry. Among other differences, it also models heat while NEMS does not.

2. Do you have access to the U.S. Department of Census Manufacturing consumption data?  
Answer: We do not have access to the Census microdata, but we use the Manufacturing Energy Consumption Survey, or MECS for the Industrial Demand Module. The data for the MECS is collected by Census for the EIA. Other data used in the model is sourced from other government surveys such as the Agricultural Resources Management Survey (ARMS), the Census of Mining, the Census of Construction, and various EIA in-house surveys.
3. Europe has extensive data on CO<sub>2</sub> emissions. Could you use something like CO<sub>2</sub> emissions data and work backwards? Answer: EIA models CO<sub>2</sub> emissions based on fuel consumption as does IEA. Although IEA asks countries to report emissions, the reported emissions are derived from fuel consumption statistics.
4. The DC circuit court recently [July 29, 2016] vacated some parts of Boiler MACT. Were you aware of this and will it be reflected in your model?. Answer: No. We were not aware of this. Thank you. We will look into it.
5. To what extent do you talk to trade associations? Do you have a systematic way to reach out to them? Answer: We talk to people in the industry and trade associations regularly. .
6. Are emissions regulations now focused more on cement than steel? Answer: [This was in reference to a discussion about coal.] The regulations don't target steel, but steel is a larger user of coal. So any regulations affecting coal will affect steel more than cement.
7. Do you consider the life cycle of products? Answer: No. We model industrial energy use at the production site only, and do not take into account the energy used to produce raw materials or intermediate goods used as inputs.
8. Are you seeing a trend towards greater electrification? With the regulations on fuel use and air permits isn't it easier to use electricity? Answer: We get asked about electrification trends a lot. Keep in mind that electricity is neither an efficient nor economical source of heat for energy intensive industries. There is a large conversion penalty for electricity (at least 60%) and a penalty for transmission losses if the electricity is purchased (about 8%).We are paying attention to this and will look into it over the coming year.
9. Do you have any statistics on district heating or district energy? But not just district heating but also other fuel sharing among facilities? Answer: District heating is not in the industrial model. Fuel sharing between facilities is something the IDM does not model. The IDM is not detailed enough to analyze it. Moreover, we think the opportunities for significant fuel sharing is limited in the United States.

The next Industrial Working Group will be held on September 22, 2016, from 1:30-3:00 in 2E-081 or by Webex