Availability of the National Energy Modeling System (NEMS) Archive.

NEMS has been developed primarily for use by the modelers at Energy Information Administration (EIA) who understand its structure and programming. As a result, NEMS is only used by a few organizations outside of the EIA. Most people who have requested NEMS in the past have found out that it was too difficult or rigid to use. For example, it is not typically used for state-level analysis and is poorly suited for application to other countries. However, many obtain the model simply to use the data in its input files or to examine the source code. EIA is the developer of NEMS and so in general, most of what constitutes NEMS is in the public domain and no licenses are required for the EIA-developed portions of NEMS. However, NEMS contains some proprietary components that are outside the public domain which can be licensed as discussed below.

NEMS is an integrated model of the U.S. energy system linked to a macroeconomic model. For an overview of NEMS, see: http://www.eia.doe.gov/oiaf/aeo/overview/index.html. More detailed documentation of NEMS is available at http://www.eia.gov/analysis/model-documentation.cfm

An archive of NEMS as used for the reference case for the Annual Energy Outlook 2011 (AEO) is available, **on an as-is basis**, on our web site. The AEO 2011 archive is an encrypted zip file (found in ftp://ftp.eia.doe.gov/pub/forecasts/aeo/). The purpose of the archive is to demonstrate that the published results from the AEO reference case can be replicated with the model, some of which is proprietary, and to disclose the source code and inputs used. It does not include an executable of the model, which can be generated from the source code of the model with the appropriate software.

> Note that the version of NEMS downloaded depends on whether the proprietary Global Insight model and the proprietary McGraw-Hill Construction commercial floorspace data are purchased. Download aeo2011.all.zip if you plan to purchase the commercial floorspace data either with or without the Global Insight model; download aeo2011.none.zip if you plan to purchase neither the commercial floorspace data nor the Global Insight model, and download aeo2011.yesmac.nofloor.zip if you plan to purchase the Global Insight model, but not the commercial floorspace data. These files are encrypted. Please contact Paul Kondis (contact information at the bottom of this document) for the key to the file you download.

The NEMS archive is designed for use with Microsoft Windows XP and requires these software packages that are not provided by EIA and must be obtained by the user from the vendors:

1) Intel Visual Fortran, Standard Edition, version 11.1 (version 12 is latest but 11.1 may still be available and should be installed for compatibility). (Version 11.1 can be installed on 64-bit computers, but EIA installed it as 32-bit on a 64-bit computer.) (http://www.intel.com/cd/software/products/asmo-na/eng/compilers/219759.htm) Once you have purchased and registered a copy of Intel Fortran, you can then install any previous version.

2) Optimization and Modeling Library (OML) License from Ketron Optimization, LLC (http://www.ketronms.com/oml.shtml) with optional XpressMP barrier interface. The OML libraries are in the archive file. The license key to make them operational must be obtained independently from:

Ketron Optimization Division
Optimal Software, LLC
45573 Shepard Drive - Unit 201
Sterling, VA 20164-4409 USA
Phone: 703 433 1310/1311 Fax: 703 433 1312

The parts of NEMS using OML are the Electricity Market Module, the Coal Market Module, and the Petroleum Market Module.

3) The Xpress optimizer from the Fair-Isaac Corporation, version 2008a, is used at EIA to solve the Electricity Capacity Planning module and reduces runtime for NEMS as a whole by a third. The OML optimizer can be used in place of Xpress, but the results may differ slightly from EIA's results, and execution time will be longer. EIA has made arrangements with Fair-Isaac Corporation to provide a single license of the Xpress solver to a limited number of organizations who want to use it for NEMS. Contact EIA to request a single license for Xpress under this arrangement.

4) (Optional) For macroeconomic feedback cases only: Global Insight Macro Model (http://www.globalinsight.com/) as implemented with the EViews7 software package from QMS (http://www.eviews.com/). We are currently using EViews7 standard edition, version 7.1, build September 21, 2010. The Global Insight macro module is called directly from NEMS if the "macro feedback switch" in NEMS is turned on. Users can elect to run NEMS without macro feedback, in which case the run uses a static input file with the macroeconomic inputs taken "as is." When the Macro feedback switch is on, NEMS will attempt to call the macro model by executing EVIEWS7 using the Global Insight model's "work files" as the input to Eviews7. These Eviews7 work files are not included in the archive, but if needed, can be obtained from EIA after licensing the Global Insight model. A copy of Eviews7 must also be acquired to run the Global Insight model. The Global Insight representative is Jame Niedbalski, (Jamie.Niedbalski@ihsglobalinsight.com).

5) (Optional) Commercial floorspace data from McGraw-Hill Construction, which EIA inserts into one of the EViews7 input work files for the macroeconomic module. This proprietary data is used to develop long term floorspace growth projections and is used by the commercial module in connection with commercial floorspace stock vintaging calculations. (Note that the file you download is dependent on your licensing plans. Download aeo2011.all.zip if you plan to purchase the commercial floorspace data either with or without the Global Insight model; download aeo2011.none.zip if you plan to purchase neither the commercial floorspace data nor the Global Insight model, and download aeo2011.yesmac.nofloor.zip if you plan to purchase the Global Insight model, but not the commercial floorspace data.) A license that allows EIA to provide the commercial floorspace data can be obtained

from McGraw-Hill Construction for $3000 by contacting Donald Cotchen (202-383-3709; Donald_Cotchen@Mcgraw-hill.com). His mailing address is:

Donald Cotchen
McGraw-Hill Construction
1200 G Street NW
Suite 900
Washington, DC 20005

6) Cases in which the Electricity Market Module Capacity Expansion submodule chooses to build plants with carbon sequestration (including the reference case) and the case using the new Liquid Fuels Market Module (LFMM), require GAMS (http://www.gams.com). EIA configures GAMS with the Xpress solver cited above. EIA is planning to use LFMM for AEO2013, making GAMS a requirement next year.

7) EIA is evaluating AIMMS (http://www.aimms.com/aimms/) as a potential modeling package for possible future use for parts of NEMS, with possible introduction for some modeling components as early as AEO2013.

NEMS is computationally intensive and requires a memory address space of about 1.5 gigabytes. EIA is now running NEMS on 64-bit Windows PCs with the 64-bit Windows XP or the 64-bit Windows Server 2008. The EIA PCs running NEMS have 32 gigabytes of RAM to accommodate multiple runs simultaneously.

Runs of NEMS take about 2 hours on the EIA PCs purchased in 2010, but most scenarios are solved by making a series of complete runs, known as cycles, that are used to resolve convergence and foresight issues. Such multi-run scenarios may take about 12-18 hours to run. However, runs of some individual parts of NEMS, if run separately, such as the energy demand models, take only a few minutes. Output of a single run is about 6 gigabytes, but is compressed to about 2.2 gigabytes once the run finishes.

Brief instructions for compiling the code, setting up a run, and replicating the AEO reference case are included in a “readme.txt” file included with the archive. EIA does not have a budget to support the outside use of NEMS.

Technical questions about the NEMS archive and requests for the zip file encryption key can be directed to Paul Kondis, at 202-586-1469, (paul.kondis@eia.gov).