



Framework Public Meeting
for Wine Chillers and Miscellaneous
Refrigeration Products

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- Meeting Agenda
- Introductions
- Role of the Facilitator
- Ground Rules
 - Listen as an ally
 - Focus on issues
 - Use short, succinct statements/keep to the point
 - One person speaks at a time (raise hand to be recognized; state your name for the record)
 - Hold sidebar conversations outside the room
 - Set cell phones to silent/vibrate
- Housekeeping Items

At this time DOE welcomes opening remarks/statements on the framework document for wine chillers and miscellaneous refrigeration products.

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Meeting Purpose

- Present procedural and analytical approaches to evaluate energy conservation standards for wine chillers and miscellaneous refrigeration products.
- Provide a forum for public discussion of rulemaking issues.
- Encourage interested parties to submit data, information, and written comments.
- Inform interested parties and facilitate the rulemaking process.

Request for Comment Format

Issue Box In the Rulemaking Framework Document for Wine Chillers and Miscellaneous Refrigeration Products, DOE welcomes comments on particular issues raised in a text box like this. Throughout this presentation, specific issues will be raised for discussion on slides such as this, ***with identifying numbers corresponding to those in the framework document***. In addition, DOE has added some questions that are not in the framework document. These questions are identified by a letter. Nonetheless, comments concerning any part of the document or presentation are welcome.

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Energy Conservation Standard for Refrigeration Products

- The Energy Policy and Conservation Act (EPCA) of 1975 (Public Law 94-163) established the energy conservation program.
- The amendments to EPCA in the National Appliance Energy Conservation Act of 1987 (Public Law 100-12) established energy conservation standards for residential refrigeration products and required that DOE conduct two cycles of rulemakings to determine if more stringent standards are justified 42 U.S.C. 6295(b).
 - DOE fulfilled this obligation by publishing standards rules in 1989 and 1997.
- The Energy Independence and Security Act (EISA) of 2007 (Public Law 110-140) required that DOE publish a final rule determining whether to amend the standards in effect for residential refrigeration products manufactured starting in 2014.
 - DOE fulfilled this obligation by publishing new standards on September 15, 2011. 76 FR 57516.

Current DOE standards do not address wine chillers and related refrigeration products.

- In 2001 DOE limited the application of its refrigerator standards to exclude wine chillers and similar products, because the refrigerator test procedure and standards were unable to account for specific wine chiller design and use requirements.
- DOE opted to address wine chillers and other refrigeration products separately from refrigerators.
- This action may lead to new and tailored standards for these products.
- DOE's current definition for Electric Refrigerator (see 10 CFR 430.2) excludes wine chillers due to storage temperature limits:
“ . . . designed to be capable of achieving storage temperatures above 32 °F (0 °C) and below 39 °F (3.9 °C), . . . ”

Refrigerator Scope of Coverage

- EPCA provides some scope-related criteria, but specifies no temperature limits:
 - “ . . .excluding those consumer products designed solely for use in recreational vehicles and other mobile equipment . . .” 42 U.S.C. 6292(a)
 - “Refrigerators, refrigerator-freezers, and freezers which can be operated by alternating current electricity, excluding--
 - (A) any type designed to be used without doors; and
 - (B) any type which does not include a compressor and condenser unit as an integral part of the cabinet assembly.” 42 U.S.C. 6292(a)(1)
- DOE has the authority to modify its current refrigerator definition (see 10 CFR 430.2) to include wine chiller and similar products.
- This specific authority, however, does not cover products using thermoelectric or absorption refrigeration.

Refrigerator Scope of Coverage

- Establishing coverage over new consumer products requires:
 - Minimum annual per household energy use of 100 kWh (42 U.S.C. 6292(b)(1)(B))
- To set an energy efficiency standard for a newly covered product, two key criteria must be met:
 - Minimum average annual per household energy use associated with the product of 150 kWh, and
 - National annual energy use of 4.2 billion kWh. (42 U.S.C. 6295(l)(1)(A, B))
- If national energy use does not exceed 4.2 billion kWh, DOE would be authorized to establish coverage but not efficiency standards.
 - Coverage alone without setting a national standard would preempt State standards that are already in place
- DOE recently proposed covering AC-powered thermoelectric and absorption refrigeration products. *See* 76 FR 69147 (Nov. 8, 2011).

Existing State and Foreign Standards

- California has had its current wine chiller standards in effect for at least a decade; Canada harmonized with the CA standards in 2008.¹
- The regulations set standards for two product classes: automatic-defrost wine chillers and manual-defrost wine chillers.
- The California wine chiller standards do not make a distinction regarding the cooling technology used in the product.
- DOE has not been able to identify any thermoelectric units in the CEC refrigerator database, implying either that these units do not meet the standards or that manufacturers are not aware that they are covered.

¹ The current set of Appliance Regulations (2010 Appliance Efficiency Regulations, California Code of Regulations, Title 20, Sections 1601 through 1608) became effective January 1, 2011. They were adopted by the California Energy Commission on November 18, 2009.

CAN - <http://oee.nrcan.gc.ca/regulations/product/refrigerators-freezers.cfm?attr=0>

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Summary of Coverage Options

- The coverage options DOE considered include:
 1. Establish coverage and standards for vapor compression wine chillers by modifying the refrigerator and refrigerator-freezer definitions to include these products, and either:
 - a) Establish coverage for thermoelectric and absorption products; or
 - b) Do not pursue coverage for thermoelectric and absorption units.
 2. Establish a new category of covered products for wine chillers and related products irrespective of the cooling technologies they use. This approach may preclude pursuit of energy standards for these products because of the 4.2 billion kWh statutory threshold.
- DOE is tentatively considering Option 1(a).

Item 1-3 DOE requests comment on whether other coverage/standards options in addition to the ones described above are possible. DOE also seeks feedback regarding the merits of pursuing an approach based on Option 1(a).

Request for Comment

Item 1-1 DOE requests shipment information from stakeholders for wine chillers and related refrigeration products. Segregation of such data is desired if possible by type of refrigeration technology (thermoelectric, vapor-compression, absorption), product size, product class, and any other relevant characteristics.

Item 1-2 DOE requests energy use data for wine chillers and related refrigeration products. DOE requests that the data identify model numbers or basic product information (e.g. cabinet volume) and that the method of determining the energy use be identified for such data – i.e. identify the test procedure used and/or indicate that the data are estimates, field measurements, or results determined by other methods. DOE requests that such data be segregated if possible according to refrigeration technology, product class, and/or product size.

Definitions

- **Absorption cooling** – a refrigeration technology that uses a heat source to provide the energy needed to drive the cooling system. These systems do not use a compressor.
- **Thermoelectric cooling** – a refrigeration technology using a solid state heat pump to provide cooling via the Peltier effect. These systems do not use a compressor and condenser.
- **Vapor compression cooling** – a refrigeration technology that uses a compressor and condenser to provide cooling.
- **Automatic defrost** – a system in which the defrost cycle is automatically initiated and terminated, with resumption of normal refrigeration at the conclusion of the defrost operation. The system automatically prevents the permanent formation of frost on all refrigerated surfaces. Nominal refrigerated food temperatures are maintained during operation of the automatic defrost system(s). The defrost water is disposed of automatically.
- **Manual defrost** – a method of removing frost and/or ice from the refrigerated surfaces accomplished by natural or manual means with manual initiation and manual termination of the overall defrost operation.
- **Off-cycle defrost** – a type of automatic defrost in which the re-circulating air, which is warmer than 32 °F, melts ice build up on the evaporator when the compressor is off.

Wine Chiller Definition

- DOE is considering adopting the following definition for *electric wine chiller*:
 - [A] cabinet designed for the refrigerated storage of beverages, non-perishable food products, and/or any other items, is not designed to be capable of achieving storage temperatures below 39 °F (3.9 °C), and having a source of refrigeration requiring single phase, alternating current electric energy input.
- The definition for *refrigerator* would be modified to include both *electric refrigerator* and *electric wine chiller*.
- Because some warmer-storage products are not designed uniquely for wine, DOE is considering the possibility of applying a term other than *electric wine chiller* to all products with storage temperatures warmer than 39 °F.

Modification of Compact Products Definitions

- The majority of residential wine chiller sales are of products that fit the size criteria for compact refrigerators/refrigerator-freezers/freezers.
- If DOE modifies the definition for *refrigerator* to include wine chillers, DOE may modify the definition of *compact refrigerator/refrigerator-freezer/freezer* as follows to avoid establishing a separate compact category of wine chiller:
 - Compact refrigerator/refrigerator-freezer/freezer means any refrigerator, refrigerator-freezer or freezer with total volume less than 7.75 cubic feet (220 liters) and 36 inches (0.91 meters) or less in height that is not an electric wine chiller.

Request for Comment

Item 1-4 DOE requests comment on the suggested definition for wine chiller and the modified definitions for refrigerator and compact products described above.

Item 1-5 DOE requests comments from stakeholders regarding the selection of a term identifying the product category associated with wine chillers and related refrigeration products whose compartment temperatures are warmer than 39 °F. In addition, DOE seeks comment on whether multiple product categories are necessary to address such products.

Hybrid Products

- During the refrigerator rulemakings, DOE became aware of products that combine wine storage compartments with refrigerator compartments and/or freezer compartments. 75 FR 78810, 78816-78817 (December 16, 2010).
- DOE addressed these products in February 2011.²
 - For refrigerators and refrigerator-freezers, the addition of a “wine storage” compartment does not change its status and does not affect its coverage.
 - The addition of a wine storage compartment to a freezer changes that product’s status and removes it from current coverage under DOE’s regulations.
 - DOE indicated that it was considering a rulemaking that would resolve some of these issues.

² This guidance has since been divided into three separate documents, which are available at the links below:

http://www1.eere.energy.gov/buildings/appliance_standards/pdfs/hybridwinechiller_faq_2011-02-10.pdf

http://www1.eere.energy.gov/buildings/appliance_standards/pdfs/hybridwinechiller_faq2_2011-02-10.pdf

http://www1.eere.energy.gov/buildings/appliance_standards/pdfs/hybridwinechiller_faq3_2011-02-10.pdf

Potential Framework for Addressing Hybrid Products

1. Set a threshold size for a wine storage compartment at which a refrigerator, refrigerator-freezer, or freezer is no longer one of these products and is instead classified as a “hybrid” product.
2. Establish definitions for hybrid products.
3. Develop test procedures for products for which the wine storage compartments are smaller than the thresholds.
4. Apply the existing energy standards to these products that will still be refrigerators, refrigerator-freezers, or freezers under the modified definitions.
5. Develop test procedures and energy standards for hybrid products falling out of the modified definitions for refrigerator, refrigerator-freezer, and/or freezer.

Item 1-6 DOE requests general comments on its draft framework for addressing products that include fresh food and/or freezer compartments as well as wine storage compartments.

Request for Comment

Item 1-7 DOE seeks information regarding the types and configurations of products that might need to be considered under such a framework, including examples showing product details and information on annual shipments associated with such products.

Item 1-8 DOE seeks comment on whether there should be a threshold size or percentage of total volume for wine storage compartments that would push a product out of the current definitions for refrigerator, refrigerator-freezer, or freezer into hybrid product categories. If so, what should this threshold be? What types of hybrid product categories should be established?

Item 1-9 DOE seeks comment on what kinds of test procedure revisions would be required to address these products, whether covered under the existing product categories or by new categories?

Request for Comment

Item 1-10 DOE seeks comment on whether DOE should include the development of definitions, test procedures, and energy standards for hybrid products as part of a potential rulemaking.

Item 1-19 DOE seeks comments from stakeholders regarding how compartments used in wine chillers and related refrigeration products that are currently not covered under the existing refrigeration product definitions could be defined. What compartment types should be defined and what should their standardized temperatures for energy testing be?

Other Residential Refrigeration Products

- DOE is considering, consistent with EPCA, extending coverage and establishing energy conservation standards for all other residential refrigeration products that are currently unregulated.

Item 1-13 DOE requests information regarding whether there are any residential refrigeration products not yet covered by energy conservation standards, other than the wine chillers and related hybrid products, that DOE should regulate through energy conservation standards. Assuming such products exist, what are they (i.e. types), what are their annual shipment levels in the U.S., and what are their energy use characteristics?

Other Residential Refrigeration Products (cont.)

Item 1-14 DOE seeks information regarding residential ice makers, particularly: the annual sales levels for such products in the U.S.; whether test procedures addressing energy use for such products exists; the typical annual energy use of such a product in residential settings; and other information DOE should consider in determining whether to regulate such products?

Item 1-17 DOE seeks information regarding the prevalence of “near-freezer”³ products. DOE also seeks input regarding the need to revise the current definition of the freezer and/or the freezer test procedures to address such products. Further, DOE seeks input on whether these products should fall under existing product classes or separate new product classes and energy standards. If the latter, DOE requests comments regarding the nature of these revisions.

³ Near- Freezers are discussed in more detail in the framework document. These are products that achieve freezing temperatures (below 32 °F), but do not maintain 0 °F temperature, as required by the DOE “freezer” definition.

Coverage of Wine Chillers in Residential and Commercial Applications

- DOE is aware of several attributes that could distinguish commercial types of wine chillers from residential types, but does not have sufficient information to definitively conclude that wine chillers with uniquely commercial features exist.

Item 1-15 DOE seeks comment on what design and performance characteristics distinguish wine chillers used in commercial applications from residential wine chillers. DOE also requests comment on whether any wine chillers used in commercial applications are manufactured on the same product lines as residential wine chillers. Finally, DOE seeks information as to whether any commercial wine chillers are distributed in commerce for personal or consumer use. If so, DOE seeks details regarding the magnitude of those sales as a percentage of total sales of commercial products.

Item 1-16 DOE seeks comment on whether commercial and residential wine chillers should be covered under the same test procedures and energy standards.

Products that can Operate on both AC and DC electric power

- DOE is aware of products that can operate on either AC or DC power.
- Many of these products are marketed for mobile applications, and for that reason would not be subject to EPCA coverage under 42 U.S.C . 6292.
- However, significant numbers of such products may be used in stationary applications.

Item 1-11 DOE seeks information regarding whether refrigeration products which operate on either alternating current (AC) or direct current (DC) electricity are distributed to any significant extent in commerce for personal or consumer use in stationary applications (e.g., in homes). What types of such products are sold, what are their annual shipment levels in the U.S., and what are their energy use characteristics?

Item 1-12 DOE seeks comment on whether it should specifically extend coverage and develop test procedures, definitions, and energy standards for refrigeration products that operate on either alternating current (AC) or direct current (DC) electricity.

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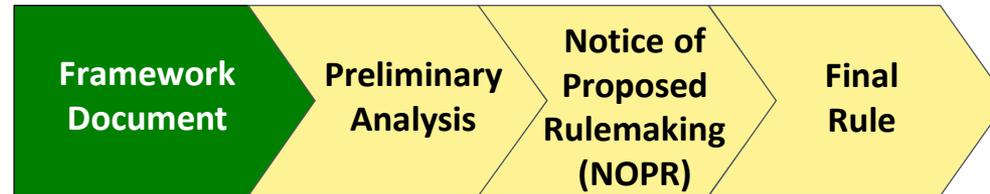
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EPCA Seven Factors

- 42 U.S.C. 6295(o)(2)(B)(i) directs DOE to consider seven factors when setting energy conservation standards:

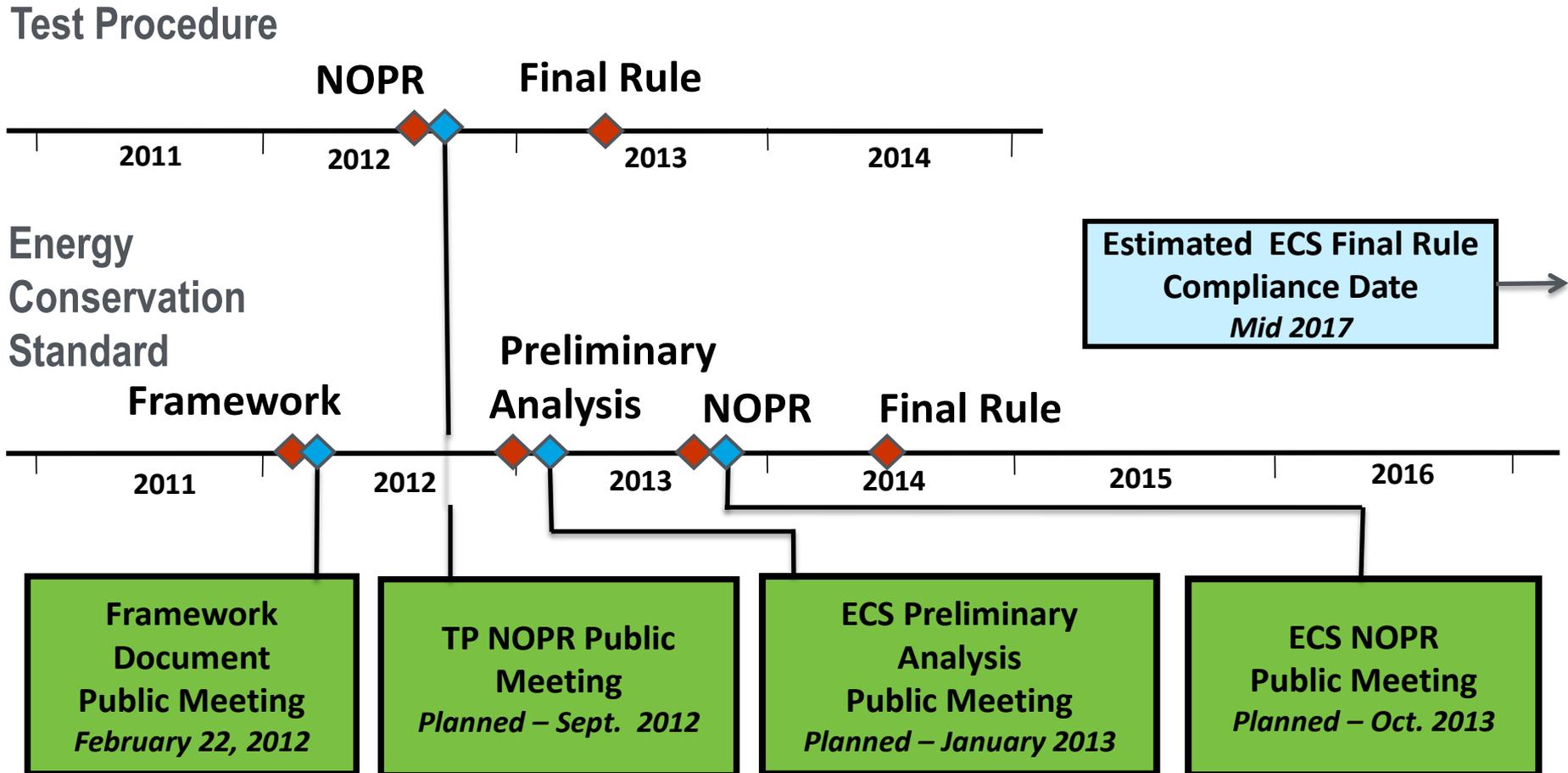
EPCA Factors	DOE Analysis
1. Economic impact on consumers and manufacturers	Life-Cycle Cost Analysis and Manufacturer Impact Analysis
2. Lifetime operating cost savings compared to increased cost for the equipment	Life-Cycle Cost Analysis
3. Total projected energy savings	National Impact Analysis
4. Impact on utility or performance	Engineering Analysis and Screening Analysis
5. Impact of any lessening of competition	Manufacturer Impact Analysis
6. Need for national energy conservation	National Impact Analysis
7. Other factors the Secretary considers relevant	Environmental Assessment, Utility Impact Analysis, and Employment Impact Analysis

Rulemaking Process Steps



- DOE published a Federal Register notice on **February 13, 2012**.
- Today's public meeting covers the Framework documents for wine chillers and miscellaneous refrigeration products.
- Framework document provides:
 - Overview of the rulemaking process
 - Provides avenues for interested parties to submit comments by **March 14, 2012**
 - The framework information and materials are available online at:
http://www1.eere.energy.gov/buildings/appliance_standards/residential/refrigerators_freezers.html

Rulemaking Timelines



Acceleration of Potential Rulemaking Timeline

- Options to accelerate the timeline:
 1. Stakeholders negotiate an appropriate efficiency level for the standard and DOE publishes a direct Final Rule. This could save 7-21 months, depending on how early in the process an agreement is reached.
 2. DOE bypasses publication of the preliminary analysis documents and the preliminary analysis public meeting and proceeds directly to a NOPR. This could save 6-8 months.

Item 1-22 DOE requests comments from stakeholders regarding the possible acceleration of the timeline to publish a possible final rule and potential implications.

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Past Test Procedures

- The Code of Federal Regulations (CFR) prescribes the DOE test procedures for residential refrigeration products.
 - These test procedures do not include provisions for testing products that do not meet the current definition for electric refrigerators. In particular, the standardized compartment temperatures specified in the test procedures are significantly lower than those typical for wine chillers.
- The Association of Home Appliance Manufacturers (AHAM), the California Energy Commission (CEC), and Natural Resources Canada (NRCAN) all use a standardized compartment temperature of 55 °F (12.8 °C).

Correction Factor

- The AHAM, CEC, and CSA test procedures for wine chillers apply a correction factor to the wine chiller energy use calculation to account for average product usage.
- This factor reduces the measured energy use by 15% to determine daily energy consumption for a given temperature setting in order to account for the expectation that such products would have fewer door openings, on average, than a household refrigerator, may not be energized at all times, and/or other reasons that would reduce energy use.

Item 1-20 DOE requests comments on whether a correction factor is appropriate for calculating wine chiller energy use, and whether 0.85 is an appropriate value for the correction factor. DOE further requests information supporting the selection of any recommended correction factor.

Standby and Off Modes

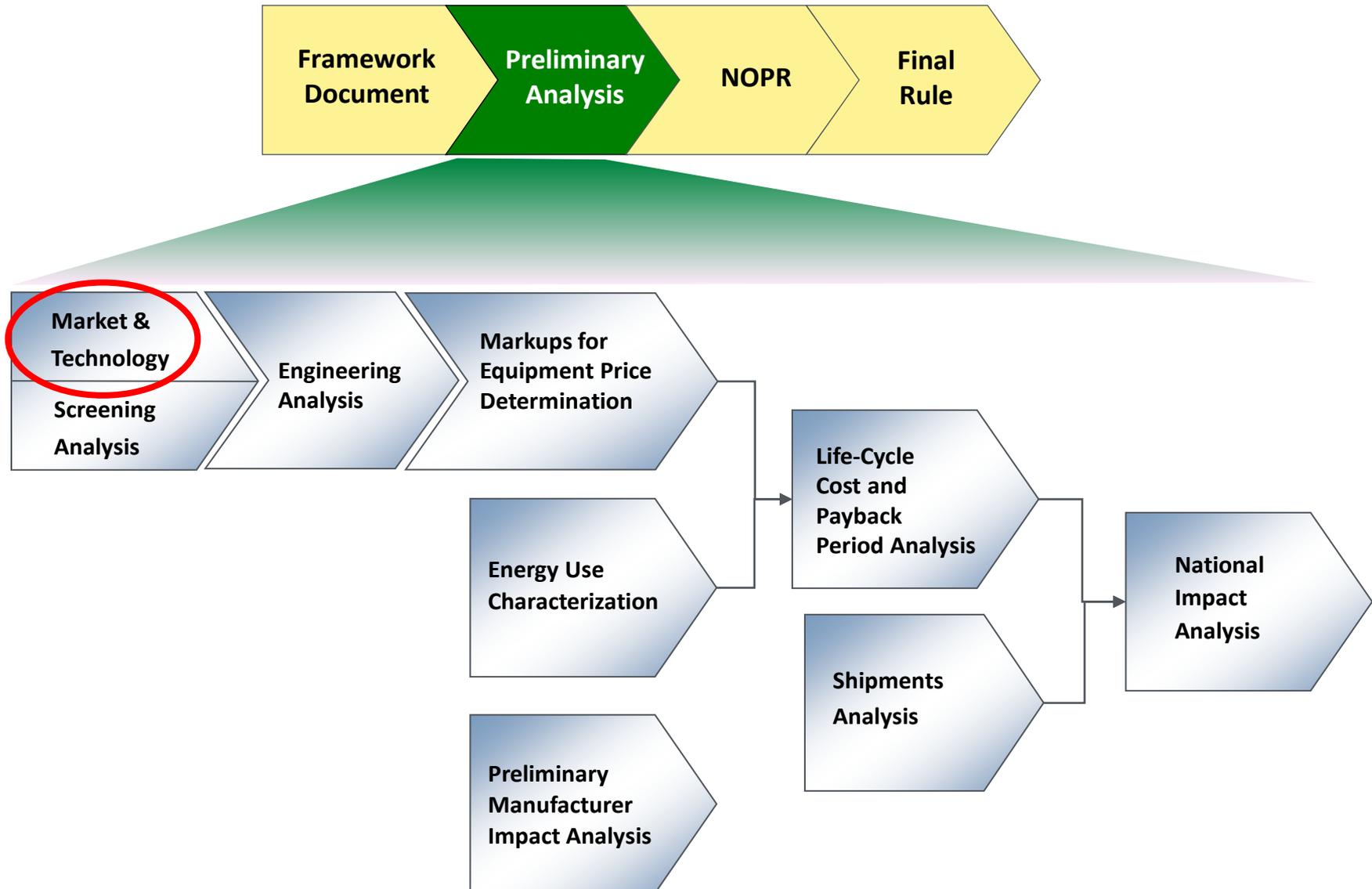
- EPCA requires DOE to consider standby mode and off mode energy consumption when amending both its test procedures and energy conservation standards.
- DOE expects that any modified version of the existing test procedures for refrigeration products that DOE would develop for these products would capture standby and off mode energy use because the test procedure measures all product energy use, including compressor “off” periods.
- DOE concludes that establishing special test procedures to address standby and off modes is not required.

Item 1-21 DOE requests input from stakeholders on the its tentative conclusion that separate test procedures to address standby and off modes are not required for wine chillers and related refrigeration products.

Test Procedure Key Issues

- Establishing definitions for product categories and/or compartment types to clarify which products are subject to which test requirements.
- Establishing standardized compartment temperatures that are appropriate for the product categories.
- Testing of hybrid products.
- Potential consideration of test procedures for commercial wine chillers.
- Applying a correction factor to determine the energy use of wine chillers and related products.
- Potential consideration of additional test procedure requirements to address standby and/or off mode energy use.

Item 1-18 DOE seeks comment regarding whether there are any other key issues associated with development of test procedures for wine chillers and related refrigeration products, and, if so, what these issues are.



Purpose of Market and Technology Assessment

- Characterize the markets, the wine chillers and miscellaneous refrigeration products industry, and the potential technological measures that improve efficiency.

Method

- Identify and characterize manufacturers of wine chillers and miscellaneous refrigeration products;
- Estimate shipments and trends in the market;
- Identify regulatory and non-regulatory initiatives intended to improve the efficiency of the equipment covered under this rulemaking; and
- Identify technologies that could improve efficiency.

Request for Comments

Item 3-1 DOE requests information that help it assess the market for those products that would be covered in this potential rulemaking. Information sought includes, but is not limited to, current product features and efficiencies, product-feature and efficiency trends, historical product shipments and prices.

Product Classes for Residential Wine Chillers and Miscellaneous Refrigeration Products

No.	Product Class
1	Residential wine chillers and miscellaneous refrigeration products with manual defrost
2	Residential wine chillers and miscellaneous refrigeration products with automatic defrost

- General criteria for different classes (42 U.S.C. 6295(q) and 6316(a)) :
 - Type of energy used
 - Capacity
 - Other performance-related features, such as those that provide utility to the consumer, that would justify the establishment of separate energy conservation standards.

Request for Comments

Item 3-2 DOE requests input from stakeholders on the proposed product classes. What other factors, if any, should DOE consider beyond those identified above as a basis for developing product classes? When answering, please explain in detail and cite specific examples to the extent possible.

Item 3-3 DOE requests information on solid-door products that would fit the definitions anticipated for wine chillers:

- How prevalent are such products?
- What are the efficiency differences between solid-door and transparent-door products?
- Is there sufficient consumer utility associated with transparent doors to make product class distinctions upon this basis?

Request for Comments

Item 3-4 Do any wine chillers or miscellaneous refrigeration products utilize heating (electric or otherwise) on glass surfaces or on door face frames to prevent condensation. If so, what types of products utilize such heating and what percentage of shipments do they represent?

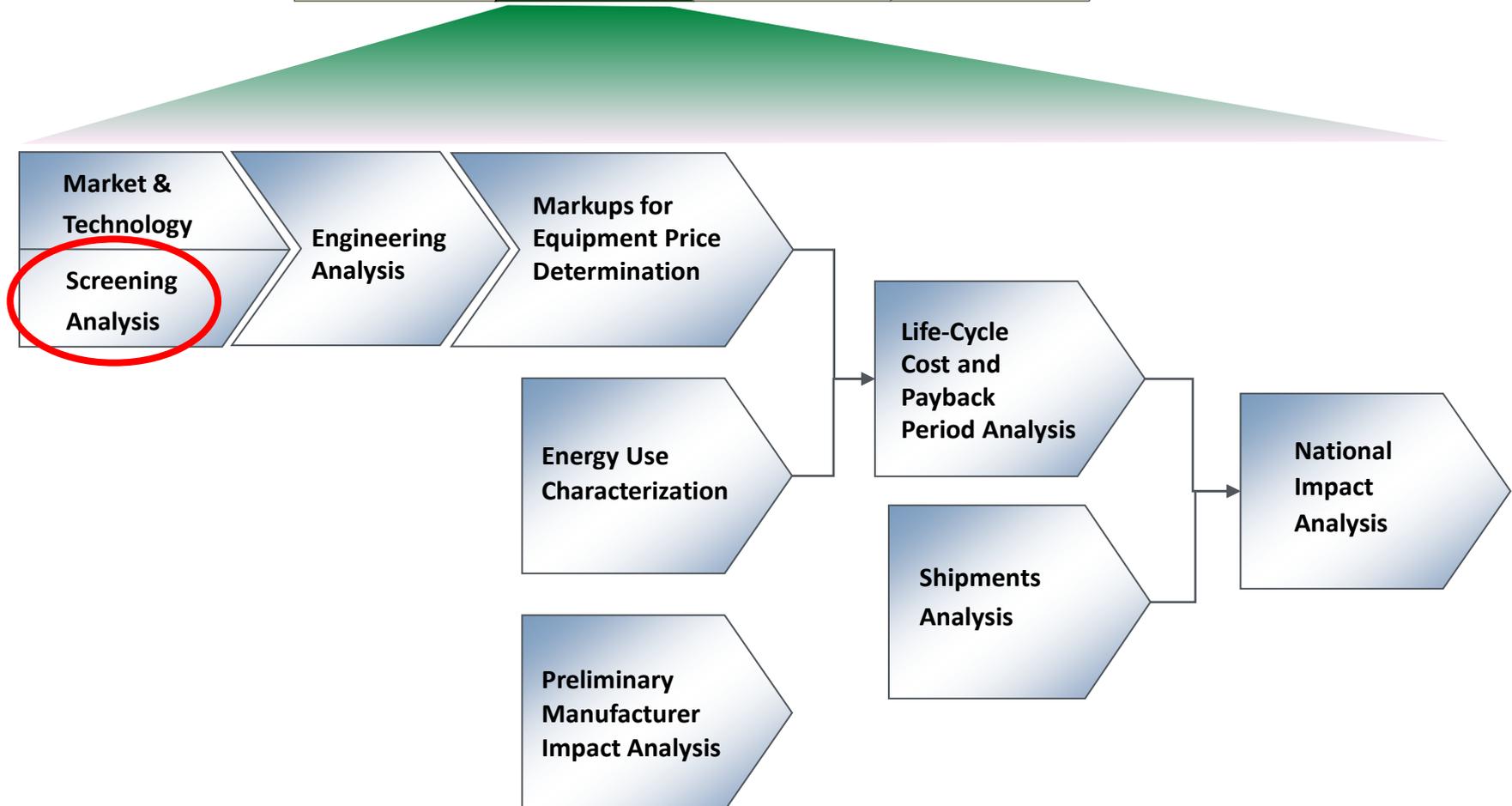
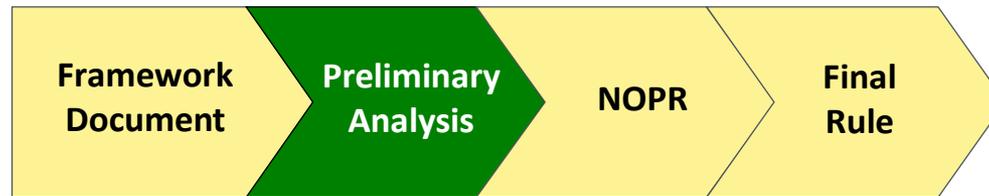
Item 3-5 Do any wine chillers or miscellaneous refrigeration products utilize defrost heating (i.e. automatic defrost methods other than by frost melting during the compressor off-cycle). If so, what types of products utilize defrost heating and what percentage of shipments do they represent? Do any wine chillers or miscellaneous refrigeration products utilize manual defrost—if so, what types of products require manual defrost and what percentage of shipments do they represent?

Wine Chiller and Miscellaneous Refrigeration Product Technologies

Insulation	Compressor
1. Improved resistivity of insulation	11. Improved compressor efficiency
2. Increased insulation thickness	12. Variable-speed compressors
3. Vacuum-insulated panels	13. Linear compressors
Gasket and Door Design	Evaporator and Condenser
4. Improved gaskets	14. Increased surface area
5. Double door gaskets	15. Improved heat exchange
6. Improved door face frame	
7. Anti-fog film	Cycling Losses
8. Improved thermal resistance glass and frames	16. Fluid control or solenoid valve
Anti-Sweat Heater	Defrost System
9. Hot gas or Warm Liquid	17. Compressor cycling defrost
Fans and Fan Motor	Other Technologies
10. Fan blade and fan motor improvements	18. Alternative refrigerants

Request for Comment

Item 3-7 Should DOE consider any additional technologies for wine chillers and miscellaneous refrigeration products in its analysis? If so, which ones and why?



Screening Analysis

- Purpose - Screen out technology options that DOE does not consider in the engineering analysis for wine chillers and miscellaneous refrigeration products.
- Approach – DOE evaluates each technology option based on the following four screening criteria:

Technological feasibility

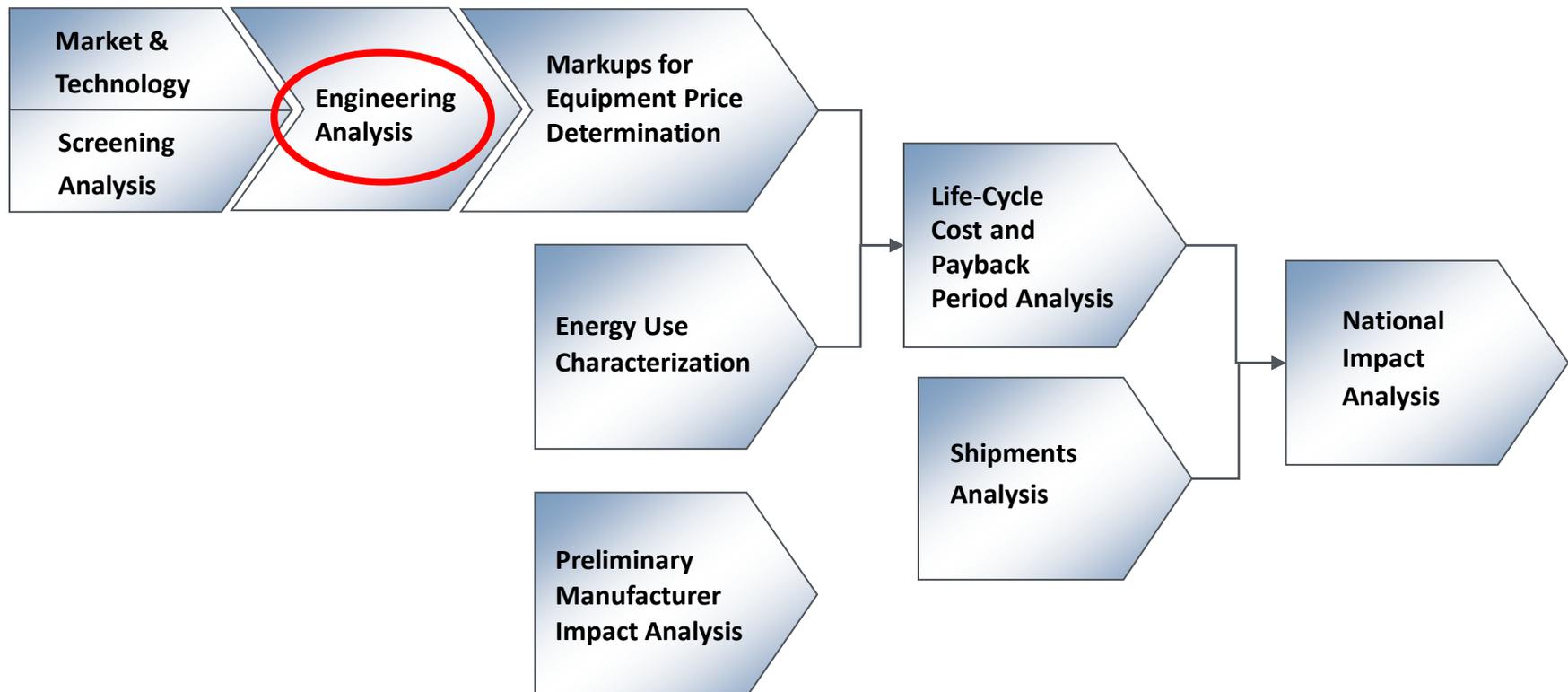
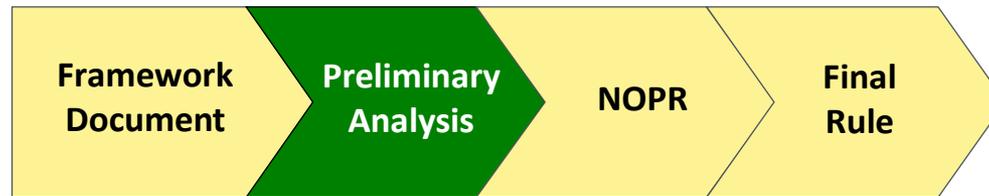
Practicability to manufacture, install, and service

Impacts on equipment utility or availability to consumers

Impacts on health or safety

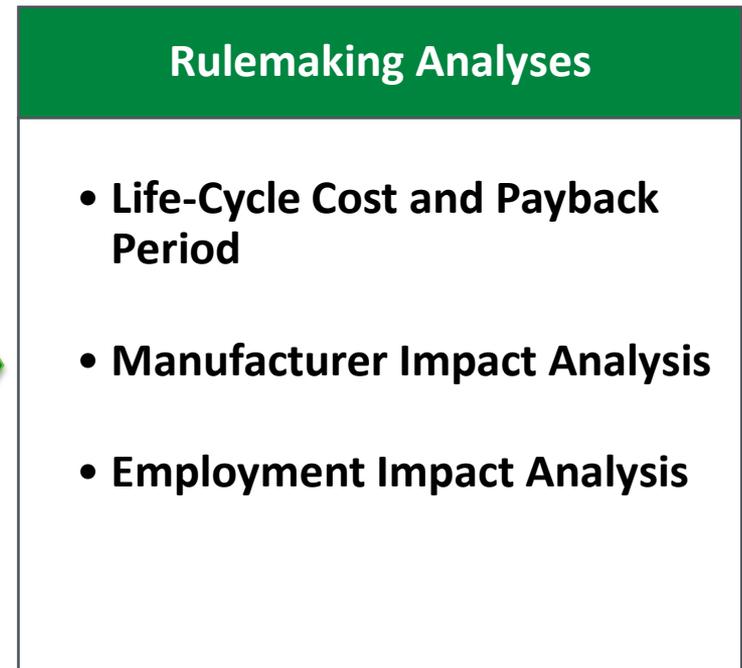
Request for Comment

Item 4-1 Are there any technologies listed in the Wine Chiller and Miscellaneous Refrigeration Product Technologies table that DOE should not consider because of any of the four screening criteria? If so, which screening criteria apply to the cited technology or technologies?



Engineering Analysis Goals

- A key factor in setting the standard is the increased cost of more-efficient equipment.
- The engineering analysis determines the relationship between cost and efficiency.



Engineering Analysis Methodology

- Engineering Analysis Approaches
 - Design Option Approach: Determination of efficiency and improvement potential based on individual and groups of design options.
 - Efficiency Level Approach: Cost information collected (i.e., from the industry) at predetermined efficiency levels to represent cost/efficiency relationship.
 - Reverse Engineering Approach: Costs for the efficiency levels associated with reverse-engineered products are calculated using a manufacturing cost model.
- DOE would use a combination of these approaches, using multiple available data sources to develop the cost-efficiency relationships.

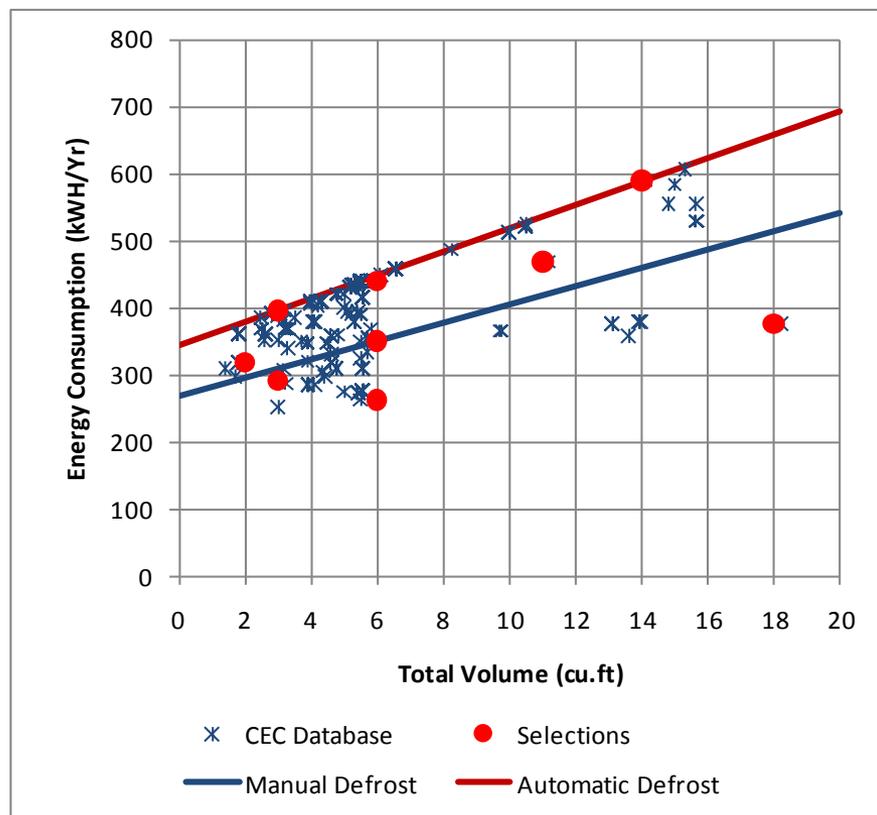
Request for Comment

Item 5-2 DOE requests feedback on the use of a design-option approach based on energy modeling and some energy testing as needed, possibly enhanced by data collection organized by AHAM or other parties to determine the relationship between manufacturer cost and annual energy consumption. Particularly, DOE is interested in whether this approach would be appropriate in developing a cost/efficiency relationship for use as the basis for setting standards. DOE is also interested in whether the industry (including AHAM) or any other party would be prepared to provide cost-efficiency information to support the rulemaking. If the suggested approach is not appropriate, why is it not?

Product Teardowns and Testing

- DOE is considering the purchase of the following types of vapor-compression cooled wine chillers for testing and reverse engineering:

Interior Volume (Cu.ft)	Capacity (bottles)	Annual Energy Use (KWh)	Installation Style	Number of Zones	Door	Defrost
2	17	318	Counter top	1	Tempered Glass	Automatic
3	24	292	Counter top	1	Tinted, Double-Panned Glass	Manual
3	26	396	Counter top or Built-in	1	Tinted Tempered Glass	Automatic
6	48	350	Built-in	1	Gas Filled Thermopane	Automatic
6	48	262	Built-in	1	Gas Filled Thermopane ¹	Automatic
6	57	439	Built-in	1	Tinted Tempered Glass	Automatic
11	75	468	Free standing	1	Tempered Glass	Automatic
14	166	590	Free standing or Built-in	2	Tinted Tempered Glass	Automatic
18	147	375	Built-in	2	Tempered Glass	Automatic



Note 1: Door panel can be selected in either glass or solid outlay. DOE plans to purchase this unit in a glass door and solid door configuration.

Baseline Efficiency Levels

- DOE is considering using the California and Canadian Standards as the Baseline Efficiency Levels for its analysis.
- These equations, which are based on the current AHAM/CEC/NRCan test procedures, would represent the baseline levels. They may change if test procedure modifications are deemed necessary.

Product Class	Equations for Maximum Energy Use (kWh/yr)
Wine chillers with manual defrost.	$13.7AV + 267$
	$0.48 av + 267$
Wine chillers with automatic defrost	$17.4AV + 344$
	$0.61 av + 344$

AV, adjusted volume in cubic feet; av, adjusted volume in liters

Item 5-1 DOE seeks input from stakeholders on whether the equations for maximum annual energy consumption based on the California and Canadian regulations are appropriate to represent the performance of baseline wine chillers.

Incremental Efficiency Levels

- DOE expects to analyze efficiency levels for wine chillers and miscellaneous refrigeration products of up to 40% for automatic defrost products and up to 25% for manual defrost products

Item 5-3 DOE seeks input from stakeholders regarding the range of efficiency levels that should be examined as part of its analysis

Industry Data Collection

- In many rulemakings, DOE requests cost-efficiency data from the industry to supplement its own analysis.
- These data are generally collected and aggregated by the applicable trade organization (AHAM for wine chillers and miscellaneous refrigeration products) to protect the privacy of the information provided by individual manufacturers.

Item 5-4 DOE seeks comment on how to select representative products for detailed analysis and on how to extrapolate such analyses to the full range of wine chiller and miscellaneous residential refrigeration products.

Proprietary Designs

- DOE evaluates all design options that are commercially available or present in a working prototype, including proprietary designs and technologies.
- DOE only considers efficiency levels associated with proprietary designs if these designs do not present unique paths to the given efficiency levels.
- DOE maintains the confidentiality of manufacturers.

Item 5-5 Are there proprietary designs or technologies of which DOE should be aware for the products under consideration in this potential rulemaking? If so, how should DOE acquire the cost data necessary for evaluating these designs?

Outside Regulatory Change

- In conducting an engineering analysis, DOE takes into consideration the effects of regulatory changes outside DOE's statutory energy conservation standards rulemaking process that can affect manufacturers of products addressed by the rulemaking, some of which can also affect the energy efficiency or energy consumption of those products.
- DOE considers adjustments to its analysis based on the comments received on the engineering analysis documented in the preliminary analysis.

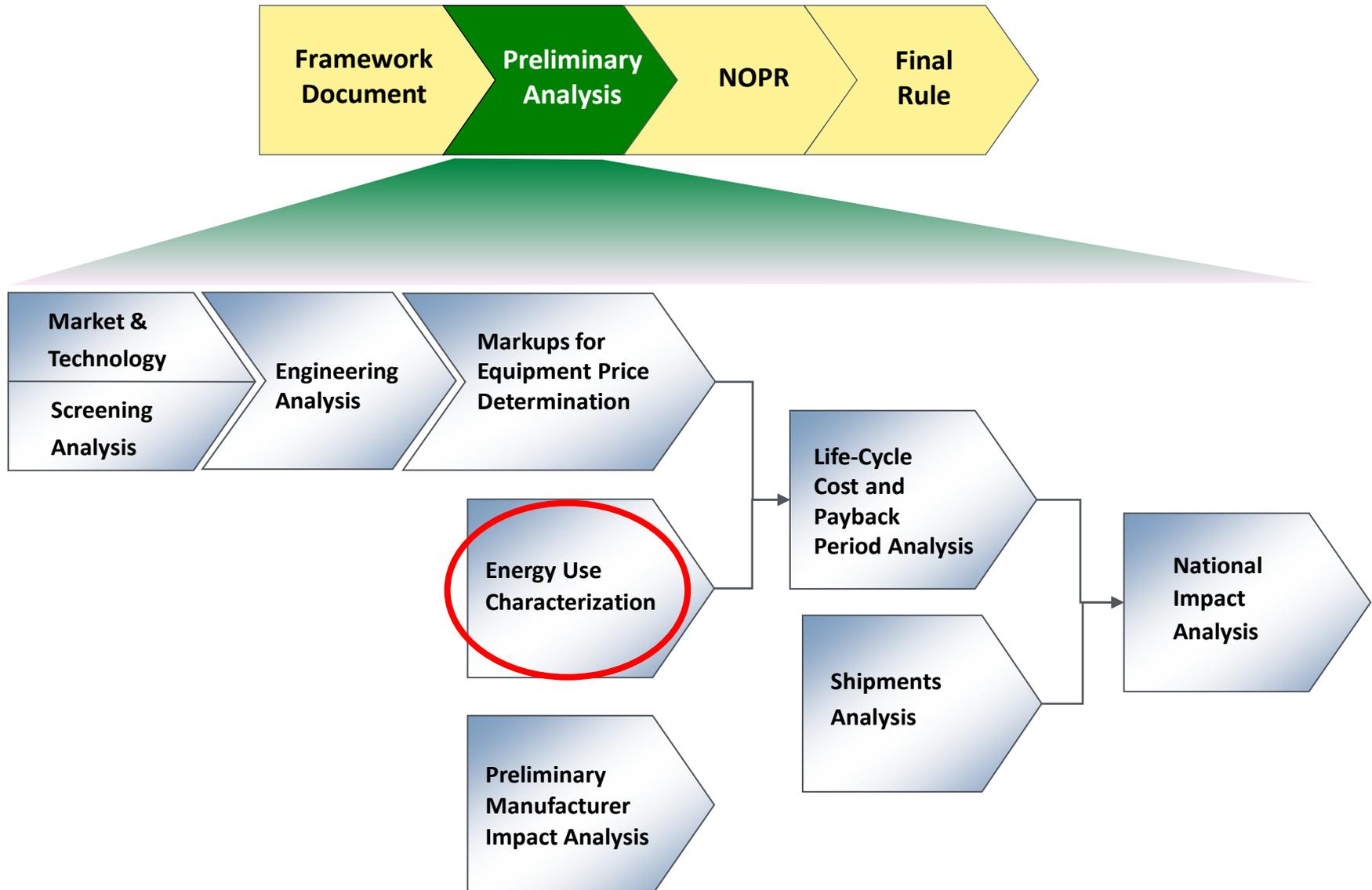
Item 5-6 Are there outside regulatory issues that DOE should consider in its analysis of residential wine chillers and miscellaneous refrigeration products? If so, identify what they are and how DOE should consider them for purposes of its analysis.

Types of Markups in Distribution Chain

- **Baseline Markups:**
 - Markups relate consumer price to the cost of goods sold (CGS).
 - Baseline markups relate price to cost prior to a change in efficiency.
 - Baseline markups indicate a consumer price that covers all of a distributor's or contractor's expenses plus profit.
- **Incremental Markups:**
 - Incremental markups relate the incremental change in consumer price to the incremental change in CGS.
 - 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.
 - Incremental markups cover only expenses that vary with CGS – in this case, expenses that increase due to an increase in equipment efficiency.

Request for Comment

Item 6-1 DOE welcomes suggestions and comments concerning its proposed approach for developing estimates of future retail prices.



Energy Use Characterization

- Analyze the annual energy consumption of the appliance to assess the energy savings potential of different equipment efficiencies.
- Provide the basis for the unit energy costs used in the life-cycle cost analysis.

Energy Use Characterization Issues

- Typically, DOE relies on the Residential Energy Consumption Survey (RECS) to estimate an appliance's annual energy consumption. However, RECS has not attempted to obtain information on wine chillers.
- Instead, California's maximum energy use standards can be combined with sales data from the NPD Group to estimate a range of annual energy use values for vapor-compression wine chillers. Two limitations of this approach are:
 1. only the maximum possible energy use of each model in the NPD database can be defined, as opposed to its actual rated energy use, and
 2. it is unknown as to whether the CEC test procedure provides a reasonable estimate of wine chiller annual energy use.
- Because of the apparent lack of energy use data, DOE may rely on in situ field measurements as a means to characterize wine chiller energy use.

Request for Comment

Item 7-1 DOE seeks comments on the approach of estimating the annual energy consumption of wine chillers based on a combination of NPD sales data, CEC model data, and California's energy conservation standards equations for establishing maximum energy use.

Item 7-2 DOE seeks input on potential data sources for establishing the annual energy consumption of wine chillers.

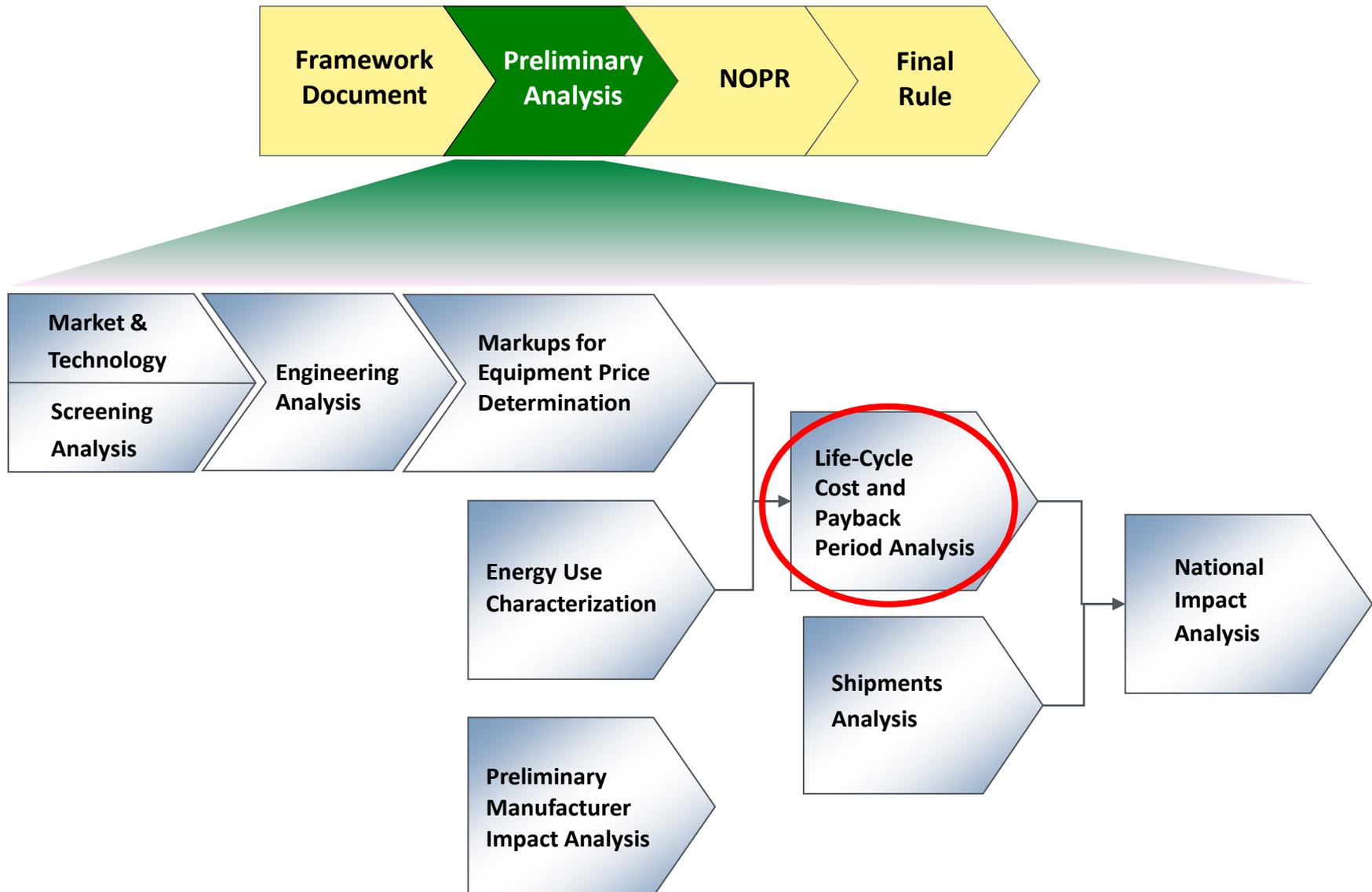
Item 7-3 DOE seeks comments on the viability of using in situ field measurements of wine chiller energy use as a proposed basis for characterizing the product's energy consumption.

Request for Comment

Item 7-4 DOE seeks comments on whether annual energy use is best characterized with a sensitivity analysis to determine how high and low estimates of energy use might impact the economic feasibility of any amended energy conservation standards.

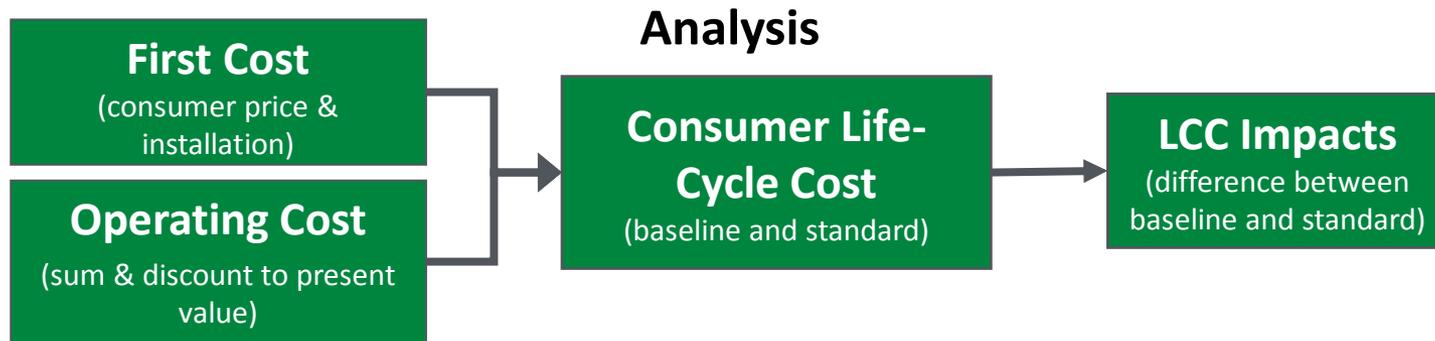
Item 7-5 DOE seeks comments on the rebound effect associated with more efficient wine chillers. In other words, DOE seeks input on what portion of the energy savings resulting from more efficient equipment may be lost due to consumers purchasing larger or more feature laden equipment.

Preliminary Analysis & Test Procedure



Purpose of Life-Cycle Cost (LCC) and Payback Period (PBP) Analysis

- Assess the net LCC and PBP for different efficiency levels.



- LCC equals consumer price plus the sum of annual operating costs discounted to a particular base year.
- Economic evaluation performed from the consumer perspective.
- Analysis is implemented in an Excel spreadsheet, using Monte Carlo probability approach to sample a full range of uncertain consumer variables.
- Results are expressed as the LCC difference (baseline minus standard level).
- Simple payback equals the incremental first cost divided by the operating cost savings for 1 year.

Life-cycle Cost Subgroup Analysis

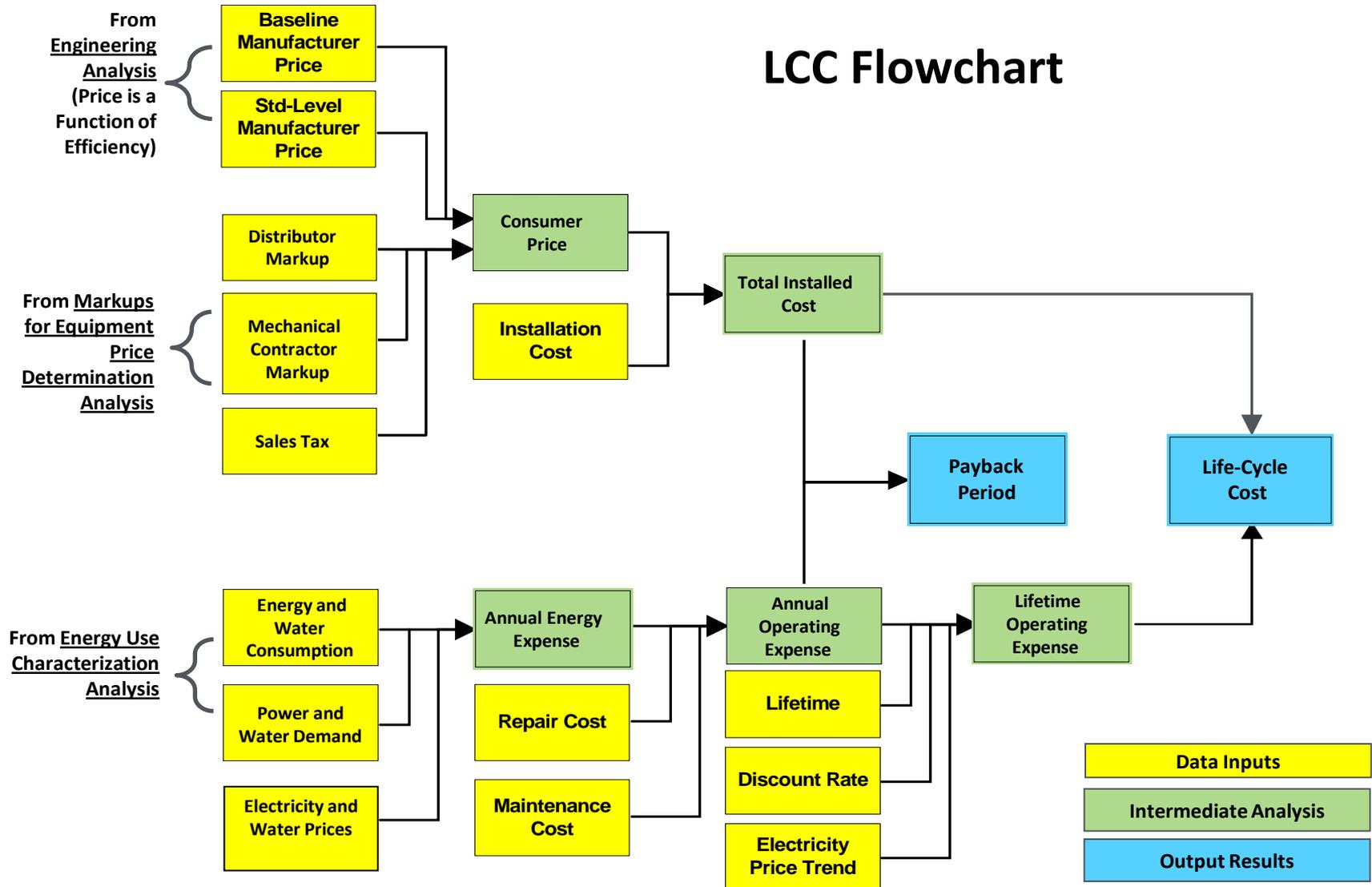
- DOE analyzes the consumer impact of any new standards by dividing consumers into subgroups and accounting for variations in key inputs to the LCC analysis.
- A consumer subgroup comprises a subset of the population that is likely, for one reason or another, to be affected disproportionately by new or revised energy conservation standards.
 - In comparing potential impacts on the different consumer subgroups, DOE will evaluate variations in regional electricity prices, variations in energy use profiles, and variations in purchase prices that might affect the LCC of an energy conservation standard to certain consumer subgroups.

Item 11-1 DOE requests input as to what, if any, consumer subgroups are appropriate when considering standards for wine chillers.

Preliminary Analysis & Test Procedure

Life-Cycle Cost and Payback Period Analysis

LCC Flowchart



Installation, Maintenance, and Repair Costs

- DOE bases repair costs on annualized costs of key components and frequency of replacement in the field.
- Typically, small incremental changes in product efficiency incur little or no changes in repair and maintenance costs over baseline products. There is a greater probability that equipment with efficiencies that are significantly higher than the baseline will incur increased repair and maintenance costs, since such equipment is more likely to incorporate technologies that are not widely available.
- Unless the efficiency increases considered for this rulemaking result **in** significantly larger or heavier products, DOE expects that more-efficient wine chillers and miscellaneous refrigeration equipment will not incur increased installation costs.

Request for Comment

Item 8-1 DOE seeks stakeholder input on the proposed approach of using probability distributions and Monte Carlo simulation to conduct the LCC and PBP analysis.

Item 8-2 DOE requests data from stakeholders to characterize the current mix of wine chiller efficiencies in the market.

Item 8-3 DOE seeks stakeholder input on the planned approach for estimating current and forecasted energy prices.

Item 8-4 DOE seeks stakeholder input on whether it is correct to assume that changes in maintenance, repair, and installation costs will be negligible for more-efficient residential wine chillers. If it is incorrect, DOE is interested in the reasons why this is so and in specific ways in which to correct this assumption.

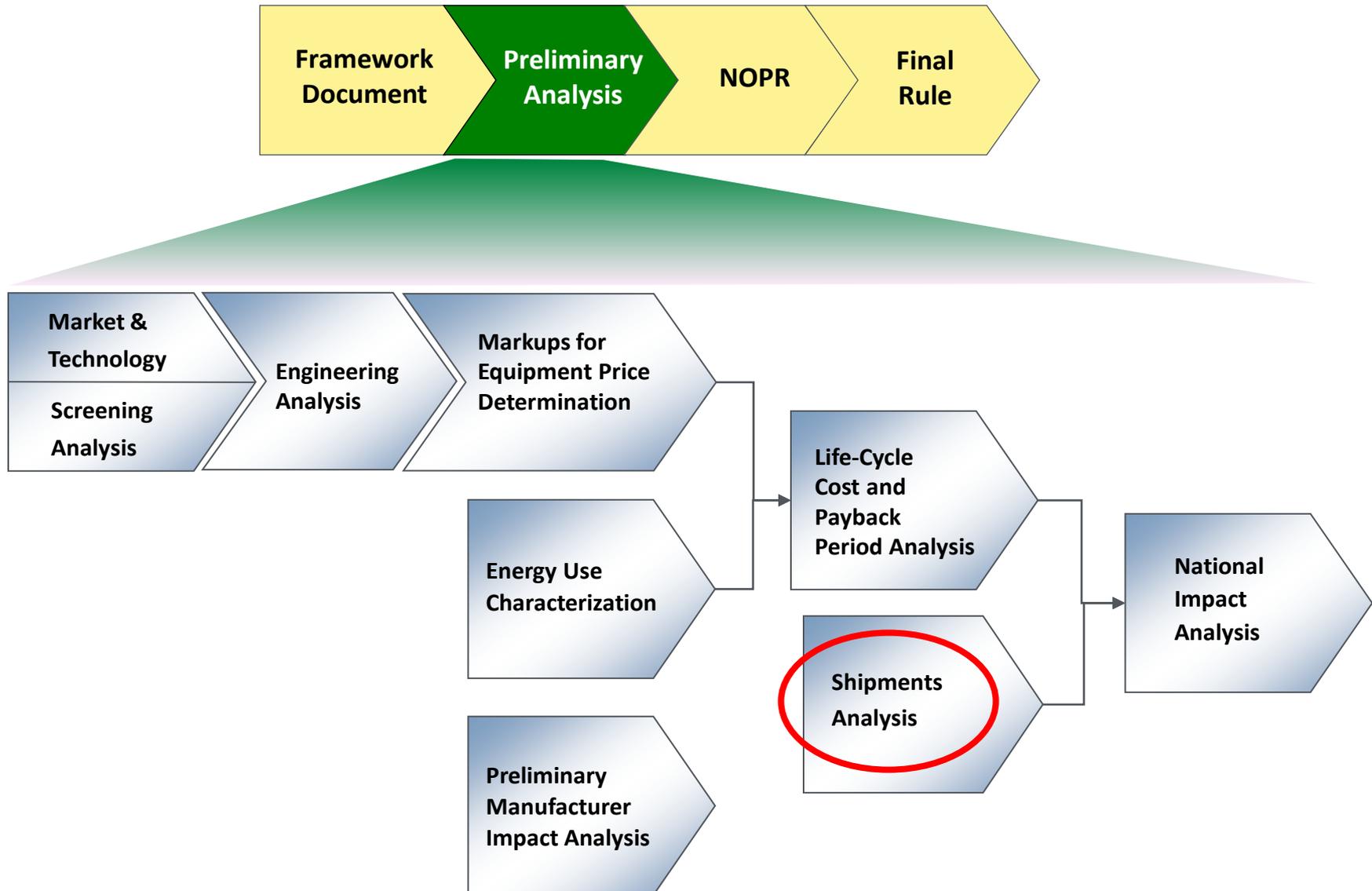
Item 8-6 DOE seeks stakeholder input on the planned approach for estimating discount rates for residential consumers.

Equipment Lifetimes

- DOE will use information from available literature sources as well as input from manufacturers and other stakeholders to establish specific wine chiller lifetimes or whether the product lifetimes for refrigerators, refrigerator-freezers, and freezers are representative of wine chiller lifetime.
 - For standard-sized refrigerator-freezers and freezers, DOE has characterized survival functions with Weibull distributions that have mean lifetimes of 17.4 and 22.3 years, respectively.
 - For compact refrigerators and freezers, DOE has developed survival functions that have mean lifetimes of 5.6 and 7.5 years, respectively.

Item 8-5 DOE seeks stakeholder input on appropriate product lifetimes for wine chillers. Specifically, DOE seeks data sources for establishing product lifetimes and comments on whether standard-sized and compact-sized refrigerator, refrigerator-freezer, and freezer lifetimes are representative of wine chillers.

Preliminary Analysis & Test Procedure



Shipments Analysis

- Estimate changes in shipments due to potential new or amended energy efficiency standards.

Approach

- Data sources: AHAM, NPD Group
- Estimate base case forecast – what is the effect if the new or amended energy standards were not imposed?
- Estimate impact of standards – increase/decrease in shipments in each equipment class due to new/amended standards, if any.

Request for Comment

Item 9-1 DOE seeks historical shipments data from stakeholders. If such data are provided, DOE requests that market share data showing the percentage of product shipments for compressor/condenser-based and thermoelectric-based products be included.

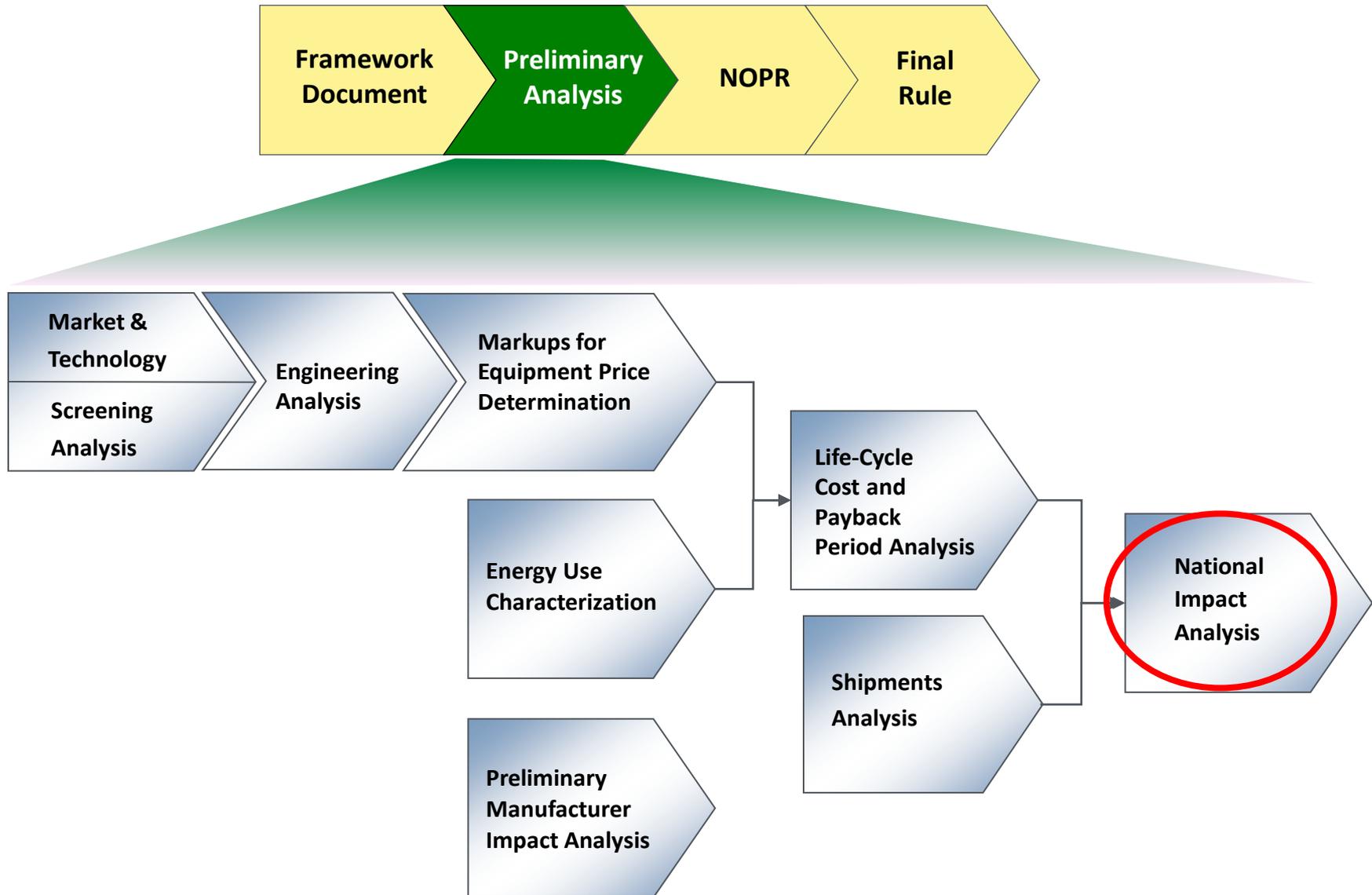
Item 9-2 If stakeholders are unable to provide historical shipments data, DOE seeks comment on which data source is more representative of historical shipments -- the AHAM shipments data or the NPD Group sales data -- and why.

Request for Comment

Item 9-3 DOE seeks input on the types of potential scenarios it should use to forecast base-case shipments and the reason(s) for the suggested scenario(s)

Item 9-4 As part of its preliminary manufacturer impact analysis, DOE seeks input from manufacturers on the potential impact of new energy conservation standards on wine chiller shipments. DOE also seeks input from other stakeholders on the potential impact of standards on product shipments.

Item 9-5 DOE also requests input on any market-pull programs that currently exist to promote the adoption of more-efficient wine chillers.



Purpose of National Impact Analysis (NIA)

- Estimate national energy savings (NES) and national net present value (NPV) of consumer savings for higher-efficiency standard levels.

Analysis

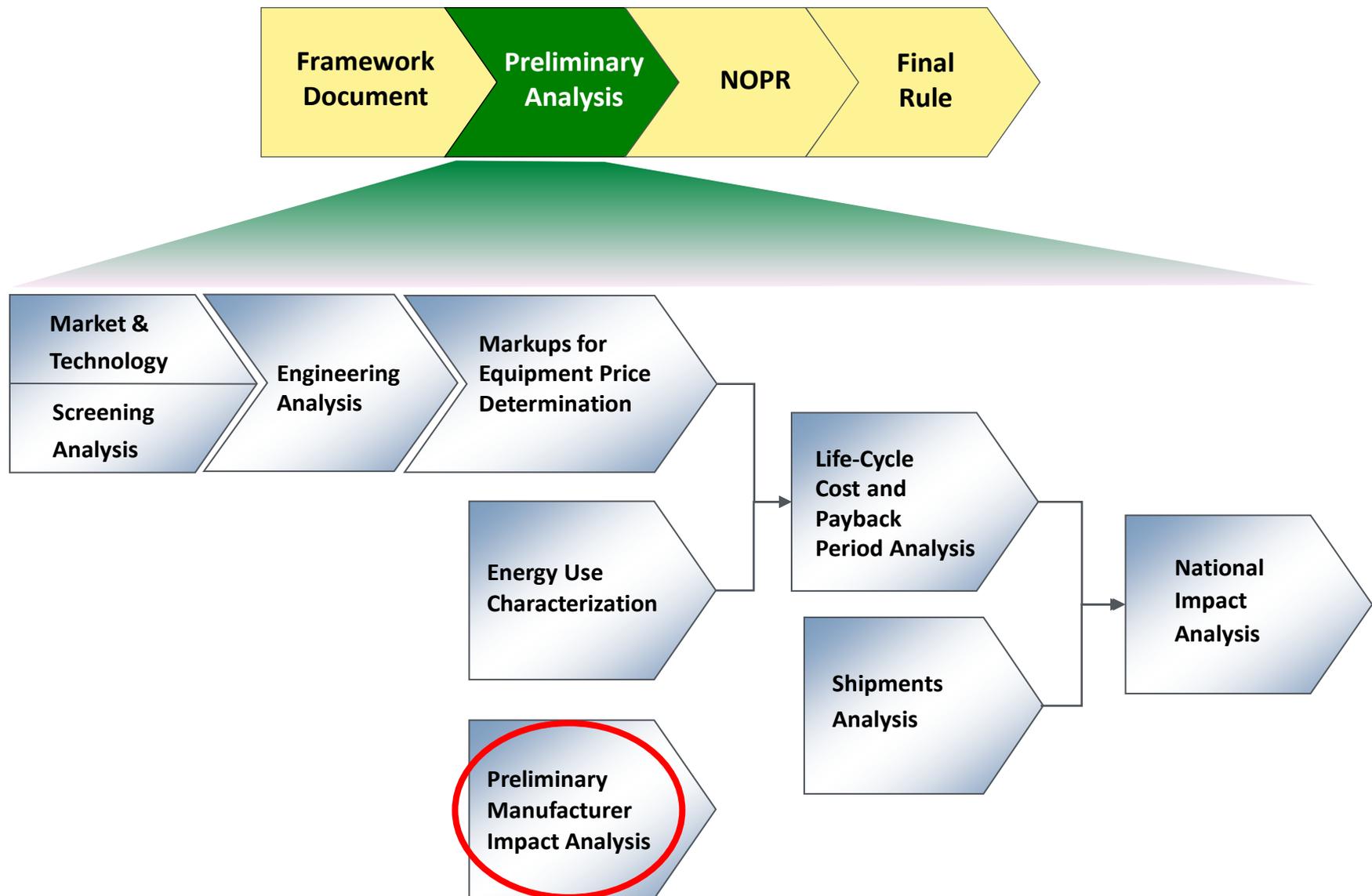
- DOE intends to take into account the rebound effect associated with more efficient wine chillers.
- Excel spreadsheets will be used for calculation of NES and NPV of consumer savings.

National Impact Analysis (cont.)

- For past rulemakings, DOE relied on input from stakeholders to develop base-case historical shipment-weighted average efficiencies (SWEF). Although DOE hopes that AHAM and manufacturers will provide similar historical SWEF data for wine chillers, because of the apparent lack of information for this product, it is likely that DOE will need to rely on other sources to develop such data.
- NPV of consumer savings will be calculated, as per OMB guidance, with two different discount rates: 3% and 7%.

Item 10-1 DOE seeks historical SWEF data for wine chillers. DOE also seeks historical market share data showing the percentage of product shipments by efficiency level.

Item 10-2 DOE seeks input on its plan to develop Excel spreadsheet models for estimating national impacts of amended energy conservation standards for wine chillers. For example, are spreadsheet models still the preferred approach for estimating national impacts?



Preliminary Manufacturer Impact Analysis (MIA)

- The Preliminary MIA is conducted during the preliminary analysis and provides an assessment of the potential impacts of standards on manufacturers of wine chillers and miscellaneous refrigeration products.
- During the preliminary analysis, DOE interviews manufacturers, soliciting information on the possible impacts of standards on manufacturing costs, equipment prices, sales, direct employment, capital assets, and industry competitiveness.
- During the preliminary analysis, DOE also prepares a Government Regulatory Impact Model (GRIM). The GRIM analysis uses a number of inputs to determine a series of industry annual cash flows beginning from the announcement of the new standard and continuing for several years after its implementation.
- Later, during the NOPR phase, DOE completes the MIA, conducting a follow-up interview with manufacturers and assessing the financial impact of new standards using the GRIM.

Manufacturer Subgroups

- DOE recognizes that smaller manufacturers, niche players, and manufacturers exhibiting a cost structure that differs significantly from the industry average may be affected differently by the imposition of standards.
 - DOE uses the results of the market and technology assessment to group manufacturers into subgroups, as appropriate.
 - The detailed manufacturer subgroup impact analysis entails calculating cash flows separately for each defined class of manufacturer.

Item 12-1 DOE seeks comment on appropriate manufacturer subgroups, if any, for residential wine chillers and miscellaneous refrigeration products that DOE should consider in a manufacturer subgroup analysis.

Cumulative Regulatory Burden

- DOE is aware that other regulations may apply to equipment covered under this rulemaking.
- Multiple regulations may result in a significant, cumulative regulatory burden on these manufacturers.
- Regulations that could affect the industries affected by this rulemaking include:
 - DOE standards for residential refrigeration products
 - Phaseout of HCFC blowing agents in 2003
 - Reduction of Hazardous Substances directive
 - Legislation limiting emissions of Greenhouse Gases

Item 12-2 What other regulations or pending regulations should DOE consider in its examination of cumulative regulatory burden?

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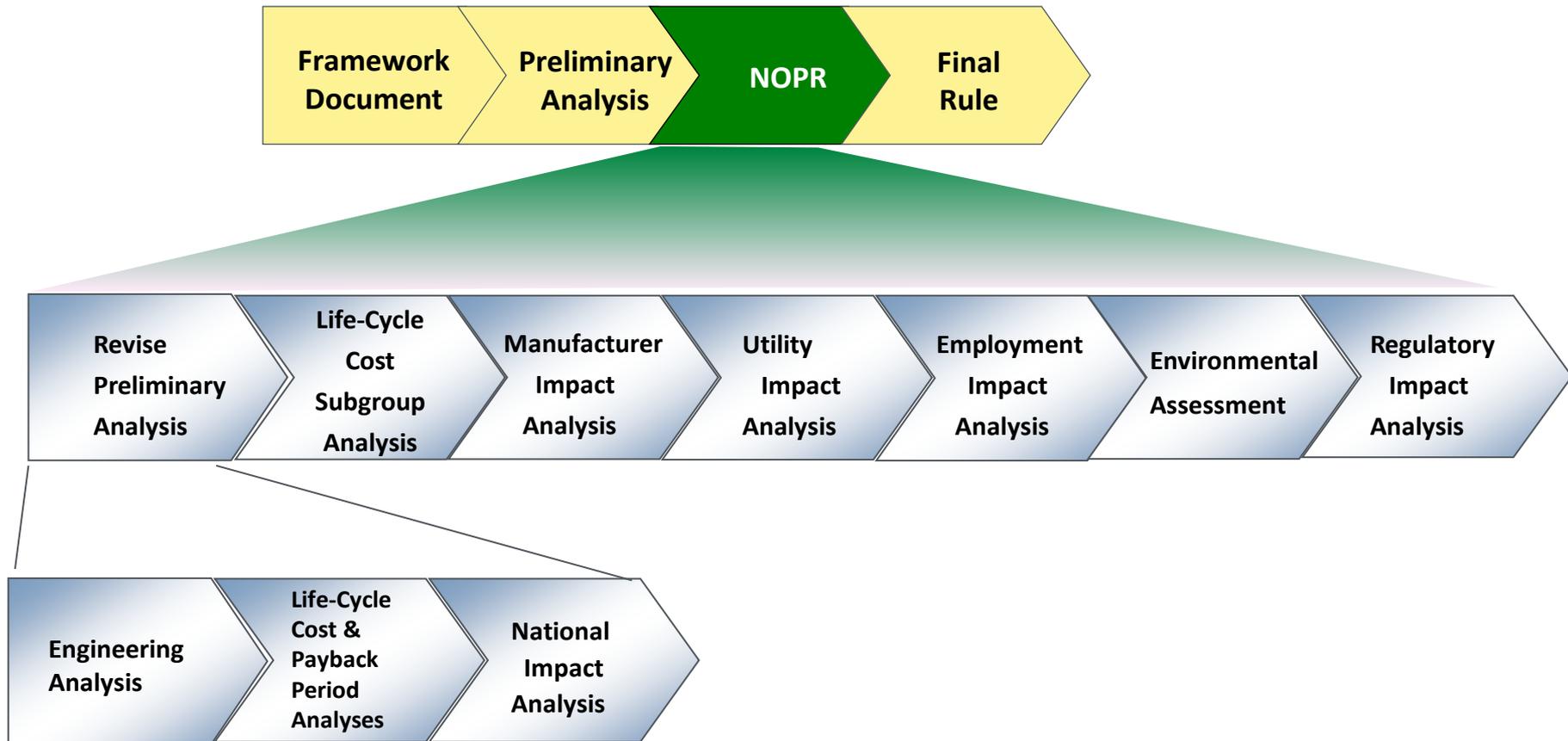
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Notice of Proposed Rulemaking (NOPR) Analyses

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Closing Remarks, Contacts & Information

NOPR Phase



Request for Comment

Item 13-1 DOE seeks input from stakeholders on its plans to use the Building Technologies National Energy Modeling System (NEMS-BT) to conduct the utility impact analysis. Examples of the type of input sought by DOE include, but are not limited to, whether the NEMS-BT model is appropriate for assessing the utility impacts of efficiency standards — and if not, what would be a more appropriate model to use?

Item 14-1 DOE welcomes feedback on its planned approach for assessing national employment impacts, both direct and indirect, and it is interested in whether other tools or factors should be considered as part of its analysis. If other tools or factors should be considered, please identify them and explain why, and how, they should be integrated into DOE's analysis.

Item 15-1 DOE seeks input on its plans to use NEMS-BT to conduct the environmental assessment for the products covered by this potential rulemaking.

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Wine Chiller and Miscellaneous Residential Refrigeration Products Comment Submittal Information

Please reference all correspondence for this action with the following information:

- Wine Chiller and Miscellaneous Residential Refrigeration Products Rulemaking
- Docket Number **EERE-2011-BT-STD-0043**
- Regulatory Identification Number (RIN) **1904-AC51**

Email: WineChillers-2011-STD-0043@ee.doe.gov

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Comment period ends: March 14, 2012

Wine Chiller and Miscellaneous Residential Refrigeration Products WebPages and DOE Contacts

- DOE Appliance Standards
 - http://www1.eere.energy.gov/buildings/appliance_standards/
- Wine Chiller and Miscellaneous Refrigeration Products Rulemaking
 - http://www1.eere.energy.gov/buildings/appliance_standards/residential/refrigerators_freezers.html
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