DOE's Proposed Furnace Rule:

An unnecessary challenge for Gas Utilities and their customers?

David C. Weaver
Vice President
Regulatory Affairs
July 2015

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This Slide makes the lawyers happy!

Forward-Looking Statements

Certain expectations regarding in this presentation are forward-looking statements. Forward-looking statements involve matters that are not historical facts. Forward-looking statements contained in this press release include, without limitation, the expected use of proceeds of the senior note offerings. AGL Resources' and AGL Capital's expectations are not guarantees and are based on currently available information. While these expectations are believed to be reasonable in view of the currently available information, they are subject to future events, risks and uncertainties, and there are several factors - many beyond the control of AGL Resources and AGL Capital - that could cause results to differ significantly from these expectations. These events, risks and uncertainties include the possibility that the conditions to closing the senior note offerings or the proposed merger with Nicor will not be satisfied or waived, and unforeseen events that may necessitate the application of the net proceeds of the senior note offerings to other, more critical purposes. Events, risks and uncertainties which may cause actual events to differ materially from expectations also include, but are not limited to, changes in price, supply and demand for natural gas and related products; the impact of changes in state and federal legislation and regulation including changes related to climate change; actions taken by government agencies on rates and other matters; concentration of credit risk; utility and energy industry consolidation; the impact on cost and timeliness of construction projects by government and other approvals, development project delays, adequacy of supply of diversified vendors, unexpected change in project costs, including the cost of funds to finance these projects; the impact of acquisitions and divestitures; direct or indirect effects on AGL Resources' business, financial condition or liquidity resulting from a change in credit ratings or the credit ratings of counterparties or competitors; interest rate fluctuations; financial market conditions, including recent disruptions in the capital markets and lending environment and the current economic downturn; general economic conditions; uncertainties about environmental issues and the related impact of such issues; the impact of changes in weather, including climate change, on the temperature-sensitive portions of AGL Resources' business; the impact of natural disasters such as hurricanes on the supply and price of natural gas; acts of war or terrorism; and other factors which are provided in detail in AGL Resources' filings with the Securities and Exchange Commission, which we incorporate by reference in this press release. Forward-looking statements are only as of the date they are made, and neither AGL Resources nor AGL Capital undertakes to update these statements to reflect subsequent changes.

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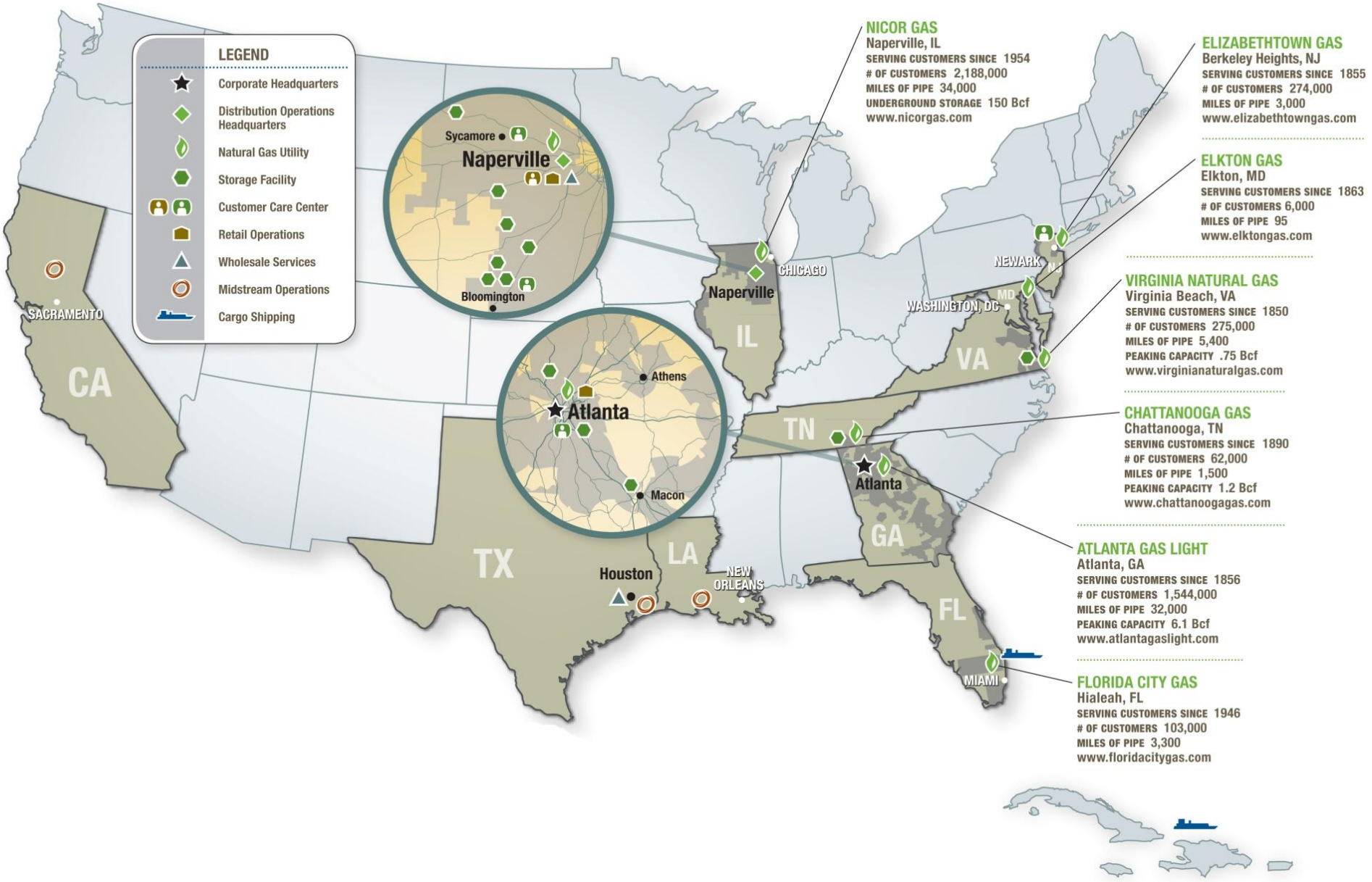

DOE Furnace Rule: Good for Consumers?

- **AGL supports energy efficiency programs and new R&D programs that would provide important appliance options for consumers**
  - Since 2011, AGA member companies have cumulatively invested nearly $3.5 billion in efficiency programs
  - AGL Resources alone has worked with customers to save over 58 million therms over the past four years.
- **The direct use of natural gas by consumers is a superior alternative in terms of cost, efficiency and environmental impact over:**
  - Electricity generated by natural gas
  - Fuel Oil
  - Propane

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DOE Furnace Rule: Sound energy policy?

Natural Gas

SOURCE ENERGY	EXTRACTION, PROCESSING & TRANSPORTATION	GENERATION	DISTRIBUTION	DELIVERED TO CUSTOMER
100 MMBtu	▼ 7% Energy Loss 93 MMBtu	No energy conversion necessary, therefore no energy is lost	▼ 1% Energy Loss 92 MMBtu	92 MMBtu

Electricity

SOURCE ENERGY	EXTRACTION, PROCESSING & TRANSPORTATION	GENERATION	DISTRIBUTION	DELIVERED TO CUSTOMER
100 MMBtu	▼ 5% Energy Loss 95 MMBtu	▼ 64% Energy Loss 34 MMBtu	▼ 6% Energy Loss 32 MMBtu	32 MMBtu

*Based on 2009 actual generation mix of all energy sources

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DOE Furnace Rule: Good for the Environment?

- **Methane emissions from natural gas LDCs is not an issue that requires federal action**
  - Through energy efficiency programs and pipe replacement programs, emissions have been reduced by 20% since the 1990s.
  - Emissions from LDCs account for less than 0.26% of total industry
  - Emissions will never be zero. Costs to move the performance toward 0.20% can be significant
- **The EPA has agreed with ONE FUTURE to allow LDCs to continue with voluntary programs with no federal mandates.**

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DOE Furnace Rule: Unintended Consequence (?)

- **DOE estimates the proposed rule would cost consumers an additional $6-$12 billion**

- **Not included is estimate:**
  - The propose furnace rule will cost consumers an additional $2500 to vent condensing furnaces
  - Consumers may likely opt for lower upfront costs for less efficient electric heat
  - Moving away from gas appliances could result in 463,000 dekatherms of additional energy usage and $45 million in increased consumer costs annually

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Concluding thoughts

- **DOE needs to revisit the proposed rule**
  - Start over with more transparency and more stakeholder input

- **DOE's claims to have justification to spend $3 billion annually on pipeline replacement programs and emissions monitoring**
  - Are those "available" funds better suited for R&D on efficient gas appliances that are affordable for consumers?

- **Furnace Rule + 2007 EISA Ban on Fossil fuels in federal buildings by 2030 = ?? [Anti Gas Bias?]**

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Thank you!

David C. Weaver
AGL Resources
dweaver@aglresources.com

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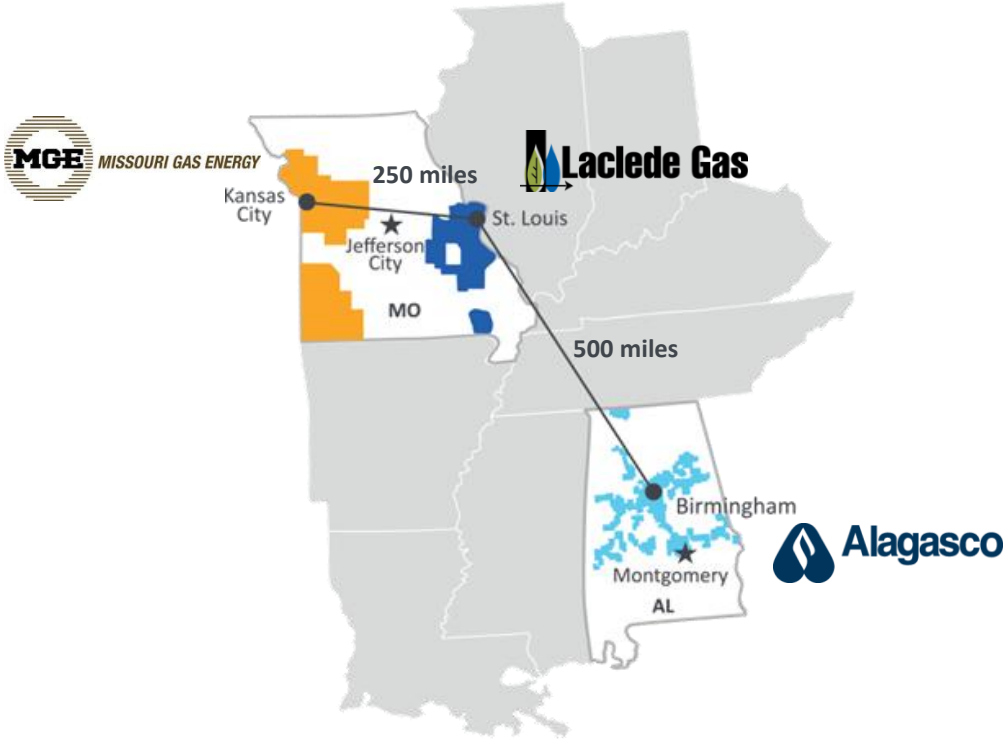
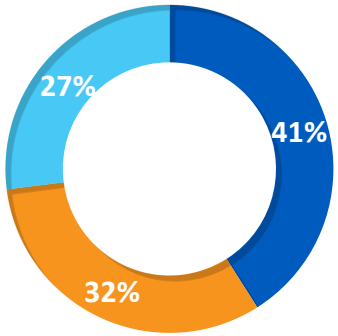
DEPARTMENT OF ENERGY (DOE)
RESIDENTIAL FURNACE EFFICIENCY
NOTICE OF PROPOSED RULEMAKING (NOPR)

LACLEDE IS A GAS COMPANY AT ITS CORE

- Three gas utilities with comparable service areas, customers and distribution systems
- Shared focus on safe and reliable service, community development and growth
- Financially strong and well-run with long operating histories
- Constructive working relationships with regulators
- Serves regions with solid market and economic profiles
- Strong track record promoting energy efficiency



Gas Distribution Customers



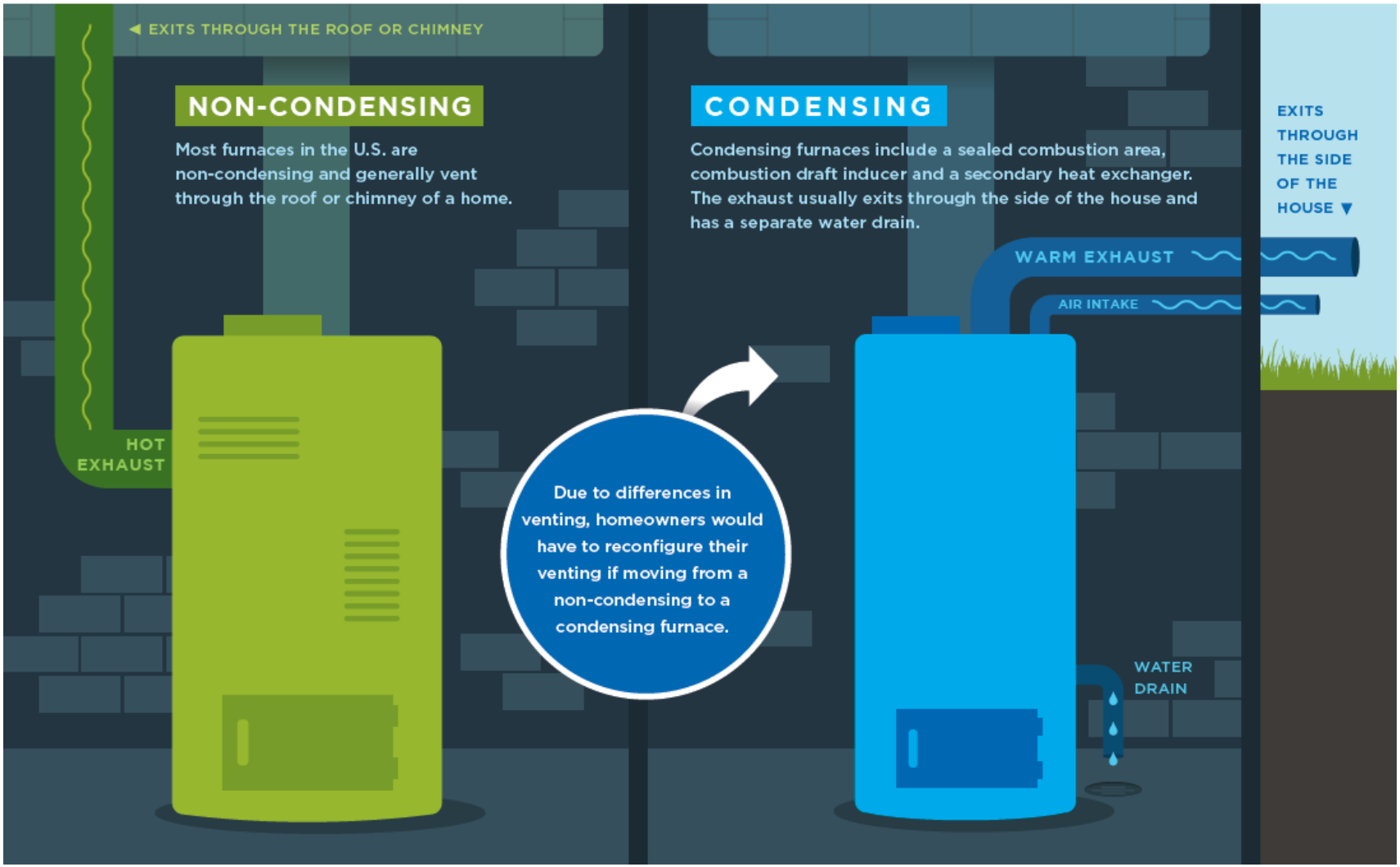
1.56 Million

RESIDENTIAL FURNACE EFFICIENCY STANDARDS

The DOE's Notice of Proposed Rulemaking:

1) Creates a national ban on non-condensing natural gas furnaces
   - Does so by administrative fiat, rather than compelling rationale or broad, popular support
   - Restricts consumer choices and creates significant additional replacement cost
     - Furnaces below 92% efficiency would be no longer available; traditional furnaces are generally 80% efficient by AFUE standards
     - Impacts related appliance choices, such as for water heaters
   - In direct conflict with the Direct Final Rule from just 3 years ago, which stated that it didn't make sense to apply this broadly
     - Non-economic in the southern region

CONDENSING VS NON-CONDENSING FURNACES (AGA)



These changes could impose significant costs, driving homeowners away from natural gas to alternative fuel heating systems that could be ultimately less efficient and less cost effective.

LEGAL CHALLENGES

Legal infirmities identified by APGA

- DOE may not proceed on the basis of a Technical Support Document that has not been the subject of an updated peer review
  - Office of Management & Budget requires agencies to conduct independent peer reviews to ensure integrity of data and analysis used to establish federal policies and rules
  - Peer review relied upon by DOE was conducted over 8 years ago and did not assess critical components of current analysis underlying Proposed Rule
  - Fuel switching assumptions in current analysis is one example of a critical component that has not been peer reviewed
- DOE is precluded by the EPCA and its own Process Improvement Rule from adopting new standard until it has completed test procedures
  - Measures the energy efficiency, energy use and other operational attributes of products
  - DOE has arbitrary assumed, without support, that such testing is not necessary
- DOE proposed ban violates requirement for 10 and 6 year intervals
  - 10-year window between the compliance dates for the first and second rounds of rulemaking
  - 6-year window between compliance dates for new appliance standards in general (furnace fan rule goes into effect 2019)
  - Compliance date under either requirement should be 2025 for adopting and implementing new energy efficiency standards for non-weatherized gas furnaces

OTHER LEGAL ISSUES

U.S.C. § 2695(o)(2)(A)

- Any amended furnace standard must be designed to achieve the *maximum improvement in energy efficiency* which DOE determines is technologically feasible and *economically justified*

U.S.C. § 6295(o)(2)(B)

- In determining whether a standard is economically justified, *DOE must determine whether the benefits of the standard exceed its burdens* by considering the following factors:
  1) *the economic impact on manufacturers and consumers;*
  2) the savings in operating costs throughout the product's estimated average life;
  3) *the total projected amount of energy saved;*
  4) any lessening of the utility or performance of the product;
  5) *the impact of any lessening of competition;*
  6) the need for national energy and water conservation; and
  7) other factors the Secretary considers relevant.

U.S.C. § 6295(q)(1)

- EPCA requires DOE to *establish separate product types or classes* where the covered products consume different fuels or have a capacity or other performance-related features that justify a higher or lower standard from that for other product types or classes

RESIDENTIAL FURNACE EFFICIENCY STANDARDS

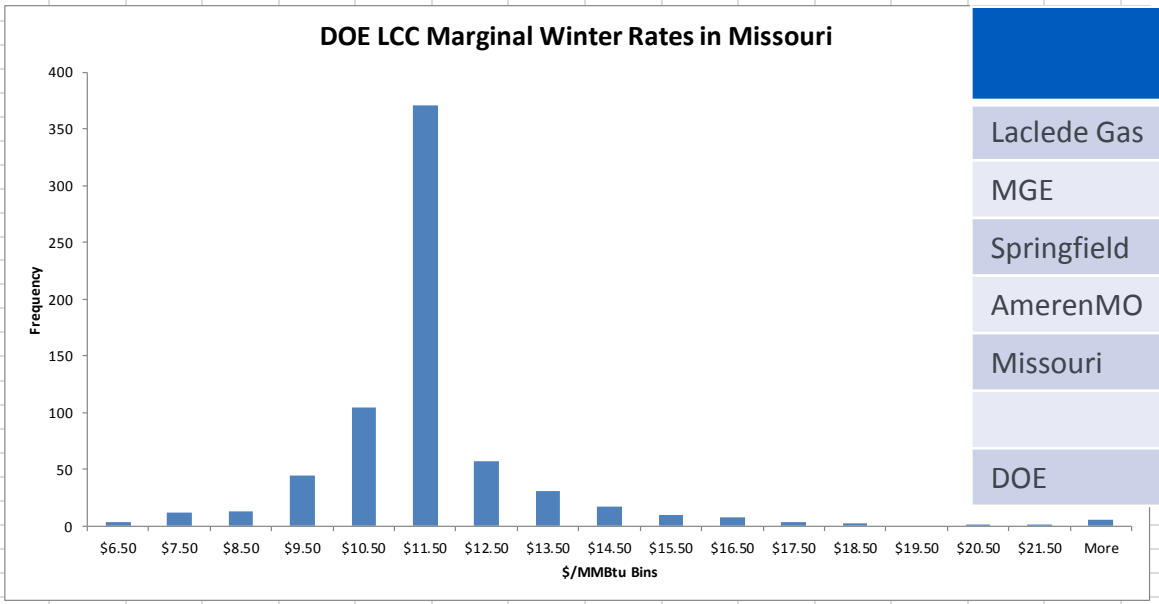
The DOE's Notice of Proposed Rulemaking:

1) Creates a national ban on non-condensing natural gas furnaces
2) Justification is based on questionable life-cycle cost (LCC) techniques
   - Relies upon dubious cost/benefit assumptions
   - Assumes furnace have a longer life than experience would show (over 20 years)
   - Lacks transparency that defies independent validation
   - Results in outcomes that defy free-market economics, and significantly different results from their own study from 2012

MARGINAL COST SAVINGS

It makes a difference: Fixed vs. Variable and Average vs. Marginal Costs

- Utility costs are almost entirely fixed, so marginal costs principally commodity-related
  - Utilities with SFV, decoupled, weather-normalized or similar this would be their rate structure
  - Lower usage would adjust rate determinants at next rate review, and distribution cost would be re-spread
- Utilization of various hub prices would be closer than a straight average of cost/MMBtu that ignores weighting for population and is inclusive of fixed distribution costs
  - A "commodity plus transport" (at 100% load factor) would reflect the appropriate marginal cost



	Marginal Winter Rate	Customers in 2013	% Total in MO
Laclede Gas	$5.88	602,459	48.4%
MGE	$6.38	440,401	35.4%
Springfield	$6.46	74,907	6.0%
AmerenMO	$8.91	114,019	9.2%
Missouri		1,243,721	
DOE	$11.38		

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Winter
avg	$10.77	$10.77	$10.91	$8.85	$10.25	$12.50	$14.30	$15.14	$14.10	$11.96	$12.95	$11.51	$11.38
min	$6.03	$6.03	$6.11	$4.96	$5.74	$7.00	$8.01	$8.48	$7.90	$6.70	$7.25	$6.45	$6.37
max	$216.04	$216.02	$218.83	$177.63	$205.69	$250.86	$286.95	$303.86	$282.96	$239.93	$259.88	$231.00	$228.35

UNREASONABLE COSTS, SIGNIFICANTLY DIFFERENT OUTCOMES

Unreasonable incremental costs

- Our survey showed condensing furnace costs are much higher
- Related costs underwhelmed
  - Low installation costs (did not contact installers)
  - Maintenance costs are essentially same as non-condensing furnaces

Results of high benefits, low costs and a longer life…

- …are significantly different between previous and current study

GTI's study showed a net negative average outcome

- 83% of the market is negative/neutral
- DOE shows 61% of the market have no impact, even with the biased assumptions

	AFUE	2011 Average LCC savings	2015 Average LCC savings	Delta	% Change
National - All Installations	90%	$87	$236	$149	170.9%
	92%	$136	$305	$169	124.1%
	95%	$205	$388	$183	89.1%
	98%	$46	$441	$395	859.1%
North - All Installations	90%	$155	$208	$53	34.0%
	92%	$215	$277	$62	29.0%
	95%	$323	$374	$51	15.7%
	98%	$198	$467	$269	135.9%
South/Rest of Country - All Installations	90%	-$13	$267	$280	2156.3%
	92%	$19	$336	$317	1667.2%
	95%	$28	$404	$376	1341.4%
	98%	-$181	$412	$593	327.7%
National - Replacements	90%	-$11	$113	$124	1130.2%
	92%	$39	$179	$140	355.5%
	95%	$111	$264	$152	136.8%
	98%	-$26	$319	$346	1309.0%
North - Replacements	90%	$90	$106	$16	17.4%
	92%	$151	$172	$21	13.6%
	95%	$262	$259	-$3	1.1%
	98%	$158	$362	$204	129.0%
South/Rest of Country - Replacements	90%	-$160	$120	$280	175.4%
	92%	-$125	$188	$312	250.5%
	95%	-$110	$268	$378	343.7%
	98%	-$297	$273	$570	191.7%
National - New Construction	90%	$383	$588	$205	53.6%
	92%	$429	$659	$230	53.5%
	95%	$487	$730	$244	50.0%
	98%	$264	$764	$499	188.9%
North - New Construction	90%	$343	$484	$141	41.2%
	92%	$404	$557	$153	38.0%
	95%	$502	$665	$163	32.5%
	98%	$315	$704	$389	123.4%
South/Rest of Country - New Construction	90%	$445	$710	$265	59.5%
	92%	$469	$779	$310	66.0%
	95%	$463	$807	$344	74.3%
	98%	$184	$834	$649	352.3%

GTI Study - Lifecycle Cost and Rulemaking Market Impact

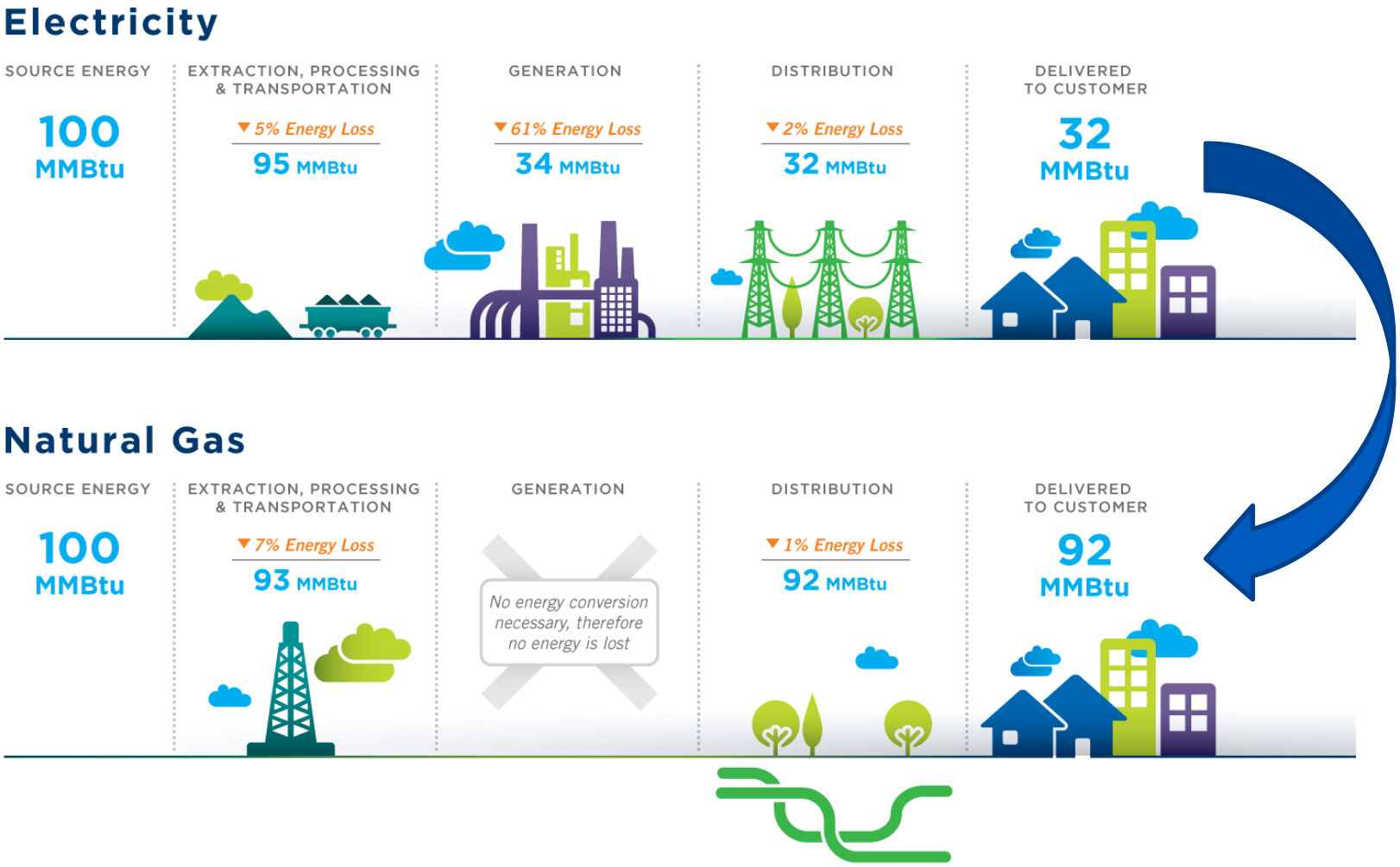
LCC Model	Average Furnace Life-cycle Cost (LCC) Savings	Fraction of Furnace Population (%)		
		Net Cost	No Impact	Net Benefit
DOE NOPR LCC Model	$305	20%	41%	39%
GTI Integrated Scenario Int-5	-$181	27%	57%	17%

RESIDENTIAL FURNACE EFFICIENCY STANDARDS

The DOE's Notice of Proposed Rulemaking:

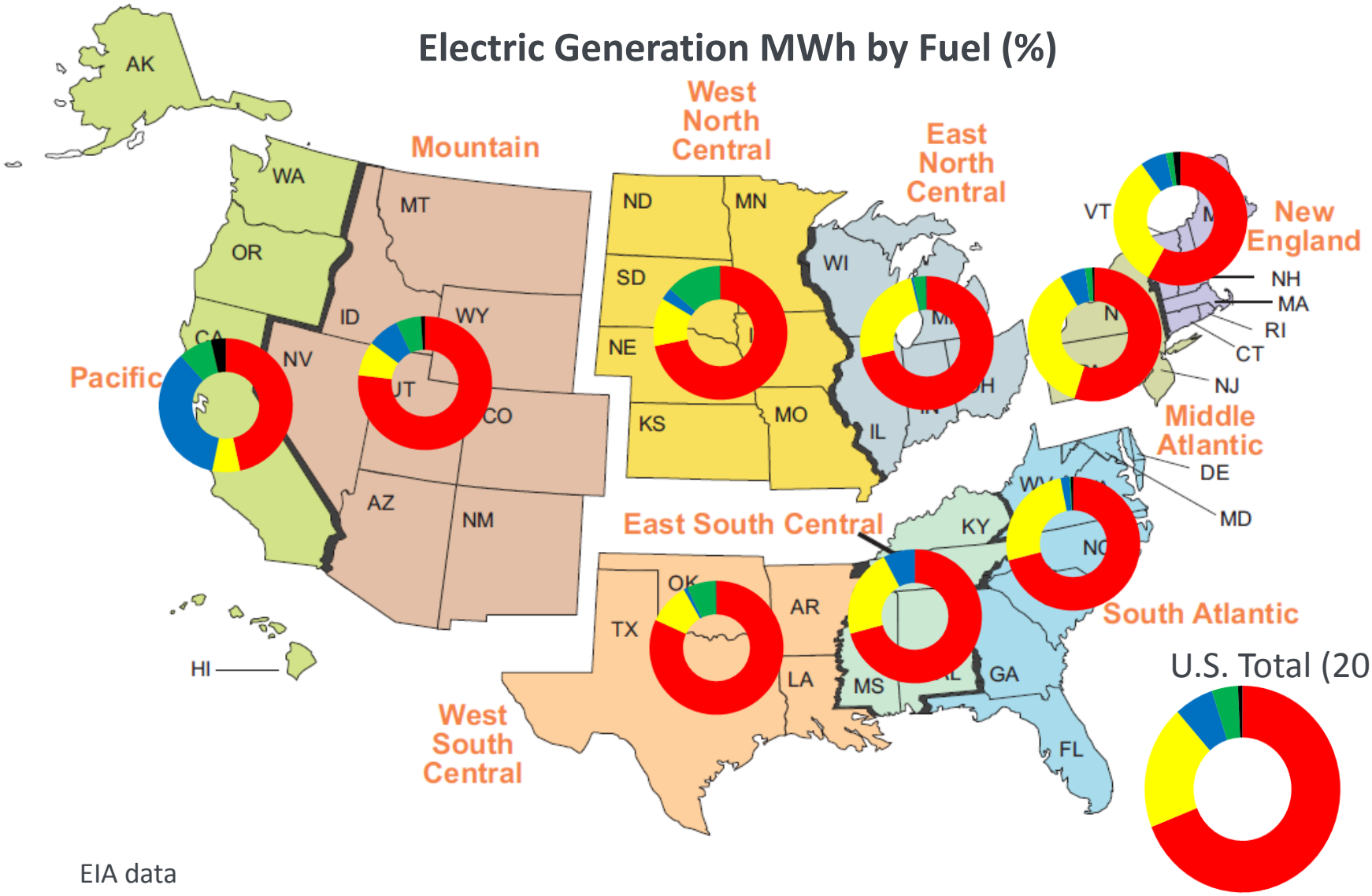
1) Creates a national ban on non-condensing natural gas furnaces
2) Justification is based on questionable life-cycle cost (LCC) techniques
3) DOE's proposal will move the market to higher levels of electrification
   - Rather than moving the market to higher levels of efficiency and lower carbon emissions, it would do just the opposite
   - Actual economics will drive many consumers to electric space and water heating – this is especially true in the South, which DOE even shows as non-beneficial for most customers
   - Site vs. Source:
     - Electric generation is based primarily on carbon-based fuels
     - Generation of one energy from another, and then distributed through hundreds of miles of transmission systems is inherently less efficient
     - Greater energy inefficiency results in more energy consumption, with resulting increased commodity costs and higher greenhouse gases

SITE VS SOURCE – LESS ENERGY EFFICIENT…



Content from AGA

…AND MORE CARBON INTENSIVE



EIA data

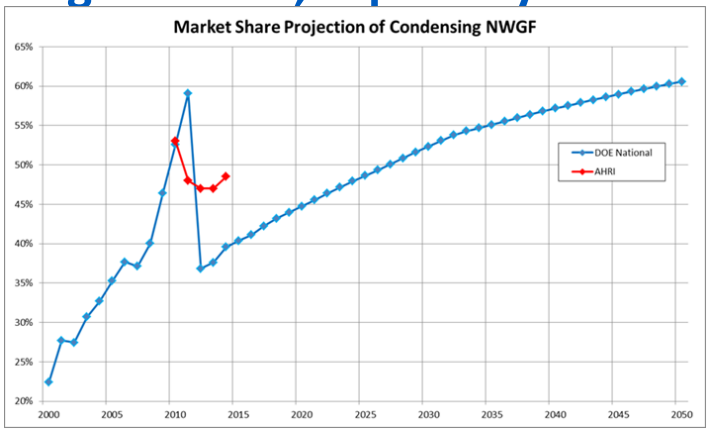
RESIDENTIAL FURNACE EFFICIENCY STANDARDS

The DOE's Notice of Proposed Rulemaking:

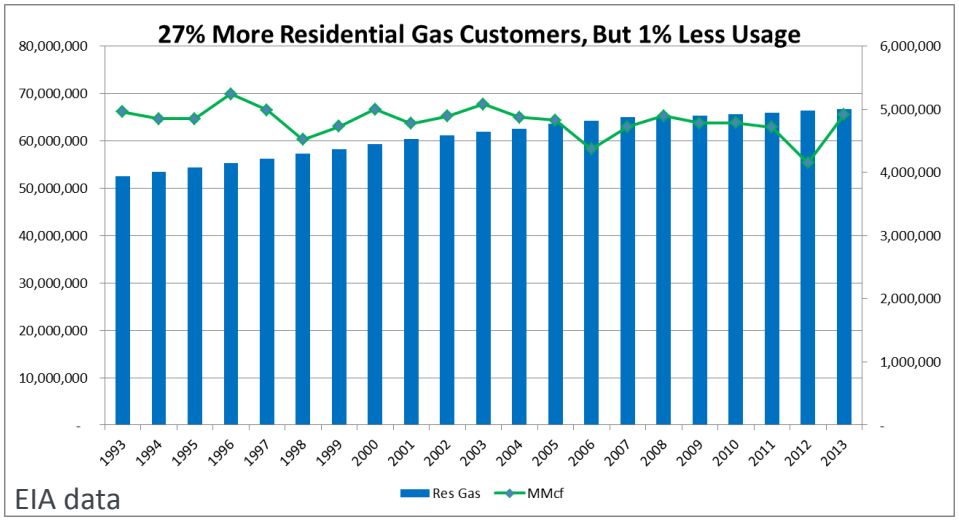
1) Creates a national ban on non-condensing natural gas furnaces
2) Justification is based on questionable life-cycle cost (LCC) techniques
3) DOE's proposal will move the market to higher levels of electrification
4) Such standards only make economic sense in higher-use applications
   - Predominantly in the northern U.S., but even there lower-use applications exist
     - Northern markets already moving to condensing furnaces without such rulemaking
     - Residential gas consumption has already achieved significant efficiencies on its own
   - Laclede is supportive of comments made by AGA and APGA and would ask that such proposal is withdrawn
     - Electric furnaces have no such restrictions, so why should gas?

GAS MARKET ALREADY ACHIEVING ENERGY EFFICIENCY

AHRI shows markets are already significantly moving in the direction of higher efficiency condensing furnaces, especially in North

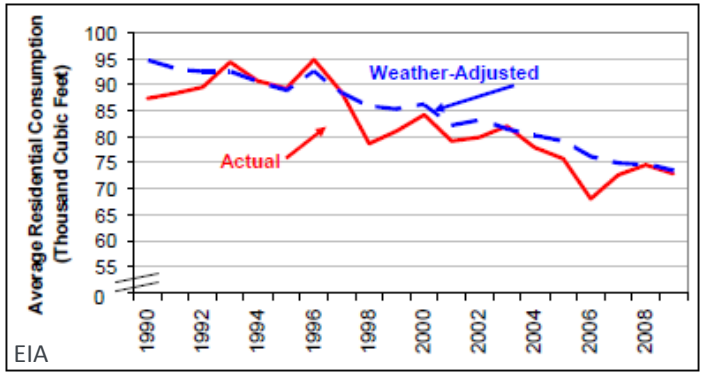


What problem is being solved here?



EIA data

Nearly a 25% decrease in 20 years in Average Residential Use/Customer



EIA

the Energy to Lead

GTI Technical Analysis of DOE NOPR on Residential Furnace Minimum Efficiencies

2015 NARUC Summer Committee Meetings

July 14, 2015

Neil Leslie, Gas Technology Institute

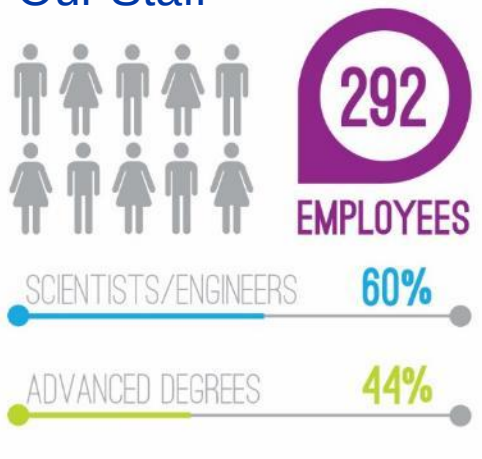
(847) 768-0926, neil.leslie@gastechnology.org

gti

GTI Overview

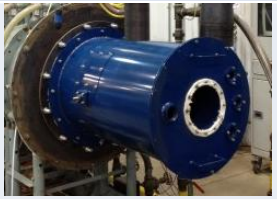
ESTABLISHED 1941

- Independent, not-for-profit established by the natural gas industry
- Providing natural gas research, development and technology deployment services to industry and government clients
- Performing contract research, program management, consulting, and training
- Wellhead to the burner tip including energy conversion technologies



GTI's Energy Utilization RD&D Program

Five Areas of Focus for Efficient, Clean Uses of Natural Gas

Highly Efficient Appliances (Including over 100% efficiency)	• Combination Space/Water Heating Systems • Gas Heat Pumps (Space Conditioning, Water Heating) • Ventilation, Indoor Air Quality • Commercial Foodservice		
Efficient, Clean Industrial Processes	• Efficient, low NOx Boilers • Advanced Process Heating • Heat Recovery Systems • Process Controls and Sensors		
Combined Heat & Power	• Integrated Commercial/ Industrial CHP Systems • Micro CHP Systems		
NGVs, Hydrogen, and Alternative Vehicles	• Ultra-Clean, Efficient HD NGVs and NGV Storage • NGV Fuel Stations, Home Fueling • Hydrogen Fuel Cells, H_2 Fueling		
Renewable Energy	• Solar Thermal/Natural Gas Hybrid Systems • Bio-Methane Production, Clean-Up, and Use		

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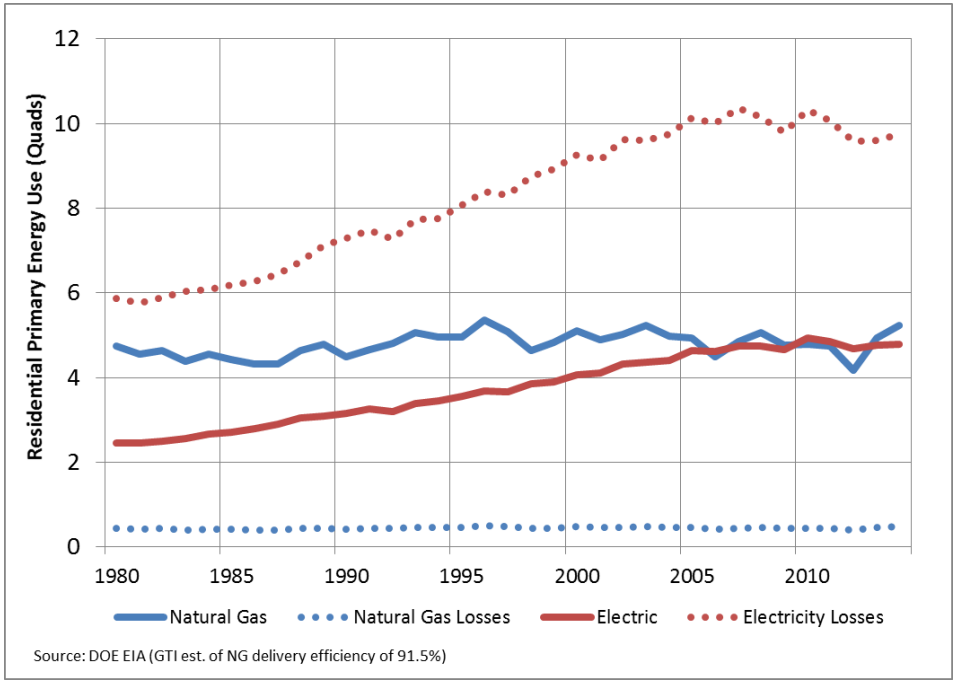
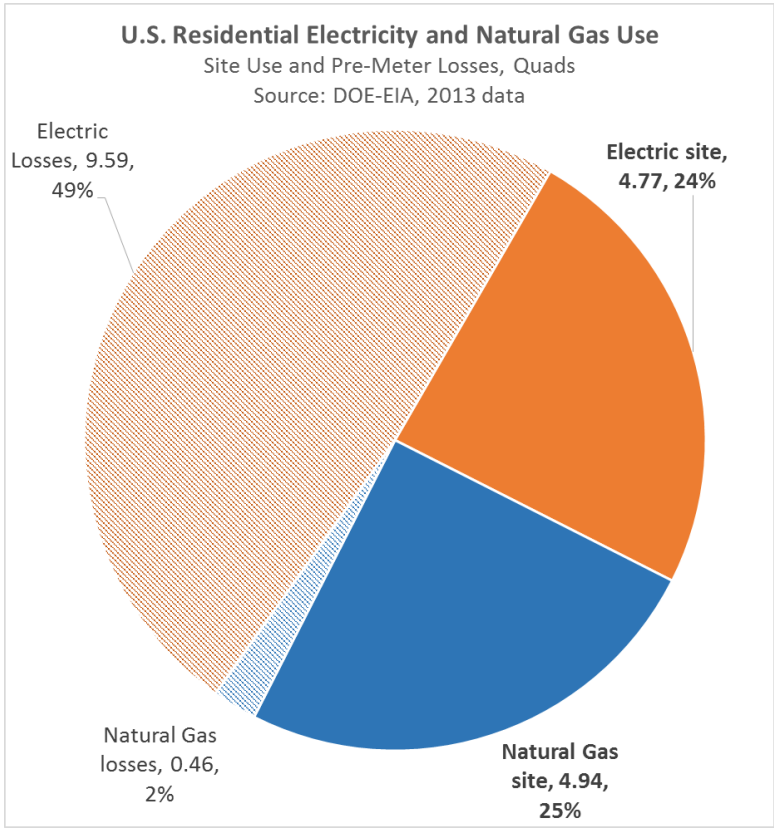
Residential Energy Use

The Big Picture



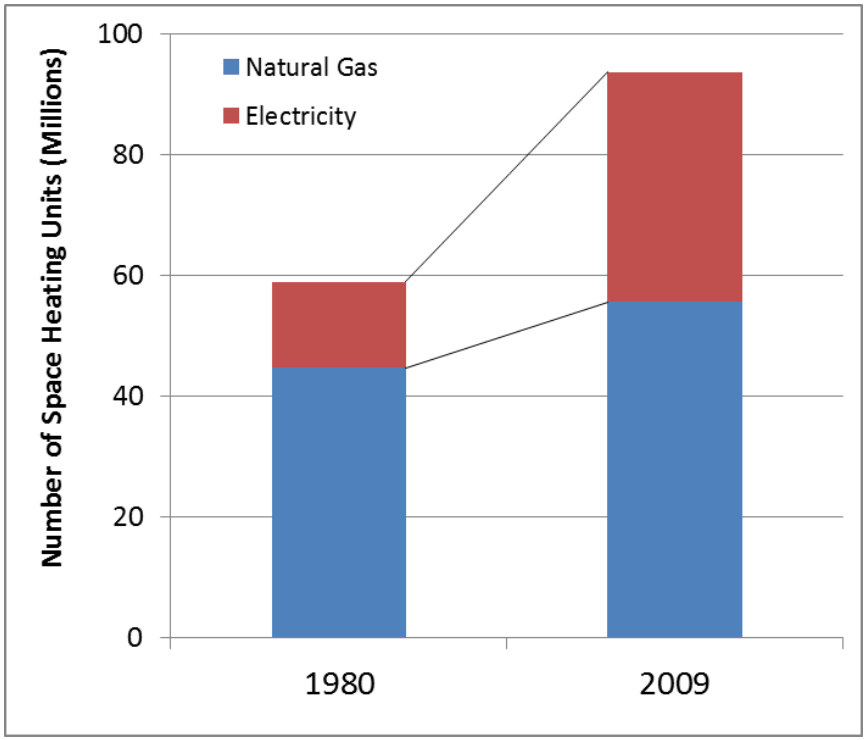


Residential energy use and losses impacted by growing electricity use between 1980 and 2010

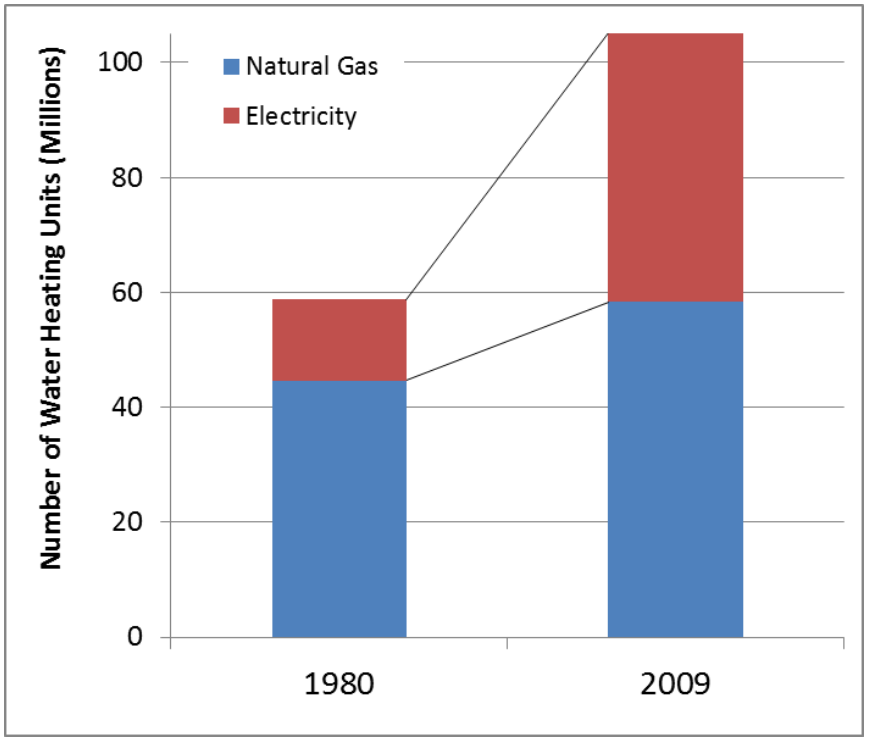
Expanding Residential Electricity Use (1980-2010)

Includes Thermal Loads

RESIDENTIAL SPACE HEATING



RESIDENTIAL WATER HEATING



DOE Residential Furnace Efficiency Proposed Rulemaking

- DOE published a proposed furnace efficiency standard on 3/12/15; public comment period ended 7/10/15.
  - 92% AFUE (condensing furnace) national standard, effective 5 years after final rule is published
  - Fuel switching impacts considered for the first time
- Gas industry concerns with technical justification for NOPR based on previous analysis
  - Inconsistent with market-based data
  - Need to understand fuel switching analysis methodology compared to 2014 fuel switching survey

LCC/Crystal Ball Spreadsheet Analysis – GTI Areas of Focus

- Detailed examination of DOE NOPR LCC Model
  - Approach, assumptions, and results
  - LCC analysis spreadsheet and Crystal Ball model
  - Rational Consumer Economic Decision (CED) framework and methodology developed by GTI
  - Surveys (e.g., American Home Comfort Study) and data on targeted input variables
  - Consumer benefits and costs associated with trial standard levels of furnace efficiency
- National impact comparison between DOE NOPR and scenario developed by GTI

Summary of GTI Analysis Results

- The examination identified flaws in two key areas
  - Random decision making methodology used by DOE to assign the base case furnace and fuel switching prompted by the proposed rule
  - Outdated or incorrect market data used for key input variables in the model/spreadsheets
- DOE NOPR LCC model results overstate savings compared to CED framework

Lifecycle Cost and Market Impacts

- GTI Scenario Int-5
  - Negative average LCC savings
  - More consumers with net cost than net benefit
  - Increased total primary energy use and CO_2e emissions resulting from the proposed rule
    - Negative societal impacts of fuel switching caused by DOE rule outweigh the natural gas primary energy savings and associated CO_2e emission reduction

LCC Model	Average Furnace Life-cycle Cost (LCC) Savings	Fraction of Furnace Population (%)		
		Net Cost	No Impact	Net Benefit
DOE NOPR LCC Model	$305	20%	41%	39%
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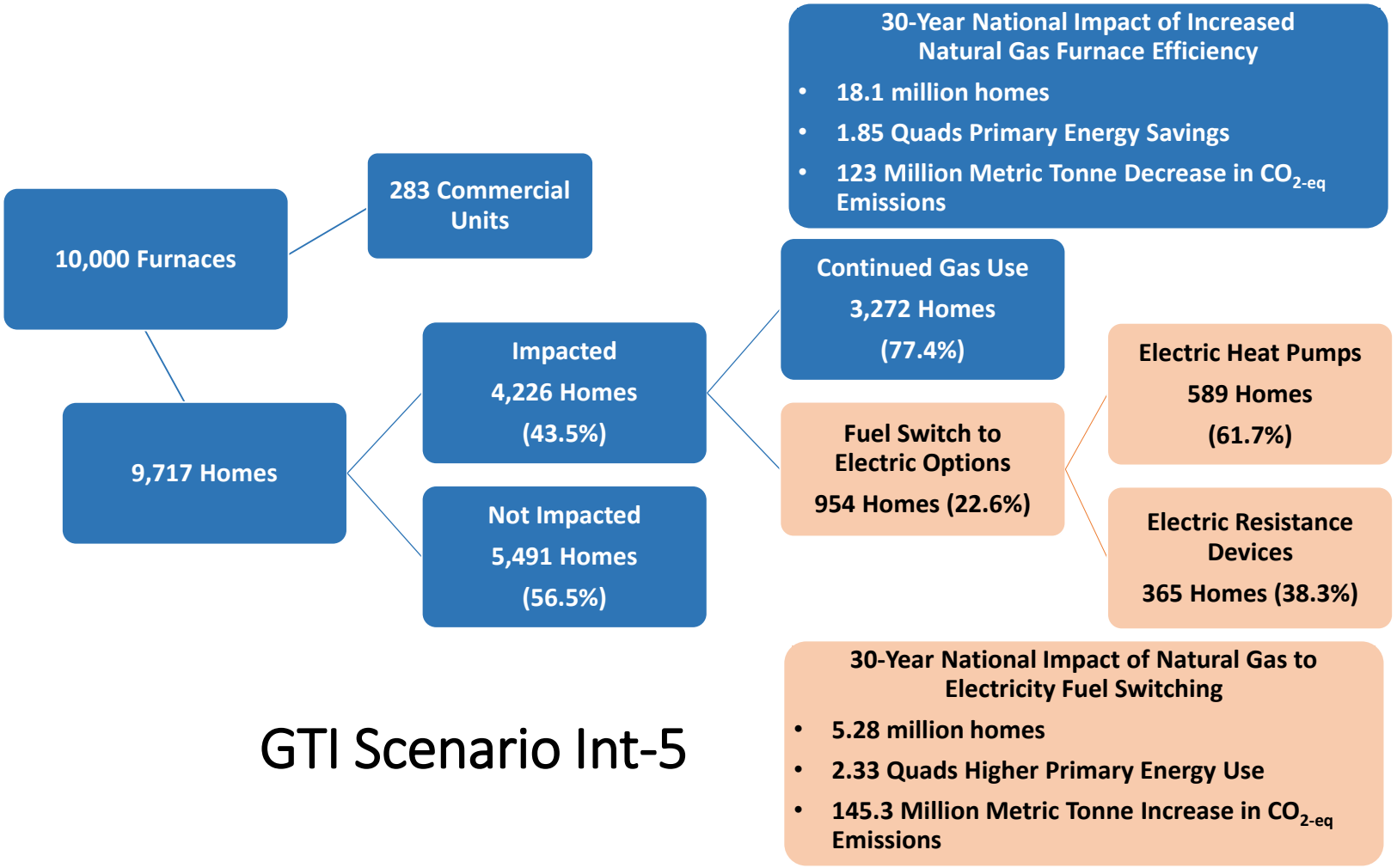
National Impact Estimate



GTI Scenario Int-5

Summary

- DOE LCC analysis contains significant technical flaws that overstate savings compared to CED framework
- CED framework addresses decision making flaws using detailed AHCS information
- Improved input data addresses inconsistency between DOE calculations and market data
- Integrated CED and Data scenario shows no economic justification for a DOE proposed rule at any of the TSLs (90, 92, 95, or 98% AFUE) evaluated by DOE
- National impact estimate shows increased primary energy and CO_2e emissions caused by rule

Supplemental Information

Four Categories of Consumers Based on Financial Benefit or Loss

- **Category 1:** Consumers that choose a condensing furnace, and accrue financial benefit
- **Category 2:** Consumers that choose a condensing furnace, but suffer financial loss
- **Category 3:** Consumers that do not choose a condensing furnace, and do not accrue financial benefit
- **Category 4:** Consumers that do not choose a condensing furnace, and do not suffer financial loss

Consumer Economic Decision Framework

Consumer Economic Decision Making Based on Unregulated Market Factors, Market Transformations, and Regulatory Interventions		
Unregulated Market (Based on Economic Factors)	Financial Benefit (Acceptable Payback)	Financial Loss (Unacceptable Payback)
Select Condensing Furnace (48.5% of purchases in 2014).	**Category 1** Rational decision.	**Category 2** Irrational decision.
Do Not Select Condensing Furnace (51.5% of purchases in 2014).	**Category 3** Irrational decision.	**Category 4** Rational decision.
Market Transformation (Energy Efficiency Incentives)	Financial Benefit (Acceptable Payback or LCC)	Financial Loss (Unacceptable Payback or LCC)
Select Condensing Furnace.	Rational decision. Incentives may induce Category 3 or Category 4 consumers to make rational decision. May also have Category 1 free riders.	Irrational decision. Incentives may induce Category 4 consumers to make irrational decision. May also have Category 2 free riders.
Do Not Select Condensing Furnace.	Irrational decision. Incentives do not induce Category 3 consumers to make rational decision.	Rational decision. Incentives do not induce Category 4 consumers to make irrational decision.
Regulatory Intervention (Codes, DOE Rule, Legislation)	Financial Benefit (Acceptable LCC)	Financial Loss (Unacceptable LCC)
Select Condensing Furnace.	Intervention does not impact Category 1 consumers. May force Category 3 consumers to make rational decision.	Intervention does not impact Category 2 consumers. May force Category 4 consumers to make irrational decision.
Do Not Select Condensing Furnace.	May force Category 3 consumers to fuel switch.	May force Category 4 consumers to fuel switch.

Technical Flaws in DOE's Decision Making Criteria

- Random baseline furnace assignment
  - Ignores consumer economic decision making
  - Causes wrong consumers to be impacted by rule
  - Overstates savings compared to CED framework
- Average "switching payback" period for fuel switching decisions
  - Consumer response to LCC savings is non-linear; averaging overstates savings
  - Distribution of allowable "switching payback" periods based on income; averaging overstates savings

Illustrative DOE "Impacted by Rule" Cases With First Cost and Operating Cost Savings

Crystal Ball Trial Case	92% vs. 80%		LCC Savings		Region/ Location	Type	Payback (Years)
	Cost Penalty	Annual Savings	DOE	GTI Scenarios			
7067	-$1,656	$76	$2,702	No Impact	North/ New York	Single Family New	-22
8749	-$457	$315	$8,659	No Impact	North/ New York	Single Family New	-1
1886	-$690	$360	$6,961	No Impact	North/ New York	Single Family Replacement	-2
138	-$856	$56	$2,165	No Impact	South/ AL, KY, MS	Single Family Replacement	-15
5327	-$741	$379	$6,917	No Impact	North/ Pacific	Commercial New	-2
8042	-$876	$155	$5,934	No Impact	South/ Tennessee	Single Family New	-6

Illustrative DOE "No Impact" Cases With Negative LCC Savings

Crystal Ball Trial Case	92% vs. 80%		LCC Savings		Region/ Location	Type	Payback (Years)
	Cost Penalty	Annual Savings	DOE	GTI Scenarios			
287	$1,055	$1	No Impact	No Impact	North/ IA, MN, ND, SD	Single Family Replacement	1,323
5872	$1,118	$3	No Impact	-$809	North/ IN, OH	Single Family Replacement	382
8906	$810	$2	No Impact	-$59	North/ OR, WA	Single Family Replacement	340
6467	$4,620	$23	No Impact	-$3,792	North/ Illinois	Multifamily Replacement	201
8377	$3,287	$27	No Impact	-$3,035	South/ California	Multifamily Replacement	90
7147	$1,891	$10	No Impact	-$1,680	South/ California	Single Family Replacement	189

Impact of DOE Random Base Case Assignment

Characteristics of Crystal Ball Trial Cases at 92% TSL	DOE LCC Model		GTI Scenarios	
	Number of Cases	Percent of Total	Number of Cases	Percent of Total
Number of Residential	9,717	100%	9,717	100%
Replacements	7,241	75%	7,241	75%
- Payback Period ≤ 0 years	530	5%	526	5%
- Impacted by Rule	324	3%	0	0%
- Payback Period >15 years	3,062	32%	3,065	32%
- No Impact	1,053	11%	264	3%
New Installations	2,476	25%	2,476	25%
- Payback Period ≤ 0 years	1,709	18%	1,707	18%
- Impacted by Rule	1,061	11%	0	0%
- Payback Period >15 years	21	0%	28	0%
- No Impact	7	0%	2	0%
Total Residential Trial Cases	9,717	100%	9,717	100%
- Payback Period ≤ 0 years	2,239	23%	2,233	23%
- Impacted by Rule	1,385	14%	0	0%
- Payback Period >15 years	3,083	32%	3,093	32%
- No Impact	1,060	11%	266	3%

Technical Flaws in DOE's Input Data Assumptions

- DOE information is inaccurate or outdated
  - AEO 2014 forecast
  - Extrapolated condensing furnace fractions
  - Component build-up for manufacturing costs
  - Marginal gas prices using adjusted average prices
- Each assumption overstates savings compared to more accurate and current data

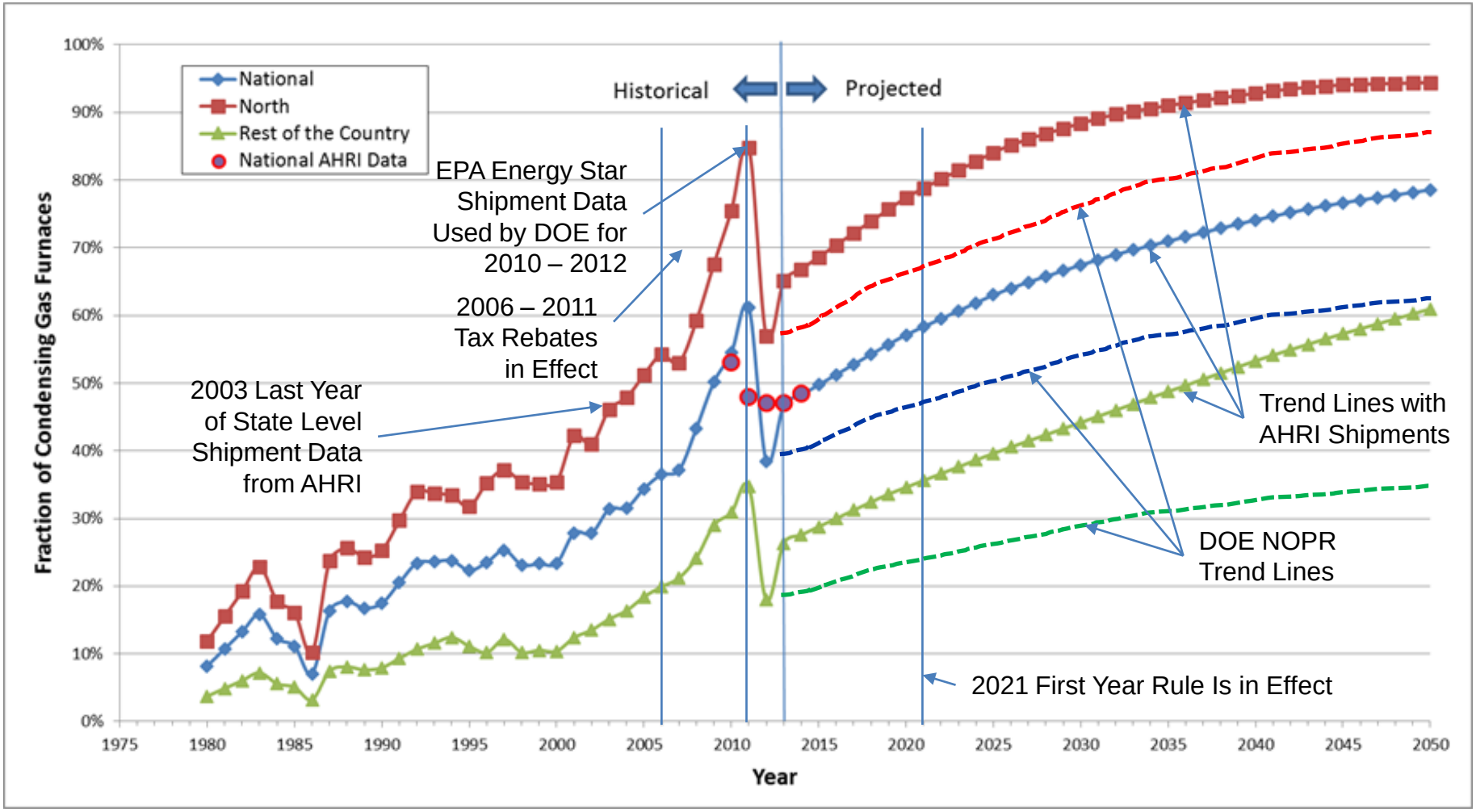
Approach to Correct DOE Methodology Flaws

- Consumer Economic Decision framework for baseline furnace assignment
  - Different consumers impacted by DOE rule
  - Fewer new installations impacted by DOE rule
  - More replacements impacted by DOE rule
- More granular AHCS survey information for full distribution of consumer allowable payback
  - Different consumers impacted by DOE rule
  - Different consumers induced to fuel switch; more inefficient fuel switching by impacted consumers compared to DOE NOPR methodology

Approach to Correct DOE Input Data Flaws

- AEO 2015 forecast
  - Impact: Lower energy price trends than AEO 2014
- AHRI condensing furnace shipment data
  - Impact: Higher condensing furnace fractions
- Internet direct-to-consumer furnace price data
  - Impact: Higher differential price between condensing furnace and non-condensing furnace in 2013 Internet direct-to-consumer price guide
- AGA marginal natural gas prices using tariff data
  - Impact: Lower marginal gas prices in AGA tariff data

Trend Line based on updated AHRI Shipment Data for 2010 – 2014



Integrated Scenario Selection Criteria

- Use consumer economic decision framework with AHCS payback distribution by income for baseline furnace assignment and LCC analysis
  - Calibrate minimum allowable payback period to align with DOE fuel switching fractions
    - Scenario 24 aligns better than Scenario 23
  - Incorporate improved input data (Scenario I-16)
    - AEO 2015 forecast, AHRI condensing furnace shipment data, 2013 furnace price guide data, AGA marginal gas prices using actual tariffs
- Integrate Scenarios 24 and I-16 for final result (Scenario Int-5)

Summary of National Results: DOE LCC Model vs. GTI Scenario Int-5

Simulation Results NATIONAL - 10000 samples		DOE NOPR LCC Model (GTI Scenario 0)								
		Average LCC Results							Payback Results	
Level	Description	Installed Price	Lifetime Oper. Cost*	LCC	LCC Savings	Net Cost	No Impact	Net Benefit	Average	Median
NWGF										
0	NWGF 80%	$2,218	$10,314	$12,533						
1	NWGF 90%	$2,654	$9,388	$12,042	$236	22%	47%	32%	18.0	10.6
2	NWGF 92%	$2,669	$9,228	$11,897	$305	20%	41%	39%	13.9	7.7
3	NWGF 95%	$2,788	$8,985	$11,773	$388	24%	23%	53%	12.9	8.9
4	NWGF 98%	$2,948	$8,771	$11,718	$441	40%	0%	60%	16.8	12.0

Simulation Results NATIONAL - 10000 samples		Scenario Int 5 (Scenarios 24 & I-16) (D2, D4, D5, D8 D9, I2, I6, I8, I13)								
		Average LCC Results							Payback Results	
Level	Description	Installed Price	Lifetime Oper. Cost*	LCC	LCC Savings	Net Cost	No Impact	Net Benefit	Average	Median
NWGF										
0	NWGF 80%	$2,016	$9,984	$12,001						
1	NWGF 90%	$2,634	$9,266	$11,900	-$215	28%	62%	10%	39.2	28.0
2	NWGF 92%	$2,649	$9,123	$11,772	-$181	27%	57%	17%	28.0	19.8
3	NWGF 95%	$3,139	$9,017	$12,156	-$445	57%	29%	14%	40.4	32.5
4	NWGF 98%	$3,283	$8,882	$12,165	-$447	68%	2%	30%	30.8	24.6

Low Income Results: DOE LCC Model vs. GTI Scenario Int-5

Simulation Results Low Income Only		DOE NOPR (GTI Scenario 0)								
		Average LCC Results							Payback Results	
Level	Description	Installed Price	Lifetime Oper. Cost*	LCC	LCC Savings	Net Cost	No Impact	Net Benefit	Average	Median
NWGF										
0	NWGF 80%	$1,983	$10,641	$12,625						
1	NWGF 90%	$2,498	$9,720	$12,218	$176	26%	43%	31%	19.6	12.8
2	NWGF 92%	$2,512	$9,562	$12,074	$247	23%	38%	39%	16.2	10.0
3	NWGF 95%	$2,618	$9,328	$11,945	$330	26%	24%	51%	13.1	9.5
4	NWGF 98%	$2,776	$9,012	$11,789	$485	43%	1%	56%	17.4	12.7

Simulation Results Low Income Only		Scenario Int-5 (Scenarios 24 & I-16) (D2, D4, D5, D8 D9, I2, I6, I8, I13)								
		Average LCC Results							Payback Results	
Level	Description	Installed Price	Lifetime Oper. Cost*	LCC	LCC Savings	Net Cost	No Impact	Net Benefit	Average	Median
NWGF										
0	NWGF 80%	$1,771	$10,201	$11,972						
1	NWGF 90%	$2,413	$9,873	$12,286	-$555	31%	61%	8%	39.1	28.1
2	NWGF 92%	$2,427	$9,737	$12,164	-$533	30%	56%	14%	29.0	21.1
3	NWGF 95%	$2,795	$9,743	$12,538	-$804	51%	36%	13%	36.6	30.1
4	NWGF 98%	$2,933	$9,575	$12,507	-$743	69%	2%	28%	31.5	25.1