U.S. Department of Energy
Energy Efficiency and Renewable Energy
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U.S. Department of Energy

Energy Conservation Program for Consumer Products and Commercial and Industrial Equipment

Energy Conservation Standards Rulemaking for Walk-In Coolers and Walk-In Freezers

Building Technologies Program
Office of Energy Efficiency and Renewable Energy

February 4, 2009

http://www1.eere.energy.gov/buildings/appliance_standards/commercial/wicf.html

Public Meeting Agenda

1. Introduction
2. Rulemaking Overview
3. Preliminary Analyses
4. NOPR Analyses
5. Final Rule Analyses
6. Closing Remarks

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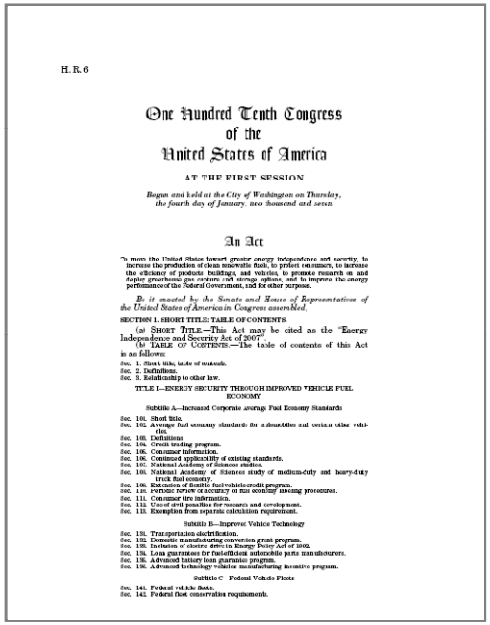
Purpose of the Framework Public Meeting

- Present the procedural and analytical approaches the U.S. Department of Energy (DOE or the Department) anticipates using to evaluate energy conservation standards for walk-in coolers and walk-in freezers (walk-ins or WICF).
- Encourage parties to submit data, information, and written comments.
- Inform parties and facilitate the rulemaking process.

Background

- **The Energy Independence and Security Act of 2007 (EISA)**
  - Section 312(a): Defines the terms applicable to walk-in coolers and walk-in freezers.
  - Section 312(b):
    - Establishes prescriptive requirements mandated by Congress for walk-in coolers and walk-in freezers, applicable to all WICF equipment manufactured on or after **January 1, 2009**.
    - Directs DOE to publish by rule, no later than **January 1, 2012**, energy conservation standards effective for equipment manufactured on or after **three years from the date of publication**.
  - Section 312(c):
    - Prescribes methods for determining the K factor and calculating the R value of insulation.
    - Directs DOE to establish, by **January 1, 2010**, a test procedure to measure the energy use of walk-in coolers and walk-in freezers.



H. R. 6

One Hundred Tenth Congress
of the
United States of America

AT THE FIRST SESSION

Begun and held at the City of Washington on Thursday, the fourth day of January, two thousand and seven

An Act

To move the United States toward greater energy independence and security, to increase the production of clean renewable fuels, to protect consumers, to increase the efficiency of products, buildings, and vehicles, to promote research on and deploy greenhouse gas capture and storage options, and to improve the energy performance of the Federal Government, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS

(a) SHORT TITLE.—This Act may be cited as the "Energy Independence and Security Act of 2007".

(b) TABLE OF CONTENTS.—The table of contents of this Act is as follows:

Sec. 1. Short title; table of contents.
Sec. 2. Definitions.
Sec. 3. Relationship to other law.

TITLE I—ENERGY SECURITY THROUGH IMPROVED VEHICLE FUEL ECONOMY

Subtitle A—Increased Corporate Average Fuel Economy Standards

Sec. 101. Short title.
Sec. 102. Average fuel economy standards for automobiles and certain other vehicles.
Sec. 103. Definitions.
Sec. 104. Credit trading program.
Sec. 105. Consumer information.
Sec. 106. Continued applicability of existing standards.
Sec. 107. National Academy of Sciences studies.
Sec. 108. National Academy of Sciences study of medium-duty and heavy-duty truck fuel economy.
Sec. 109. Extension of flexible fuel vehicle credit program.
Sec. 110. Periodic review of accuracy of gas guzzler tax testing procedures.
Sec. 111. Consumer tire information.
Sec. 112. Use of civil penalties for research and development.
Sec. 113. Exemption from separate calculation requirement.

Subtitle B—Improved Vehicle Technology

Sec. 131. Transportation electrification.
Sec. 132. Domestic manufacturing conversion grant program.
Sec. 133. Inclusion of electric drive in Energy Policy Act of 1992.
Sec. 134. Loan guarantees for fuel-efficient automobile parts manufacturers.
Sec. 135. Advanced battery loan guarantee program.
Sec. 136. Advanced technology vehicles manufacturing incentive program.

Subtitle C—Federal Vehicle Fleets

Sec. 141. Federal vehicle fleets.
Sec. 142. Federal fleet conservation requirements.

Background: Definitions

- EISA Section 312(a): Defines the terms ‘walk-in cooler’ and ‘walk-in freezer’ to mean:

  “an enclosed storage space refrigerated to temperatures, respectively, above, and at or below 32 degrees Fahrenheit that can be walked into, and has a total chilled storage area of less than 3,000 square feet. The terms ‘walk-in cooler’ and ‘walk-in freezer’ do not include products designed and marketed exclusively for medical, scientific, or research purposes.”

Background

- **Federal Register** - **74 FR 411 (January 6, 2009) and 74 FR 1992 (January 14, 2009)**
  - Gives official public notice of the public meeting and availability of the Framework Document.
  - Initiates information and data collection process.
  - Encourages interested parties to submit comments.
- **Framework Document**
  - Explains issues, analyses, and the process that DOE is considering to develop energy conservation standards for walk-in coolers and walk-in freezers.
  - Solicits data and information, and invites comments
  - A copy of the Framework Document is available at: http://www1.eere.energy.gov/buildings/appliance_standards/commercial/wicf_framework_document.html.

How to Submit Written Comments

- **In all correspondence, please refer to the Walk-In Coolers and Walk-In Freezers Rulemaking by:**
  - **Docket Number EERE-2008-BT-STD-0015, or**
  - **Regulatory Identification Number (RIN) 1904-AB86.**
- **Email:** **wicf-2008-std-0015@ee.doe.gov**
- **Postal Mail:** **Brenda Edwards**
  U.S. Department of Energy
  Building Technologies Program, Mail Stop EE-2J
  Walk-In Coolers and Freezers Rulemaking, RIN 1904-AB86
  1000 Independence Avenue, SW
  Washington, DC 20585-0121
- **Courier:** **Brenda Edwards**
  U.S. Department of Energy
  Building Technologies Program
  Walk-In Coolers and Freezers Rulemaking, RIN 1904-AB86
  950 L'Enfant Plaza, 6th Floor
  Washington, DC 20024
- **Comment period closes February 12, 2009.**

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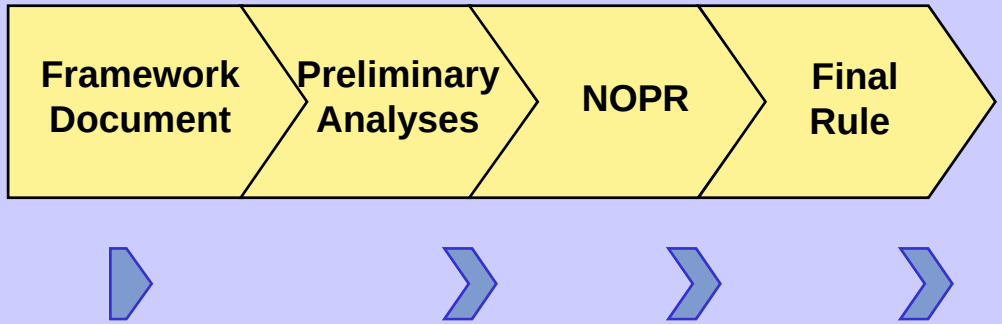
Stages of the Rulemaking Process

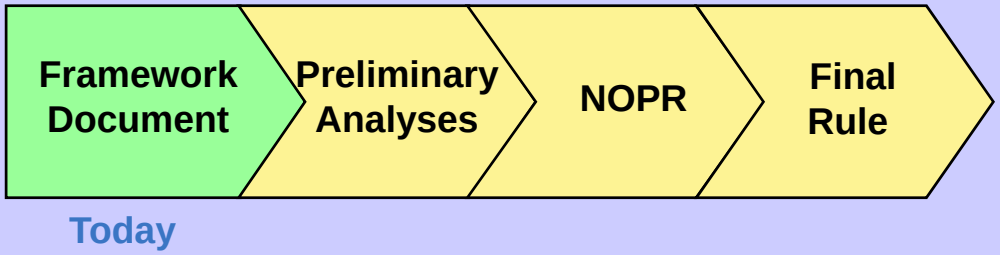


Federal Register notices

Opportunities for interested parties to participate

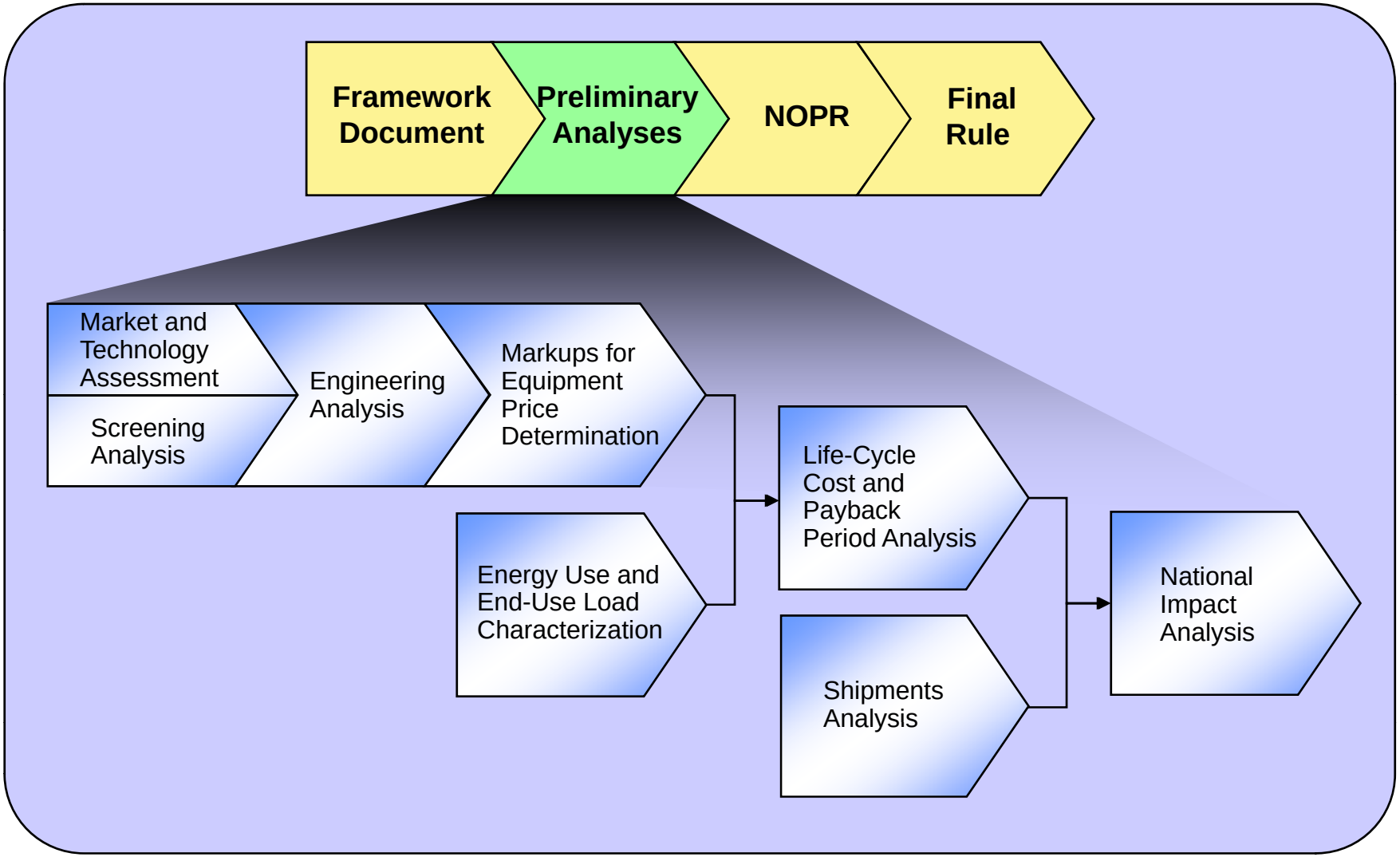
- Public meetings and oral comments
- Written comments on Federal Register notices and Technical Support Document

Framework Document

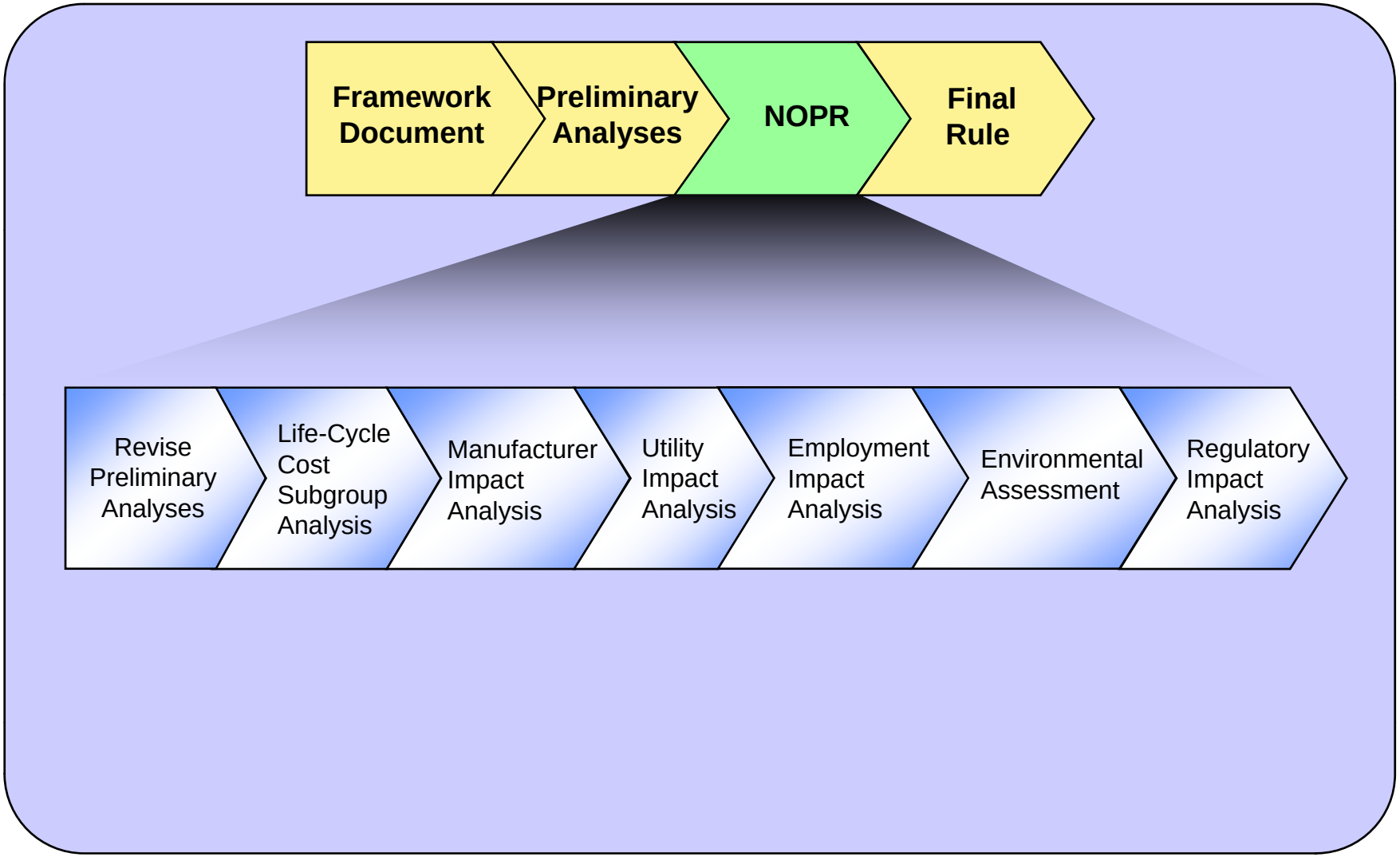


- Today's public meeting covers the Framework Document for this rulemaking.
- The Framework Document provides an overview of the rulemaking process and encourages early participation by interested parties.
- The Department encourages all interested parties to read the Framework Document, available at: http://www.eere.energy.gov/buildings/appliance_standards/commercial/wicf_framework_document.html

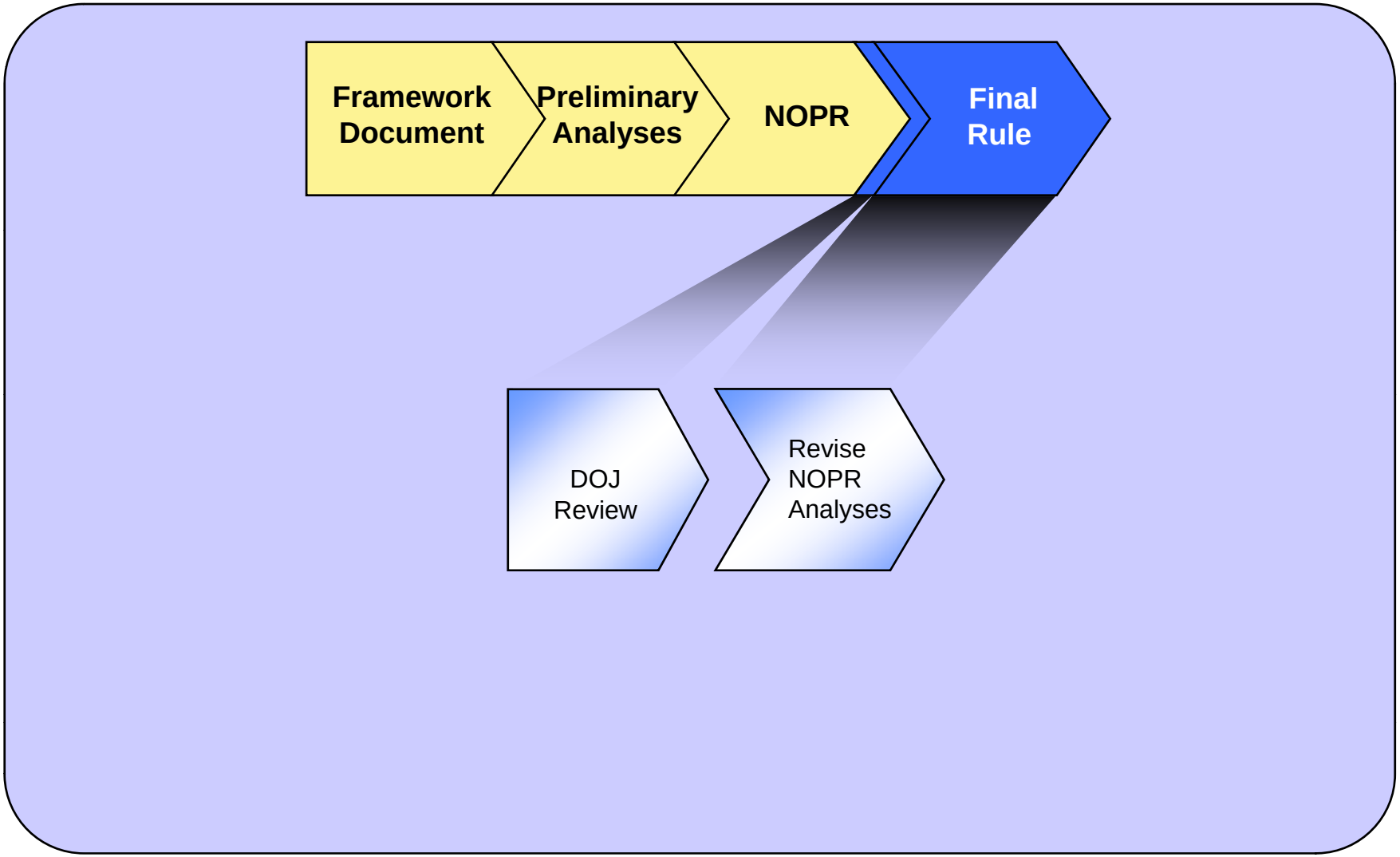
Preliminary Analyses



Analyses for Notice of Proposed Rulemaking (NOPR)



Analyses for Final Rule



Test Procedures

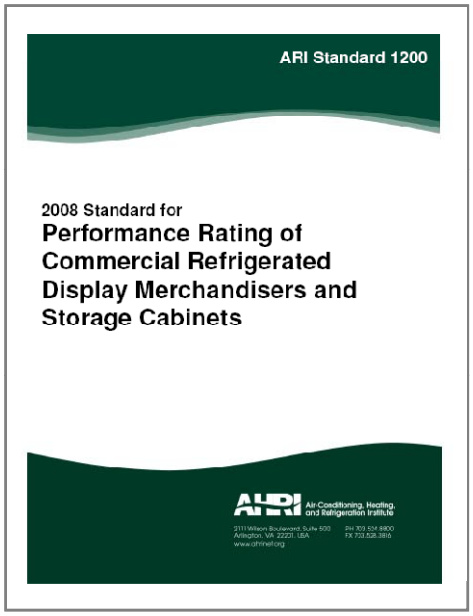
- Section 312(c) of EISA states: “Not later than January 1, 2010, the Secretary shall establish a test procedure to measure the energy use of walk-in coolers and walk-in freezers.”

- DOE is developing test procedures and rating temperatures for walk-in coolers and walk-in freezers covered under this rulemaking, in a separate but concurrent rulemaking.

- DOE researched federal, state, and international standards for walk-ins and found no existing test procedures.

Rating Methods and Normalizing Factors

- The Department is considering several options for manufacturers to rate walk-in coolers and walk-in freezers, including:
  - Test the equipment using a modified version of ANSI/ARI 1200-2008: "Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets."
  - Calculate the energy consumption using an Alternative Efficiency Determination Method (AEDM).
  - Use some combination of these options.
- The Department is considering applying a normalizing factor to the test metric to accommodate equipment of different sizes.
  - Gross volume
  - Floor area


ARI Standard 1200

2008 Standard for
Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets

ARI Air-Conditioning, Heating, and Refrigeration Institute

Item 2-1 The Department seeks feedback on appropriate test metrics and normalization factors for the walk-in coolers and walk-in freezers covered under this rulemaking.

Rating Method 1: Use a Modified Version of ARI 1200

- Test the walk-in cooler or walk-in freezer at steady state within a controlled test room, under the conditions specified in ASHRAE 72 ("Method of Testing Commercial Refrigerators and Freezers").
- Record test data for the walk-in cooler or walk-in freezer over a 24-hour period to obtain the total energy consumption.

Advantages

- Test procedure already developed; requires some modification.
- Accurate.

Limitations

- Since many walk-ins are custom-made, testing each one may be burdensome, expensive, or impractical.

Item 2-2 Walk-ins are excluded from the scope of ASHRAE 72. What might DOE need to address to be able to use this test method to rate walk-ins?

Rating Method 2: Develop an AEDM

- Examples of approaches include, but are not limited to:
  - A calculation methodology; or
  - A computer simulation.
- The AEDM must be:
  - Based on analytic evaluation of performance data of a walk-in; and
  - Substantiated by testing a "significant sample" of walk-in units of the same type and showing that the AEDM is accurate to a certain percentage.

Advantages

- Easy to use for custom equipment because it does not require every unit to be tested.

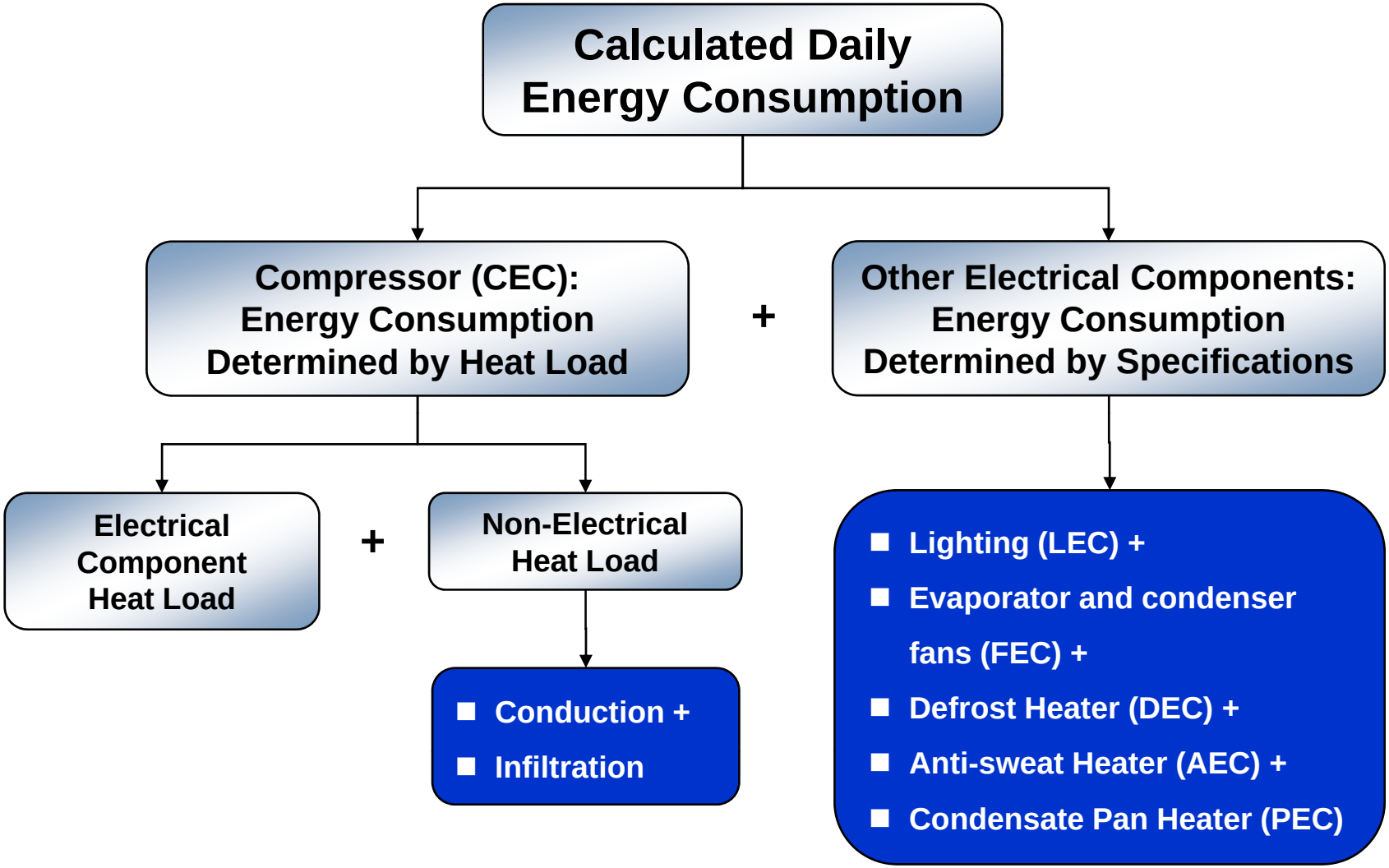
Limitations

- May be inaccurate.
- May be difficult or impractical to develop.

Item 2-3 What significant sample size should DOE use to substantiate an AEDM?

Item 2-4 To what percentage should the AEDM be accurate?

AEDM: Example of Calculation Methodology Approach



AEDM: Computer Simulation Approach

- A manufacturer may develop a computer model in order to calculate the energy consumption of a walk-in.
- The computer model may simulate operation of the walk-in over a certain time period.
- EISA states that “The test procedure may be based on computer modeling, if the computer model or models have been verified using the results of laboratory tests on a significant sample of walk-in coolers and walk-in freezers.”

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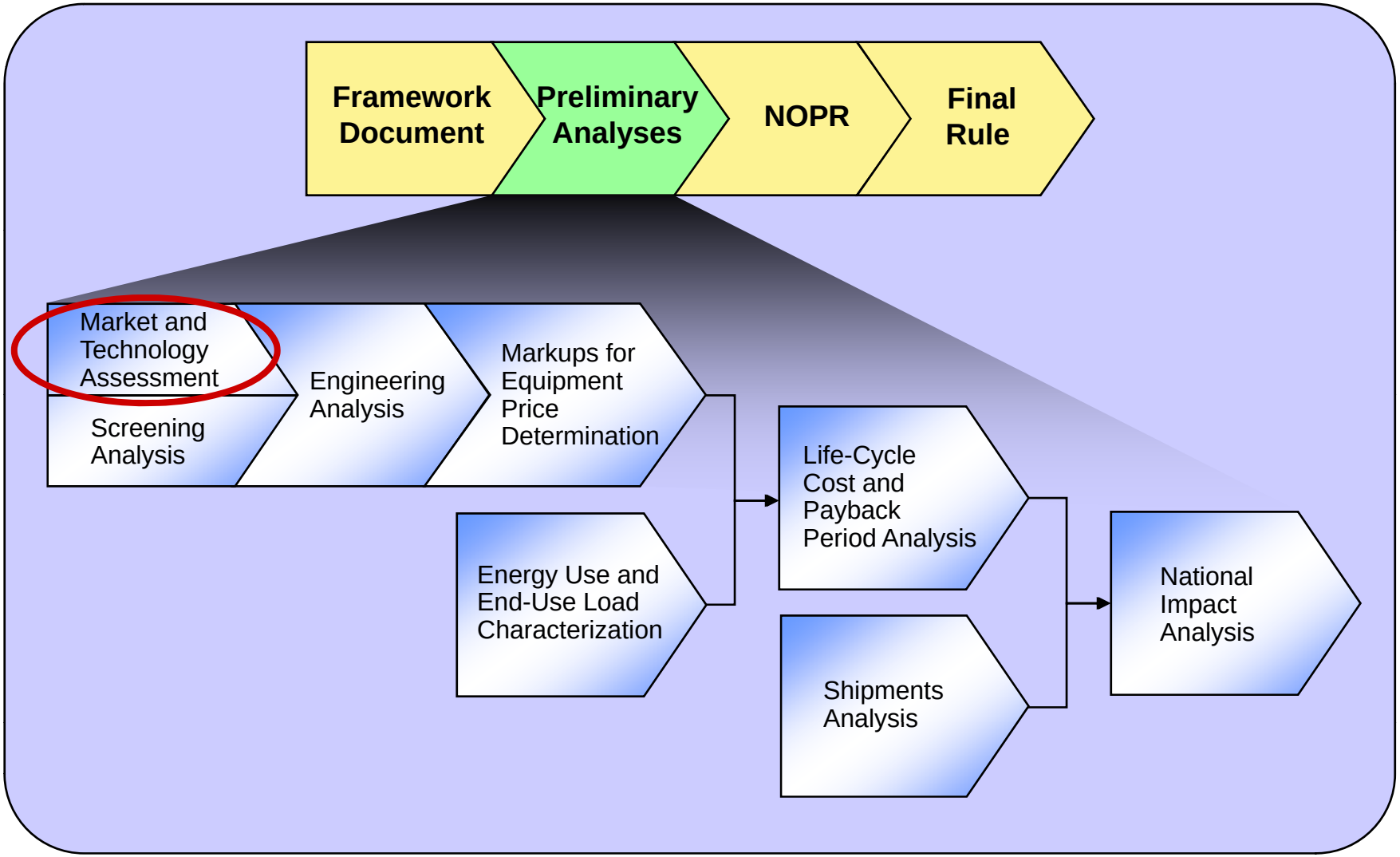
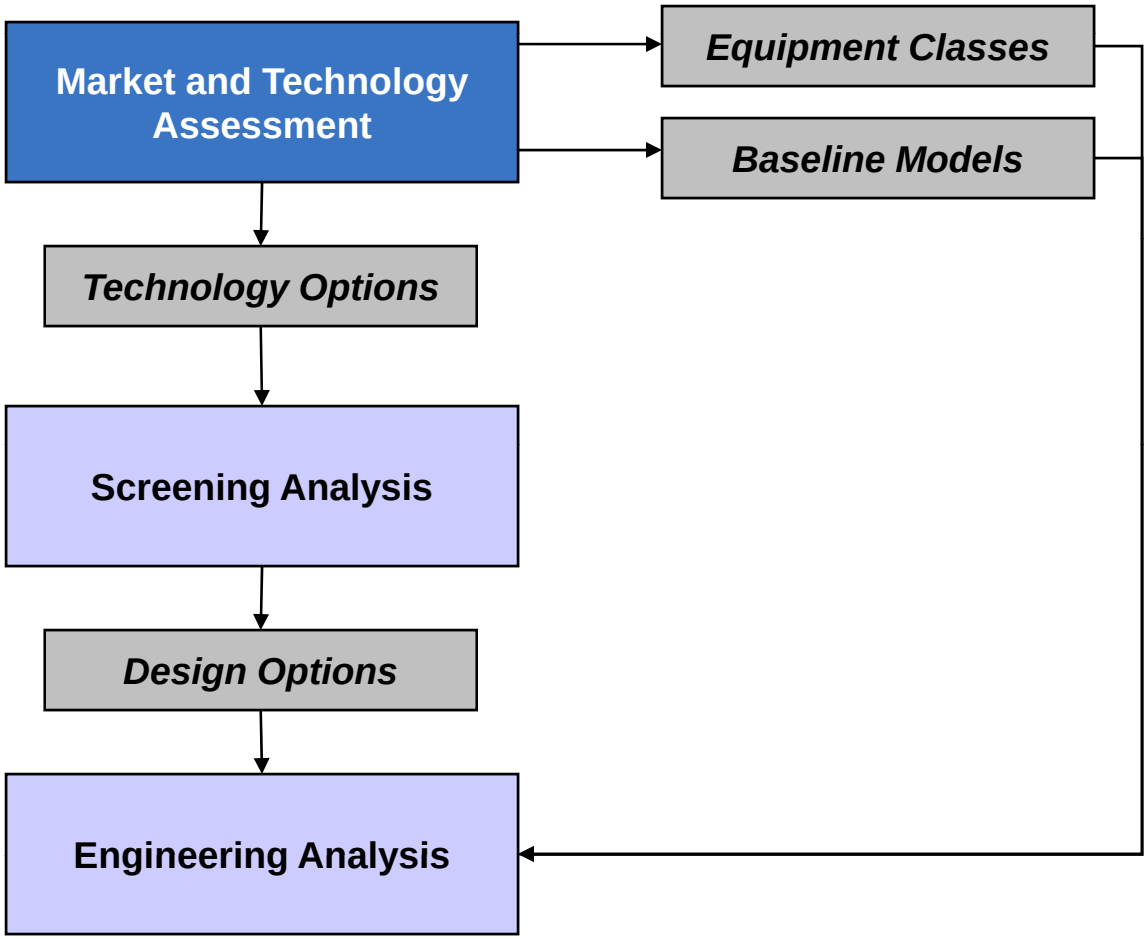
Preliminary Analyses



Relationship of Analyses



Purpose

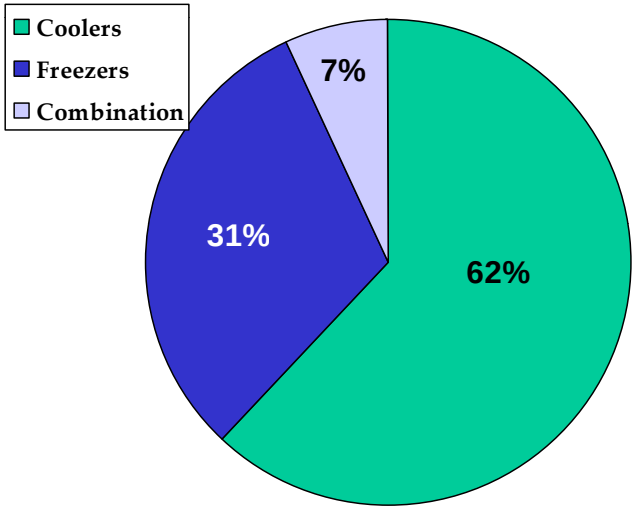
- Characterize the walk-in cooler and walk-in freezer industry and market.

Method

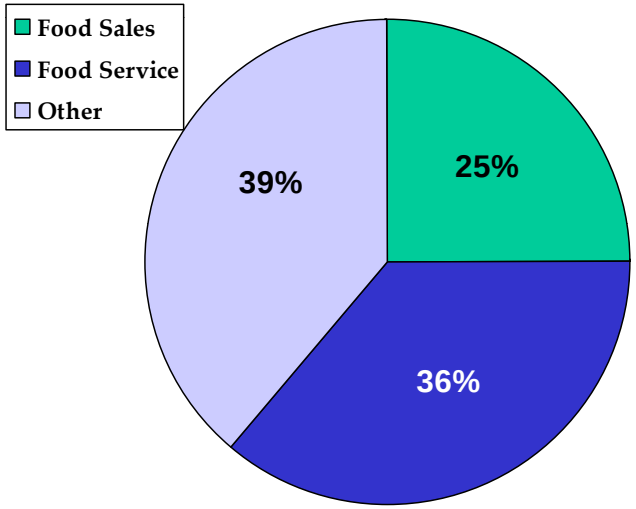
- Identify and characterize manufacturers of walk-in coolers and walk-in freezers.
- Estimate market shares and trends in the market.
- Identify technologies that could be applied to walk-in coolers and walk-in freezers.
- Identify regulatory and non-regulatory initiatives intended to improve energy efficiency of the equipment covered under this rulemaking.

Overview of Walk-In Cooler and Walk-in Freezer Industry and Market

- Total Installed Base: 1,000,000 units[1]
- Total Annual Sales: 40,000 units/year[2]
- Total Market Value of 2008 Sales: $800,000,000[3]
- Total Energy Consumption: 18.8 TWh[4]



Walk-Ins by Temperature Level[5]



Walk-Ins by End-Use Applications[6]

[1] Inventory estimates from major walk-in manufacturers.
[2] Manufacturer interviews; Freedonia, Energy Savings in Refrigerated Walk-in Boxes, DOE/EE-0170, 2004.
[3] Freedonia, Energy Savings in Refrigerated Walk-in Boxes, DOE/EE-0170, 2004.
[4] Manufacturer data.
[5] Major manufacturers; Energy Savings Potential for Commercial Refrigeration Equipment, prepared for the U.S. Department of Energy by Arthur D. Little, June, 1996 (ADL '96).
[6] Commercial Building Energy Consumption Survey (CBECS), Energy Information Administration, 2003; major manufacturers.

Characteristics of a Typical Walk-In Cooler and Walk-In Freezer

	Cooler	Freezer
Cooling Capacity (Btu/h)	26,230	4,929
Size (ft^2)	140	80
Energy Use (kWh/yr)	14,600	15,600
Insulated Box Average Life (yr)	18	18
Compressor Average Life (yr)	10	10
Retail Equipment Cost	$13,500	$7,900
Total Installed Cost	$17,500	$8,900
Annual Maintenance Cost	$750-$1,000	$500

Sources: ADL '96; Analysis of Standard Options for Walk-in Coolers (Refrigerators) and Freezers, Pacific Gas and Electric Company, May 2004; Energy Saving Incentives for High Efficiency Scroll Compressors in Walk-In Coolers, Emerson Climate Technologies, November 2006; Food Marketing Institute Facts and Figures web site (www.fmi.org, June 2008); NCI Analysis, 2008; distributor websites.

Request for Feedback

- Existing standards for the walk-in coolers and walk-in freezers covered under this rulemaking are design requirements.
- These walk-in coolers and walk-in freezers have never before been the object of energy-use regulation at the Federal level.
- Interested parties are encouraged to submit any available, applicable data.

Item 3-1 DOE seeks information that would contribute to the market assessment for walk-in coolers and freezers, including information on manufacturers, market shares, trends in the market, technological improvements, and any other applicable information. Examples of the type of information sought by DOE, include, but are not limited to: a listing of walk-in cooler and freezer manufacturers and their respective market shares, historical shipment data by equipment class, equipment efficiency data by equipment class, etc. It is particularly important that DOE be aware of the major and small/niche manufacturers.

Item 3-2 DOE seeks information on annual product shipments from 1990 to present (both domestic and imports), and the corresponding shipment-weighted average efficiency of these shipments. Additionally, what units of measure are typically used for annual shipments of this equipment (e.g., cases per year, square-feet per year (floor-area-based), cubic-feet per year (refrigerated-volume-based), etc)?

Possible Equipment Class Divisions to Consider

- **Capacity**: Small, Medium, or Large
  - **Small**: Less than or equal to 1,000 ft^2
  - **Medium**: Greater than 1,000 ft^2 and less than or equal to 2,000 ft^2
  - **Large**: Greater than 2,000 ft^2 and less than 3,000 ft^2
- **Type**: Self-contained or Remote Condensing
  - **Self-contained**: The condensing unit is an integral part of the walk-in cooler or freezer construction.
  - **Remote Condensing**: The condensing unit is located elsewhere, possibly in an equipment room.
- **Location**: Indoor or Outdoor
  - **Indoor**: Fabricated within a building as part of that building.
  - **Outdoor**: Constructed as a stand-alone structure or an extension of an existing building.
- **Temperature:** Cooler, Freezer, or Combination
  - **Cooler**: Medium temperature.
  - **Freezer**: Low temperature.
  - **Combination**: Has a medium temperature and a low temperature space.

Examples of Equipment Classes

- Small, remote-condensing, indoor

- Small, self-contained, indoor (cooler-freezer combination)

- Large, self-contained, outdoor

- Small, remote condensing, indoor (walk-in display cooler)

Request for Feedback

Item 3-3 The Department requests feedback on the proposed classes for the walk-in coolers and freezers covered under this rulemaking, and the criteria used in creating the classes.

Item 3-4 What other equipment class divisions might be appropriate?

Item 3-5 What equipment classes, if any, can be combined for standards-setting purposes because of their similarities?

Item 3-6 Can analyses for any one of these equipment classes be applied or extrapolated to another equipment class?

Item 3-7 Should all of these equipment classes be considered (e.g., do any of these equipment classes have few or no shipments)?

Baseline Units

- Will be selected once equipment classes are established.
- Are selected for each equipment class, against which changes resulting from energy conservation standards can be measured.
- Represent typical characteristics of equipment in that class.
- Are used in the engineering analysis and the life-cycle cost and payback period analysis.
- Since no energy conservation standards exist, the Department is surveying publicly-available product literature to establish baseline models.
- The Department also proposes to use information provided by interested parties in selecting appropriate baseline models.

Item 3-8 The Department seeks feedback on how to select a baseline model for each equipment class.

Item 3-9 The Department seeks information on what particular components and features characterize the baseline model in each equipment class (e.g., materials, dimensions, insulation, refrigerant type, compressors, evaporators, condensers, expansion devices, fans, motors, anti-condensate devices and controls, defrost mechanisms and controls, lighting, etc.).

Initial Technology Choices:

All Equipment Types (continued on next slide)
defrost mechanism (hot-gas defrost rather than electric defrost)
case insulation increases or improvements
floating head pressure
ambient subcooling
external heat rejection
economizer cooling
higher-efficiency evaporator fan blades
higher-efficiency evaporator fan motors (e.g. electronically commutated motors (ECM))
evaporator fan motor controllers (e.g. optimize duty cycle)
higher-efficiency lighting ballasts (i.e. electronic rather than magnetic)
higher-efficiency lighting (e.g., T8 fluorescent lamps, light-emitting diodes (LEDs))
remote lighting ballast location (i.e., outside the refrigerated space)
anti sweat heater controls (e.g. dew point sensor)
non-electric anti-sweat heating

Initial Technology Choices (continued):

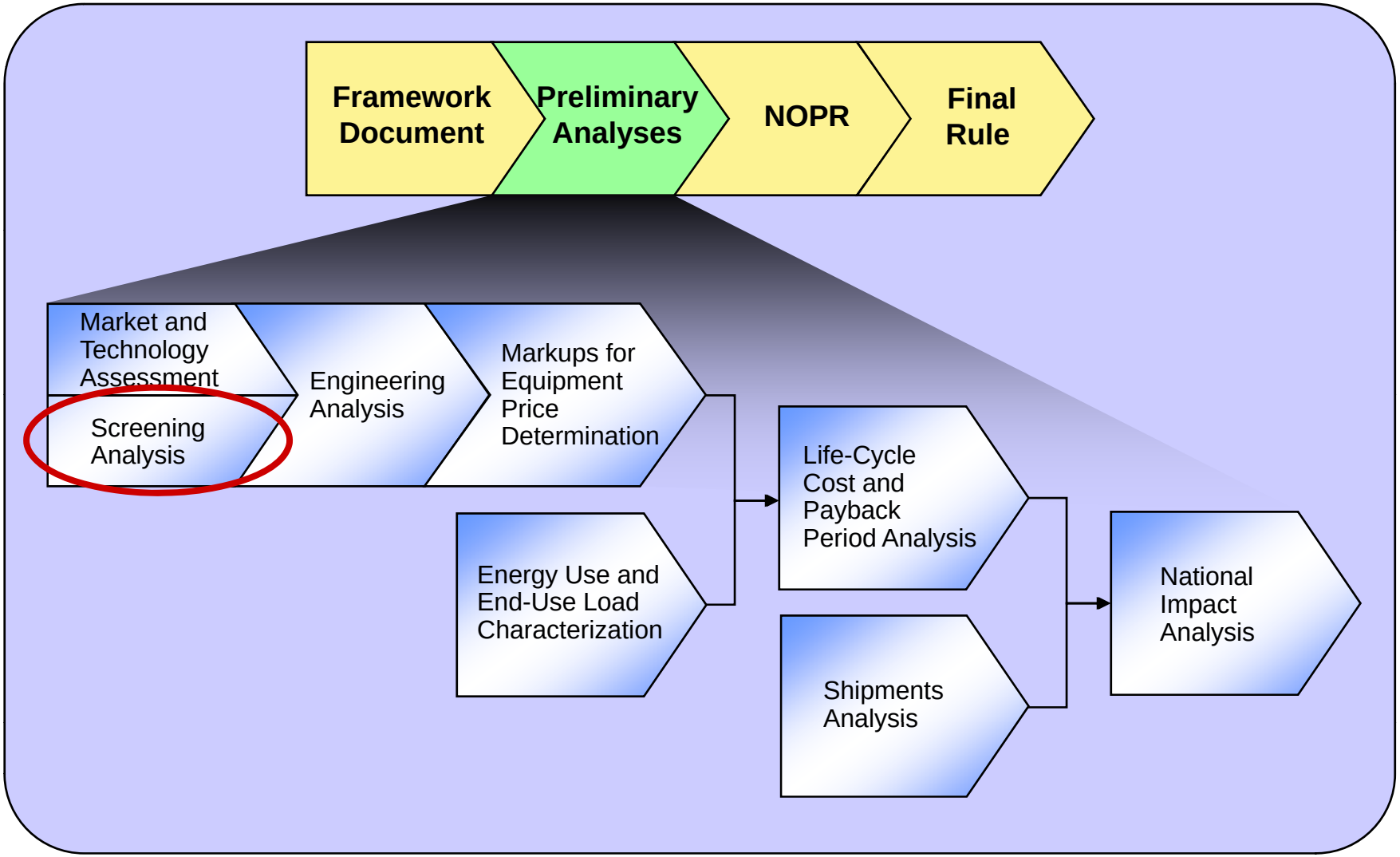
All Equipment Types (continued)
higher-efficiency expansion valves (e.g., dual-port thermostatic expansion valves (TXVs) and electronic expansion valves (EEVs))
increased evaporator surface area or efficiency to achieve lower case-evaporator temperature differential (with a possible increase in fan energy)
low pressure-differential evaporators

Self-contained equipment only
higher-efficiency compressors (e.g., variable-speed compressors)
liquid-to-suction heat exchanger (LSHX) (i.e., subcool liquid refrigerant with suction line)
increased condenser surface area or efficiency
higher-efficiency condenser fan blades
higher-efficiency condenser fan motors (e.g., electronically commutated motors (ECM))
condenser fan motor controllers

Freezers only
defrost cycle control (demand-based defrost rather than time-based defrost)

Item 3-10 What technologies or designs, if any, should DOE add or remove from the above list?

Preliminary Analyses



Purpose

- Screen out technology options that will not be considered in the rulemaking for walk-in coolers and freezers

Method

- Each technology will be screened based on the following four criteria:

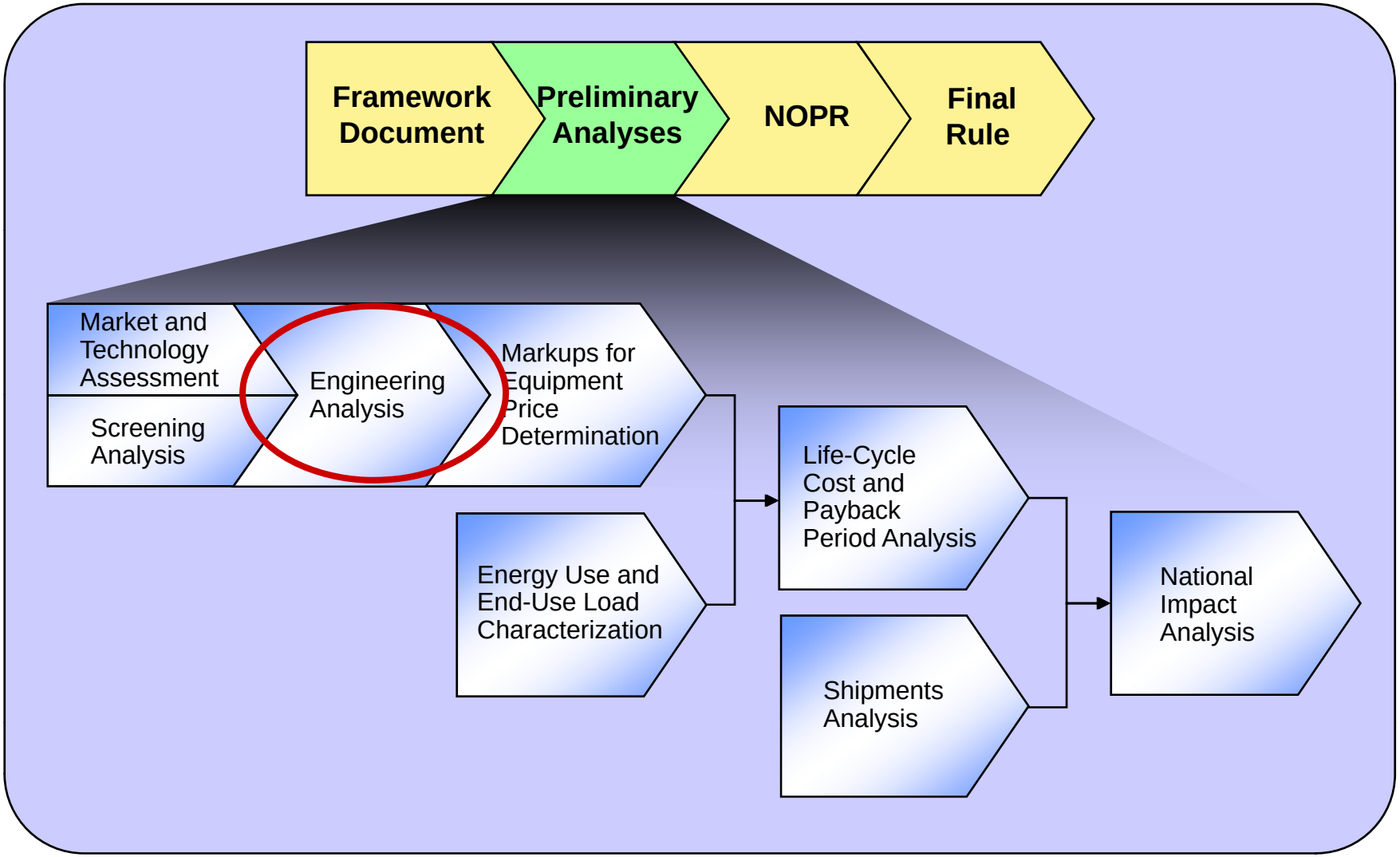
Technological feasibility

Practicability to manufacture, install and service

Adverse impacts on utility or availability to consumers

Adverse impacts on health or safety

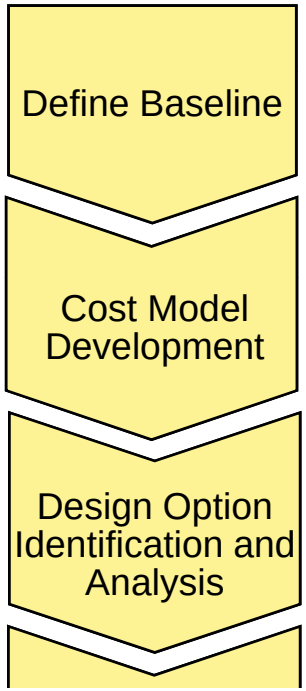
Preliminary Analyses



Purpose

- Characterize the relationship between manufacturer cost and energy consumption.

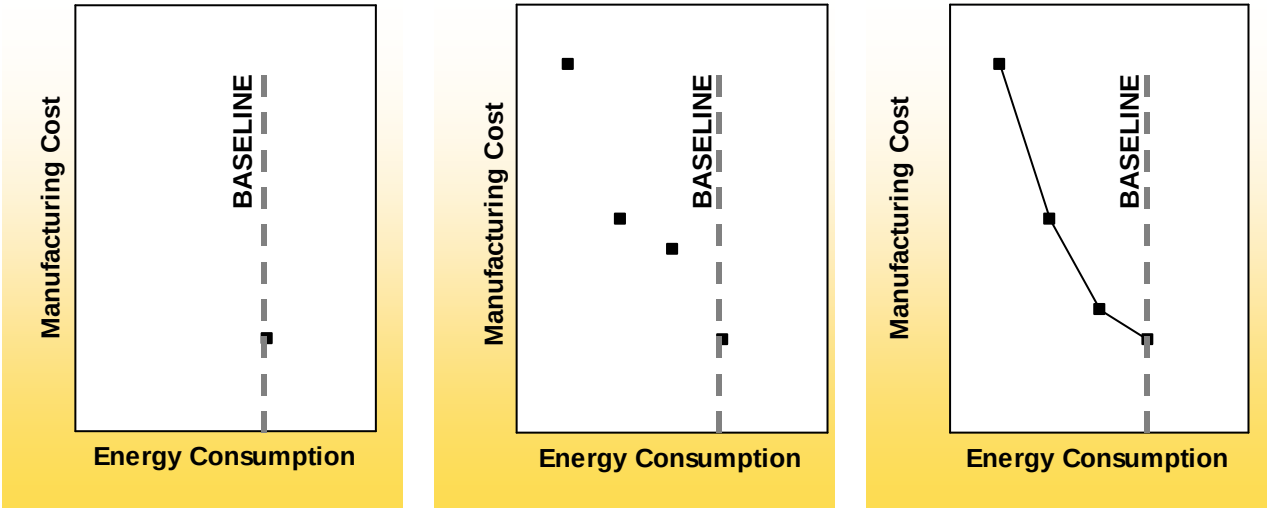
Method



- ⇦ Define baseline units for each equipment class, collect baseline performance and cost data, apply markup assumptions.
- ⇦ Collect manufacturer production cost data to estimate the cost of the core case.
- ⇦ Identify applicable design options, collect manufacturer cost data, qualify cost-energy consumption relationship.
- ⇦ Incorporate interested parties' feedback at the Preliminary Analysis stage.

Cost-Energy Consumption Curve Development

1. Baseline information is obtained for each equipment class
2. Cost data is plotted at energy consumption levels for each design option
3. The design options are re-ordered with the most cost-efficient applied first



Request for Feedback

Item 5-1 DOE requests feedback on using a design-option approach to determine the relationship between manufacturer production cost and energy-efficiency levels for walk-in coolers and freezers.

Item 5-2 DOE requests feedback on an appropriate representative capacity (i.e., the most common or highest-volume capacity) for each equipment class of walk-in coolers and freezers.

Item 5-3 DOE seeks information on what particular components and features (e.g., materials, dimensions, compressors, coils, expansion devices, fans, motors, controls, and panel construction characteristics) characterize the baseline model in each equipment class.

Manufacturing Cost Components

Full Production Cost + Markups (Non-Production Costs) = Manufacturer Selling Price

- Direct material
- Direct labor
- Factory overhead
- Depreciation

- Sales & marketing
- Research & development
- Interest
- Profit

- Examples of publicly available information:
  - SEC 10-K reports
  - Company annual reports
  - Dun and Bradstreet reports
  - Value Line industry statistics
  - Standard and Poor's composite industry statistics
  - Ibbotson Associates reports

Item 5-4 The Department seeks comment on the planned markup approach proposed for developing estimates of manufacturer selling prices.

Proprietary Designs

- The Department will evaluate all design options that are commercially available or present in a working prototype, including proprietary designs.
- Proprietary designs will only be considered if they do not present a unique path to a given energy consumption level.
- The confidentiality of manufacturers will be maintained.

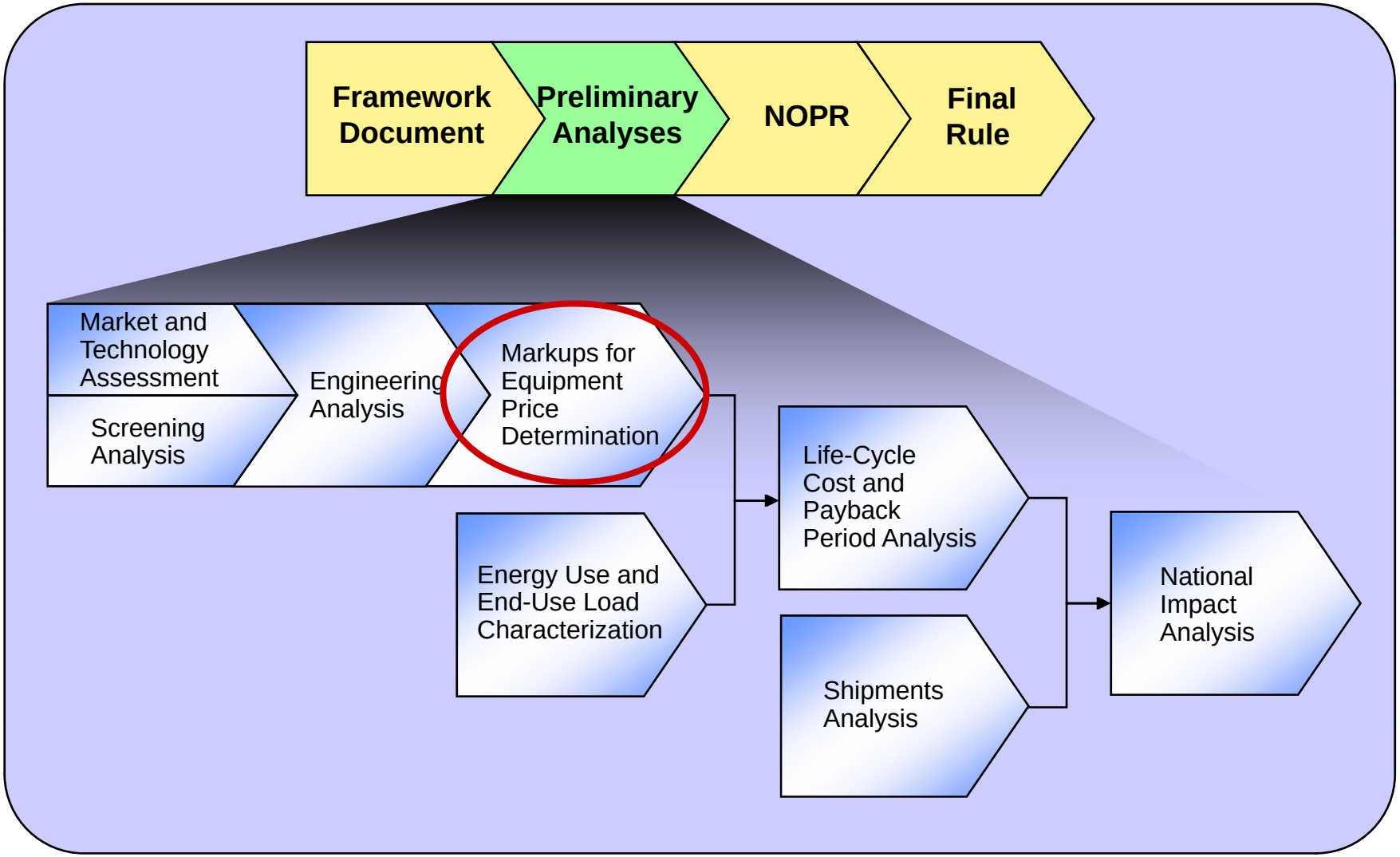
Outside Regulatory Changes

- Consider the effects to manufacturers of other regulatory changes outside of the standards rulemaking process.

Item 5-5 Are there proprietary designs that the Department should consider for any of the equipment under consideration by this rulemaking? If so, how should the Department acquire the cost data necessary for evaluating these designs?

Item 5-6 Are there additional outside issues that the Department should consider in its analysis of walk-in coolers and freezers?

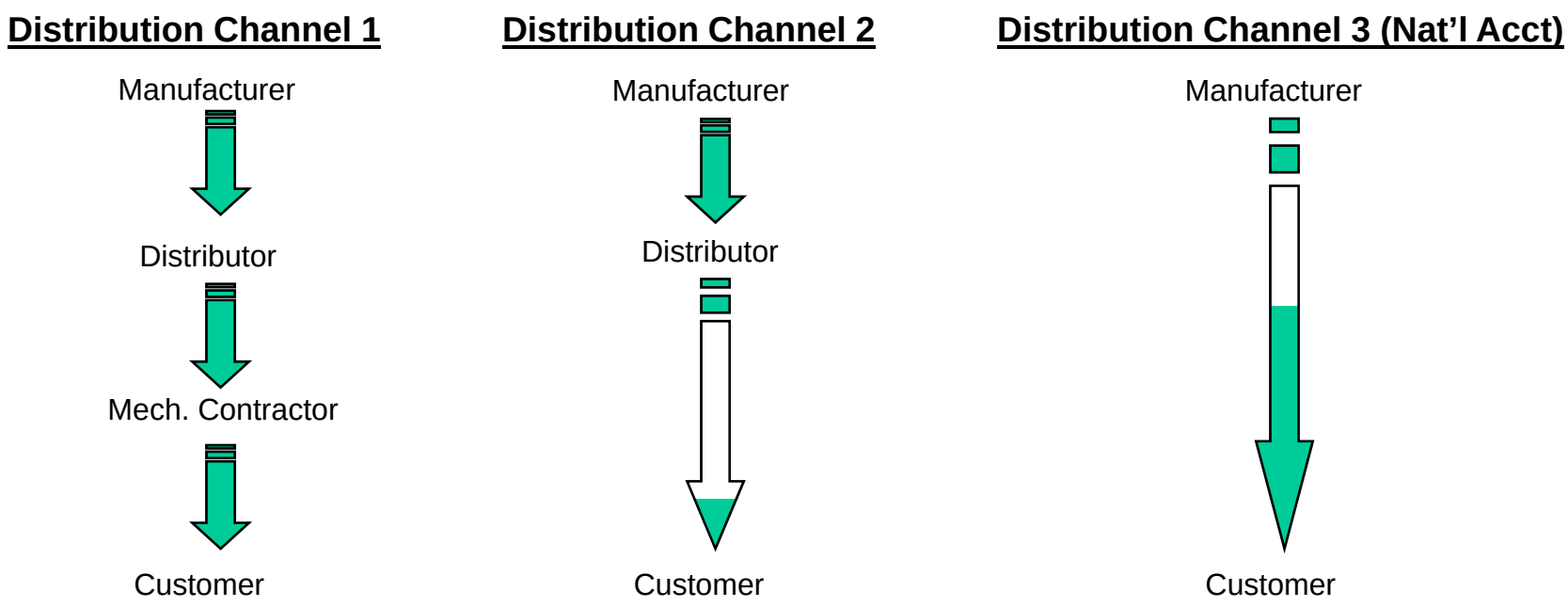
Preliminary Analyses



Purpose

- Develop overall distribution chain price markups from the manufacturer to the customer.
- Establish the customer prices for both baseline equipment and equipment at higher standard levels.

Distribution Channels



Two Types of Markups in Distribution Chain: Baseline and Incremental

- Markups relate consumer price to cost of goods sold (CGS).
  - Baseline markups relate price to cost prior to a change in efficiency.
  - Baseline markups indicate a customer price that covers all of a distributor's or contractor's expenses plus profit.

Some costs may remain constant when CGS increases

- Incremental markups relate the incremental change in consumer price to the incremental change in CGS.
  - Incremental markups cover only expenses that vary with CGS – in this case, expenses that increase due to an increase in equipment efficiency.
  - Certain costs, such as direct labor costs (salaries, payroll, rental and occupancy) do not vary with efficiency induced changes in CGS and remain constant in the calculation of incremental markups.

Request for Feedback

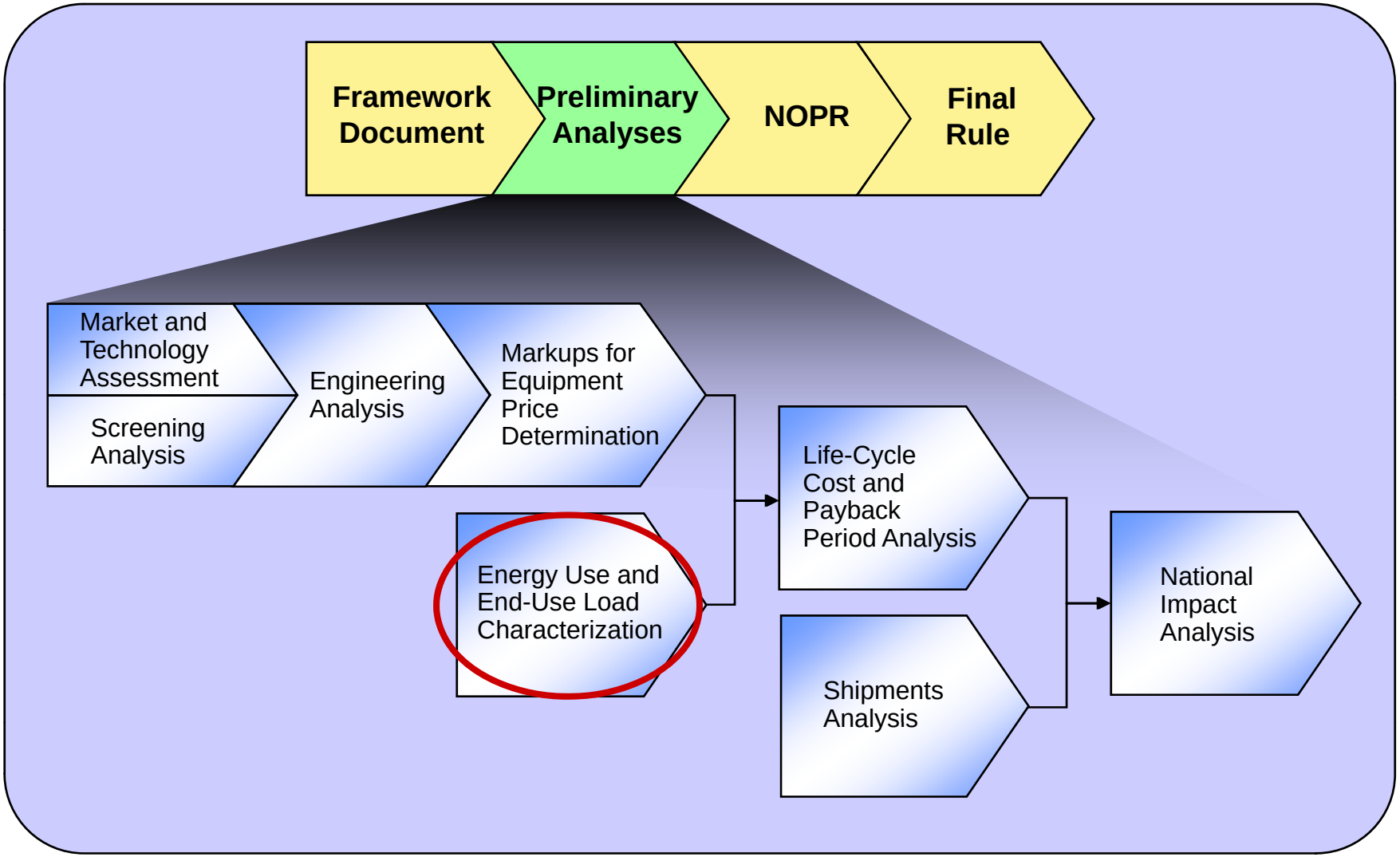
Item 7-1 The Department requests information from interested parties on the proposed distribution paths for the walk-in coolers and freezers covered under this rulemaking. The Department also requests information on the relative fractions of shipments expected for each path.

Item 7-2 The Department requests feedback on if the overall markups for the walk-in coolers and freezers covered under this rulemaking for each path in the distribution chain.

Item 7-3 The Department requests feedback on its proposal to use incremental distribution chain markups for the life cycle cost (LCC) analysis.

Item 7-4 The Department seeks comment on other sources of relevant data that could be used to characterize markups for the walk-in coolers and freezers.

Preliminary Analyses



Purpose

- Develop energy use and peak electricity demand characteristics for buildings that use walk-in coolers and freezers.
- Provide the basis for the unit energy costs used in the Life-Cycle Cost Analysis.

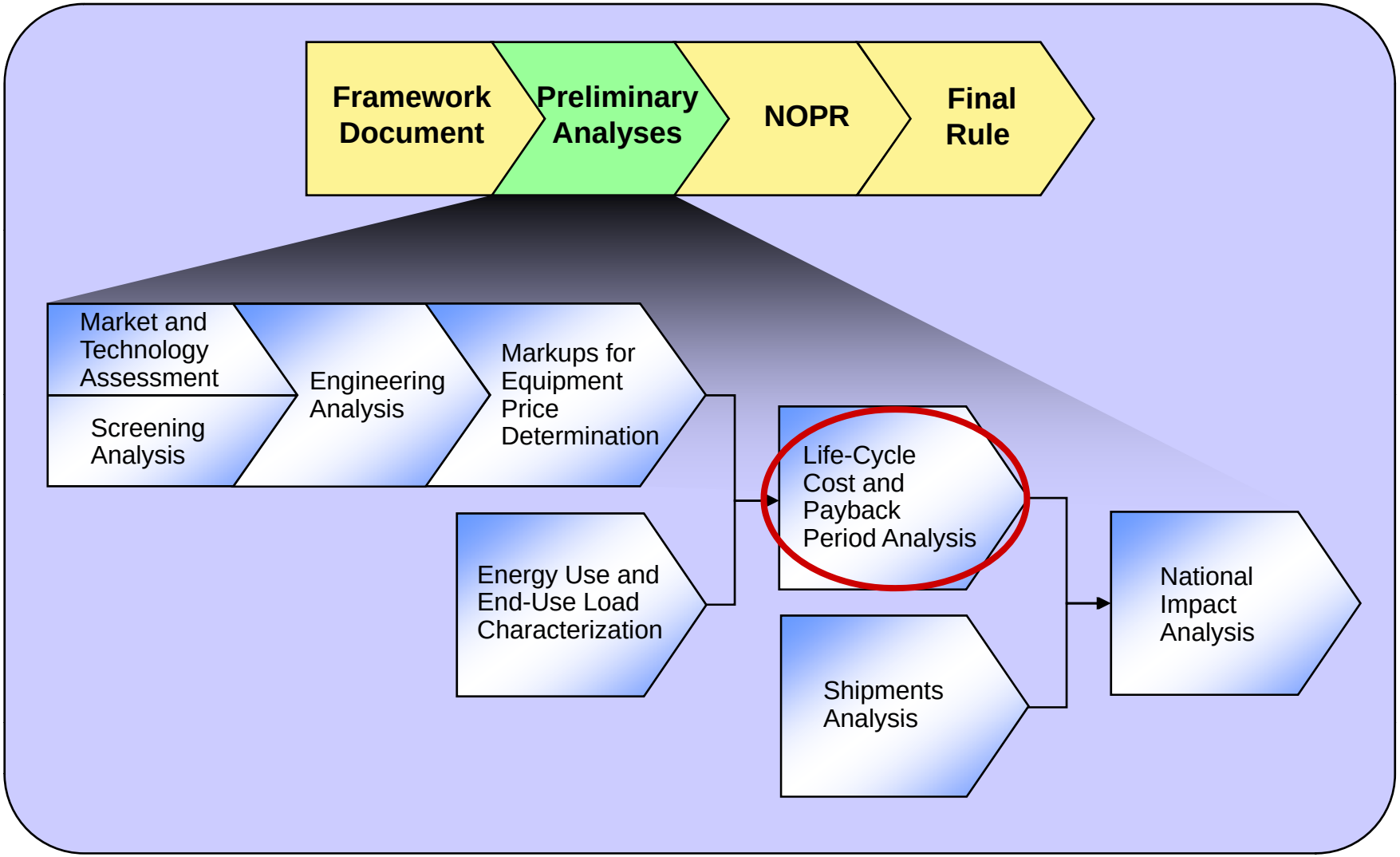
Method

- The Department is considering conducting a simplified analysis of walk-in coolers and freezers that does not address the impact of higher-efficiency design options on building space heating and cooling loads, but is based on the engineering analysis tools the Department is developing for walk-in coolers and freezers.
- Statistical data will be used to develop appropriate weights for the resulting energy use data. These weights will be used to develop regional and national average net energy use figures as well as energy use distributions for specific equipment classes and efficiency levels.

Request for Feedback

Item 6-1 The Department seeks input on the relative merits of incorporating the whole building space heating and cooling energy in its energy analysis of walk-in coolers and freezers. If a whole building analysis is recommended, the Department seeks the reasons supporting this type of analysis as well as comments on what building types and analysis tool, and for which equipment classes, such analysis should be considered.

Preliminary Analyses

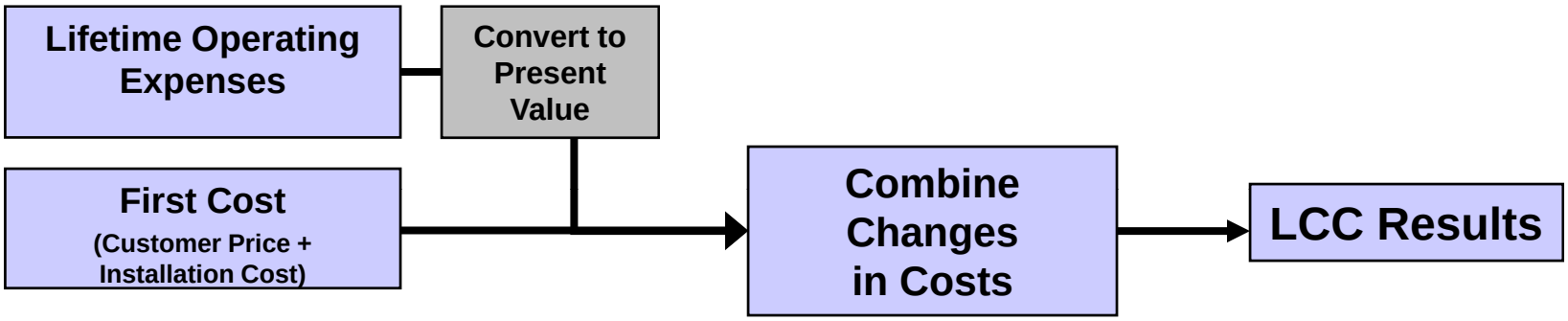


Purpose

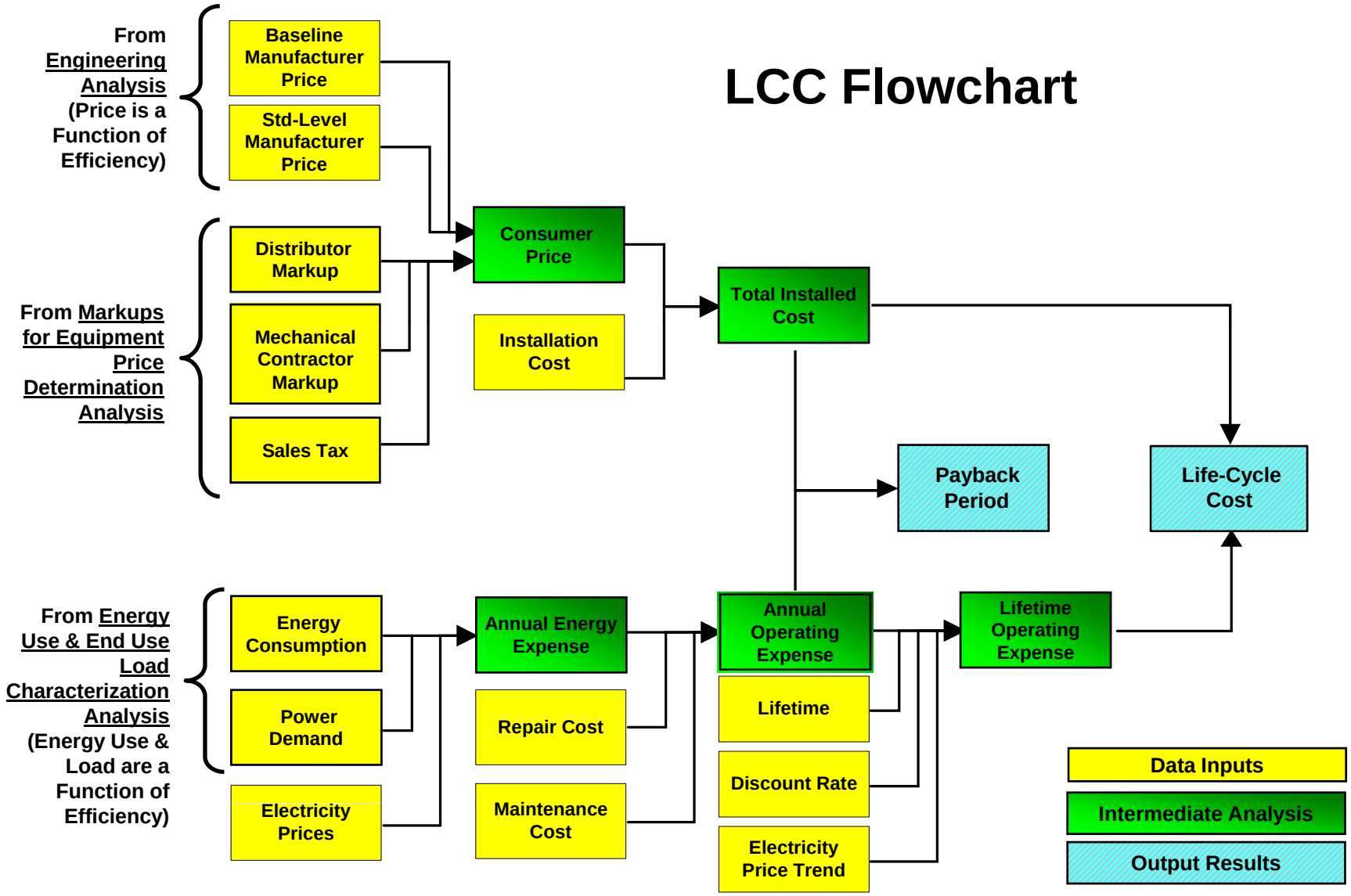
- Assess the net life cycle cost (LCC) impacts of differing efficiency levels for walk-in coolers and freezers on the customer.

Method

- LCC equals customer price plus the sum of annual operating costs discounted to a particular base year.
- Economic evaluation from the customer perspective.
- Analysis Implemented in an Excel spreadsheet.
- Results are expressed as LCC difference (baseline minus standard level).
- Simple payback (years) is also calculated and reported in this analysis.



LCC Flowchart



Energy Prices

- Energy prices are necessary to convert the energy consumption for the equipment analyzed to energy costs.
- DOE proposes to use regional average electricity and natural gas fuel prices for its analysis of walk-in coolers and freezers.
- DOE will use the Energy Information Administration (EIA) *Annual Energy*
- DOE will use the latest *AEO* forecasts for subsequent analyses, as they become available.

Item 8-1 The Department seeks comment on the proposed approaches for estimating current and forecasted energy prices.

Discount Rates

- Discount rates are used to convert streams of annual operating expenses to present value in the LCC analysis.
- The Department will derive the LCC discount rates by estimating the weighted average cost of capital (WACC) for companies that purchase walk-in coolers and freezers.

Item 8-2 The Department seeks comment on the proposed approaches for estimating discount rates for customers purchasing the equipment covered under this rulemaking.

Item 8-3 Given the relatively narrow commercial application of most of the equipment covered under this rulemaking, which, if any, commercial sectors beyond grocery stores and restaurants should be considered in the evaluation of discount rates? In addition, do interested parties feel government purchases of this equipment are large enough to require that they be included in the evaluation of discount rates?

Other LCC and PBP Analysis Inputs

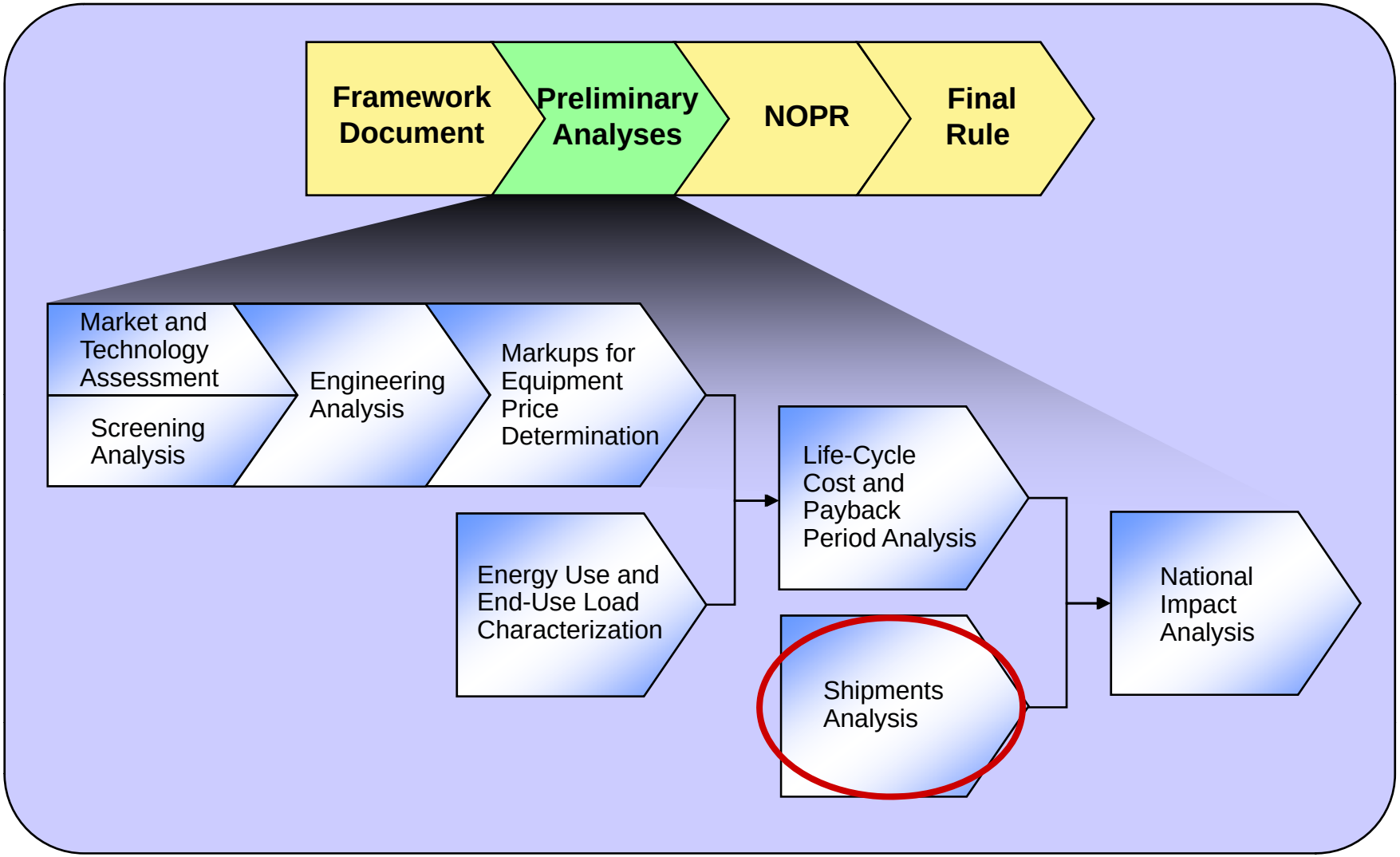
- Installation costs
- Equipment lifetime
- Repair costs
- Maintenance costs

Item 8-4 The Department seeks feedback on whether changes in maintenance, repair, and installation costs will be negligible for equipment with lower energy consumption. The Department also seeks feedback on whether changes in maintenance, repair, and installation costs will change as a result of efficiency increases and, if so, whether those changes are likely to be negligible. If those costs are not likely to be negligible, please explain what those costs would be and why this would likely be the case.

Item 8-5 If it is not appropriate to assume that changes in maintenance, repair, or installation costs would be negligible for equipment with lower energy consumption, the Department seeks comment on appropriate methodologies for assessing changes to each of these costs.

Item 8-6 The Department seeks comment on appropriate equipment lifetimes for the equipment covered in this rulemaking and the basis for these estimates.

Preliminary Analyses



Purpose

- Project the rate of new equipment shipments under a proposed energy conservation standard.
- Track the WICF equipment stock of equipment, by vintage, over the time frame of the standard.
- Develop a base case shipments forecast to compare against the standards case forecasts.

Method

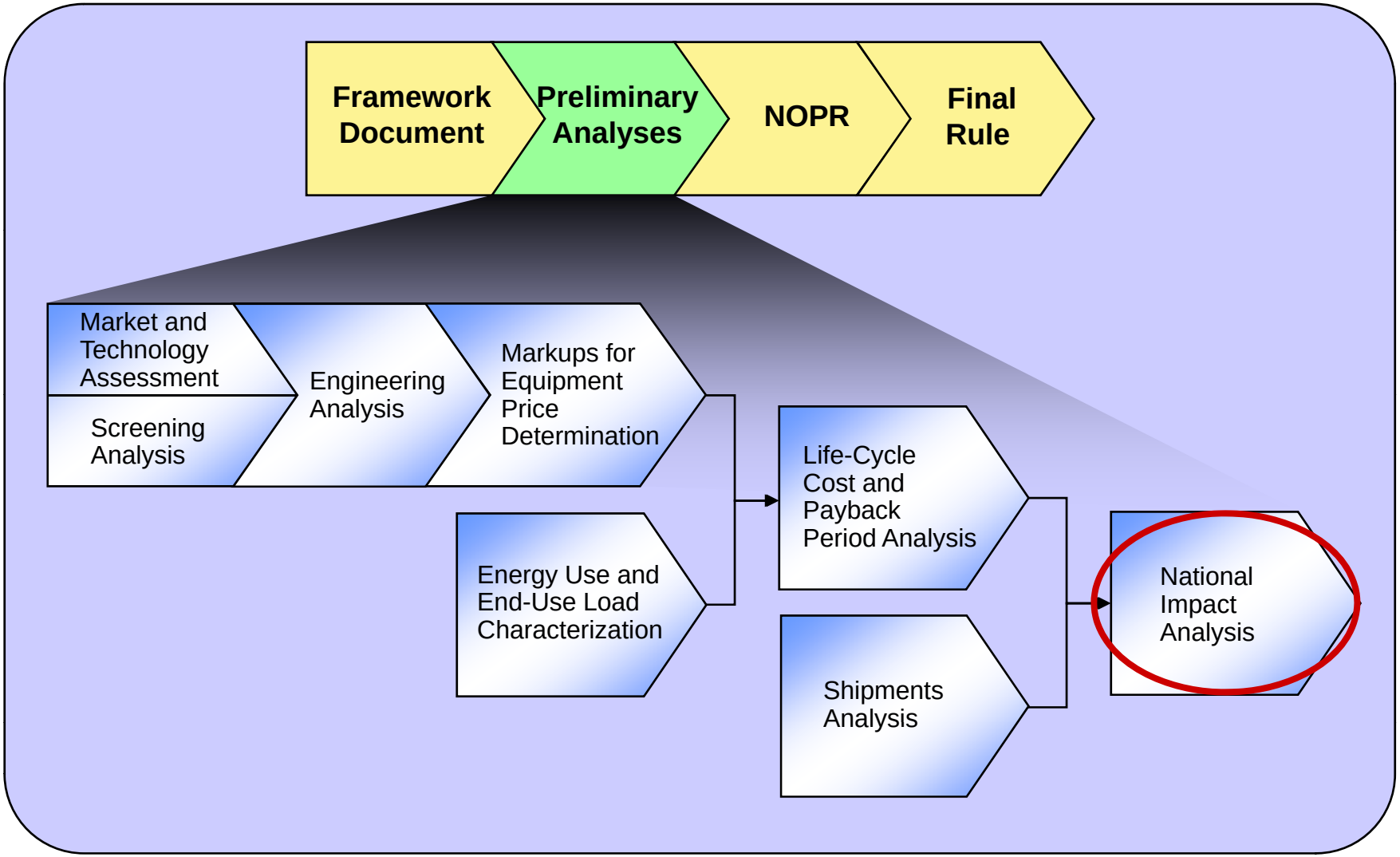
- The life cycle of equipment is modeled as a "cradle to grave" process in which equipment moves from one state to another.
  - New equipment is purchased and shipped to a building.
  - Equipment operates for some number of years in a building or attached to a building.
  - Also, some equipment is "constructed on-site."
  - The equipment is retired.
- Data sources used include: product lifetimes, estimates of commercial
- The shipments model is calibrated to historical shipments and market saturation data.

Request for Feedback

Item 9-1 The Department seeks information on representative saturation rates for each equipment$_{c}$ lass covered$_{un}$ der this rulemaking, as well as industry-trend data regarding relative growth in each equipment class.

Item 9-2 As part of its preliminary manufacturer impact analysis, the Department will seek input from manufacturers on the potential impact of new energy conservation standards on equipment shipments. Other interested parties are also welcome to provide input. The Department also requests input on any market-pull programs that currently exist to promote the adoption of more-efficient WICF equipment.

Preliminary Analyses



Purpose

- Develop National Energy Savings (NES) and National Net Present Value $(NPV)_{im}$ pact estimates for higher-efficiency standard levels.

Method

- Uses a spreadsheet-based analysis tool.
- Develops annual time series of energy and economic impacts.
- Provides national summations of impacts for defined analysis periods.
- Utilizes the shipments model to estimate the total stock of covered walk-in coolers and freezers products in service in any year.
- Utilizes the LCC to estimate cost and energy use per unit in any given year.
- Aggregates the costs and energy use, by vintage, for all years in the analysis period.
- Reports estimates for energy use at the source of production (quads source energy).
- Reports estimates for economic impact as change in NPV (in constant year dollars.)
- Accounts for the time-value of money though use of defined discount rates.

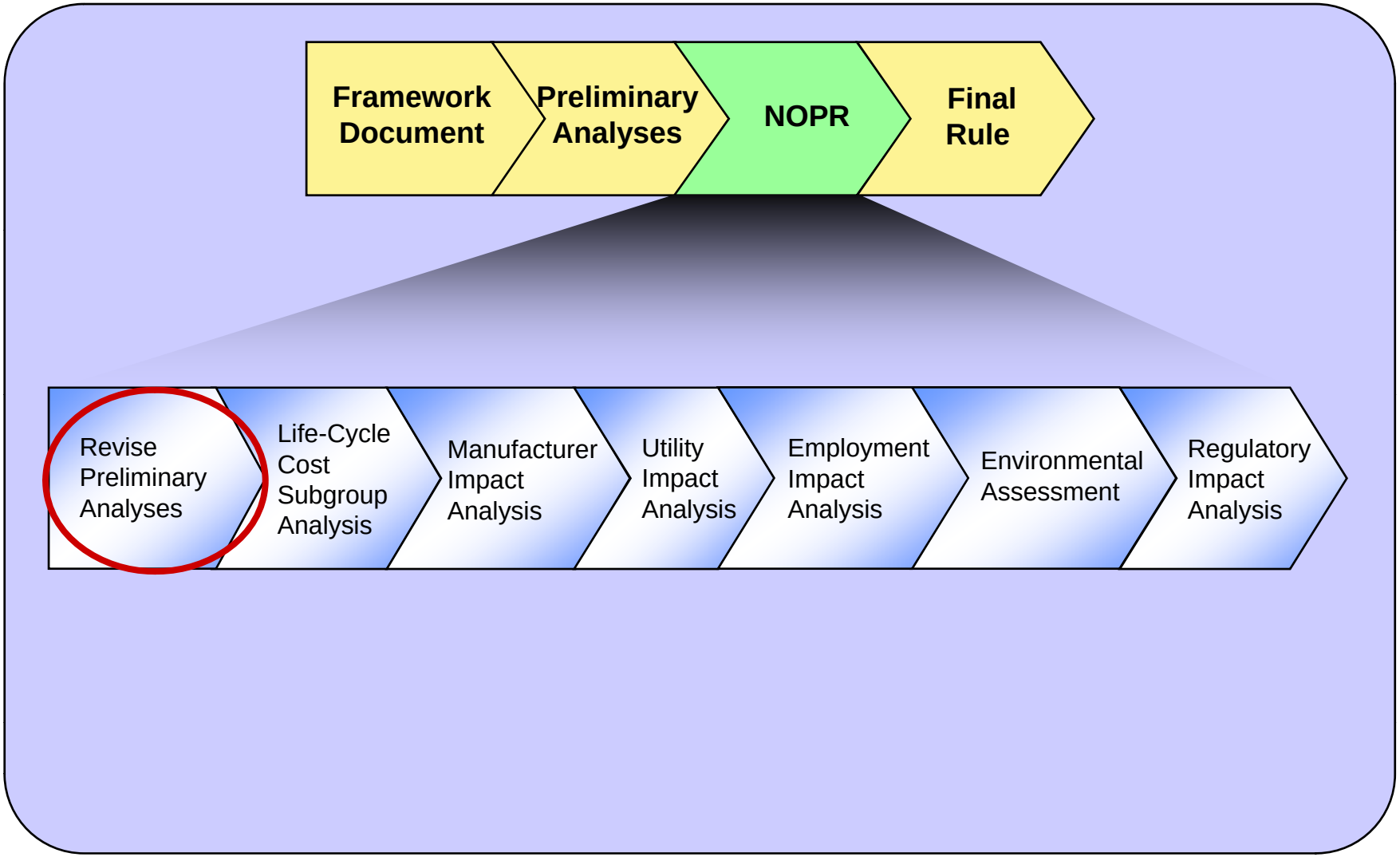
Request for Feedback

Item 10-1 The Department seeks comment on its plan to develop NES spreadsheet models for estimating national impacts of energy conservation standards for covered WICF equipment.

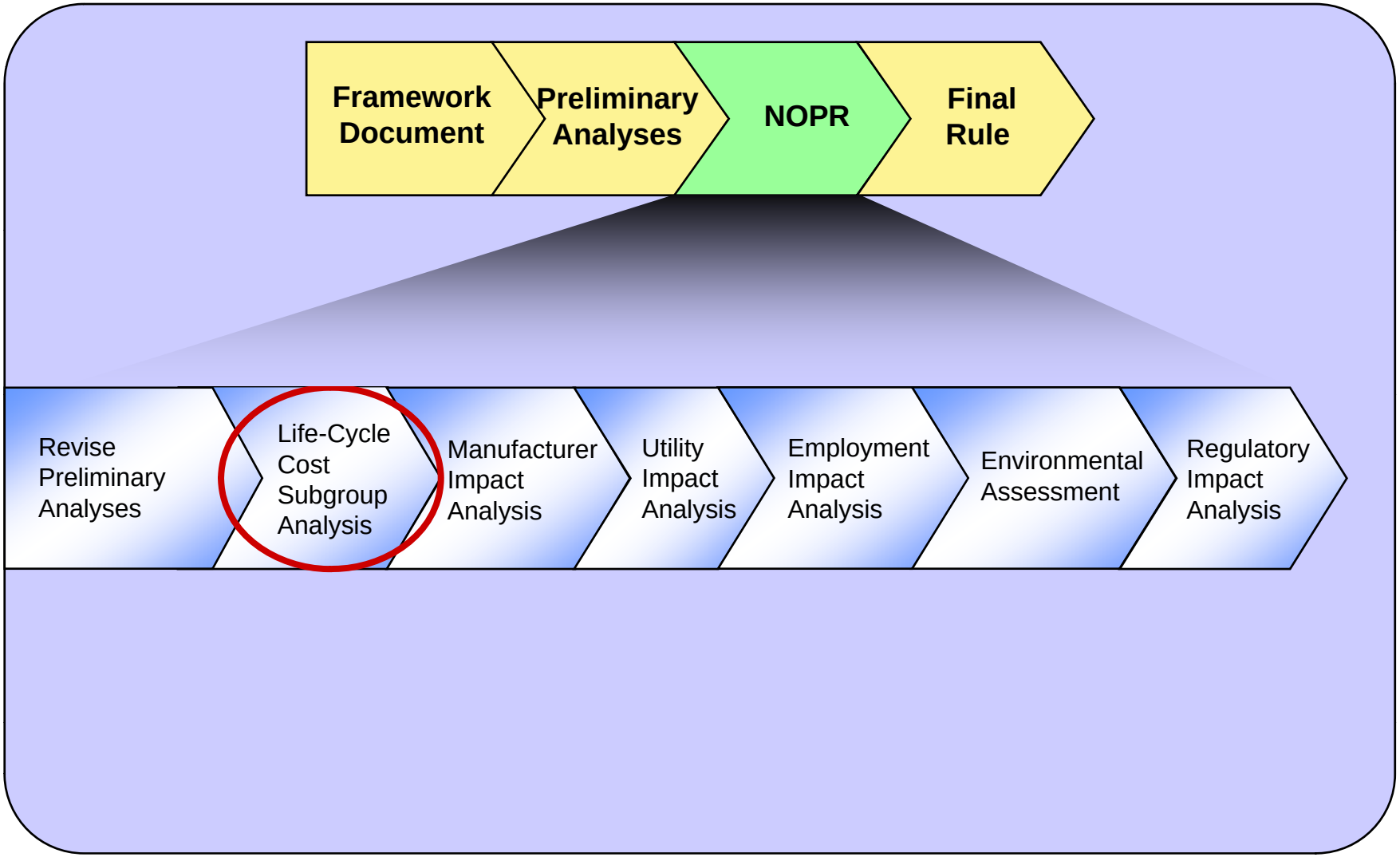
Public Meeting Agenda

1 Introduction
2 Rulemaking Overview
3 Preliminary Analyses
4 NOPR Analyses
5 Final Rule Analyses
6 Closing Remarks

Analyses for Notice of Proposed Rulemaking



Analyses for Notice of Proposed Rulemaking



Purpose

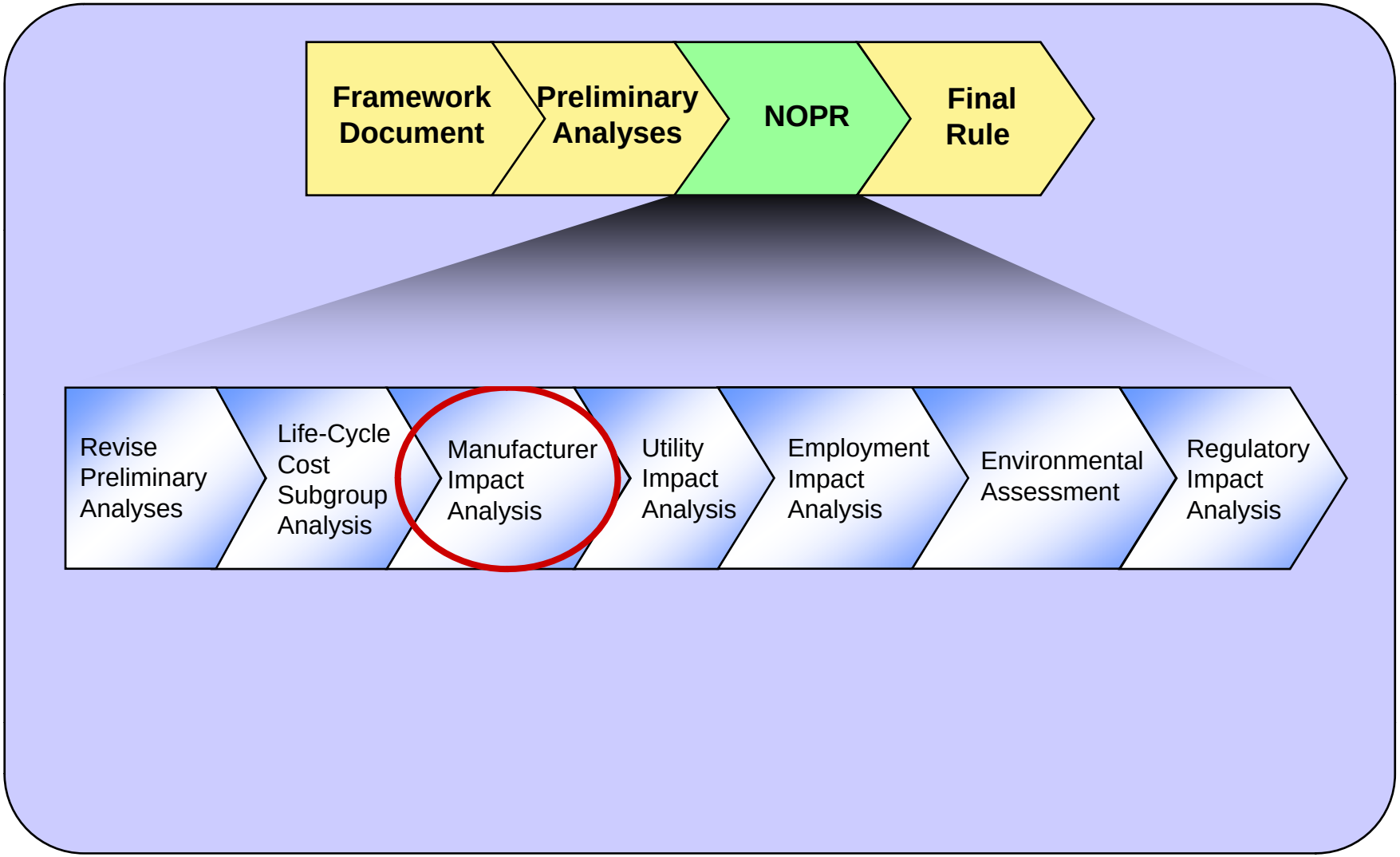
- Analyze the economic impacts of standards on customer subgroups who may be disproportionately impacted compared$_{W}$ ith the general user population.

Method

- Extend the LCC analysis to examine the impacts for defined subgroups.

Item 11-1 The Department seeks input as to what customer subgroups the Department should consider in the present rulemaking. Examples of possible subgroups the Department could consider appropriate for walk-in coolers and freezers include independent grocery stores and small convenience stores.

Analyses for Notice of Proposed Rulemaking



Purpose

- Assess the impacts of standards on manufacturers.
- Identify and estimate impacts on manufacturer subgroups that may be more severely impacted than the industry as a whole.
- Examine the impact of cumulative regulatory burden on the industry.

Method

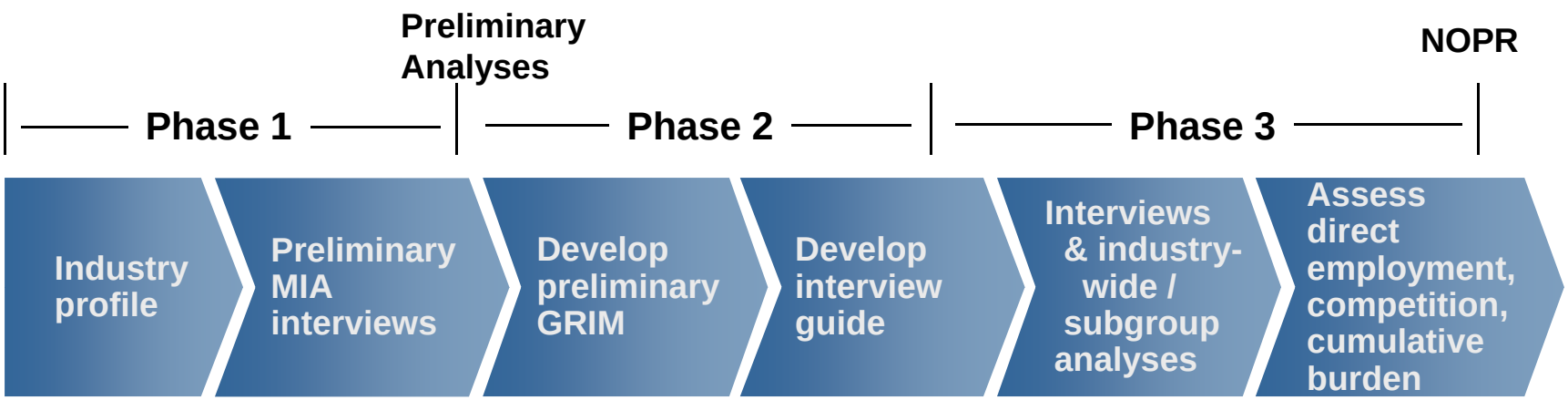
- Analyze industry cash flow and net present value through use of the Government Regulatory Impact Model (GRIM).
- Interview manufacturers to refine inputs to the GRIM, develop subgroup analyses, and address qualitative issues.

Output

- Industry NPV impacts.
- Subgroup NPV impacts.
- Other impacts.

Methodology

- The MIA consists of three main phases:



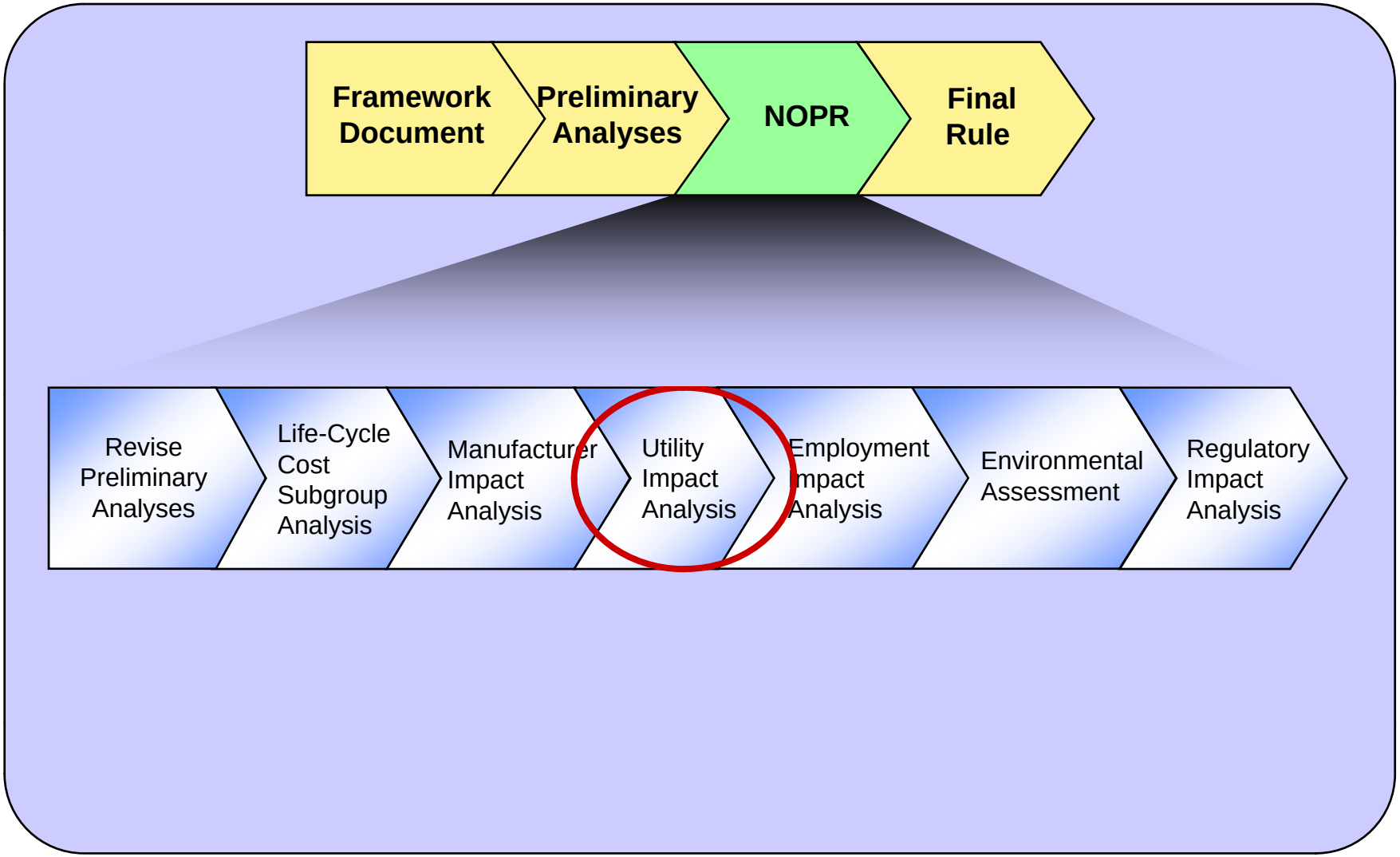
Request for Feedback

Item 12-1 What procedures should DOE follow when scheduling interviews and requesting information?

Item 12-2 DOE seeks comment on the establishment of manufacturer subgroups for walk-in coolers and freezers.

Item 12-3 What regulations or pending regulations should DOE consider in the analysis of cumulative regulatory burden?

Analyses for Notice of Proposed Rulemaking



Purpose

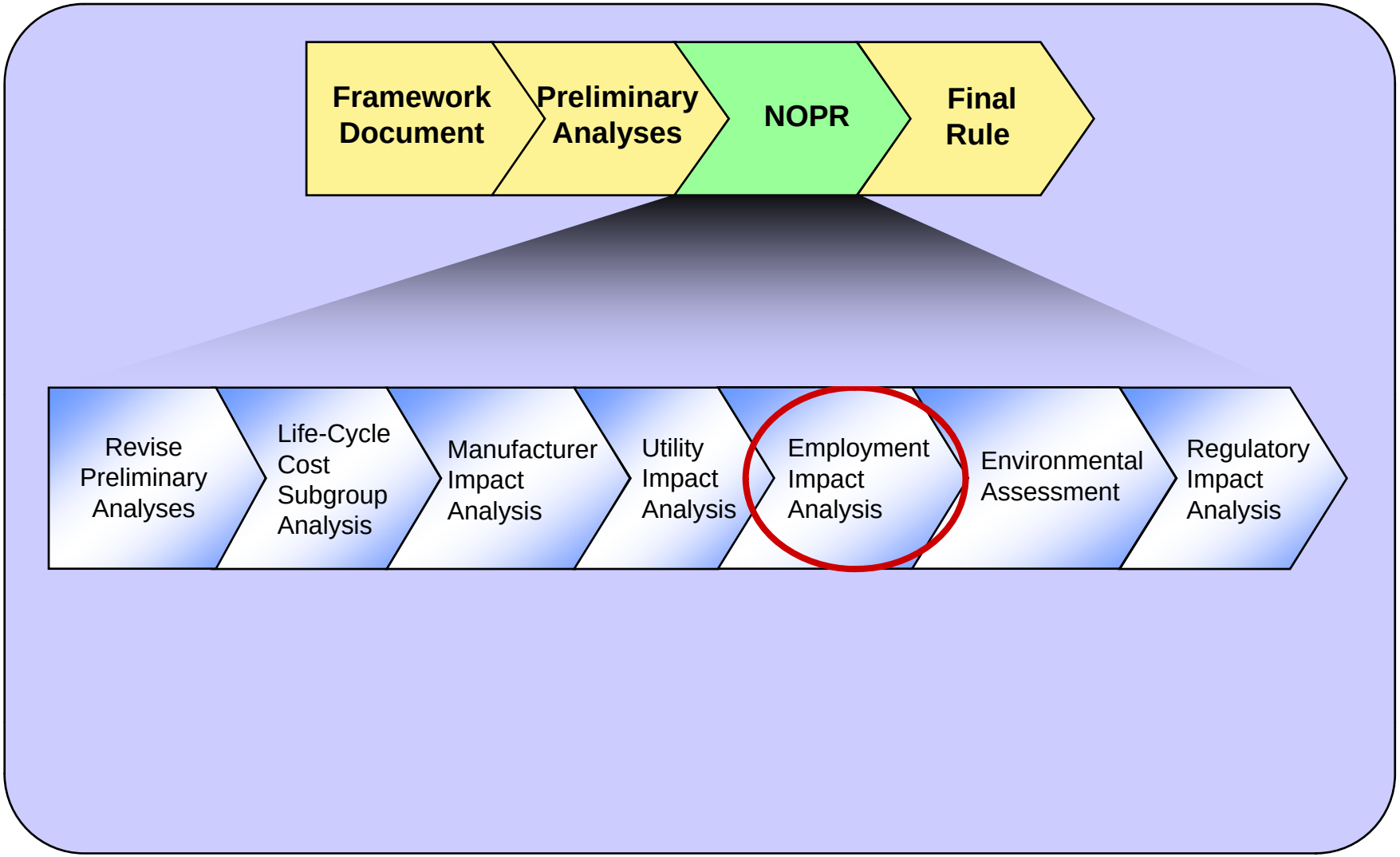
- Assess the overall impacts on domestic energy supplies that would result from implementation of energy conservation standards.

Method

- The Department proposes to use NEMS-BT, a variant of the NEMS (National Energy Modeling System) developed and used by DOE/EIA for their *Annual Energy Outlook* report, as the basis of the Utility Impact Analysis.
- Use the energy savings calculated from the NES spreadsheet analysis to reduce the sector electrical loads from the Commercial Building Demand Module in NEMS-BT.
- Energy savings translated to a reduction in the electrical demand faced by the utility system over time resulting from the energy conservation standard.

Item 13-1 The Department seeks input from interested parties on its proposed use of NEMS-BT to conduct the utility impact analysis.

Analyses for Notice of Proposed Rulemaking



Purpose

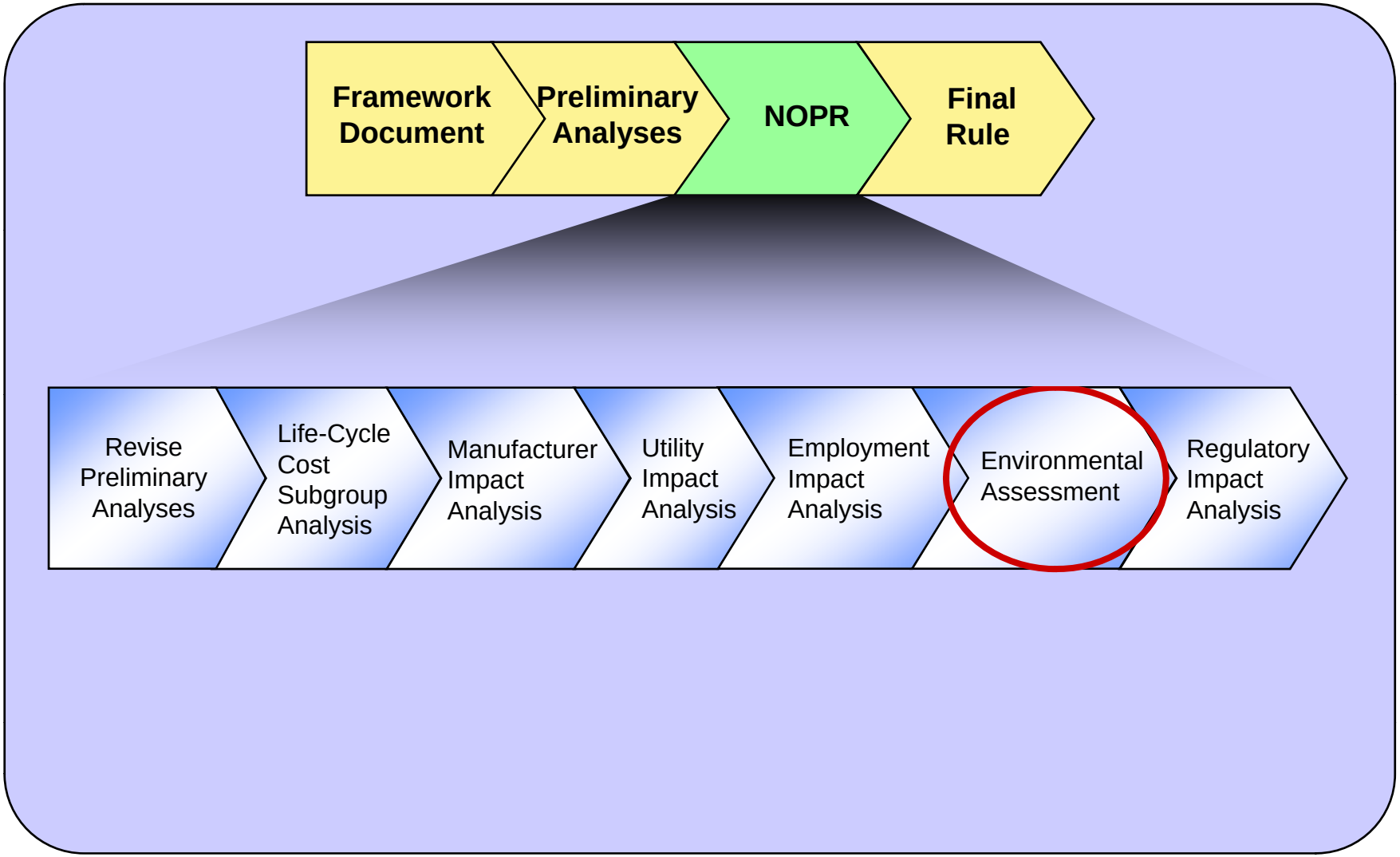
- Assess the overall impact on national employment from energy conservation standards.
- Include both direct and indirect employment impacts.
  - Direct employment impacts are estimated in the manufacturer impact analysis.
  - Indirect employment impacts result from shifting customer expenditures among goods and services (“substitution effect”) and changing equipment and energy costs (“income effect”).

Method

- The Department intends to use the IMSET (Impact of Sector Energy Technologies) model for the evaluation of indirect employment impacts.

Item 14-1 The Department requests feedback on this approach to assessing employment impacts.

Analyses for Notice of Proposed Rulemaking



Purpose

- Estimate national environmental impacts from a new energy conservation standard for walk-in coolers and freezers covered under this rule.

Method

- The Department intends to use the environmental impacts predicted from the NEMS-BT modeling analysis used for the Utility Impact Analysis. Impacts calculated within NEMS include:
  - Quantities of U.S. emissions of nitrogen oxides (NO_x), mercury (Hg) and (CO_2) and from power plants.
  - Direct environmental impacts from reduction of fossil fuel use at the building level.
  - Any measurable impact from NEMS in terms of the trading price of sulfur dioxide (SO_2) in the utility sector and subsequent impact on SO_2 emissions.
- DOE will examine economic values associated with emissions reductions.

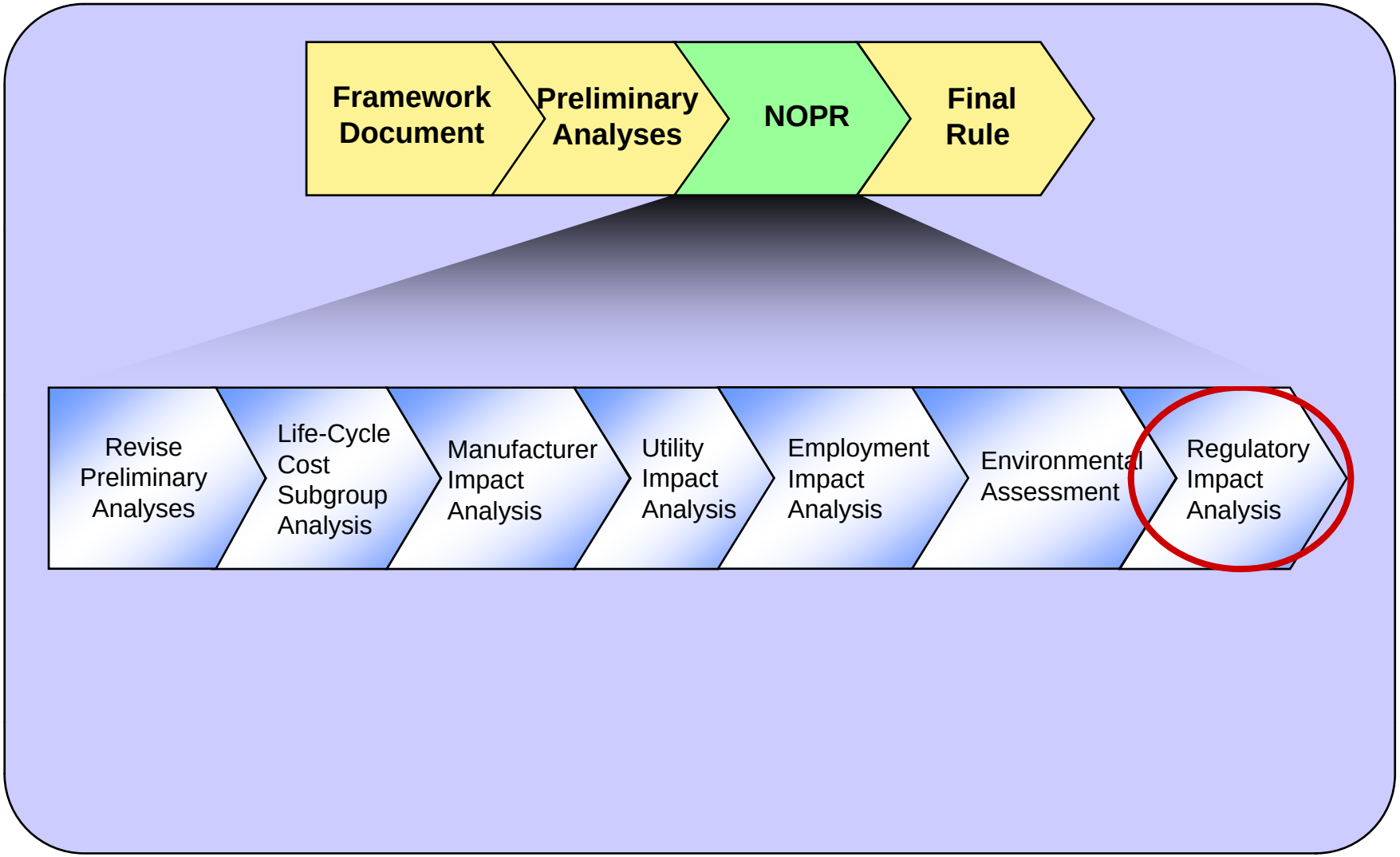
Request for Feedback

Item 15-1 The Department seeks input from interested parties on its plans to use NEMS-BT to conduct the environmental impact analysis on the equipment covered by this rulemaking. DOE is particularly interested in whether there are any other approaches to the environmental assessment that it should consider and the advantages and disadvantages for each of those approaches.

Item 15-2 DOE invites comments on how to estimate such monetary values associated with emissions reductions or on any widely accepted values which might be used in DOE's analyses.

Item 15-3 DOE seeks input on other environmental factors to consider in this rulemaking.

Analyses for Notice of Proposed Rulemaking



Purpose

- Explore the potential for non-regulatory approaches to supplant or augment energy conservation standards to improve efficiency for WICF equipment.

Method

- Base the assessment on the actual impacts of any such initiatives to date. DOE will consider information presented regarding the impacts that any existing initiative might have in the future.

Item 16-1 The Department is unaware of any current non-regulatory initiatives that specifically target the walk-in coolers and freezers covered under this rulemaking. Are interested parties aware of any such initiatives that should be examined as optional, non-regulatory approaches?

Item 16-2 Are there specific subgroups of end-users whom the Department should consider in its review of potential adverse impacts from standards developed under this rulemaking?

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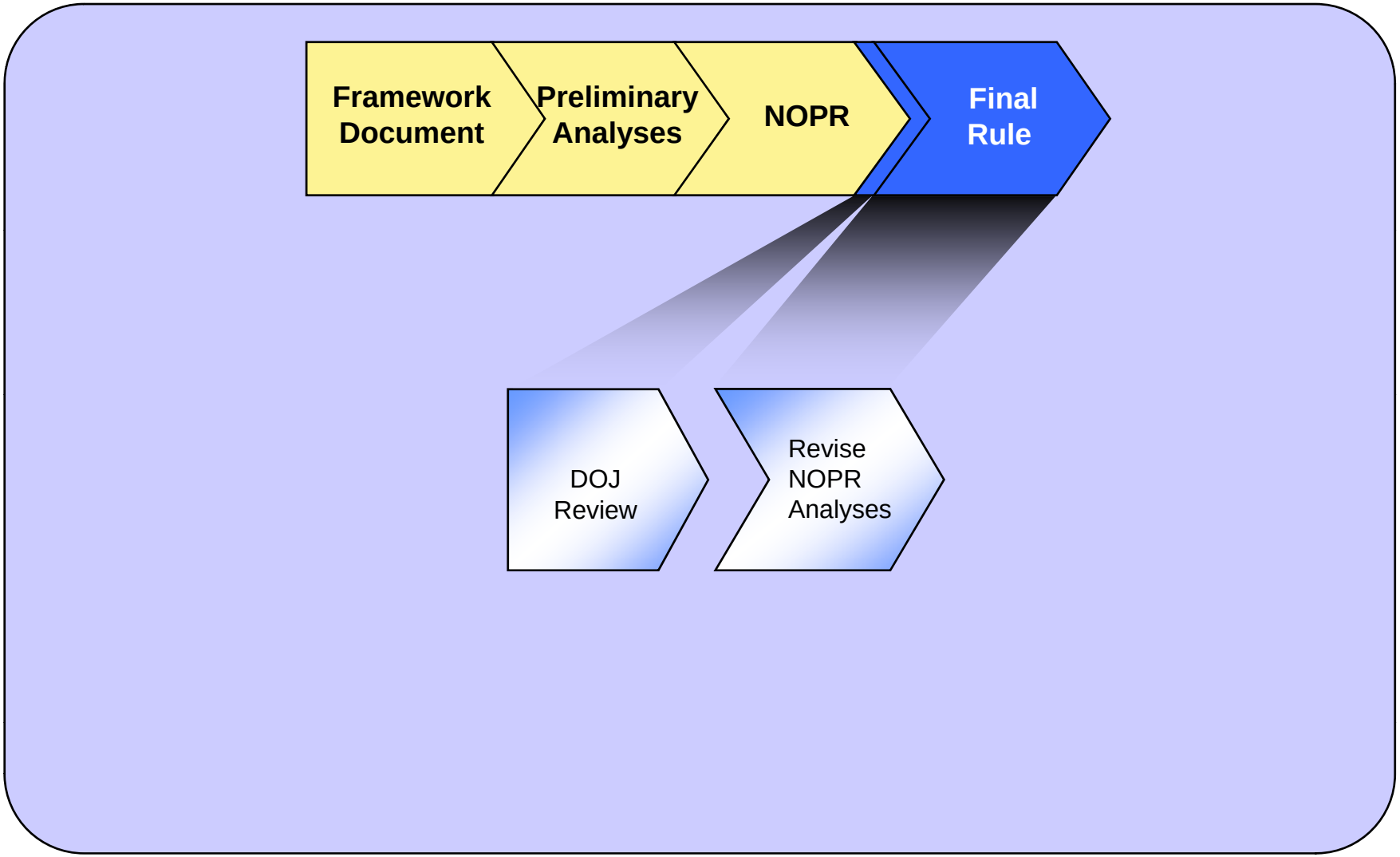
Analyses for Final Rule



Public Meeting Agenda

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Thank you. For more information…

- Website:

  http://www.eere.energy.gov/buildings/appliance_standards/

  http://www1.eere.energy.gov/buildings/appliance_standards/commercial/wicf.html

- Written comments
  - The comment period will be open until **February 12, 2009**.
    Please reference the rulemaking docket number **EERE-2008-BT-STD-0015** and/or RIN number **1904-AB86**, in all correspondence.

Email: **wicf-2008-std-0015@ee.doe.gov**

Mail:
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U.S. Department of Energy
Building Technologies Program, Mail stop EE-2J
Framework for Walk-In Coolers and Walk-In Freezers, RIN 1904-AB86
1000 Independence Avenue, SW
Washington DC, 20585-0121

Courier:
Brenda Edwards
U.S. Department of Energy
Building Technologies Program
Walk-In Coolers and Freezers Rulemaking, RIN 1904-AB86
950 L'Enfant Plaza, 6th Floor
Washington, DC 20024

- Contact:

  Charles Llenza, (202) 586-2192, or charles.llenza@ee.doe.gov

BACKUP SLIDES

Legislative Requirements

- EPCA
  - DOE must consider the economic impact of standards on manufacturers.
  - DOE must consider the impacts of any lessening of competition in the industry.
- The Process Rule
  - "Procedures, Interpretations and Policies for Consideration of New or Revised Energy Conservation Standards for Consumer Products" (10 CFR 430, Subpart C, Appendix A).
  - Contains principles for the analysis of regulatory impacts on manufacturers.
- 2006 Report to Congress
  - DOE announced changes to the format of the MIA (as required by section 141 of EPACT 2005).
  - DOE will collect, evaluate, and report preliminary manufacturer impact analysis information in the Preliminary Analyses phase.
  - This information includes the anticipated conversion capital expenditures by efficiency level and the anticipated impacts on jobs.

Background: Performance Standards

- EISA Section 312(b): Directs DOE to issue energy conservation standards.
  A. "The Secretary shall publish performance-based standards for walk-in coolers and walk-in freezers that achieve the maximum improvement in energy that the Secretary determines is technologically feasible and economically justified" by **January 1, 2012.**
  B. The standards shall apply to walk-ins that are manufactured beginning on the date that is **3 years after the final rule is published.** If the Secretary determines, by rule, that a 3-year period is inadequate, the Secretary may establish an effective date for walk-ins manufactured beginning on the date that is not more than **5 years after the date of publication of a final rule.**

Background: Test Procedures

- EISA Section 312(c): Details requirements for test procedures.
  A. For the purpose of test procedures for walk-in coolers and walk-in freezers:
     i. The R value shall be the 1/K factor multiplied by the thickness of the panel.
     ii. The K factor shall be based on ASTM test procedure C518-2004.
     iii. For calculating the R value for freezers, the K factor of the foam at 20 °F (average foam temperature) shall be used.
     iv. For calculating the R value for coolers, the K factor of the foam at 55 °F (average foam temperature) shall be used.;
  B. Development of a test procedure:
     i. Not later than **January 1, 2010**, the Secretary shall establish a test procedure to measure the energy use of walk-in coolers and walk-in freezers.
     ii. The test procedure may be based on computer modeling, if the computer model or models have been verified using the results of laboratory tests on a significant sample of walk-in coolers and walk-in freezers.

Background: Design Standards: EISA Section 312(b)

- EPCA Section 342(f)(1): "In general.— …each walk-in cooler or walk-in freezer manufactured on or after January 1, 2009, shall—
  - A. "have automatic door closers that firmly close all walk-in doors that have been closed to within one inch of full closure, except that this subparagraph shall not apply to doors wider than 3 feet 9 inches or taller than 7 feet;
  - B. "have strip doors, spring hinged doors, or other method of minimizing infiltration when doors are open;
  - C. "contain wall, ceiling and door insulation of at least R-25 for coolers and R-32 for freezers, except that this subparagraph shall not apply to glazed portions of doors nor to structural members;
  - D. "contain floor insulation of at least R-28 for freezers;
  - E. "for evaporator fan motors of under 1 horsepower and less than 460 volts, use—
    - i. "electronically commutated motors (brushless direct current motors); or
    - ii. "3-phase motors;
  - F. "for condenser fan motors of under 1 horsepower, use—
    - i. "electronically commutated motors;
    - ii. "permanent split capacitor-type motors; or
    - iii. "3-phase motors; and
  - G. For all interior lights, use light sources with an efficacy of 40 lumens per watt or more, including ballast losses (if any), except that light sources with an efficacy of 40 lumens per watt or less, including ballast losses (if any), may be used in conjunction with a timer or device that turns off the lights within 15 minutes of when the walk-in cooler or walk-in freezer is not occupied by people."

Background: Design Standards: EISA Section 312(b)

- EPCA Section 342(f)(1): "Electronically commutated motors.—
  A. "In general.— The requirements of paragraph (1)(E)(i) for electronically commutated motors shall take effect January 1, 2009, unless, prior to that date, the Secretary determines that such motors are only available from 1 manufacturer.
  B. "Other types of motors.— In carrying out paragraph (1)(E)(i) and subparagraph (A), the Secretary may allow other types of motors if the Secretary determines that, on average, those other motors use no more energy in evaporator fan applications than electronically commutated motors.
  C. "Maximum energy consumption level.— The secretary shall establish the maximum energy consumption level under subparagraph (B) not later than January 1, 2010.

Background: Design Standards: EISA Section 312(b)

- EPCA Section 342(f)(1): "Additional specifications.— Each walk-in cooler and walk-in freezer with transparent reach-in doors manufactured on or after January 1, 2009, shall also meet the following specifications:
  A. "Transparent reach-in doors for walk-in freezers and windows in walk-in freezer doors shall be of triple-pane glass with either heat-reflective treated glass or gas fill.
  B. "Transparent reach-in doors for walk-in coolers and windows in walk-in cooler doors shall be:
     i. "double-pane glass with heat-reflective treated glass and gas fill; or
     ii. "triple-pane glass with either heat-reflective treated glass or gas fill.
  C. "If the appliance has an antisweat heater without antisweat heater controls, the appliance shall have a total door rail, glass, and frame heater power draw of not more than 7.1 watts per square foot of door opening (for freezers) and 3.0 watts per square foot of door opening (for coolers).
  D. "If the appliance has an antisweat heater with antisweat heater controls, and the total door rail, glass, and frame heater power draw is more than 7.1 watts per square foot of door opening (for freezers) and 3.0 watts per square foot of door opening (for coolers), the antisweat heater controls shall reduce the energy use of the antisweat heater in a quantity corresponding to the relative humidity in the air outside the door or to the condensation on the inner glass pane."