Meeting with AHAM & EPA
March 11, 2014

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Appliance Early Replacement/Recycling Program:

A Tool for GHG Emission Reduction Under EPA's Power Plant ESPS

February 2014

AHAM
ASSOCIATION OF HOME APPLIANCE MANUFACTURERS

Leadership • Knowledge • Innovation

Overview

- AHAM proposes that EPA include in the ESPS rulemaking an early replacement/recycling program to remove older refrigerators and other less-efficient appliances from the grid
- A unique opportunity to:
  - Reduce CO_2 emissions from power plants
  - Deliver energy savings to consumers
  - Promote responsible recycling

5-Year Refrigerator Program	Estimated Impacts
Total Rebates	2-4 million/year for 5 years
Total Energy Savings	43,000-85,000 GWh
Total Consumer Cost Savings	$5-$10 Billion
Total Carbon Reduction	30-60 $MMtCO_2$
Cost of Carbon Reduction	$17-$33/$MtCO_2$
Percentage of Annual Power Plant Emissions *(based on 2013 EPA GHG inventory)*	1.4-2.8%

- Request to EPA: Work with AHAM, DOE, NGOs, states and power sector to build support and develop details

Attractive compliance pathway for states under ESPS

Scope of Opportunity

- In 2016, 147 million refrigerators will be on the grid
- Refrigerators have long useful life and retain value for consumers
- When replaced, many older refrigerators remain on grid because they are kept as a second unit, refurbished, resold or given away
- Older refrigerators use significantly more energy than newer units
  - DOE standards and ENERGY STAR levels have contributed to a 50% improvement in refrigerator energy efficiency since 1990

Replacing older refrigerators with the latest models will yield immediate large-scale energy and CO_2eq savings

Basic Program Design

- Five year program
- Robust national education/marketing campaign with EPA
  - Manufacturers and retailers have clear incentive to promote plan
- Rebates of $50-$100 based on efficiency levels, i.e., 2014 DOE standard or ENERGY STAR
  - Possible additional rebate for removing 2nd unit
- Rebate conditioned on purchasing new unit and proper recycling of old one (i.e., no resale; verification required)
- Funding from participating utilities or state energy efficiency/GHG-reduction programs
- No restriction on age of eligible refrigerators
- Some "free riders" may receive rebates, as in all such programs, but would be accounted for in measuring program benefits

Building on Successful Rebate Programs

- Currently 40+ utility rebate programs exist to recover and recycle older refrigerators
- ARRA (stimulus legislation) provided $300M for rebates to replace older appliances
  - DOE considers program a "huge success"
  - Major appliances (particularly refrigerators) accounted for nearly 90% of rebates
  - 1.7 million rebates provided to consumers
    - ~565,000 rebates for refrigerators

Experience shows that rebates are an effective motivator for replacing old refrigerators

Energy and Carbon Reductions Benefits

5-Year Refrigerator Program	$75 Rebate
Number of Rebates Per Program Year	3 million *(2% of units on grid)*
Total Energy Savings From Program	64,000 GWh
Total Cost Savings From Program	$7.7 billion
Total Cost of Program	$1.12 billion
Total Carbon Reduction From Program	45 $MMtCO_2$
Cost of Carbon Reductions	$25/$MtCO_2$
Benefits of EPA's 2010 Social Cost of Carbon *($5.7-38.4 from Interagency WG on SCC Year 2015)*	$257 million - $1.7 billion

Measure of benefits is combination of (1) cumulative difference in energy consumption between new/old units over remaining useful life of old units and (2) prevention of older units remaining on grid

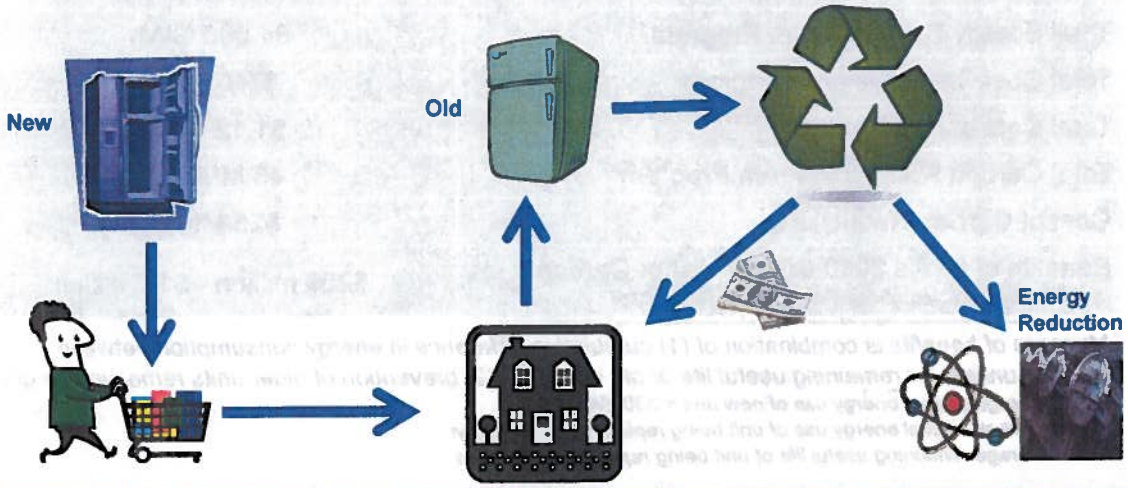
- *Average annual energy use of new unit = 330 kWh/yr*
- *Average annual energy use of unit being replaced = 678 kWh/yr*
- *Average remaining useful life of unit being replaced = 5.3 years*

Good Fit: ESPS and Early Replacement

- Program delivers reductions beyond business as usual:
  - Rebates induce replacement of units that would otherwise remain in service
  - Recycling reduces secondary market for less efficient appliances
- Energy reductions quantifiable with confidence
  - Extensive data on energy efficiency of old and new units, remaining useful life and CO_2 reduction
- Reliable verification and accountability measures document reductions: proof of removal and recycling of old unit
- Can accommodate states' need for flexibility in selecting tools to meet reduction goals
- Cost likely competitive with other emission-reduction options
- Reductions achieved immediately

Summary

This program holds significant potential to incentivize the early replacement and recycling of old appliances and thereby reduce energy consumption, reduce carbon emissions and save consumers money.



Requested Next Steps

- Schedule technical meeting between AHAM and EPA staff to provide feedback on AHAM technical analysis and key program elements
- Convene dialogue with utilities, retailers, states, DOE and other stakeholders to refine program design, evaluate program benefits and build support for implementation
- Include Appliance Early Replacement/Recycling Program as cost-effective GHG-reduction option in proposed ESPS rule and background documents
  - Send strong signal about EPA acceptance of efficiency programs in state performance standards
  - Early replacement program could begin in 2014-2015
  - Provide credit for early action

APPENDIX

Appendix Data Sources Index

- DOE technical source documents from 2014 refrigerator standard rulemaking provide appliance survival rates, usage adjustment factors
- DOE Uniform Methods Project (UMP) protocol for determining energy efficiency savings from recycling refrigerators (steering committee included EPA, NARUC, ACEEE, LBNL, and EEI)
- EPA emissions factor used to convert energy use to $MtCO_2eq$
- AHAM historical efficiency data
- AHAM shipment data

Energy and Carbon Reductions Benefits

Refrigerator Program • 5 years (2016-2020)	$50 Rebate	$75 Rebate	$100 Rebate
Number of Rebates Per Program Year	2 million	3 million	4 million
Total Energy Savings From Program	43,000 GWh	64,000 GWh	85,000 GWh
Total Cost Savings From Program	$7.7 billion	$11.6 billion	$15.4 billion
Total Cost of Program	$750 million	$1.12 billion	$1.5 billion
Total Carbon Reduction From Program	30 $MMtCO_2$	45 $MMtCO_2$	60 $MMtCO_2$
Cost of Carbon Reductions	$17/$MtCO_2$	$25/$MtCO_2$	$33/$MtCO_2$
Benefits of EPA's 2010 Social Cost of Carbon *($5.7-38.4 from Interagency WG on SCC Year 2015)*	$0.17 - $1.2 billion	$0.26 - $1.7 billion	$0.34 - $2.3 billion

Measure of benefits is combination of (1) cumulative difference in energy consumption between new/old units over remaining useful life of old units and (2) prevention of older units remaining on grid

- *Average annual energy use of new unit = 330 kWh/yr*
- *Average annual energy use of unit being replaced = 678 kWh/yr*
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