2008.11.18 16:36:45
Kansas Corporation Commission
/S/ Susan K. Duffy

BEFORE THE STATE CORPORATION COMMISSION OF THE STATE OF KANSAS

**In the Matter of General Investigation) **
Into Incentives for Fuel Switching) Docket No. 09-GIMX-160-GIV

THE JOINT RECOMMENDATIONS AND COMMENTS OF KANSAS GAS SERVICE, A DIVISION OF ONEOK, INC. AND ATMOS ENERGY

STATE CORPORATION COMMISSION
NOV 1 8 2008
Susan Talbuffy Docket Room

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COMES NOW, Kansas Gas Service, a division of ONEOK, Inc. (Kansas Gas Service), and Atmos Energy (Atmos), collectively referred to as the "Kansas Gas Utilities," and provide the following recommendations and comments in response to the Commission's investigation of fuel switching and providing incentives to induce energy consumption in a way that promotes energy efficiency and reduces green house gases and other emissions. In support of the following recommendations and comments, it is stated:

I. INTRODUCTION

1. The Commission opened two dockets (08-GIMX-441-GIV and 08-GIMX-442-GIV, respectively identified as Docket 441 and Docket 442,) to investigate energy efficiency as a resource for meeting the future energy needs of the state. The Commission cited the cost of providing future generation and transmission capacity and the environmental concerns related to CO_2 as a basis for developing a policy framework to review and evaluate energy efficiency programs on a "uniform and consistent basis." In keeping with the Commission's role to assure "efficient and sufficient" service at just and reasonable rates, the Commission encouraged the implementation of energy efficiency programs and referenced a legislative directive to develop a comprehensive energy conservation plan. Although the Commission had not identified fuel-switching as a potential issue in the earlier phases of its investigation, the Commission did determine it was necessary to expand its investigation to address fuel-switching issues raised in Docket 442.

2. Consistent with the Commission's decision to open a fuel-switching docket, the Commission Staff filed a motion on August 8, 2008 to open an investigation of the issues raised in Docket 442 regarding the use of alternative fuels to fulfill the objectives of promoting energy efficiency and conservation and reducing emissions from pollution sources. The Commission officially opened a fuel-switching docket on September 29, 2008, and determined to divide its investigation into two phases. In Phase 1, the parties are to provide recommendations and comments on the Commission's authority to limit fuel-switching initiatives, policies to consider in implementing fuel-switching measures and the practice of providing incentives and promotions to encourage fuel-switching. On concluding the Commission has authority to address fuel-switching as an energy efficiency measure, the Commission will open Phase 2 of the proceedings and determine its policy, rules and regulatory framework for addressing fuel-switching issues. As part of Phase 1, the Commission additionally set forth a number of additional questions it desired the parties to address.

3. The Kansas Gas Utilities take this opportunity to address the questions raised by the Commission in explaining why fuel-switching from electricity to natural gas is energy efficient and will reduce carbon emissions and other pollution and is very much consistent with the goals the Commission set out in its policy statements in Docket 442. Because fuel-switching is a component of energy efficiency and the Commission has indicated its authority to implement energy efficiency and conservation programs in addition to setting forth a comprehensive statewide conservation plan, the Commission under the parameters established would have the authority to address fuel-switching and to develop policies and practices associated with fuel-switching that would further its objectives to establish efficient and sufficient service at just and reasonable rates, monitor the construction of additional generation and transmission facilities and limit carbon emissions and other pollutants. In conjunction with the Commission's stated

authority over energy efficiency, the Kansas Gas Utilities will demonstrate in these comments the following principles:

A. Under definitions of energy efficiency from the National Action Plan for Energy Efficiency ("NAPEE") and the Commission's prior orders, fuel switching from electric to natural gas appliances at the end use level is energy efficient and reduces environmental emissions. Furthermore, fuel switching programs from electricity to natural gas appliances are among the most cost effective energy efficiency programs and can provide more energy efficiency benefits than single fuel incentive programs.

B. Fuel switching programs from electricity to natural gas appliances at the end use level can result in reduced rates for both electric and gas customers.

C. DSM programs that focus on only one fuel are not necessarily fuel neutral

II. THE COMMISSION DOES HAVE JURISDICTION TO CONSIDER ISSUES RELATED TO FUEL SWITCHING PROGRAMS, INCENTIVES, RULEMAKING, POLICY AND REGULATIONS BECAUSE FUEL SWITCHING QUALIFIES AS ENERGY EFFICIENCY

4. The Commission has previously interpreted its general statutory authority to give it the power to (1) provide incentives to promote energy efficiency and conservation of energy; (2) consider and apply methodologies for approving energy efficiency programs; and (3) develop policy for key elements of a comprehensive energy efficiency/conservation program. *Docket No. 07-GIMX-247-GIV, Order issued October 10, 2007, pages 6-7.* Because fuel switching qualifies as energy efficiency, the Commission's analysis would support the conclusion that it has the power to consider issues related to fuel substitution programs, incentives, rules, policy and regulations pursuant to that same general statutory authority it has identified for implementing energy efficiency and conservation programs. This section of the Comments will summarize the general statutory authority the Commission has previously cited as the basis for developing a comprehensive energy efficiency policy. It then will highlight the substantive discussion to follow concerning why fuel switching qualifies as energy efficiency, and why substituting

natural gas for direct site applications is an effective way to promote the goals articulated by the Commission in Docket 442.

5. The Commission has relied on its general authority as a basis to consider issues related to fuel switching programs, incentives, rules, policy and regulations. K.S.A. 66-101 and 66-1,200 state that the Commission has "full power, authority and jurisdiction to supervise and control" electric and natural gas public utilities. Those statutes also state the Commission may "to do all things necessary and convenient for the exercise of such power, authority and jurisdiction." K.S.A. 66-101g and 66-1,207 provides a rule of construction and states the "grants of power, authority and jurisdiction...made to the commission shall be liberally construed." Those statutes also have been interpreted to grant and confer upon the Commission "all incidental powers necessary to carry into effect" the provisions of the Kansas Public Utility Act. In reference to these enabling statutes, the Kansas Supreme Court has recognized the Commission's authority to supervise and control public utilities and to do all things necessary and convenient for the exercise of such authority and has noted the liberal construction to be given to the statutory provisions granting authority, power and jurisdiction to the Commission. *Kansas Gas & Electric Co. v. State Corporation Commission*, 239 Kan. 483, 491, 720 P.2d 1063 (1986).

6. Energy efficiency, as defined by the National Action Plan for Energy Efficiency, means "using less energy to provide the same or improved level of service to the energy consumer in an economically efficient way." *National Action Plan for Energy Efficiency*, July 2006, ES-12. It also means "using less energy at any time, including at times of peak demand through demand response and peak saving efforts." *Id.* Relying on these definitions, it can be demonstrated that fuel switching programs are cost effective and result in less energy use and provide the same level of service to customers than programs only designed to focus the

efficiency of electric applications. By making fuel switching a component of the Commission's comprehensive energy efficiency policy, it can provide a major opportunity for energy savings, energy cost savings, carbon reduction and a host of other societal benefits.

7. As more fully explained below, programs supporting the conversion of electric end uses to natural gas provide significant improvements in energy efficiency and should be included as part of the Commission's comprehensive energy efficiency policy. The advantage of natural gas-based homes was explained by the American Gas Association in this way:

> This energy efficiency advantage of natural gas-based homes stems from the fact that only about ten percent (10%) of the gas energy produced is used or lost from the point of production to the residence. In contrast, approximately seventy-three percent (73%) of the fossil fuel energy produced to satisfy the electricity needs of the consumers is used or lost in the process of energy production, conversion, transmission and distribution.

American Gas Association, Energy Efficiency, Economic and Environmental Comparison of Natural Gas, Electric and Oil Services in Residences, May 26, 1999.

8. In addition, converting electric end uses to natural gas can provide significant emissions reductions. According to the Gas Technology Institute:

> Optimizing how the U.S. uses energy has the potential to reduce carbon dioxide (CO_2) emissions by 375-565 million metric tons/year. This strategy would bring the net CO_2 levels from natural gas end-use and the natural gas industry to 15% lower than the 1990 levels, well beyond the Kyoto Accord goals (5% lower than 1990 levels).

Gas Technology Institute, *A Lower-Cost Option for Substantial Carbon Dioxided Emission Reductions in the U.S.*, January 2008, page 1.

9. Fuel switching programs can reduce rates for both electric and natural gas customers, something that single fuel incentive programs are unlikely to do. This is realized when load reductions on the electric system from natural gas applications result in the avoided marginal

cost of new generation capacity that is more expensive than the average embedded costs of the existing electric utility operation.

10. As further proof that fuel switching programs are energy efficient and deserve the Commission's support, other state commissions have moved ahead and included fuel switching programs as part of their comprehensive energy efficiency policy.

11. The failure of the Commission to find that it has jurisdiction to include fuel switching programs as part of the Commission's comprehensive energy efficiency policy, will likely result in less energy efficiency. Inclusion of fuel switching programs in a comprehensive energy efficiency policy will allow an analysis of whether a natural gas appliance will use less energy than a comparable electric appliance to provide the same level of end use service. Energy efficiency programs, even those that claim they are "fuel-neutral," such as the Energy Star® programs being proposed by Kansas City Power & Light Company, will likely have fuel-selection consequences. Those consequences are described in more detail below. In a nutshell, the failure of the Commission to find that it has jurisdiction to include fuel switching programs, incentives, rules, policy, or regulations as part of its comprehensive energy policy will cause the following problems:

> (a) Incentives that are provided by electric utilities to entities that do not have natural gas service currently or potentially available to them for the purpose of encouraging the installation of "efficient heating and cooling appliances" have the great potential to increase electricity at the expense of natural gas and to increase overall energy usage; and
>
> (b) Any natural gas to electricity fuel switching that occurs, as a result of DSM incentive payments is likely to result in the increased consumption of electricity, in direct conflict with current Commission energy efficiency policy objectives.

12. Clearly, as part of the discussion over of the Commission's authority is its ability to impact energy consumption through the determination of just and reasonable rates. The

Commission should consider the implications of jurisdictional utility existing rate structures in light of its desire to promote energy efficiency and conservation. As an example, reference may be made to the Kansas City Power and Light Residential Tariff. Kansas City Power and Light Schedule of Rates, Schedule 11, Sheet 2 and 3 attached as Exhibit "A". A cursory review of the tariff leads to the conclusion that KCPL's existing rate design promotes more electric use and is load building. If a residential customer employs electric water heating (one meter), he or she enjoys a 36% reduction in base rates for all consumption up to 1000 kWh per month during the winter. Similar discounts are available for electric space heating with a heat pump and give rise to reductions of 35% for the initial block of the winter heat pump rate and a 51% reduction in the second block as compared to the standard winter residential use rate. With the continued approval of this discounted rate, customers will be induced to switch to electric appliances under promotion or discounted rates. Moreover, if the load building characteristics of the tariff are not addressed, customers who are induced to switch will consume more electricity in contravention of the goals and policies of the comprehensive energy efficiency plan being considered by the Commission. Apart from the formal adoption of a comprehensive energy efficiency plan, the Commission certainly has jurisdiction to examine utility rate structures to limit or prohibit rates and utility practices that promote inefficient energy consumption and increased pollution levels.

12. The Commission will have various options open to it in advancing its energy efficiency policy objectives. With respect to load building activities and the substitution of electrical appliances for those burning natural gas, several recommendations are provided. For example, the Commission can require that any program that influences the fuel selection decision include a requirement on the utility to report, on a real-time basis, to the Commission and the public, those situations in which a fuel switch has taken place. The Commission can also examine the appropriateness of the payment of incentives to promote electric heat pumps. It can

also require that programs be evaluated using the cost effectiveness tests that are developed and explained in the California Standard Practice Manual, which consider source-to-site energy efficiency and including the impact on alternate fuel suppliers.

13. For all of the reasons set forth above, the Kansas Gas Utilities request that the Commission find it has jurisdiction under its general statutory powers to consider fuel switching issues as part of its continuing efforts to develop a comprehensive energy efficiency policy. Once the Commission finds it has jurisdiction to promote energy efficiency through fuel-switching, the Commission will then advance these proceedings into Phase 2. The Kansas Gas Utilities encourage the Commission to consider the attached PowerPoint presentation provided by Paul Raab before the Oklahoma Corporation Commission and to arrange a workshop or collaborative as soon as possible to permit a similar presentation to this Commission in furtherance of the Commission's goal of setting policies, rules and regulations and practices as part of the on-going proceedings in this docket. Energy Efficiency Benefits of Natural Gas Programs, attached as Exhibit "B."

III. <u>FUEL SWITCHING PROGRAMS FROM ELECTRICITY TO NATURAL GAS ARE AMONG THE MOST EFFECTIVE ENERGY EFFICIENCY PROGRAMS AND CAN PROVIDE MORE ENERGY EFFICIENCY BENEFITS THAN SINGLE FUEL INCENTIVE PROGRAMS</u>.

14. In evaluating the type of programs and practices the Commission may adopt as part of its energy plan, the threshold question is whether fuel switching promotes energy efficiency. The <u>National Action Plan for Energy Efficiency</u> defines energy efficiency as follows:

> Energy efficiency refers to using less energy to provide the same or improved level of service to the energy consumer in an economically efficient way. The term energy efficiency as used here includes using less energy at any time, including at times of peak demand through demand response and peak shaving efforts.[1]

Thus, if fuel switching can be shown to be cost-effective, result in less energy use and provide the same level of service to customers, it easily qualifies as "energy efficiency" based on the National Action Plan definition. Although cost-effectiveness needs to be evaluated on a case-by-case basis, it is clear that the same level of service is provided to customers regardless of the energy source of the appliance used to provide the service. Consequently, the pertinent question

[1] <u>National Action Plan for Energy Efficiency</u>, July 2006, ES-12.

in fuel switching cases is whether the natural gas appliance uses less energy than a comparable electric appliance to provide the same level of end use service.

15. Based on an analysis of source-to-site energy, it can be easily shown that the energy savings associated with even the most effective electric conservation programs will pale in comparison to the effectiveness of an electric to natural gas fuel switching program for many types of equipment. Some actual service territory numbers make this clear. Nationally, the United States Department of Energy (DOE) estimates that the average family of four uses 4,770 kWh of electricity per year for water heating.[2] The average family uses 320 therms of natural gas per year for water heating.[3] Using a source-to-site methodology and some standard engineering relationships, it can be determined that the average electric water heater uses about 58 MMBtu of source energy to supply the domestic hot water needs of a typical residence for a year. In contrast, the average natural gas water heater uses about 35 MMBtu of source energy to supply the domestic hot water needs of a typical residence for a year. This means that an electric efficiency program would need to reduce water heating electricity usage by almost 40% in order to achieve the same level of energy reduction as could be achieved by a simple program that would assist customers to replace their electric water heating with a similar natural gas appliance. It is doubtful that a program to reduce electricity consumption by this magnitude could be developed without resorting to fuel switching, simply because there are no electric devices that improve efficiency this much.

16. Using the same assumptions, and emissions values from the United States Environmental Protection Agency (EPA) 2006 Emissions & Generation Resource Integrated Database for 2006 (eGRID2006), it can be shown that electric water heating is significantly more

[2] United States Department of Energy, 2007 Buildings Energy Data Book, Table 7.2.1.
[3] Ibid, Table 7.2.2.

detrimental environmentally than natural gas water heating.[4] A single electric water heater produces 4,047 more pounds of CO_2 than its natural gas counterpart and 6.22 more pounds of NOx every year. It is simply not possible to install an electric water heater that is efficient enough to reduce consumption to levels that will achieve the same environmental benefits of natural gas.

The calculations described above are summarized in the following table:

COMPARISON OF ELECTRICITY VERSUS NATURAL GAS ENERGY EFFICIENCY AND POLLUTION BENEFITS

	Electric Water Heater	Natural Gas Water Heating	Natural Gas Water Heating Advantage
Average Annual Site Usage (kWh/therms)	4,770 (3)	320 (3)	-
Source Energy Used (Btu)	57,730,532	34,972,678	22,757,854
CO2 Emissions (lbs)	8,923	4,875	4,047
NOX Emissions (lbs)	19.05	12.83	6.22
CO2 Emissions (lbs/MWh; lbs/therm) (1)	1870.58	15.235	
NOX Emissions (lbs/MWh; lbs/therm) (1)	3.994	0.0401	
Source-to-Site Efficiency (2)	28.20%	91.50%	
Btus per kWh	3,413		
Btus per therm		100,000	

Notes:
(1) Source: EPA
(2) Source: AGA
(3) Source: DOE

[4] United States Environmental Protection Agency: The Emissions & Generation Resource Integrated Database for 2006 (eGRID2006), April 2007.

IV. FUEL-SWITCHING PROGRAMS CAN ALSO REDUCE RATES FOR BOTH ELECTRIC AND NATURAL GAS CUSTOMERS.

17. One of the difficulties facing regulators when they are asked to approve energy efficiency programs is that there are short-term rate impacts associated with many programs that conserve energy, as measured by the Rate Impact Measure (RIM) test of the California Standard Practice Manual (SPM).[5] This problem is particularly acute in areas where energy efficiency programs are being implemented in response to high electricity prices occasioned by failed deregulation attempts or the impending need for new electric generating capacity.

The RIM test measures potential rate increases by comparing the cost of implementing a DSM program to the difference between the average energy cost and the marginal energy cost. Using the terms defined in the SPM, the test determines whether:

$$UAC > RL + PRC + INC$$

where:

UAC	equals the life cycle avoided costs over the life of the DSM measure
RL	equals the life cycle revenue losses over the life of the DSM measure
PRC	equals the life cycle program costs over the life of the DSM measure
INC	equals the life cycle incentive costs over the life of the DSM measure.

18. In simple terms, the test measures whether the avoided cost savings are of a sufficient magnitude to compensate customers for utility revenue losses, program costs and incentive costs over the life of the DSM measure. If the avoided costs are great enough, then rates will decline over the life of the DSM measure. If the avoided costs are not great enough, then rates will increase over the life of the DSM measure.

[5] California Standard Practice Manual: Economic Analysis of Demand Side Programs and Projects, October 2001.

19. In the case of electric DSM programs, a program can pass the RIM test because the marginal cost of electricity generation (reflected in the UAC term) is higher than the average cost of electricity generation (reflected in the RL term). Thus, the real key to passing the RIM test is whether the difference in these values is greater than program and incentive costs. Efficient program design can ensure this outcome.

20. In the case of natural gas utilities, it is rarely the case that the marginal cost of delivered natural gas is higher than the average embedded cost. The likely upward pressure on rates explains why there are relatively few natural gas DSM programs in existence today. However, the fact that the marginal/embedded cost relationship for a natural gas utility is exactly opposite the marginal/embedded cost relationship for an electric utility provides another compelling argument for electric to natural gas fuel switching programs: such programs can actually result in lower rates for <u>both</u> electric and natural gas utility customers. This can again be demonstrated by application of the RIM test of the California Standard Practice Manual.

21. The same terms as above apply to the electric utility in an electric to natural gas fuel switching program. The following equation is applied to determine the impact on the natural gas (alternate fuel) utility:

$$UACa > RLa$$

where:

UACa equals the life cycle natural gas avoided costs over the life of the DSM measure

RLa equals the life cycle natural gas revenue losses over the life of the DSM measure.

Of course, since load is increasing on the natural gas system, both UACa and RLa are less than zero. Therefore, the test determines whether the marginal cost of providing the additional natural gas is less than the revenues received from delivery of the additional natural gas, the multiplication by negative 1 reverses the inequality, and the above relationship is ensured because the marginal cost of delivered natural gas is less than the average embedded cost.

V. DSM PROGRAMS THAT FOCUS ON ONLY ONE FUEL ARE NOT NECESSARILY FUEL NEUTRAL.

22. There is an implicit assumption among regulators and legislators that, if a DSM program is designed to focus on only one fuel, then there will be no fuel-selection consequences. The Kansas Gas Utilities disagree and would submit that there can be no revenue-neutral DSM programs in cases of fuel competition at the end-use level. Specifically, the Kansas Gas Utilities submit that, whether intentional or not, the payment of an incentive to promote more fuel efficiency by an end use will have an economic impact on the usage of a fuel competing for that end use. Incentives that are provided by electric utilities to entities that are currently served by natural gas for the purpose of encouraging the installation of efficient heating and cooling appliances have the great potential to increase electricity at the expense of natural gas and to increase overall energy usage. In other words, they are marketing programs that will increase electricity use to the detriment of citizens, funded by those same citizens. This means that concerns related to the need to maintain fuel neutrality should not prevent the Commission from approving fuel-switching programs because no DSM program that addresses an appliance with multiple fuel choices is ever fuel neutral. This concept can best be demonstrated by reliance on simple economic theory.

23. When consumers consider the type of appliance to purchase, the economic theory of the consumer suggests that they are really purchasing the services that any particular appliance provides (warmth, cooling, toasted bread, etc.) and they combine inputs (appliances, fuel, etc.) to achieve the benefits of the service at the lowest possible cost. Among other things, consumers must evaluate the up-front or capital cost of "i" competing appliances (CC_i) and the annual

operating cost of those appliances over their respective lifetimes ($OC_{i,t}$). Thus, for example, the cost of purchasing heating service may be evaluated by comparing the life cycle costs (LC_i) of alternatives and choosing that alternative with the lowest cost:

$$LC_i = CC_i + OC_{i,1}/(1+r)^0 + OC_{i,2}/(1+r)^1 + \ldots + OC_{i,n}/(1+r)^{(n-1)}$$

where "r" is the consumers' time value of money and "n" is the appliance lifetime. Of course, individual customer preferences play a role in the appliance selection decision. Otherwise, only one type of appliance would be purchased.

24. This equation explains the rationale for offering incentives for higher efficiency appliances, even though in many cases the higher efficiency choice seems like an economic "no-brainer." Specifically, higher efficiency appliances generally have a higher up-front cost (CC_i), lower annual operating costs ($OC_{i,t}$) and lower life cycle costs than their less-efficient counterparts. The payment of the incentive lowers the up-front cost, thereby lowering the life-cycle cost of the higher efficiency option and encouraging the selection of the higher efficiency option. The following table provides an example.

Rationale for DSM Incentive Payments

	Standard Efficiency Appliance	High Efficiency Appliance	High Efficiency Appliance With Rebate
Up-Front Cost	$ 1,000	$ 1,500	$ 1,250
Annual Operating Costs	$ 500	$ 450	$ 450
Appliance Lifetime (Years)	15	15	15
Discount Rate	10%	10%	10%
Life-Cycle Cost	$ 5,183	$ 5,265	$ 5,015

This table compares the life cycle costs of a standard efficiency appliance to the life cycle costs of a high efficiency appliance and a high efficiency appliance after payment of a $250 rebate. As can be seen in the table, the high efficiency appliance has a higher life cycle cost under the assumptions listed. However, payment of a $250 incentive reduces the up-front cost of the high efficiency appliances so that the life cycle costs of the high efficiency appliance are now lower than the life cycle costs of the standard efficiency appliance.

25. In the same way that the payment of an incentive for a higher efficiency appliance encourages consumers to choose a higher efficiency product, this incentive payment can also encourage the selection of appliances of a particular fuel type. It does so by lowering the relative life cycle cost of appliances of that fuel type. Consider the following example:

Impact of DSM Incentive Payments on the Fuel Selection Decision			
	High Efficiency Electrical Appliance	High Efficiency Electrical Appliance With Rebate	Gas Appliance
Up-Front Cost	$ 1,500	$ 1,250	$ 2,500
Annual Operating Costs	$ 450	$ 450	$ 320
Appliance Lifetime (Years)	15	15	15
Discount Rate	10%	10%	10%
Life-Cycle Cost	$ 5,265	$ 5,015	$ 5,177

Using the same assumptions for the high efficiency electrical appliance as were made above, but adding additional assumptions regarding a competing natural gas appliance, it can be seen that the incentive payments intended to encourage the selection of the high efficiency option have, perhaps unwittingly, encouraged the selection of electricity over natural gas. They do so by lowering the life cycle cost of the efficient electrical appliance below that of the natural gas appliance, even though the natural gas appliance is the least cost option in the absence of the market intervention.

26. Although these examples make particular assumptions about the costs of alternative appliances, their conclusions are not dependent on any specific information that has been

included in developing these simplified examples. The critical and inescapable conclusion from the high efficiency appliance examples is that simple economics dictate that the incentives paid to encourage the purchase of higher efficiency appliances of a particular fuel type must lower the life cycle costs of appliances of that fuel type and will impact the fuel selection decision. To deny this statement is to deny the primary and proper basis for making a DSM appliance incentive payment, i.e., to promote the use of less energy.

This conclusion has three important corollaries that are discussed in the following subsections.

A. Any natural gas to electricity fuel switching that occurs as a result of DSM incentive payments is likely to result in the increased consumption of electricity, in direct conflict with conservation objectives.

27. Although the data needed to assess the magnitude of this problem are often not available, certain reasonable assumptions can be made, and the estimated savings levels that can reasonably be expected as a result of these types of programs can be determined. In this case, assume that an electric utility is providing an incentive to improve the efficiency of installed electric cooling appliances (either central air conditioning or heat pumps) and that the incentives are designed to encourage the installation of appliances that use 10% less electricity than their standard efficiency counterparts. Further assume that the all house electric cooling market is shared equally by heat pumps and by central air conditioning equipment and that the incentive payment has exactly the same impact on heat pump users as it has on central air conditioning users. Finally, assume that the switch from a central air conditioning system to an efficient heat pump doubles the electricity usage of the home for space conditioning. Given these assumptions, it is likely that a typical HVAC incentive program will result in about 5% greater usage of electricity. The following table summarizes this calculation:

Likely Electricity Savings Impact			
Action Stimulated	Savings	Likelihood	Expected Savings
A/C to efficient A/C	10%	25%	2.5%
A/C to efficient H/P	<50%>	25%	<12.5%>
H/P to efficient H/P	10%	50%	5.0%
Total Impact			<5.0%>

28. The column entitled "Expected Savings" is the product of the likelihood of occurrence and the electricity savings by occurrence. When these products are summed, the resulting electricity savings as a result of these programs are –5.0%. In other words, with reasonable assumptions, it can be demonstrated that a likely outcome of an HVAC incentive program is to <u>increase</u> electricity usage by about 5% for program participants, and will do so at the expense of natural gas. While this result is clearly dependent upon the assumptions made, it is easy to show that the incentives need to affect less than 20% of the market and the conservation benefits of the program are eliminated.

29. There are three possible solutions to this problem. First, at a minimum, any program that influences the fuel selection decision should be accompanied by a requirement that the offering entity maintain and report on a real-time basis, those situations in which a fuel switch has taken place. However, this does not appear to be the best solution for this problem because a reporting requirement is not the best solution for poor program design. When the natural gas load loss occurs, it occurs for twenty years or more. Reporting is simply a reactive solution to a program design problem that should be corrected from the outset. Correction of the program design problem involves the second solution to this problem: denying the payment of incentives

to promote heat pumps. However, the third solution to this problem is to require that programs be evaluated using the cost-effectiveness tests that are developed and explained in the California Standard Practice Manual. A critical component of these tests is the avoided (or increased) alternate fuel costs and the impact that the DSM measures will have on rate levels of the alternate fuel supplier. Inclusion of these factors is the only way to ensure that the programs are truly cost-effective on a global basis. To ignore these factors in a DSM program evaluation could lead to higher prices for customers of alternative fuel suppliers and violations of anonymous equity considerations, in which a ratepayer's demands are diverted away uneconomically from an incumbent.

B. Even programs that are touted as "fuel-neutral," such as the Energy Star® program, will likely have fuel selection consequences.

30. It is often the case that the payment of incentives by electric utilities is bundled in a "whole house" efficiency programs such as the Energy Star® program. The Energy Star® program for new residential construction, for example, allows residences to qualify for an Energy Star® rating if those residences exceed a certain score in the Home Energy Rating System (HERS), which rates structural criteria (thickness of insulation, window efficiency, air-tightness, etc.), the heating and cooling system and domestic water heating. There have been criticisms raised about the effectiveness of this program in achieving increased energy efficiency:

> 1. The criteria for an Energy Star home cover less than half of the home's total energy use, with the remainder caused by appliances. Because of the areas ignored, an Energy Star house could be easily outfitted with average efficiency appliances, resulting in a high overall energy use.[6]

[6] Alan Meier, The Future Of Energy Star And Other Voluntary Energy Efficiency Programs, Proceedings of the ECEEE 2003 Summer Study – Time to Turn Down Energy Demand, 2003, page 677.

2. Most of the Energy Star performance specifications are expressed in terms of an efficiency, that is, a unit of service per unit of energy expended. The constant efficiency approach is biased towards larger products. It is typically easier to meet the efficiency criteria with a larger product than a small product because there are various economies of scale. The impact of this bias is most evident for energy targets for new homes. It is relatively cheaper to build a very large Energy Star home than a small one, even though the greenhouse gas emissions from the larger home will be greater than those from a small, inefficient house.[7]

However, the criticism that is of greatest importance in the current discussion relates to the impact that the Energy Star® program can have on the fuel selection decision. In that regard, the following criticism has been raised:

3. Energy Star has always established separate performance specifications for electric and gas products. Electrically-heated homes have different specifications from gas-heated homes. This makes sense from an economic perspective because electric heat is more expensive than gas heat in most regions. But the specifications also lead to Energy Star electrically-heated homes that have higher greenhouse gas emissions than for comparable gas-heated homes (with the present mix of power generation sources). Furthermore it is often cheaper to build a house meeting the electric-heating criteria for Energy Star than for the gas heating criteria. Energy Star has traditionally shied away from any program that might encourage fuel-switching because this would antagonize some of its partners (notably electric utilities). The Energy Star program for water heating was delayed in part because of difficulty in overcoming the fuel choice problem between electric and gas-fired water heaters.[8]

31. More will be said regarding the unintended consequences of incentive payments and the higher greenhouse gas emissions of electrically heated homes in later sections of these comments. However, for purposes of the current discussion, it is important to recognize that the fuel selection decision can be impacted by many factors, even a voluntary program such as Energy Star® that is touted as "fuel neutral."

C. <u>Requiring that the aggrieved utility offer its own incentives is not the appropriate remedy for this problem</u>.

[7] Ibid, page 677.
[8] Ibid, page 677.

32. It has been suggested that a potential solution for the above problem is to require the utility whose load is being spirited away in the guise of energy conservation to provide incentive payments to stop the load loss. This is clearly not in the best interests of customers.

33. To demonstrate this point, assume that the payment of incentives by natural gas utilities works exactly as expected. In this case, the net effect for the natural gas utility is no change, i.e., the natural gas incentive serves to preserve the same electric/natural gas market share as would exist in the absence of incentives. As a result, such a program will fail all traditional tests of cost-effectiveness (Total Resource Cost Test, Societal Cost Test) from the natural gas utility perspective. Furthermore, such a program will fail the Ratepayer Impact Measure (RIM) test by definition (incentives are paid for no net energy usage impact), indicating that rates will rise. Thus, while this "solution" may benefit electric utilities because no load is lost to a more efficient fuel source such as natural gas, the benefit will have been achieved at the expense of natural gas customers, who have had to absorb higher rates to offset the payment of incentives to prevent greater displacement of natural gas by electricity.

VI. RESPONSE TO SPECIFIC QUESTIONS POSED BY THE COMMISSION'S ORDER

34. A discussion of the remaining Commission questions in the Order of September 29, 2008, is presented below:

A. Does the Commission have authority to deny or limit a utility company's efforts, including but not limited to financial incentives, to encourage their customers to switch from a competing fuel to that utility's energy service either for specific applications or whole-service application?

35. The Commission has no obligation to protect a supplier of one type of energy commodity from fair competition from alternative types of energy. However, the Commission does have a regulatory obligation to protect a supplier of one type of energy commodity from competition from alternative types of energy that is neither reasonable nor in the best interests of

gas and electric customers in the state of Kansas. The Commission would be abrogating its responsibilities with respect to the latter obligation if it allows electric utilities to offer incentives to uneconomically induce customers to reduce usage of natural gas and increase usage of electricity, all funded by ratepayers. Furthermore, it makes little or no sense to force the disadvantaged natural gas utilities to engage in a bidding war for customers through the payment of competing incentives. This practice would clearly raise rates for both natural gas and electric utility ratepayers and would create an arms race between electric and natural gas utilities, to the disadvantage of natural gas customers who could not afford to pay as much incentive money as their electric counterparts, whose rates are determined on much larger rate base investments.

B. Should the Commission establish policies to deny or limit a utility company's efforts, including but not limited to financial incentives, to encourage their customers to switch from a competing fuel to that utility's energy service either for specific applications or whole-service application?

36. No. However, the Commission should establish policies to ensure that it is promoting only economically efficient energy efficiency programs. However well intentioned the Commission may be in attempting to improve the efficiency with which energy is consumed in that state of Kansas, regulators must recognize that by taking action in approving incentives, they are influencing the end-use fuel selection market for electricity, natural gas and other fuels. Unless these incursions into the free market are carefully considered, they are likely to have unintended consequences. Specifically, whether intentional or not, the payment of an incentive to promote more electric efficiency by certain end uses will have a negative economic impact on the usage of natural gas or any other fuel competing for that end use. The resultant natural gas to electricity fuel switching that is likely to occur as a result of DSM incentive payments will result

in the increased consumption of electricity. This is in direct conflict with the stated conservation objectives of the legislature and this Commission. This negative consequence is avoidable.

37. Furthermore, dramatic reductions in electricity usage can be obtained from promotion of the more efficient direct use of natural gas for residential and commercial heating. This cost-effective fuel switching could result in reduced rates for both gas and electric customers in Kansas without any negative consequences for the distribution utilities. Kansas has the unique opportunity to join the developing movement across the nation to capture the benefits from the direct use of natural gas at the site of use.

38. This means that it is vitally important that the Commission establish clear goals at the outset describing the objectives of the proposed market incursions (i.e., energy conservation, electricity conservation, emissions reductions, etc.) and establish a set of policies that will achieve these goals most effectively. The recommended policies that will serve the Commission well under a broad range of objectives and will do so more efficiently than many of the current proposals that are guiding significant conservation investments for which customers will ultimately be asked to pay are:

1. Conservation and energy efficiency programs for application in competitive markets should be analyzed on a multi-fuel and comprehensive basis, looking at all reasonably available competing energy products and services and taking into consideration all likely impacts of the proposed programs (including impacts on load growth).

2. Conservation and energy efficiency programs should be analyzed on a full fuel cycle (source-to-site plus appliance efficiency) basis.

3. Conservation and energy efficiency programs and utility rates should be constructed in a manner designed to create incentives for consumers to use energy wisely and remove disincentives for utilities to promote conservation.

4. Conservation and energy efficiency programs should promote the use, among feasible alternatives, of the most efficient and lowest emitting energy sources in particular applications.

5. Any DSM proposal should be required to demonstrate that any programs submitted for Commission approval will be implemented in a fuel-neutral manner, should monitor for fuel switching caused by the programs or, if these programs do result in fuel-switching, that fuel-switching serves the overall public interest.

6. The cost-effectiveness evaluation of proposed programs should be performed using the cost-effectiveness tests that are developed and explained in the California Standard Practice Manual. These tests recognize explicitly that the promotion of any DSM program could have a significant impact on alternate fuel suppliers. Therefore, a critical component of these tests is the avoided (or increased) alternate fuel costs and the impact that the DSM measure will have on rate levels of the alternate fuel supplier. Inclusion of these factors is the only way to ensure that the program is truly cost-effective on a global basis. To ignore these factors in a DSM program evaluation could lead to higher prices for customers of alternative fuel suppliers and violations of anonymous equity considerations, in which a ratepayer's demands are diverted away uneconomically from an incumbent.

7. Electric DSM programs should be approved only after it has been demonstrated that the offering entity has considered and evaluated all potential programs, including perhaps the most important resource for reducing electricity consumption and CO_2 emissions, while simultaneously improving the efficiency with which energy is consumed: encouraging the usage of natural gas where it is a viable substitute for electricity and converting loads currently served by electricity to natural gas.

39. It is also important in the event the Commission authorizes incentives to be paid, to assure that the entity receiving value under a fuel-switching program is the entity providing the incentives under the program. It is often suggested that if natural gas utilities want to encourage the implementation of programs that cause customers to substitute natural gas for electricity usage, then the natural gas utilities should be responsible for paying the incentives causing customers to switch. However, it would be unreasonable to suggest that the natural gas utility be responsible for payment of all program costs and incentives because both electric and natural gas customers benefit. It is appropriate to have natural gas customers share in the expense of a fuel-switching program to recognize the benefits conferred on those customers. The question then becomes, how can the costs of fuel switching programs be shared in an equitable manner?

40. Because the results of the Participant Test, the Total Resource Cost Test (and related Societal Cost Test) and the Program Administrator Cost test do not vary with respect to who provides the incentive and administers an energy efficiency program; these tests provide no guidance on how program and incentive costs should be shared. The results of the Rate Impact Measure Test, on the other hand, do depend critically on who provides the incentive and administers the program. Using the relationships from the RIM test developed above, the electric utility can afford to pay an amount of program and incentive costs up to the difference between its avoided cost and its revenue loss:

$$UAC - RL$$

The natural gas utility can afford to pay an amount of program and incentive costs up to the difference between its avoided cost and its revenue loss:

$$UACa - RLa$$

In cases where the sum of these differences exceed the program and incentive costs, which appears likely, these differences can be used to allocate program and incentive costs between electric and natural gas utilities.

C. What are the public policy considerations of adopting such policies and limiting utility companies' ability to compete for customers by providing incentives or other promotions?

41. If the Commission adopts Kansas Gas Utilities' seven recommended policies set forth on paragraph 38 above, substantial economic and environmental benefits documented elsewhere in these comments should result. In addition, DSM programs will be fuel neutral. This will alleviate the problem of many electric-only programs, because there is not likely to be natural gas to electricity fuel switching that occurs as a result of DSM incentive payments. The appropriate applications of these principles will prevent increased consumption of electricity and

be in accordance with the Commission's objective of providing the most efficient energy source with the greatest reduction in emissions.

D. Can end-use application programs for fuel-switching incentives be economically and/or environmentally justified?

42. In later sections, these comments provide studies that confirm the Kansas Gas Utilities' statement that fuel switching for end-use applications is economically sound and beneficial to the environment when natural gas is used as a direct site fuel source in preference to electricity. Kansas Gas Utilities would submit that the same factors that discourage customers from employing the most efficient end use equipment also discourage customers from installing appliances that are the most environmentally benign. Referencing the National Action Plan for Energy Efficiency, these factors include:

- *Market barriers,* such as the well-known "split-incentive" barrier, which limits home builders' and commercial developers' motivation to invest in energy efficiency for new buildings because they do not pay the energy bill; and the transaction cost barrier, which chronically affects individual consumer and small business decision-making. This is a very obvious barrier in a fuel switching discussion, because often times electrical appliances and interior wiring is cheaper to install than natural gas appliances and piping, causing the cheapest installation to be selected without regard to the long range energy costs and effects on the environment through carbon and other emissions.

- *Customer barriers,* such as lack of information on energy saving opportunities, lack of awareness of how energy efficiency programs make investments easier, and lack of funding to invest in energy efficiency.

- *Public policy barriers,* which can present prohibitive disincentives for utility support and investment in energy efficiency in many cases. For example, the reliance on traditional ratemaking methods may create disincentives through the approval of rate designs that are based on the units sold and cause revenue to be collected through the volumetric component rather than a customer of fixed cost recovery charge.

- *Utility, state, and regional planning barriers,* which do not allow energy efficiency to compete with supply-side resources in energy planning.

- *Energy efficiency program barriers,* which limit investment due to lack of knowledge about the most effective and cost-effective energy efficiency program portfolios, programs for overcoming common marketplace barriers to energy efficiency, or available technologies.[9]

43. Clearly, the absolute cost of converting an application to a differing fuel source that obtains equal or greater efficiency will be greater than the cost of increased efficiency for an end-use application within the same fuel source, due to the cost of connecting customers, the generally higher cost of natural gas appliances and the cost of venting and piping. However, it is important to put this higher cost in context.

44. In the case of an electric only DSM program, it may be possible to save 15% of the electricity usage of a standard efficiency application. On the other hand, a fuel switching DSM program will save 100% of the electricity usage of the same application. Evaluating the electricity reduction and corresponding natural gas usage increase on a source versus site basis indicates that the fuel switching DSM program will save almost five times as much source energy as the electric only DSM program. Thus, even though more costly, properly designed fuel switching DSM programs have the great potential to achieve greater fuel savings more cost-effectively than corresponding electric only DSM programs.

45. However, if these types of_DSM programs are to be implemented, natural gas and electric utilities should be required to work together in their overlapping territories to promote the most efficient fuel for end-use applications. This is the only way that such programs are likely to be implemented and is the only way for the Commission to ensure that ratepayer funds are being spent in the most cost-effective manner possible.

46. It is important for the Commission to recognize in this regard that fuel switching programs can and have been implemented in many jurisdictions. The practice of implementing

[9] National Action Plan for Energy Efficiency, July 2006, 1-9.

electric to natural gas fuel-switching programs to influence the fuel selection process can obviously provide great benefits to electric ratepayers, natural gas ratepayers and society as a whole and can achieve many legislatively mandated energy reduction targets at less cost than other proposed programs. However, many regulatory authorities are reluctant to order the implementation of these types of programs because, it is argued, these types of programs represent an unnecessary violation of consumer sovereignty. This appears to be a weak argument since the use of incentives is already encouraging consumers to make a particular energy efficiency decision that they would not make absent the market intrusion. Even worse, the incentives are encouraging consumers to choose the energy efficiency measure *of the utility's choosing*.

47. Regulatory authorities are also uncomfortable in recommending solutions that are not being implemented elsewhere. However, fuel switching programs are becoming more commonplace. For example, the 2007 survey of LDC natural gas energy efficiency programs published in January 2008 reports that "[s]even (7) of the regulator-approved natural gas [energy efficiency] programs in the survey encourage fuel switching, by, for instance, providing financial incentives (e.g., rebates, low-interest loans, reduced costs, construction allowances) for replacing, switching to, or installing new gas water heaters, boilers, furnaces, and cooling equipment to residential and commercial customers."[10] These types of programs have been approved in Florida, Missouri, New Jersey and Wisconsin. The neighboring sate of Missouri has approved a new high-efficiency-appliance program for the Laclede Gas Company and an efficiency program for Missouri Gas Energy that permits it to offer incentive payments to replace electric water heaters.

[10] American Gas Association, LDC Natural Gas Energy Efficiency Programs Report 2007, January 2008.

48. Even more compelling, however, is the Large Commercial and Industrial Standard Offer Program proposed by Public Service Company of Oklahoma (PSO) for implementation in Oklahoma.[11] Under this program, PSO will provide incentives for demand and energy savings achieved from eligible measures such as HVAC, chillers, motors, lighting, and window tinting/shading in the large commercial and industrial customer class. However, this program will also provide incentives for "any measure that produces savings through...a substitution of another energy source for electricity supplied through the transmission grid."[12] This program offering demonstrates that fuel-switching programs have clear value for electric utilities as energy efficiency options.

49. Kansas Gas Utilities believe that the Commission is the most appropriate organization to facilitate the coordination and flow of information between gas and electric utilities to promote efficient use of fuels if the Commission finds that it is appropriate for it to influence end-use fuel markets by supporting utility-sponsored DSM programs.

E. Is general research available regarding the costs and benefits of fuel switching for end-use applications?

50. Yes. Kansas Gas Utilities would recommend the following four documents:

- United States Environmental Protection Agency, ENERGY STAR Performance Ratings Methodology for Incorporating Source Energy Use, December 2007.
- American Gas Association, Energy Efficiency, Economic and Environmental Comparison of Natural Gas, Electric, and Oil Services in Residences, May 26, 1999.
- Gas Technology Institute, A Lower-Cost Option for Substantial Carbon Dioxide Emission Reductions in the U.S., January 2008

[11] Cause No. PUD200700449, Direct Testimony of Billy G. Berny on Behalf of Public Service Company of Oklahoma, December 10, 2007.
[12] Ibid, Exhibit BGB-7, page 3 of 7.

- American Gas Foundation, Direct Use of Natural Gas: Implications for Power Generation, Energy Efficiency, and Carbon Emissions, April 2008.

51. The publication by the United States Environmental Protection Agency (EPA) focuses on source-to-site energy efficiency. With respect to this issue, the report states:

> EPA's national performance ratings evaluate the performance of buildings that use all types of energy. To compare this diverse set of commercial buildings equitably, the ratings must express the consumption of each type of energy in a single common unit. EPA has determined that ***source energy*** is the most equitable unit of evaluation. Source energy represents the total amount of raw fuel that is required to operate the building. It incorporates all transmission, delivery and production losses, thereby enabling a complete assessment of energy efficiency in a building.
>
> Most building managers are familiar with ***site energy***, the amount of heat and electricity consumed by a building as reflected in utility bills. Site energy may be delivered to a facility in one of two forms: primary and/or secondary energy. ***Primary energy*** is the *raw fuel* that is burned to create heat and electricity, such as natural gas or fuel oil used in onsite generation. ***Secondary energy*** is the energy product (heat or electricity) created from a raw fuel, such as electricity purchased from the grid or heat received from a district steam system. A unit of one represents a raw fuel while the other represents a converted fuel. Therefore, in order to assess the relative efficiencies of buildings with varying proportions of primary and secondary energy consumption, it is necessary to convert these two types of energy into equivalent units of raw fuel consumed to generate that one unit of energy consumed on-site. To achieve this equivalency, EPA uses the convention of source energy.[13]

In other words, in its evaluations, the EPA recognizes that the energy consumption characteristics of electricity and natural gas end uses cannot be directly compared, since electricity is a secondary energy source and natural gas is a primary energy source. To develop an informed comparison, these two forms of energy must first be converted to equivalent units of source energy.

The primary purpose of the EPA report is to update the national source-site ratios to be used in evaluations of energy efficiency when multiple fuels can be used to provide the energy service required in buildings. National source-site ratios are defined to be "[t]he factors used to

[13] United States Environmental Protection Agency, ENERGY STAR Performance Ratings Methodology for Incorporating Source Energy Use, December 2007, page 2, emphasis in original.

restate primary and secondary energy in terms of the total equivalent source energy."[14] The EPA defines the following ratios by fuel that it intends to be used when evaluating competing fuels[15]:

Table 1 Source-Site Ratios for all Portfolio Manager Fuels	
Fuel Type	**Source-Site Ratio**
Electricity	3.340
Natural Gas	1.047
Fuel Oil (1,2,4,5,6,Diesel, Kerosene)	1.01
Propane & Liquid Propane	1.01
Steam	1.45
Hot Water	1.35
Chilled Water	1.05
Wood	1.0
Coal/Coke	1.0
Other	1.0

Thus, for example, the electricity source-site ratio indicates that 3.34 units of raw energy are needed to produce every unit of site energy consumed. The other ratios in the table have a similar interpretation and lead to two obvious conclusions:

- More raw energy is required to produce one unit of site energy in the form of electricity than any other type of fuel. This means that all other fuels evaluated have an energy efficiency advantage over electricity at the site, assuming equivalent efficiency characteristics of the end use. It also means that energy efficiency is improved every time one of these other sources is substituted for electricity at the site of usage, again assuming equivalent efficiency characteristics of the end use.
- When natural gas, for example, is substituted for electricity at the site of usage, it enjoys a three times energy efficiency advantage over electricity. Although not the only argument favoring natural gas for electricity fuel switching, this is certainly a powerful one.

52. The American Gas Association (AGA) document reports on an analysis similar to the EPA analysis referenced above to evaluate the energy usage characteristics of a typical residential dwelling unit.[16] The following table summarizes that analysis:

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[14] Ibid, page 2.
[15] EPA recognizes that these ratios will change over time. Therefore, the report indicates that these ratios will be reviewed and updated, as appropriate, every 3 to 5 years.

Typical Site-Use and Total Energy Requirements for New Homes (MMBtu per year)			
	Gas	**Electricity**	**Oil**
1,500 Square Feet			
Heating [1]	41.0	14.8	45.2
Other(see note below)	22.4	15.3	20.2
Total Site Use	**63.4**	**30.9**	**65.4**
Energy Losses [2]	6.3	84.7	24.1
TOTAL ENERGY [3]	**69.7**	**115.6**	**89.5**
3,000 Square Feet			
Heating [1]	68.0	24.9	75.1
Other	22.4	15.3	20.2
Total Site Use	**90.4**	**40.2**	**95.5**
Energy Losses [2]	8.9	110.3	28.8
TOTAL ENERGY [3]	**99.3**	**150.5**	**124.3**
[1] Includes end-use energy requirements for water heating, cooking, and clothes drying.			
[2] Includes energy used or last in extraction, processing, conversion, transportation and distribution of energy.			
[3] Sum of Site Use and Energy Losses.			

These results show that, while electricity appears to be more efficient at the site, when source energy is considered, energy savings of between 34% and 40% are possible if natural gas end use applications are installed in place of electricity end use applications. AGA concludes that:

> This energy efficiency advantage of natural gas-based homes stems from the fact that only about ten percent of the gas energy produced is used or lost from the point of production to the residence. In contrast, approximately 73 percent of the fossil fuel energy produced to satisfy the electricity needs of consumers is used or lost in the process of energy production, conversion, transmission and distribution.[17]

It follows logically from the above analysis that emissions will be less if natural gas is used at the site rather than converted to electricity and transmitted to the site, given the significant energy losses associated with energy conversion, transmission and distribution.

[16] American Gas Association, Energy Efficiency, Economic and Environmental Comparison of Natural Gas, Electric, and Oil Services in Residences, May 26, 1999.
[17] Ibid, page 2.

While this statement is true when natural gas at the source is compared to natural gas at the site, it is even truer when natural gas at the site is compared to a more traditional mix on raw fuels at the source, such as coal, oil and other fossil fuels. The AGA study referenced above develops these typical CO_2 emissions results for the energy consumption results summarized above:

Total Energy Efficiency Carbon Dioxide Emissions for New Homes[1] (lbs of CO_2 per Average Household Energy Use[2])		
	1,500 SQ. FT.	**3,000 SQ. FT.**
Natural Gas	**7,423**	**10,583**
Oil	**13,095**	**15,198**
Electricity[3]:		
Coal-Based	17,560	22,828
Oil-Based	582	757
Natural Gas-Based	1,561	2,029
Total Electricity	**19,703**	**25,614**
[1] Based on hypothetical fuel generating mix.		
[2] Excludes energy use for cooling and base electric requirements.		
[3] For existing generating capacity only.		

AGA summarizes these results as follows:

> On a total energy efficiency basis, natural gas use in residential applications generates significantly less CO_2 than electricity generated from fossil fuels and oil. Although the size and geographic location of a residence affects total energy consumption per residence and resulting CO_2 emissions through space conditioning requirements, natural gas is consistently the optimal fuel choice in terms of overall environmental impact.[18]

53. Consistent with this conclusion, the Gas Technology Institute recently released a white paper in which the authors attempt to quantify the extent to which carbon dioxide emissions can be reduced if the U.S. implements a national policy of optimizing how the country

[18] Ibid, page 10.

uses energy by "aggressive deployment of increased-efficiency natural gas equipment in our nation's homes, offices, and industries."[19] This report concludes that, "[o]ptimizing *how* the U.S. uses energy has the potential to reduce carbon dioxide (CO_2) emissions by 375-565 million metric tons/yr." and that the strategy would bring the "net CO_2 levels for natural gas end-use and the natural gas industry to 15% lower than the 1990 levels, well beyond the Kyoto Accord goals (5% lower than 1990 levels)."[20]

54. In Direct Use of Natural Gas: Implications for Power Generation , Energy Efficiency, and Carbon Emissions, the American Gas Foundation with the assistance of the Black and Veatch Corporation examines the impact of the increased direct use of natural gas (i.e., fuel switching) for residential and commercial end uses. The study highlights eight "Major Findings," all of which are relevant to the Commission's determination in this docket:

- Increased direct use of natural gas in residential and commercial applications can increase the productivity of available energy supplies, reduce overall energy cost, and reduce related CO_2 emissions in all scenarios considered.

- Natural gas demand for power generation is expected to increase significantly in a CO_2 constrained world. Nuclear power and renewables could offset part of the increase but natural gas demand is still projected to increase over the forecast horizon with an accompanying upward pressure on gas prices.

- The increased direct use of natural gas for residential and commercial applications rather than for power generation is expected to decrease energy consumption in the United States. Within the scenarios considered, a shift of 7% of the total electric load for residential and commercial applications to natural gas, indicates that the energy savings can range from 1.25-2.00 quadrillion Btu in 2030 – or 6% of total energy consumption growth projected by AEO through 2030. In the absence of restrictions on CO_2 emissions, there is a greater proportion of coal fired plants in the electric generation mix. Coal generation gets displaced when the increased direct use of gas for residential and commercial applications decreases electricity demand.

- Depending on the scenario, the avoided generation capacity is forecast to range from 63 to 80 GW. The avoided investment costs are forecast to range from $49 billion to $122 billion.

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[19] Gas Technology Institute, A Lower-Cost Option for Substantial Carbon Dioxide Emission Reductions in the U.S., January 2008, page 1.

[20] Ibid, page 1.

- With restrictions on the total level of CO_2 emissions, natural gas generation is displaced when the increased direct use of gas for residential and commercial applications decreases electricity demand. A larger market percentage of the direct use of natural gas for residential and commercial applications drives a net decrease in overall gas consumption as well as energy costs (since the decrease in gas demand for power generation is higher than the increase in direct use of natural gas in the residential and commercial sectors).

- In the scenario where CO_2 restrictions match the levels proposed by the Lieberman-Warner Senate bill currently being debated in Congress, the value of the reduction in energy costs is significant and ranges from $18 to almost $29 billion dollars by the year 2030.

- Emissions are decreased in all scenarios considered. The highest impacts are in the Reference Case where coal fired generation is displaced. The CO_2 constrained scenarios also show a decrease in CO_2 emissions when there is a greater direct use of gas in residential and commercial applications.[21]

F. Is there research available which indicates the effect of fuel-switching for end-use applications on the environment, energy use and energy costs?

55. The above references address the energy usage and emissions reductions benefits associated with a switch from electricity to natural gas at the end use level. With respect to energy cost consequences, it follows logically that converting electric appliances to natural gas will likely exert downward pressure on the prices of both electricity and natural gas, consistent with the conclusions reached in the American Gas Foundation study. It will do so because electricity usage will be decreased (as natural gas is substituted for electricity at the end use level) and natural gas usage will be decreased (as natural gas at the end use level consumed with an efficiency of greater than 91% is substituted for natural gas used to generate electricity and provide the same level of end use service at an efficiency of less than 29%).

[21] American Gas Foundation, Direct Use of Natural Gas: Implications for Power Generation, Energy Efficiency, and Carbon Emissions, April 2008, page iii.

G. What is the cost of switching fuels for end-use applications?

56. There are four major costs associated with switching end-use fuels from electricity to natural gas: (1) the cost of extending distribution mains, (2) the cost of connecting customers to the mains, (3) the cost of the appliances themselves (netted against the cost of the alternate fuel appliance in the benefit cost tests), and (4) the cost of appliance installation, including piping and venting. Due the variability of these costs among different applications (indeed, line extension policies calculate the cost of the first two items on a case-by-case basis), it is not possible to develop a generic estimate of these cost elements that will apply in all cases, and it is anticipated that fuel switching may not be cost-effective in all cases. However, Kansas Gas Utilities believe that there are certain applications in which fuel switching will be the most cost effective of all DSM options and should be offered to customers. This is particularly true in the case of new construction and will likely be the most cost effective of all options in that market.

57. It is also interesting to point out that Washington Gas Light Company ("Washington Gas") has proposed fuel switching programs in its Maryland service territory. Maryland is under legislative mandate to reduce electricity usage. The basic elements of the Washington Gas Appliance Retrofit Program are as follows:

1. As part of the Electric & Natural Gas Weatherization/Audit Program, the contractor will determine the source energy usage of each of the major energy-using appliances in the home (including heating system, water heater, clothes dryer and range) and the source energy usage of high efficiency alternatives.

2. The contractor will present a menu of all incentives available from Pepco and Washington Gas to encourage the installation of high efficiency alternatives.

    a. Washington Gas will determine the incentives that it can pay to fund the installation of high efficiency natural gas appliances. If the customer chooses to install a high efficiency natural gas appliance in place of a standard efficiency natural gas appliance, Washington Gas will be responsible for paying the incentive, if any.

b. Pepco [the competing electric utility] will determine the incentives that it can pay to fund the installation of high efficiency electric appliances. If the customer decides to install a high efficiency electric appliance in place of a standard efficiency electric appliance, Pepco will be responsible for paying the incentive, if any. Of course, there is room for the customer to provide a contribution to the program. However, it is notable that the preliminary analysis indications that the fuel switching program is cost-effective without a customer contribution.

c. Washington Gas and Pepco will jointly determine the incentives that each can pay to fund an electric to natural gas fuel switch. If the customer chooses to install a natural gas appliance in place of an electric appliance, Pepco will be responsible for paying the following incentives:

i. the contribution to cover gas infrastructure and natural gas appliance installation, plus
ii. the cost of a standard efficiency natural gas appliance

Washington Gas is responsible for the payment of the standard efficiency to high efficiency incentive.[22]

In the case of the retrofit market, Washington Gas has estimated that the net cost of connecting customers (required contribution) in order to implement a fuel switching program in Maryland is $663. The costs of appliances, venting and piping are:

Appliance	Initial Cost	Piping and Venting
Space Heat	$4,383	$785
Water Heat	$917	$1,579
Clothes Dryer	$473	-
Range	$440	-

With this level of costs, natural gas fuel switching is cost-effective by a wide margin. Since the above costs relate to the retrofit market, it is clear that a fuel switching program that targets the new construction market will be cost effective by an even larger margin.

58. Furthermore, if this program replaces only electric heating with natural gas heating, it will reduce energy usage for heating by over 70%, reduce CO_2 emissions by over 70%, reduce NOx emissions by almost 90% and virtually eliminate SO_2 emissions. To put

[22] Comments of Washington Gas Light Company, Filed in Maryland Case No. 9111, August 18, 2008

these savings in context, the competing electric utility would need to install over 1,000 CFLs to achieve the electricity savings associated with the conversion of one home to natural gas heating. From these statistics, Washington Gas concludes that programs that involve fuel switching are likely to be superior in every way to the current electric-only program offerings in its service territory.[23]

H. Under what conditions would it be appropriate for a utility to offer an incentive to switch fuels?

59. In this and in the 441 and 442 dockets, the Commission's primary interest is in how to implement energy efficiency programs in Kansas. Kansas Gas Utilities believe that there is <u>no</u> difference between market interference for the purpose of improving the efficiency with which energy is consumed at the end-use level and market interference for the purpose of encouraging fuel switching from electricity to natural gas at the end-use level.

60. Kansas Gas Utilities have reviewed the Commission orders in the three dockets relevant to this evaluation (Docket No. 07-GIMX-247-GIV, Docket No. 08-GIMX-441-GIV and Docket No. 08-GIMX-442-GIV). Although "energy efficiency" is not directly defined in these orders, it is possible to obtain a working definition of the term from the discussion on pages 9-12 of the Commission's <u>Order Setting Energy Efficiency Policy Goals, Determining A Benefit-Cost Test Framework, And Engaging A Collaborative Process To Develop Benefit-Cost Test Technical Matters And An Evaluation, Measurement, And Verification Scheme</u> in Docket No. 08-GIMX-442-GIV. There, the Commission expresses a preference for treating energy efficiency as a resource option, with the following attributes:

- investments in energy efficiency programs should provide immediate and dependable energy savings supplied throughout the relevant lifetime of the program

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[23] Ibid.

- investments in energy efficiency programs should provide benefits throughout the life of the program
- programs proposed by utilities should address efficiency improvements in a comprehensive manner
- programs should be implemented in a logical sequence that makes the most cost-effective use of energy efficiency expenditures.

61. As Kansas Gas Utilities demonstrate throughout these comments, fuel switching DSM programs satisfy these requirements more effectively than single fuel DSM programs. Thus, Kansas Gas Utilities believe that it is appropriate for a utility to offer an incentive to switch fuels in all cases where direct market interventions to improve efficiency are considered for the following reasons:

1. Fuel switching programs save more electricity, and may do so more cost-effectively, than corresponding single-fuel programs.

2. Fuel switching programs reduce emissions more dramatically than single-fuel incentive programs.

3. Fuel switching programs better satisfy the Commission's preference for treating energy efficiency as a resource option, with the following attributes:
   a. fuel switching programs provide immediate and dependable energy savings supplied throughout the relevant lifetime of the program
   b. fuel switching programs will provide benefits throughout the life of the program, with no loss of effectiveness as the measure ages
   c. fuel switching programs address efficiency improvements in a comprehensive manner
   d. fuel switching programs make the most cost-effective use of energy efficiency expenditures.

I. If utilities should be required to promote the most economical or environmentally beneficial fuel, is the issue regarding lost revenue recovery any different than for energy efficiency programs in general?

62. It is Kansas Gas Utilities' position that if utilities should be required to promote the most economical or environmentally beneficial fuel, then the issue of lost revenue recovery is no different than for energy efficiency programs in general. Specifically, to the extent that an

electric utility can demonstrate that the payment of an incentive was responsible for the conversion of electric appliances to natural gas, it should be entitled to lost revenue recovery until base rates are reset in the next base rate proceeding. It may be difficult to make such a demonstration in the case of a new home, but the same rules would apply in that case as apply in the case of single-fuel efficiency investments in new construction.

VII. CONCLUSION

63. The Kansas Gas Utilities want to express their appreciation to the Commission for opening up the fuel switching docket . This forum provides the parties with an ability to discuss the merits of adopting a comprehensive energy efficiency plan that permits programs to be considered on a multi-fuel basis. As stated previously, the Commission should take a broad look and not artificially limit energy efficiency programs to a single fuel analysis. Electric efficiency programs designed to increase the installation of heat pumps or electric water heaters are not the most optimal solutions to the state's energy challenges. The installation of heat pumps and water heaters will result in more electricity being consumed. It will also result in more natural gas being used for generation and in the final analysis cause the price of energy to increase in the state. Any meaningful analysis of energy efficiency programs should be done taking into account the entire fuel cycle including both source-to-site and appliance efficiency.

65. The Commission should consider fuel switching programs causing electric usage to be replaced by direct usage of natural gas for space heating and water heating. The adoption of such a plan will put downward pressure on construction of additional generation capacity, which would otherwise be needed to supply incremental electric space heating and water heating load. Should the Commission decide to allow incentives to be paid by electric customers, it is

recommended that all alternative fuel suppliers be given an opportunity to compete for those dollars to advance better energy efficiency alternatives.

66. In closing, the Kansas Gas Utilities would like to reiterate its recommendations for the Commission's consideration:

1. Conservation and energy efficiency programs for application in competitive markets should be analyzed on a multi-fuel and comprehensive basis, looking at all reasonably available competing energy products and services and taking into consideration all likely impacts of the proposed programs (including impacts on load growth).

2. Conservation and energy efficiency programs should be analyzed on a full fuel cycle (source-to-site plus appliance efficiency) basis.

3. Conservation and energy efficiency programs and utility rates should be constructed in a manner designed to create incentives for consumers to use energy wisely and remove disincentives for utilities to promote conservation.

4. Conservation and energy efficiency programs should promote the use, among feasible alternatives, of the most efficient and lowest emitting energy sources in particular applications.

5. Any DSM proposal should be required to demonstrate that any programs submitted for Commission approval will be implemented in a fuel-neutral manner, should monitor for fuel switching caused by the programs or, if these programs do result in fuel-switching, that fuel-switching serves the overall public interest.

6. The cost-effectiveness evaluation of proposed programs should be performed using the cost-effectiveness tests that are developed and explained in the California Standard Practice Manual. These tests recognize explicitly that the promotion of any DSM program could have a significant impact on alternate fuel suppliers. Therefore, a critical component of these tests is the avoided (or increased) alternate fuel costs and the impact that the DSM measure will have on rate levels of the alternate fuel supplier. Inclusion of these factors is the only way to ensure that the program is truly cost-effective on a global basis. To ignore these factors in a DSM program evaluation could lead to higher prices for customers of alternative fuel suppliers and violations of anonymous equity considerations, in which a ratepayer's demands are diverted away uneconomically from an incumbent.

7. Electric DSM programs should be approved only after it has been demonstrated that the offering entity has considered and evaluated all potential programs, including perhaps the most important resource for reducing electricity consumption and CO_2 emissions, while simultaneously improving the efficiency with which energy is consumed: encouraging the usage of natural gas where it is a viable substitute for electricity and converting loads currently served by electricity to natural gas.

Respectively Submitted by:

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VERIFICATION

STATE OF KANSAS)
) ss
COUNTY OF JOHNSON)

Walker Hendrix of lawful age, being first duly sworn upon oath, deposes and states: That he is an attorney for Kansas Gas Service, a division of ONEOK, Inc.; that he has read the above and foregoing *Joint Recommendation and Comments* and that the statements therein contained are true according to his knowledge, information and belief.

Walker Hendrix

Subscribed and sworn before me this 13th day of November 2008.

Notary Public

My Appointment Expires: 9/28/2012

NOTARY PUBLIC -- State of Kansas
JO M. SMITH
My Appt. Exp. 9/28/2012

VERIFICATION

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) ss:
COUNTY OF FRANKLIN)

James G. Flaherty of lawful age, being first duly sworn upon oath, deposes and states:

That he is an attorney for Atmos Energy; that he has read the above and foregoing Joint Recommendation and Comments and that the statements therein contained are true according to his knowledge, information and belief.

James G. Flaherty

Subscribed and sworn before me this 13th day of November 2008.

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RONDA ROSSMAN
My Appt. Expires 5/25/2010

Notary Public

Appointment/Commission Expires:

CERTIFICATE OF SERVICE

I Hereby Certify that on this 18th day of November, 2008, a true and correct copy of the above and foregoing ***Joint Recommendations and Comments*** was deposited in the United States mail, first-class postage prepaid, properly addressed to:

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Walker Hendrix

KANSAS CITY POWER & LIGHT COMPANY (Name of Issuing Utility)	SCHEDULE 11
Rate Areas No. 2 & 4 (Territory to which schedule is applicable)	Replacing Schedule 11 Sheet 2 which was filed December 4, 2006
No supplement or separate understanding shall modify the tariff as shown hereon.	Sheet 2 of 5 Sheets

RESIDENTIAL SERVICE
Schedule R **(Continued)**

RATE:

Single-phase kWh and three-phase kWh will be cumulated for billing under this schedule.

A. RESIDENTIAL GENERAL USE:

Customer Charge (Per Month) $7.93

	Summer Season	Winter Season
Energy Charge (Per kWh):		
First 1000 kWh per month	$0.07779	$0.07026
Over 1000 kWh per month	$0.07779	$0.06996

B. RESIDENTIAL GENERAL USE AND WATER HEAT – ONE METER:

When the customer has electric water heating equipment for the residence and the equipment is of a size and design approved by the Company and not connected through a separately metered circuit, the kWh shall be billed as follows:

Customer Charge (Per Month) $7.93

	Summer Season	Winter Season
Energy Charge (Per kWh):		
For 1000 kWh per month	$0.07779	$0.04526
For 1000 kWh per month	$0.07779	$0.06916

07-KCPE-905-RTS
Approved
Kansas Corporation Commission
November 20, 2007
/S/ Susan K. Duffy

Issued: December 7, 2007 (Month Day Year)	FILED
Effective: January 1, 2008 (Month Day Year)	THE STATE CORPORATION COMMISSION OF KANSAS
By: Chris B. Giles Vice-President (Title)	By: (Secretary)

RESIDENTIAL SERVICE
Schedule R (Continued)

C. RESIDENTIAL GENERAL USE AND SPACE HEAT - ONE METER:

When the customer has electric space heating equipment for the residence and the equipment is of a size and design approved by the Company and not connected through a separately metered circuit, the kWh shall be billed as follows (customer may also have electric water heating equipment, of a size and design approved by the Company, under this option):

Customer Charge (Per Month) $7.93

	Summer Season	Winter Season
Energy Charge (Per kWh)		
First 1000 kWh per month	$0.07779	$0.04556
Over 1000 kWh per month	$0.07779	$0.03416

D. RESIDENTIAL GENERAL USE AND SPACE HEAT - 2 METERS:

When the customer has electric space heating equipment for the residence and the equipment is of a size and design approved by the Company and connected through a separately metered circuit, the kWh used shall be billed as follows. This option of separately metered space heating is limited to premises connected prior to January 1, 2007.

07-KCPE-905-RTS
Approved
Kansas Corporation Commission
November 20, 2007
/S/ Susan K. Duffy

Customer Charge (Per Month) $9.85

	Summer Season	Winter Season
Energy Charge for Usage on General Use Meter (Per kWh):		
First 1000 kWh per month	$0.07779	$0.06796
Over 1000 kWh per month	$0.07779	$0.06726
Separately metered space heat rate:		
For all kWh (Per kWh)	$0.07779	$0.03286

OW

EXHIBIT B

Energy Efficiency Benefits of Natural Gas Programs

Oklahoma Rulemaking Collaborative

June 24, 2008

By

Paul Raab

The Importance of Source Energy

- Definitions
  - Source energy represents the total amount of raw fuel that is required and incorporates all transmission, delivery and production losses, thereby enabling a complete assessment of energy efficiency.
  - Site energy is the amount of heat and electricity consumed as reflected in utility bills.
  - Primary energy is the raw fuel that is burned to create heat and electricity, such as natural gas or fuel oil used in onsite generation.
  - Secondary energy is the energy product (heat or electricity) created from a raw fuel, such as electricity purchased from the grid or heat received from a district steam system.

  Source: United States Environmental Protection Agency, <u>ENERGY STAR Performance Ratings Methodology for Incorporating Source Energy Use</u>, December 2007, page 2.

The Importance of Source Energy

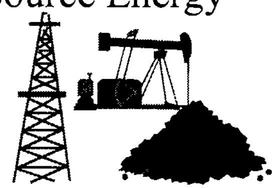
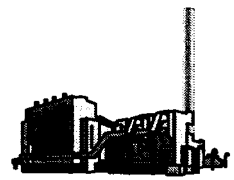
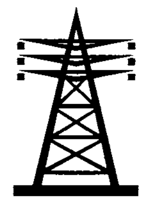
Table 1
Source-Site Ratios for all Portfolio Manager Fuels

Fuel Type	**Source-Site Ratio**
Electricity	3.340
Natural Gas	1.047
Fuel Oil (1,2,4,5,6,Diesel, Kerosene)	1.01
Propane & Liquid Propane	1.01
Steam	1.45
Hot Water	1.35
Chilled Water	1.05
Wood	1.0
Coal/Coke	1.0
Other	1.0

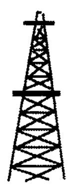
The Importance of Source Energy

- More raw energy is required to produce one unit of site energy in the form of electricity than any other type of fuel. This means that all other fuels evaluated have an energy efficiency advantage over electricity at the site, assuming equivalent efficiency characteristics of the end use. It also means that energy efficiency is improved every time one of these other sources is substituted for electricity at the site of usage, again assuming equivalent efficiency characteristics of the end use.
- When natural gas, for example, is substituted for electricity at the site of usage, it enjoys a three times energy efficiency advantage over electricity. Although not the only argument favoring natural gas for electricity fuel switching, this is certainly a powerful one.

The Importance of Source Energy

	Extraction, Processing, & Transportation	Conversion[1]	Distribution	Delivered To Customer	
Electricity	100 MMBtu Source Energy	88	29	27	
27% Efficient					**Total CO_2**
CO_2 emissions from typical household use* (tons)	1.5	9.3	0	0	**10.8**

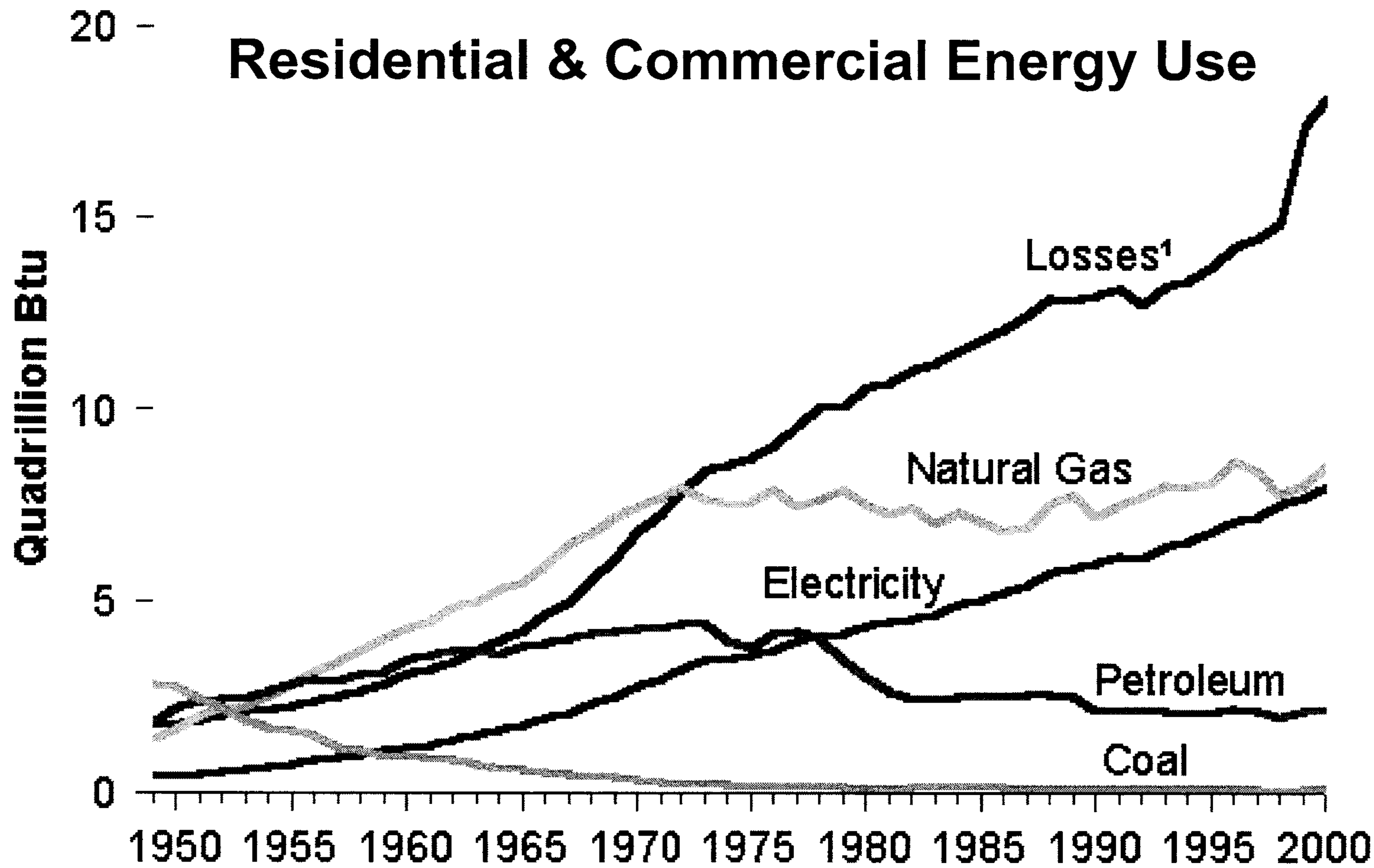
1. Based on 2005 actual generation mix of all energy sources

Natural Gas	100 MMBTU Source Energy	Not Applicable	92	90	
90% Efficient					**Total CO_2**
CO_2 emissions from typical household use* (tons)	0.6		0.1	6.5	**7.2**

The Importance of Source Energy

- Electric power generation, T&D are major source of energy losses.
- **Losses alone** now greater than point of use consumption of natural gas AND electricity in res/comm sector.
- Major opportunity energy savings, energy cost savings, carbon reduction, and a host of other societal benefits.

Residential & Commercial Energy Use



Source: DOE/EIA
(1) Energy lost during generation, transmission, and distribution of electricity

Why This Is an Issue for the Natural Gas Industry

- Simple economics dictates that incentives paid to encourage the purchase of higher efficiency appliances of a particular fuel type must lower the life cycle costs of appliances of that fuel type and will impact the fuel selection decision.
- This occurs as a result of the simple economics of life cycle costs:

$$LC_i = CC_i + OC_{i,1}/(1+r)^0 + \ldots + OC_{i,n}/(1+r)^{(n-1)}$$

Why This Is an Issue for the Natural Gas Industry

Rationale for DSM Incentive Payments

	Standard Efficiency Appliance	High Efficiency Appliance	High Efficiency Appliance With Rebate
Up-Front Cost	$ 1,000	$ 1,500	$ 1,250
Annual Operating Costs	$ 500	$ 450	$ 450
Appliance Lifetime (Years)	15	15	15
Discount Rate	10%	10%	10%
Life-Cycle Cost	$ 5,183	$ 5,265	$ 5,015

Why This Is an Issue for the Natural Gas Industry

Impact of DSM Incentive Payments on the Fuel Selection Decision

	High Efficiency Electrical Appliance	High Efficiency Electrical Appliance With Rebate	Gas Appliance
Up-Front Cost	$ 1,500	$ 1,250	$ 2,500
Annual Operating Costs	$ 450	$ 450	$ 320
Appliance Lifetime (Years)	15	15	15
Discount Rate	10%	10%	10%
Life-Cycle Cost	$ 5,265	$ 5,015	$ 5,177

Why This Is an Issue for the Natural Gas Industry

- Even programs that are touted as "fuel-neutral," such as the Energy Star® program, will likely have fuel selection consequences:

  "[I]t is often cheaper to build a house meeting the electric-heating criteria for Energy Star than for the gas heating criteria." Alan Meier, <u>The Future Of Energy Star And Other Voluntary Energy Efficiency Programs</u>, Proceedings of the ECEEE 2003 Summer Study – Time to Turn Down Energy Demand, 2003, page 677.

Why This Should be an Issue for the Collaborative

Likely Electricity Savings Impact			
Action Stimulated	Savings	Likelihood	Expected Savings
A/C to efficient A/C	10%	25%	2.5%
A/C to efficient H/P	<50%>	25%	<12.5%>
H/P to efficient H/P	10%	50%	5.0%
Total Impact			<5.0%>

Why This Should be an Issue for the Collaborative

- Even programs that are touted as “fuel-neutral,” such as the Energy Star® program, will likely have fuel selection consequences:
  - The criteria for an Energy Star home cover less than half of the home’s total energy use, with the remainder caused by appliances. Because of the areas ignored, an Energy Star house could be easily outfitted with average efficiency appliances, resulting in a high overall energy use.
  - Most of the Energy Star performance specifications are expressed in terms of an efficiency, that is, a unit of service per unit of energy expended. The constant efficiency approach is biased towards larger products. It is typically easier to meet the efficiency criteria with a larger product than a small product because there are various economies of scale. The impact of this bias is most evident for energy targets for new homes. It is relatively cheaper to build a very large Energy Star home than a small one, even though the greenhouse gas emissions from the larger home will be greater than those from a small, inefficient house.

Why This Should be an Issue for the Collaborative

- Incentives that are provided by electric utilities to entities that do not have natural gas service currently or potentially available to them for the purpose of encouraging the installation of "efficient heating and cooling appliances" have the great potential to increase electricity at the expense of natural gas and to increase overall energy usage.
- Any natural gas to electricity fuel switching that occurs as a result of DSM incentive payments is likely to result in the increased consumption of electricity, in direct conflict with current Commission's rulemaking objectives.

Proposed Solutions for This Problem

- Any program that influences the fuel selection decision should be accompanied by a requirement that the offering entity maintain and report on a real-time basis, those situations in which a fuel switch has taken place.
- Correction of the program design problem to deny the payment of incentives to promote electric heat pumps.
- Require that programs be evaluated using the cost-effectiveness tests that are developed and explained in the California Standard Practice Manual, considering source-to-site energy efficiency and including the impact on alternate fuel suppliers.

Proposed Solutions for This Problem

- Requiring that the aggrieved utility offer its own incentives is not the appropriate remedy for this problem.

How the Natural Gas Industry Can Help

- Converting electric end uses to natural gas can provide significant improvements in energy efficiency.
  - This energy efficiency advantage of natural gas-based homes stems from the fact that only about ten percent of the gas energy produced is used or lost from the point of production to the residence. In contrast, approximately 73 percent of the fossil fuel energy produced to satisfy the electricity needs of consumers is used or lost in the process of energy production, conversion, transmission and distribution. Source: American Gas Association, <u>Energy Efficiency, Economic and Environmental Comparison of Natural Gas, Electric, and Oil Services in Residences</u>, May 26, 1999.

How the Natural Gas Industry Can Help

Typical Site-Use and Total Energy Requirements for New Homes (MMBtu per year)

	Gas	Electricity	Oil
1,500 Square Feet			
Heating [1]	41.0	14.8	45.2
Other	22.4	15.3	20.2
Total Site Use	**63.4**	**30.9**	**65.4**
Energy Losses [2]	6.3	84.7	24.1
TOTAL ENERGY [3]	**69.7**	**115.6**	**89.5**
3,000 Square Feet			
Heating [1]	68.0	24.9	75.1
Other	22.4	15.3	20.2
Total Site Use	**90.4**	**40.2**	**95.5**
Energy Losses [2]	8.9	110.3	28.8
TOTAL ENERGY [3]	**99.3**	**150.5**	**124.3**

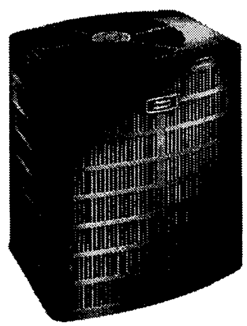
[1] Includes end-use energy requirements for water heating, cooking, and clothes drying.

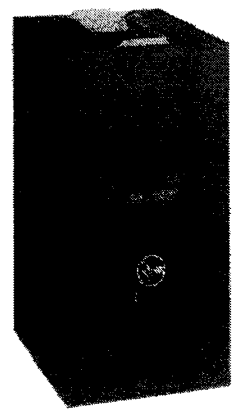
[2] Includes energy used or last in extraction, processing, conversion, transportation and distribution of energy.

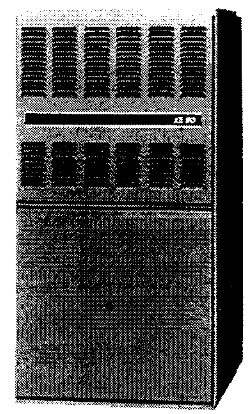
[3] Sum of Site Use and Energy Losses.

How the Natural Gas Industry Can Help Space Heating

DOE site-specific energy ratings are misleading. *While DOE rates an electric appliance with a more efficient energy rating than a similar gas appliance, in reality that electric appliance consumes more source energy, pollutes more, and costs the consumer more to operate.*





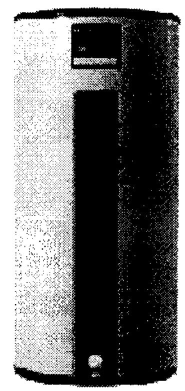
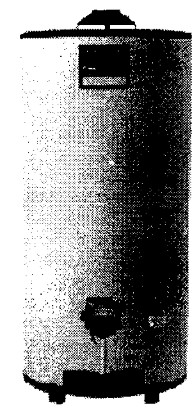


	Electric Heat Pump	Electric Resistance Furnace	Natural Gas Furnace
DOE NAECA Efficiency Rating:	**7.7 HSPF**	**99 AFUE**	**80 AFUE**
Source Energy Consumption (MMBtu/yr):	**96.6**	**229.1**	**85.2**
Energy Cost[1]/year	**$814**	**$1,930**	**$924**
CO_2 Emissions (tons/unit/yr)[2]:	**5.9**	**12.1**	**5.0**
2006 Shipments (Sales)	**1,330,000[3]**	**800,000[3]**	**3,197,000[4]**

[1]Energy Cost is based on 2007 DOE representative average unit costs for energy where electric rate is 10.65 cents/kWh; gas rate is $12.18/MMBtu
[2]Emission estimates are based on DOE's electric power emission estimates for all generation energy sources from Electric Power Annual, 2005 data
[3]Estimated
[4]Based on data from GAMA - *Consumers Continued to Choose Efficient Heating Equipment in 2006*, February 2007
HSPF=Heating Seasonal Performance Factor, AFUE=Annual Fuel Utilization Efficiency

How the Natural Gas Industry Can Help Water Heaters

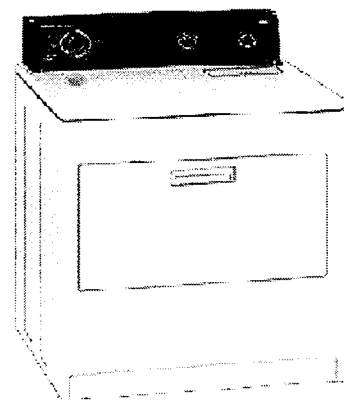
DOE site-specific energy ratings are misleading.
While DOE rates an electric appliance with a more efficient energy rating than a similar gas appliance, in reality that electric appliance consumes more source energy, pollutes more, and costs the consumer more to operate.

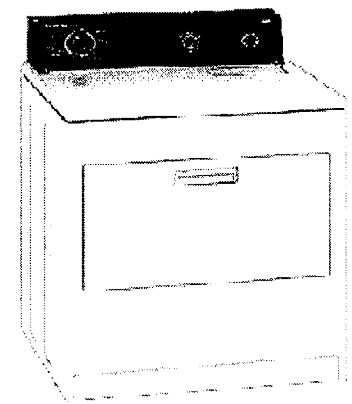
	Electric Resistance	Natural Gas
		
DOE NAECA Efficiency Rating [1]:	**.90 EF**	**.59 EF**
Source Energy Consumption (MMBtu/yr):	**61.4**	**28.2**
Energy Cost[2]/yr :	**$517**	**$309**
CO_2 Emissions (tons/unit/yr)[3]:	**3.8**	**1.7**
2006 Shipments (Sales)[4]:	**4,792,000**	**4,654,000**
Equipment Cost	**$340**	**$415**

[1] Energy factors based on a 40-50 gallon storage water heaters
[2] Energy Cost is based on 2007 DOE representative average unit costs for energy where electric rate is 10.65 cents/kWh; gas rate is $12.18/MMBtu
[3] Emission estimates are based on DOE's electric power emission estimates for all generation energy sources from Electric Power Annual 2005 data
[4] Gas Appliance Manufacturers Association
EF=Energy Factor

How the Natural Gas Industry Can Help
Clothes Drying

DOE site-specific energy ratings are misleading.
While DOE rates an electric appliance with a more efficient energy rating than a similar gas appliance, in reality that electric appliance consumes more source energy, pollutes more, and costs the consumer more to operate.





	Electric	Natural Gas
DOE NAECA Efficiency Rating:	**3.01 EF**	**2.67 EF**
Source Energy Consumption (MMBtu/yr):	**12.2**	**4.6**
Energy Cost[1]/yr:	**$95**	**$56**
CO_2 Emissions (tons/unit/yr)[2]:	**0.7**	**0.3**
2006 Shipments (Sales)[3]:	**6,360,000**	**1,614,000**

[1]Energy Cost is based on 2007 DOE representative average unit costs for energy where electric rate is 10.65 cents/kWh; gas rate is $12.18/MMBtu
[2]Emission estimates are based on DOE's electric power emission estimates for all generation energy sources from Electric Power Annual, 2005 data
[3]Appliance Magazine
EF = Energy Factor

How the Natural Gas Industry Can Help Cooking Equipment

DOE site-specific energy ratings are misleading.
While DOE rates an electric appliance with a more efficient energy rating than a similar gas appliance, in reality that electric appliance consumes more source energy, pollutes more, and costs the consumer more to operate.

	Electric	Natural Gas
		
Energy Factor	**10.9 EF**	**5.8 EF**
Source Energy Consumption (MMBtu/yr):	**6.7**	**4.0**
Energy Cost[1]/yr:	**$56**	**$42**
CO_2 Emissions (tons/unit/yr)[2]:	**0.4**	**0.2**
2006 Shipments (Sales)[3]:	**6,228,000**	**3,726,000**

[1]Energy Cost is based on 2007 DOE representative average unit costs for energy where electric rate is 10.65 cents/kWh; gas rate is $12.18/MMBtu
[2]Emission estimates are based on DOE's electric power emission estimates for all generation energy sources from Electric Power Annual, 2005 data
[3]Appliance Magazine

How the Natural Gas Industry Can Help

- Converting electric end uses to natural gas can provide significant emissions reductions.
  - "Optimizing *how* the U.S. uses energy has the potential to reduce carbon dioxide (CO_2) emissions by 375-565 million metric tons/yr." This strategy would bring the "net CO_2 levels for natural gas end-use and the natural gas industry to 15% lower than the 1990 levels, well beyond the Kyoto Accord goals (5% lower than 1990 levels)." Source: Gas Technology Institute, <u>A Lower-Cost Option for Substantial for Substantial Carbon Dioxide Emission Reductions in the U.S.</u>, January 2008, page 1.

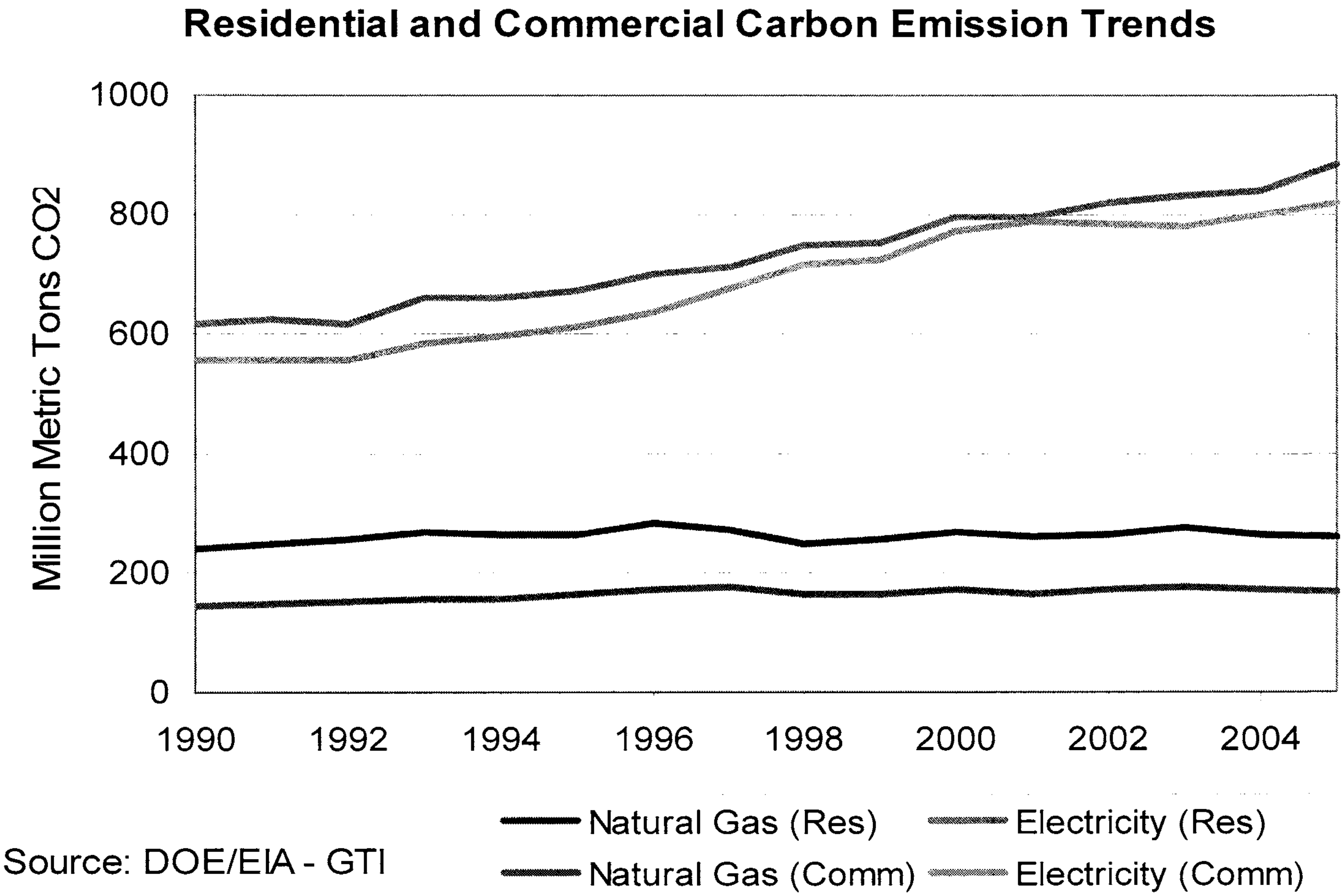
How the Natural Gas Industry Can Help

Energy End-Use Sector Sources of U.S. Carbon Dioxide Emissions, 1990-2005

	Million Metric Tons Carbon Dioxide		*Percent Change*	
Sector	**1990**	**2005**	**1990-2005**	**2004-2005**
Residential	953.7	1,253.8	*31.5%*	*3.3%*
Commercial	780.7	1,050.6	*34.6%*	*1.6%*
Industrial	1,683.6	1,682.3	*-0.1%*	*-3.1%*
Transportation	1,566.8	1,958.6	*25.0%*	*1.0%*

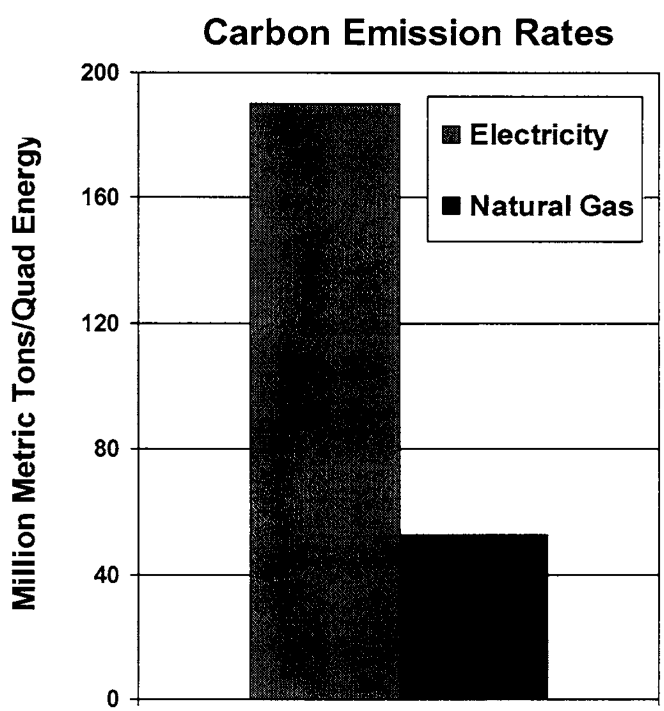
Note: Electric power sector emissions are distributed across sectors.

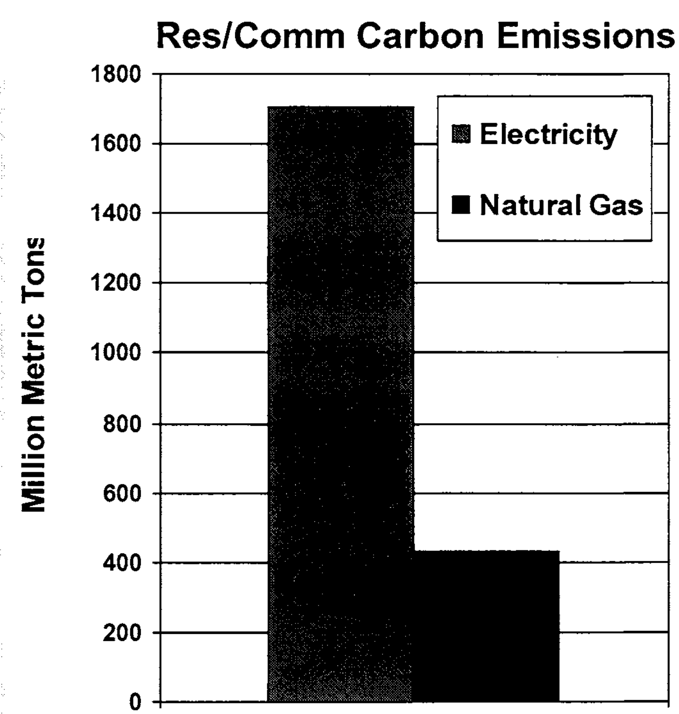
How the Natural Gas Industry Can Help



Source: DOE/EIA - GTI

How the Natural Gas Industry Can Help





Composite data for residential and commercial sectors compiled by GTI from DOE EIA AEO 2007 (2005 data)

How the Natural Gas Industry Can Help

Total Energy Efficiency Carbon Dioxide Emissions for New Homes[1] (lbs of CO_2 per Average Household Energy Use[2])		
	1,500 SQ. FT.	**3,000 SQ. FT.**
Natural Gas	**7,423**	**10,583**
Oil	**13,095**	**15,198**
Electricity[3]:		
Coal-Based	17,560	22,828
Oil-Based	582	757
Natural Gas-Based	1,561	2,029
Total Electricity	**19,703**	**25,614**
[1] Based on hypothetical fuel generating mix.		
[2] Excludes energy use for cooling and base electric requirements.		
[3] For existing generating capacity only.		

How the Natural Gas Industry Can Help

COMPARISON OF ELECTRICITY VERSUS NATURAL GAS ENERGY EFFICIENCY AND POLLUTION BENEFITS

	Electric Water Heater	Natural Gas Water Heating	Natural Gas Water Heating Advantage
Average Annual Site Usage (kWh/therms)	4,811 (4)	250 (3)	-
Source Energy Used (Btu)	58,226,748	27,322,404	30,904,344
CO_2 Emissions (lbs)	6,216	2,925	3,291
NOX Emissions (lbs)	12.46	2.30	10.16
SO_2 Emissions (lbs)	40.85	0.03	40.82
CO_2 Emissions (lbs/MWh; lbs/therm) (1)	1292.03	11.7	
NOX Emissions (lbs/MWh; lbs/therm) (1)	2.59	0.0092	
SO_2 Emissions (lbs/MWh; lbs/therm) (1)	8.49	0.0001	
Source-to-Site Efficiency (2)	28.20%	91.50%	
Btus per kWh	3,413		
Btus per therm		100,000	

Notes:
(1) Source: Baltmore Gas & Electric
(2) Source: American Gas Association
(3) Source: Washington Gas
(4) Source: Pepco

How the Natural Gas Industry Can Help

- Fuel Switching Programs can reduce rates for both electric and natural gas customers, something that single fuel incentive programs are unlikely to do.
- The RIM test for the utility sponsoring the program measures potential rate increases by determining whether:

$$UAC > RL + PRC + INC$$

where:

UAC	equals the life cycle avoided costs over the life of the DSM measure
RL	equals the life cycle revenue losses over the life of the DSM measure
PRC	equals the life cycle program costs over the life of the DSM measure
INC	equals the life cycle incentive costs over the life of the DSM measure.

- Since the marginal cost of electricity is generally greater than the average embedded cost, load decreases on the electric system generally translate into rate reductions.

How the Natural Gas Industry Can Help

- The RIM test for the alternate fuel utility measures potential rate increases by determining whether:

  $$UACa > RLa$$

  where:

UACa equals the life cycle natural gas avoided costs over the life of the DSM measure
RLa equals the life cycle natural gas revenue losses over the life of the DSM measure.

- Since the marginal cost of delivered natural gas is generally less than the average embedded cost, load increases on the natural gas system generally translate into rate reductions.

How the Natural Gas Industry Can Help

- Natural gas utilities can participate in program costs and incentive costs (since natural gas customers also benefit) and expand the scope of the programs offered.
- Sharing can be achieved using the relationships from the RIM test.
  - The electric utility can afford to pay an amount of program and incentive costs up to the difference between its avoided cost and its revenue loss:

$$UAC - RL$$

  - The natural gas utility can afford to pay an amount of program and incentive costs up to the difference between its avoided cost and its revenue loss:

$$UACa - RLa$$

How the Natural Gas Industry Can Help

- Fuel Switching programs can and have been implemented in many jurisdictions.
  - A 2007 survey of LDC natural gas energy efficiency programs published in January 2008 reports that "[s]even (7) of the regulator-approved natural gas [energy efficiency] programs in the survey encourage fuel switching, by, for instance, providing financial incentives (e.g., rebates, low-interest loans, reduced costs, construction allowances) for replacing, switching to, or installing new gas water heaters, boilers, furnaces, and cooling equipment to residential and commercial customers." Source: American Gas Association, LDC Natural Gas Energy Efficiency Programs Report 2007, January 2008.
  - Programs have been approved in Florida, Missouri, New Jersey and Wisconsin.
  - The Large Commercial and Industrial Standard Offer Program proposed by Public Service Company of Oklahoma (PSO) for implementation in Oklahoma provides incentives for "any measure that produces savings through…a substitution of another energy source for electricity supplied through the transmission grid." Source: Cause No. PUD200700449, Direct Testimony of Billy G. Berny on Behalf of Public Service Company of Oklahoma, December 10, 2007.

Hypothetical Joint Utility Program

- Electric & Natural Gas Weatherization/Audit Program
  - Both utilities share in the costs of this program, based on the source energy of the appliances currently in the home. Standard allocators of cost could be developed based on appliances and their average usage (perhaps by housing type or commercial business) and the EPA published source energy usage factors by fuel type.

Hypothetical Joint Utility Program

- Electric & Natural Gas Appliance Retrofit Program
  - As part of the Electric & Natural Gas Weatherization/Audit Program, the contractor determines the source energy usage of each of the major energy-using appliances in the home (including heating system, water heater, clothes dryer and range) and the source energy usage of high efficiency alternatives.
  - The sponsoring gas utility will determine the incentives that it can pay to fund the installation of high efficiency natural gas appliances. If the customer chooses to install a high efficiency natural gas appliance in place of a standard efficiency natural gas appliance, the sponsoring gas utility will be responsible for paying the incentive, if any.

Hypothetical Joint Utility Program

- Electric & Natural Gas Appliance Retrofit Program
  - The sponsoring electric utility will determine the incentives that it can pay to fund the installation of high efficiency electric appliances. If the customer decides to install a high efficiency electric appliance in place of a standard efficiency electric appliance, the sponsoring electric utility will be responsible for paying the incentive, if any.
  - The utilities will jointly determine the incentives that each can pay to fund an electric to natural gas fuel switch. If the customer chooses to install a natural gas appliance in place of an electric appliance, the sponsoring natural gas utility will be responsible for the payment of the standard efficiency to high efficiency incentive. The sponsoring electric utility will be responsible for paying the following incentives: the contribution to cover natural gas appliance installation, plus the cost of a standard efficiency natural gas appliance.

Recommended Policies

- Conservation and energy efficiency programs for application in competitive markets should be analyzed on a multi-fuel and comprehensive basis, looking at all reasonably available competing energy products and services and taking into consideration all likely impacts of the proposed programs (including impacts on load growth).

Recommended Policies

- Conservation and energy efficiency programs should be analyzed on a full fuel cycle (source-to-site plus appliance efficiency) basis.
- Conservation and energy efficiency programs and utility rates should be constructed in a manner designed to create incentives for consumers to use energy wisely and remove disincentives for utilities to promote energy efficiency.

Recommended Policies

- Conservation and energy efficiency programs should promote the use, among feasible alternatives, of the most efficient and lowest emitting energy sources in particular applications.

Recommended Policies

- Any electric-only DSM proposal should be required to demonstrate that any programs submitted for Commission approval will be implemented in a fuel-neutral manner, should monitor for fuel switching caused by the programs or, if these programs do result in fuel-switching, that fuel-switching serves the overall public interest.

Recommended Policies

- The cost-effectiveness evaluation of proposed programs should be performed using the cost-effectiveness tests that are developed and explained in the California Standard Practice Manual. These tests recognize explicitly that the promotion of any DSM program could have a significant impact on alternate fuel suppliers.

Recommended Policies

- Electric DSM programs should be approved only after it has been demonstrated that the offering entity has considered and evaluated all potential programs, including perhaps the most important resource for reducing electricity consumption and CO_2 emissions, while simultaneously improving the efficiency with which energy in consumed: encouraging the usage of natural gas where it is a viable substitute for electricity and converting loads currently served by electricity to natural gas.