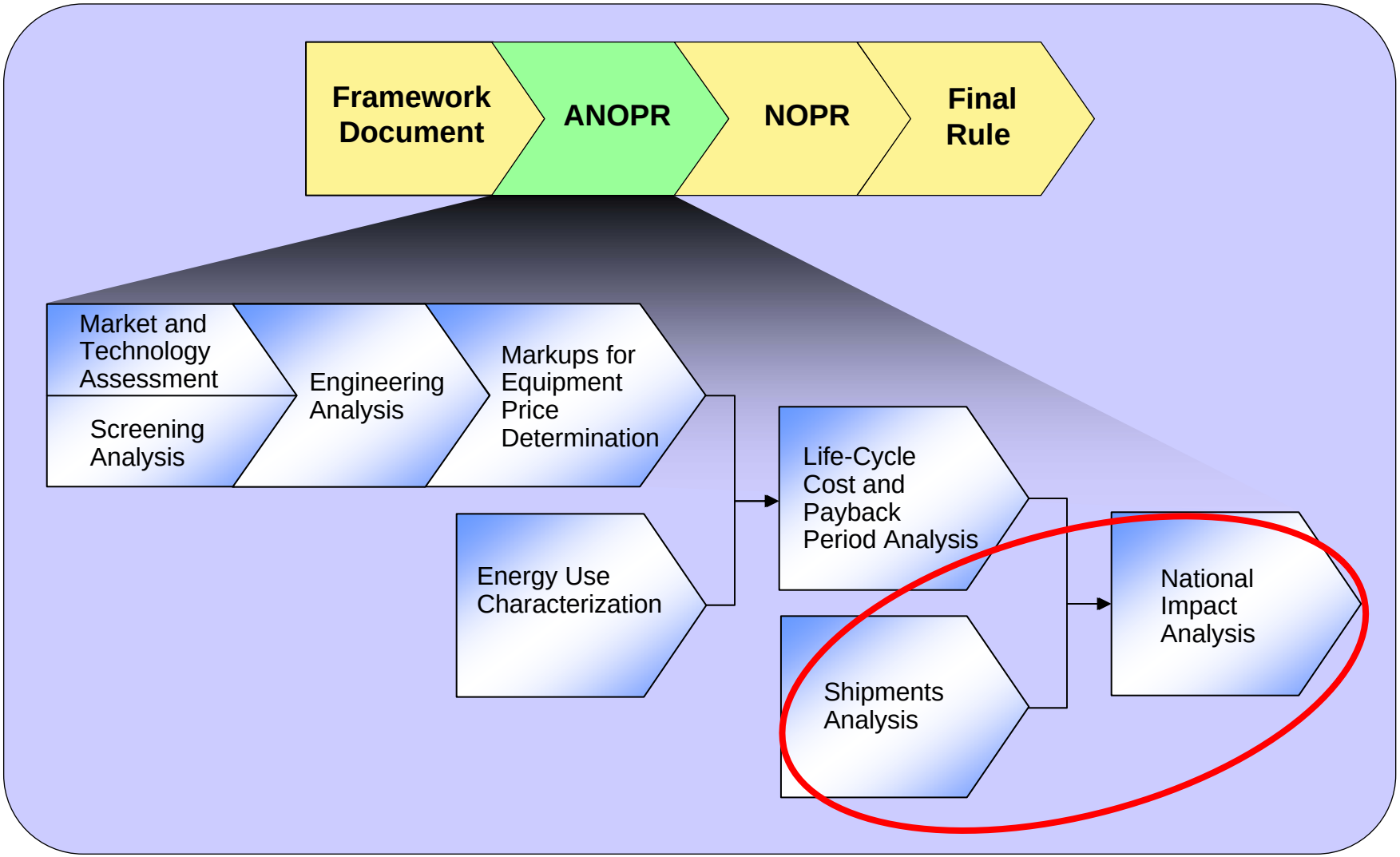
National Impact Analysis

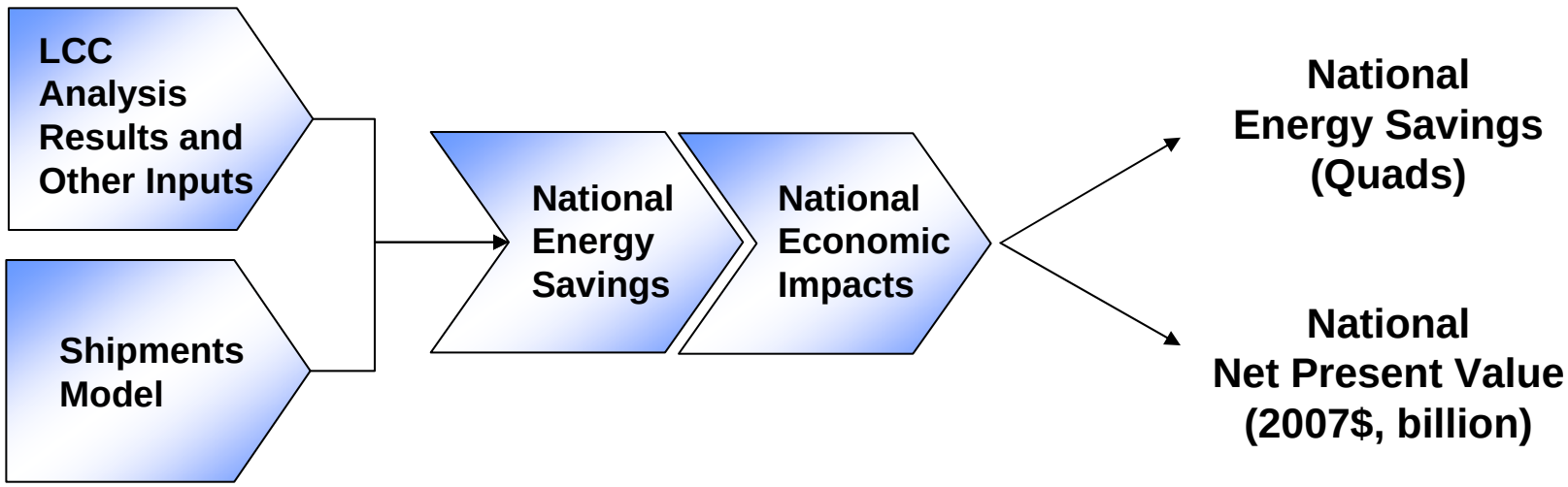
ANOPR Analyses Flow Diagram



Purpose

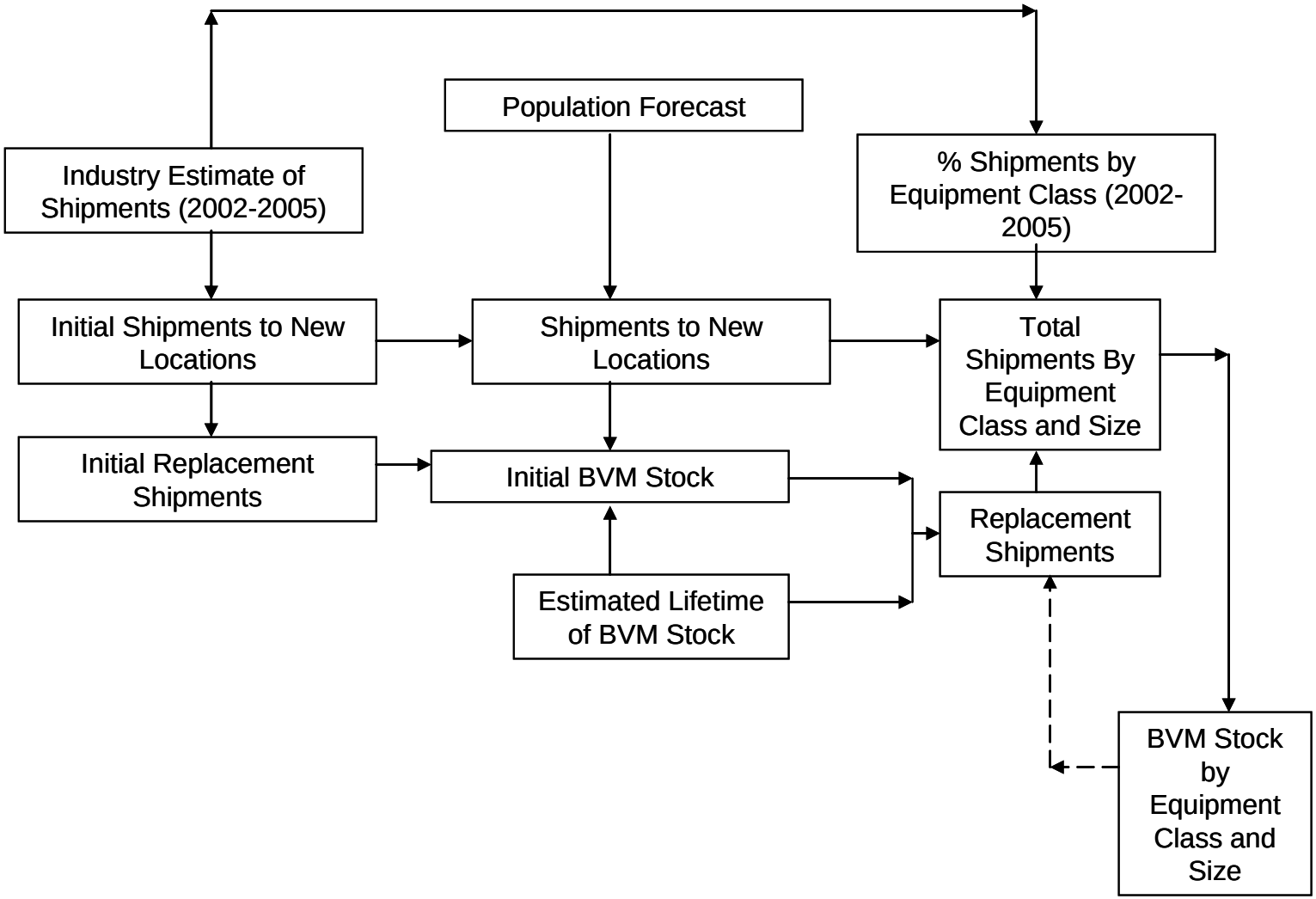
- **Shipments Analysis**
  - Estimate refrigerated beverage vending machine (BVM) equipment shipments over time.
- **National Impact Analysis**
  - Estimate the National Energy Savings (NES) from BVM equipment at different efficiency levels.
  - Estimate the national economic impact on the nation (or the Net Present Value (NPV)) of the BVM equipment at different efficiency levels.

National Impact Analysis Process



- National energy savings calculated for period from 2012-2042 (30 years).
- NPV calculated for period from 2012-2062 (50 years).

Inputs to Shipments Analysis Model



Shipments Model Inputs

- **Distribution of Sales by Equipment Class and Purchaser**
  - Based on 2002-2005 from State of the Vending Industry (2006), industry contacts, and assumptions (for capacities).
- **Initial Stock**
  - Declined from 2000 to 2006. Fell from about 4.2 million to approximately 3.7 million.
- **Sales of New Equipment**
  - Assumed to be 50,000 in 2007.
  - Grows at 2%/yr thereafter based on rate of population growth.
- **Sales of Replacement Equipment**
  - All estimated sales 2001-2006 assumed to be for replacement equipment at 150,000/yr in 2001 declining to 67,000/yr in 2006.
  - Future replacements based on existing stock and Weibull distribution of stock survival (14-year average life) with replacement of 5%/yr.

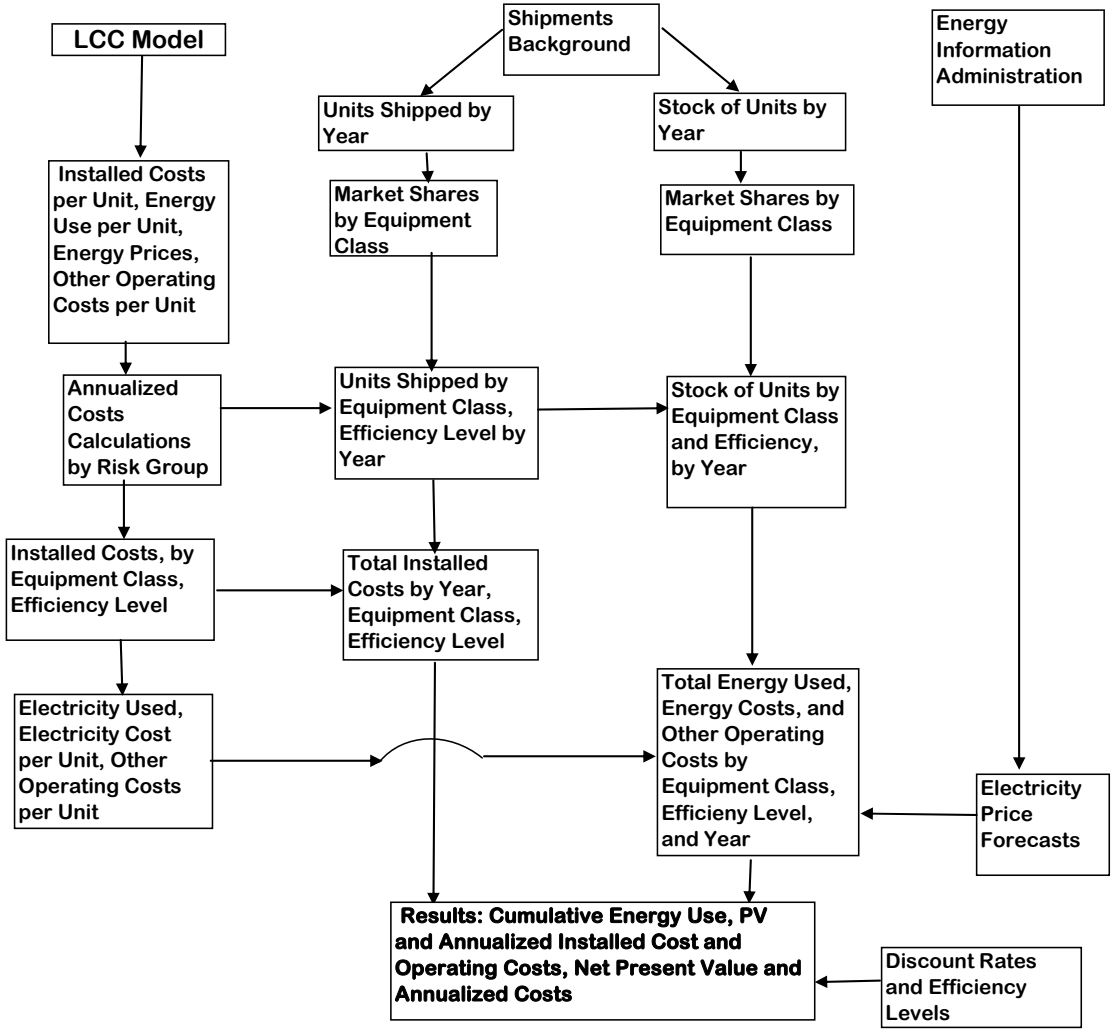
Shipments Model Results

Equipment Class	Thousands of Units Shipped by Year and Equipment Class								
	2012	2015	2020	2025	2030	2035	2040	2042	Cumulative Shipments (2012-2042)
A-L-IN	7.7	7.6	7.9	8.3	8.8	9.2	9.7	9.9	265.9
A-M-IN	7.7	7.6	7.9	8.3	8.8	9.2	9.7	9.9	265.9
A-S-IN	7.7	7.6	7.9	8.3	8.8	9.2	9.7	9.9	265.9
B-L-IO	77.6	77.0	79.8	84.2	88.8	93.4	98.4	100.5	2,688.3
B-M-IO	77.6	77.0	79.8	84.2	88.8	93.4	98.4	100.5	2,688.3
B-S-IO	77.6	77.0	79.8	84.2	88.8	93.4	98.4	100.5	2,688.3

A=fully-cooled machine (indoor use only)
B=all other machines (indoor or outdoor use)

S=small M=medium L=large
IN=indoor only IO=indoor/outdoor

National Impact Analysis Approach



Inputs

- **Shipments**
  - Annual units shipped by equipment class taken from shipments analysis.
- **Total Installed Cost**
  - National average cost per unit by equipment class and efficiency level taken from LCC analysis.
- **Repair and Maintenance Costs**
  - Average annualized values per unit by equipment class and efficiency level taken from LCC analysis.
- **Annual Energy Use**
  - National average annual energy use per unit by equipment class and efficiency level.
- **Market Shares by Efficiency Level**
  - Estimated for base case using commercial customer risk-premium factors from EIA NEMS model and LCC analysis results.
  - Developed for each standards case using a roll-up approach -- base-case market shares below a standard level are “rolled into” the market shares at the standard level.

Inputs (cont.)

- **Efficiency Trends**
  - Future trends in average equipment efficiency improvement over time not forecast due to lack of historical market data.
- **Energy Prices Escalation**
  - For base year of 2012, electricity prices taken from LCC analysis.
  - Future electricity prices adjusted using *2007 Annual Energy Outlook (2030-2042 estimated using 2020-2030 forecast trends).*
- **Electricity Site-to-Source Conversion Factors**
  - Conversion factors forecast using *2007 Annual Energy Outlook (2030-2042 estimated using 2020-2030 forecast trends).*
  - Factors vary annually and account for generation, distribution, and transmission losses.
- **Discount Rate**
  - Rate set at 7 percent and 3 percent real from OMB's Regulatory Analysis Guideline A-4.
  - Future expenses discounted to 2007, reported in 2007$.

Base Case and Standards Case Shipments Forecasts (Issue #5)

- Base case market shares by efficiency level are developed using a economic model.
- DOE did not have data with which to calibrate these market shares to actual shipments by efficiency level.
- DOE did not have historical data to indicate how equipment efficiencies have changed over time or might change in the future.
- Forecasted market shares for efficiencies above the new standard level remain constant from 2012 until the end of the forecast period.

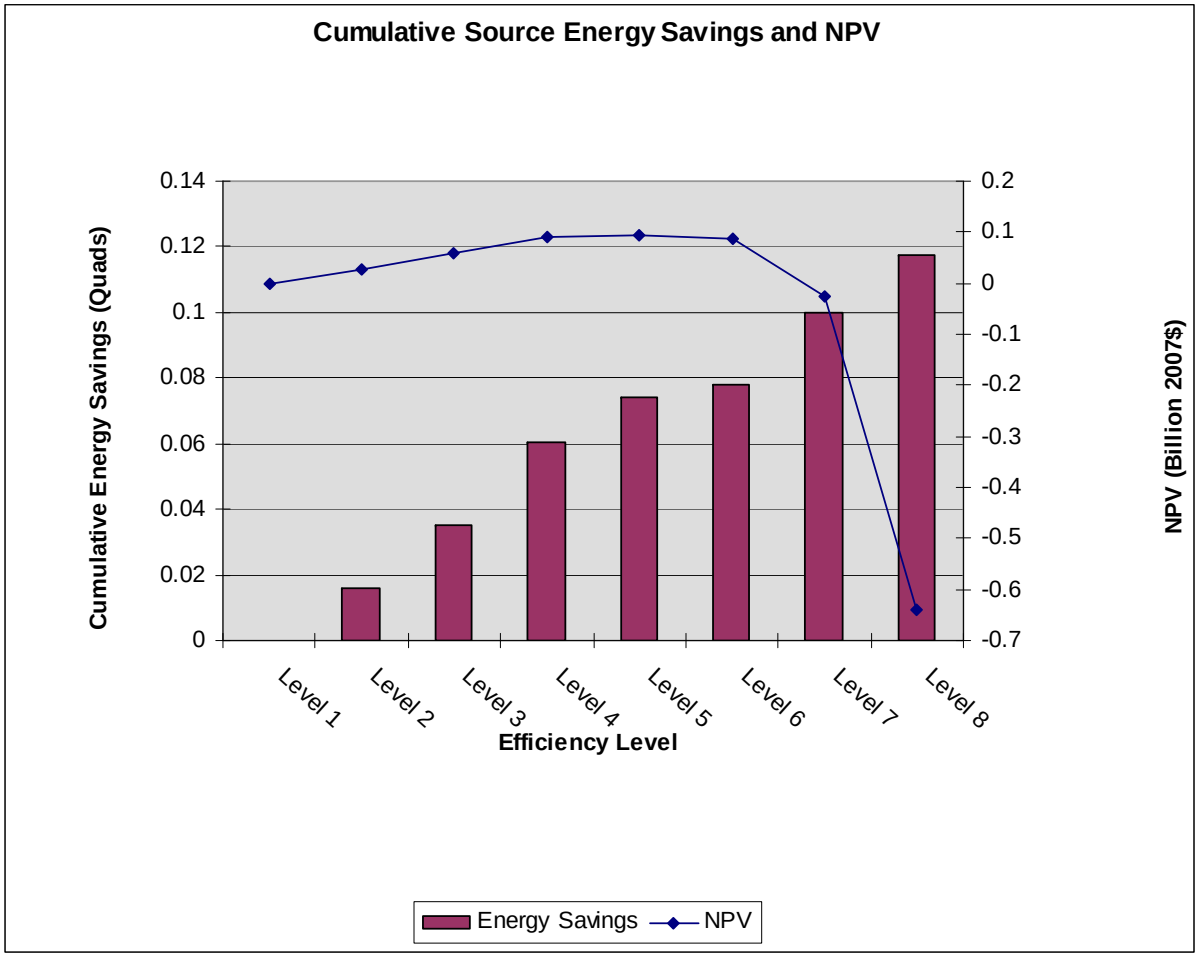
DOE invites comments on its basis for the forecasted shipments and its prediction on how standards impact efficiency distributions in the year that standards take effect.

Differential Impact of New Standards on Future Shipments by Equipment Classes (Issue #6)

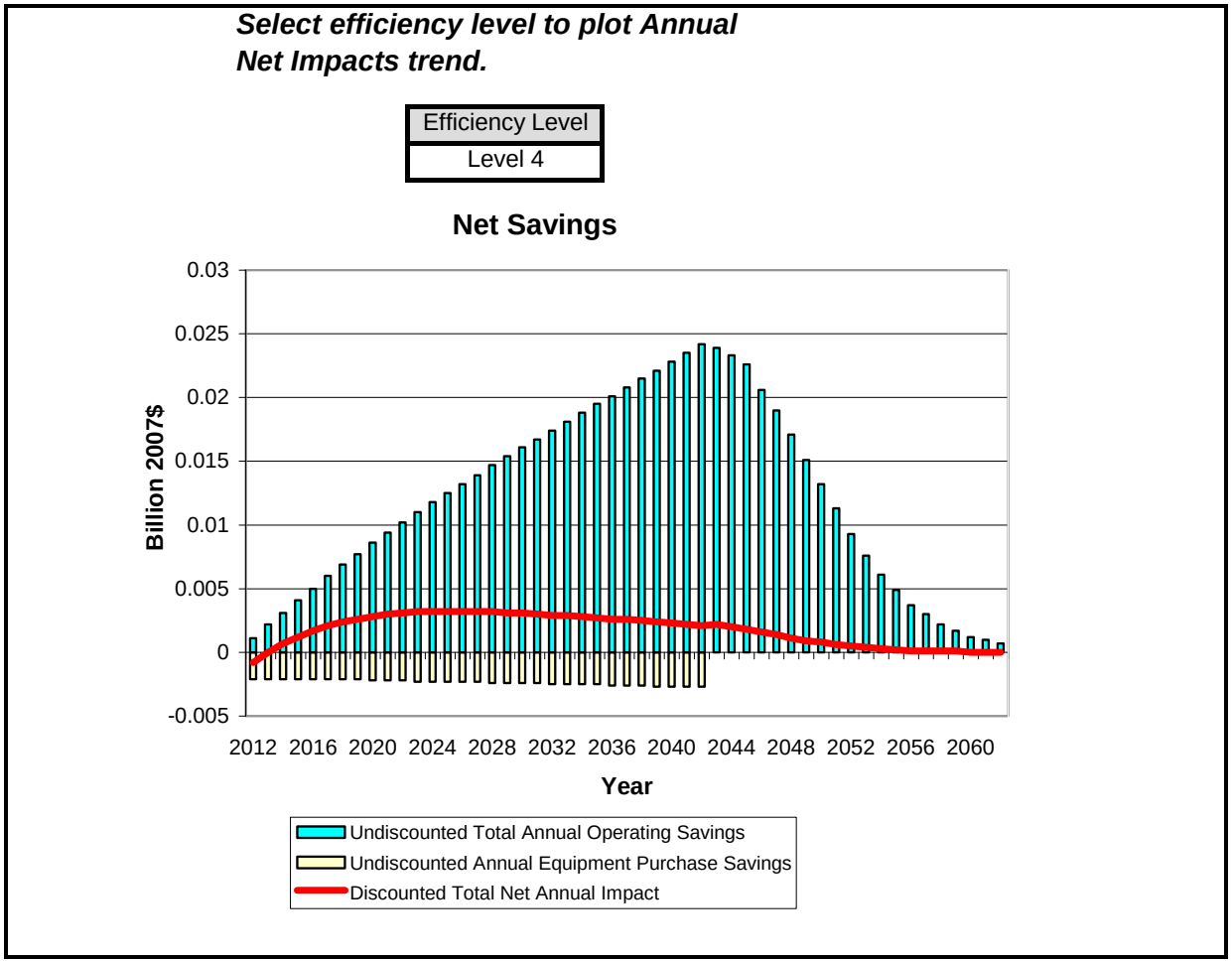
- The shipments model used by DOE presumes that the relative market shares between equipment classes remains constant over time.
- DOE is concerned that higher standards set for specific classes of equipment could shift the market to use other equipment that may have greater energy consumption.

DOE invites comments on the potential for standards-driven market shifts between equipment classes that could reduce national energy savings, and how the standards-setting process can reduce or eliminate these potential shifts.

Example of Cumulative Energy Savings and Net Present Value
(2012–2042 at 7% Discount Rate)



Example of Net Present Value Results
(2012–2042)



Total Net Annual Impact (red line) discounted at 7%

National Impact Analysis Results

- National Energy Savings (2012-2042) range from 0.05 quads at Level 2 to 0.39 quads at Level 8 (maximum efficiency level) analyzed for all equipment classes
- Range of NPV savings (at 7 percent discount rate) is from -$2.1 billion (Level 8) to +$313 million (Level 5)
- Range of NPV Savings (at 3 percent discount rate) is from -$4.1 billion (Level 8) to +$855 million (Level 5)

Other Issues

DOE invites comments and recommendations on any other aspects related to the National Impact Analysis.