INCENTIVE PROGRAMS

WHY CARE ABOUT INCENTIVES?

SAMI investigated incentive approaches to air quality management in the hope that all stakeholders could agree on an approach to improving air quality outside the traditional regulatory framework. Two areas were examined with contractor assistance by SAMI – incentives to affect consumer behavior and incentives to affect the behavior of organizations that are responsible for air emissions. While SAMI does not recommend any particular incentive-based approach, the information contained in this chapter may be useful to states and other stakeholders considering various emission management options.

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Incentive-based approaches may offer an alternative to command and control regulation and possibly achieve reductions in emissions. Because incentive-based approaches rely upon market mechanisms and voluntary behavioral responses, the outcomes from such approaches can be more difficult to predict than traditional control mandates.

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Deleted: Incentive-based approaches can, at least theoretically, offer opportunities for achieving emissions reductions at lower cost and with greater flexibility than specific control requirements. These approaches are likely to be more acceptable to businesses and politicians, and offer more implementation choices. Incentive-based approaches reward those who do more than is required. They are also a good fit for the SAMI environment, because program development involves industry representatives and regulators working together. ¶

SAMI INCENTIVES CONTRACTS

SAMI chose to look at incentives from two perspectives – consumers and corporations/organizations. ICF Consulting was contracted to produce a study and report on consumer incentives that had the potential to reduce emissions. The study looked at two main areas: transportation policies to reduce emissions and building technologies to reduce energy use. The second study was completed by BBC Research and Consulting and looked at a wide range of programs that would provide incentives to companies/organizations to reduce their emissions.

CONSUMER INCENTIVES

Transportation Policies / Incentives

Transportation demand has been growing and is projected to continue to grow at a rapid pace if current vehicle use and settlement patterns continue. In the SAMI region, vehicle use (measured in vehicle miles traveled, or VMT) is growing at a faster rate than population. By 2010, vehicle use is predicted to increase 70% from 1990 levels. Highway vehicles and utilities are the largest human sources of nitrogen oxides and highway vehicles are the largest human sources of volatile organic compounds. Incentives that affect transportation demand could have impact on air emissions.

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Fourteen different strategies were analyzed for their potential to reduce VMT and emissions. All the strategies were judged to be technically feasible and likely to affect emissions, and they either affect the demand for vehicle travel or motor vehicle technologies. All of them can possibly be implemented by creating incentives for individuals to change their behavior. The types of strategies examined include: market-based incentives; investments to encourage alternative modes/reduced traffic congestion; land-use or development-focused strategies; and incentives to purchase cleaner vehicles.

Following are brief descriptions of the incentives that were investigated. For more detail, please refer to ICF's report.

Market-based Incentives

1. **Road pricing –** Convert major bridges, tunnels, and limited access highways into toll roads; implement tolls on new limited access highways.

2. **Parking pricing / aggressively implement Commuter Choice and Parking Cash Out** – A variety of mechanisms for increasing parking costs, and for making existing fixed parking costs variable. Parking pricing programs tend to discourage automobile trips -- a $2 to $4 increase in parking costs can result in a 10 to 25% decrease in VMT. Parking Cash Out offers the value of (free) parking to employees in cash, turning a subsidy to driving into an incentive not to drive. (Note – about 95% of all commuters who drive receive free parking.)

3. **Increase gas tax –** Increase the tax on motor vehicle gasoline and diesel fuel. The effectiveness of this incentive depends on consumer reaction to the increased price. Estimates of elasticity of fuel demand to fuel price show that a 10% increase in fuel price produces a 2 to 8% decrease in fuel consumption.

4. **VMT-based fees or pay-at-the-pump auto insurance –** Implement a program to partially or fully charge vehicle insurance on a per-mile basis, thus converting one of the largest fixed costs of vehicles into a variable cost. VMT fees can cause reductions in congestion and pollution because the only way to reduce one's cost is to drive less. The fees can be tied to vehicle registration or auto insurance and can be paid based on VMT or at the gas pump.

Investments to Encourage Alternative Modes/Reduced Traffic Congestion

5. **Improve transit service, speeds and/or reliability –** Increase bus (and rail, where applicable) transit service coverage and frequency. Introduce exclusive bus lanes. Improve transit service using technologies such as signal prioritization, queue jumping, and ITS elements, such as vehicle tracking for headway control. Case studies in various U.S. cities have shown daily decreases in VMT between 18 and 55% after mass transit improvements were made.

6. **Reduce transit fares –** Lower transit fares and/or provide free transit service routes. Restructure fares to maximize mode shift from Single Occupant Vehicles (SOVs), especially for congested periods and corridors.

7. **Improve bicycle/pedestrian infrastructure** – Improve intersections and retrofit existing facilities during major rehabilitations, in accordance with recent American Association of State Highway and Transportation Officials (AASHTO) guidelines. Increase investments in sidewalks, bicycle lanes, signage, bicycle parking, and off-road walking/biking trails. Most studies estimate low reductions in VMT from bike- and pedestrian-oriented projects. Emissions benefits can be quite large because cold start and hot soak emissions comprise a large proportion of emissions from a vehicle trip.

8. **Increase ridesharing-oriented infrastructure (HOV lanes, park-and-ride)** – Increase number of high-occupancy vehicle (HOV) lanes, especially through conversion of existing lanes. Increase the number of associated park-and-ride facilities. HOV lanes are mainly effective on heavily congested roadways during peak travel times. The effectiveness of park-and-ride lots is particularly tied to available transit and ride sharing options.

9. **Coordination/Information/Marketing for SOV Alternatives –** Develop a comprehensive program to promote alternatives to driving alone, including marketing to promote transportation alternatives, information to facilitate ridesharing, guaranteed ride home programs, flexible hours, telework, etc. Note – this was not analyzed quantitatively due to the difficulty of determining promotional efforts impacts on VMT and emissions.

10. **Aggressive employer-provided TDM programs –** State and/or local governments provide tax incentives and/or matching funds for employers who implement commute benefit programs (provision of transit benefits, parking cash-out, ridesharing services, etc.). The effectiveness varies widely with employer commitment, but most employers see excellent results with moderate commitment.

Land Use / Development-Focused Strategies

11. **Transit-oriented/center-and-corridor focused development –** Provide incentives to developers that focus growth near transit stations, and pursue a “town center-and-corridor” structure for new growth. Also use disincentives to discourage Greenfield development.

Incentives to Purchase Cleaner Vehicles:

12. **Vehicle efficiency taxes / feebates** – Implement a tax on vehicles that have high emission rates/low fuel-economy, or implement a feebate program that taxes high-emission vehicles and offers rebates that lower the purchase price of fuel-efficient vehicles; substantial rebates could be implemented to encourage purchase of alternative fueled vehicles (AFVs) / low-emission vehicles.

13. **Vehicle retirement / buyback programs –** Implement a program that offers a financial incentive to voluntarily remove a high-emissions vehicle from use.

14. **Provide alternative fuel vehicle (AFV) infrastructure –** Develop fueling stations for AFVs to facilitate increased use; a substantial barrier to purchasing an AFV is that facilities are not widely available to refuel vehicles that do not run on gasoline or diesel fuel.

The SAMI Public Advisory Committee chose nine of the of the above approaches and use of Clean Diesel Fuel Technology for ICF to model and evaluate.

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Transportation Incentives - Emissions Results

The transportation sector emissions baseline was developed based on emissions inventories already developed by SAMI for highway vehicles as part of its integrated assessment. VMT growth was estimated based on the Federal Highway Administration's VMT data from 1990 to 1995; VMT growth factors from EPA were applied to each MSA; and annual growth rates from 2010 to 2040 were assumed to be the same as those indicated for 2010 to 2020.

ICF began with the baseline VMT and emissions database prepared by E.H. Pechan. They developed a spreadsheet model for each of the incentives, and input costs, response elasticity and other factors. The model then calculated the estimated VMT reductions. The following table shows the strategies along with a brief description of key assumptions and the expected reductions in VMT for 2010 and 2040.

TABLE 9.1: VMT Results

Policy	***Brief description of assumed stringency***	***2010 VMT reduction***	***2040 VMT reduction** (or equivalent for fuels policies)*
Increase parking pricing	$3/day increase	3.4%	4.2%
Gas tax	$0.50/gallon increase	5.3%	6.6%
VMT-based pricing	$0.10/mile (doubles the marginal cost of driving)	17.5%	26.2%
Transit, Bicycle, and Pedestrian-Oriented Development	10% of urban areas affected by 2010, 40% by 2040	1.5%	6.0%
Employer-based TDM	Cuts average commuting by 12% by 2010, by 20% by 2040	1.8%	3.0%
Lower Transit Fares and Improve Service	Fares decrease 50%, service improves 25%	2.4%	2.4%
Aggressive AFV program (includes incentives to purchase AFVs, refueling infrastructure and mandates)	♦ By 2010: 10% of travel converted to LEV, 5% to ZEV ♦ By 2040: 50% of travel converted to LEV, 25% to ZEV. ♦ 40% VMT-equivalency of LEV II to conventional vehicles in 2010. ♦ 20% VMT-equivalency of LEV II to conventional vehicles in 2040.	5.6%	32.7%
Increase Rideshare-Oriented Infrastructure	Ridesharing attracts 20% of urban highway trips	1.0%	1.0%
Clean Diesel-Fuel Technology (includes a combination of improved engines, emission controls, fuel improvement or alternative fuels)	♦ By 2010: 50% of public sector heavy duty VMT penetrated by clean diesel vehicles, 5% of private sector heavy duty VMT ♦ By 2040: 100% of public sector heavy duty VMT penetrated by clean diesel vehicles, 20% of private sector heavy duty VMT (See note below)	.8%	10%
Aggressive Inspection and Maintenance Program	EPA-estimated benefits of IM240 applied to all SAMI VMT	6.2%	?%

SAMI is ultimately interested in emissions reductions, so the VMT reductions were converted into estimated emissions reductions. The following table shows the estimated reductions in NOx emissions based on the baseline mobile source NOx inventory for 2010 and 2040.

TABLE 9.2: Emissions Results*

Policy	*2010 emission reduction, tons NO_x*	*2040 emission reduction, tons NO_x*
Increase parking pricing	37,483	65,412
Gas tax	58,429	102,791
VMT-based pricing	192,925	408,048
Transit, Bicycle, and Pedestrian-Oriented Development	16,536	93,446
Employer-based TDM	19,844	46,723
Lower Transit Fares and Improve Service	26,458	37,378
Aggressive AFV program	61,736	510,060
Increase Rideshare-Oriented Infrastructure	11,024	15,574
Clean Diesel-Fuel Technology	8,819	155,744
Inspection and Maintenance	68,902	n.a.

* Note: The emission reductions cannot be added without taking care not to double count emission reductions. For example, a particular trip may be affected by more than one incentive but the emissions reduced remain tied to that single trip.

From this analysis it appears that an aggressive AFV program has the best potential for long-term substantial emissions reductions. VMT-based pricing shows the second highest potential short- and long-term emissions reductions. After these, clean diesel and an increased gas tax show the highest potential reductions. To put these emissions reductions in perspective, SAMI estimates that total NOx emissions in 2040 will be 2.75 million tons. 500,000 tons represents a reduction of almost 20% of the total estimated emissions, which is substantial.

Building Technologies

Residential Building Technologies

ICF identified the following ten energy efficient technologies as most promising for new and existing residential buildings. They are listed below in order of approximate energy savings potential.

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1. **Duct Tightening**. Duct leakage is the most significant cause of energy losses in most houses.

2. **Air Sealing & Weatherization**. Air leakage through the home's envelope is the second largest cause of energy losses in most residential buildings.

3. **Increased Attic Insulation.** One of the more effective (and easy) energy efficiency upgrades is to add insulation to the attic of a home, especially for older poorly-insulated homes. This upgrade reduces both cooling and heating energy use.

4. **High Efficiency A/C Equipment / Systems.** Space cooling is one of the largest energy end-uses in the southern states. Thus, high efficiency air conditioning equipment is one of the more effective upgrades.

5. **High Efficiency Heating Equipment**. Space heating is a significant energy end-use, even in some southern states. High efficiency space heating equipment offers a significant potential to reduce energy use.

6. **High Efficiency Window**s. Solar heat gain through windows is one of the most significant causes of space cooling energy use in southern states. High efficiency (i.e., low-E) windows can reduce solar gains by more than 50%.

7. **Water Heating System Improvements.** Hot water energy use can be the second largest energy end-use in some homes. There are several effective upgrades for water heating systems, including: low flow faucets and shower heads, insulated water heater tank wrap, and reduced hot water temperature.

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8. **High Efficiency Appliances.** There are several high efficiency appliances available in the market. Refrigerators and clothes washers are two of the more significant energy consuming appliances in homes. High efficiency models can reduce energy use by as much as 50%.

9. **High Efficiency Lighting.** Lighting is a relatively small energy end-use in homes. However, compact fluorescent lamps (CFLs) use less than 20% of the energy consumed by incandescent lamps. Thus, in selected applications, CFLs are highly effective in reducing energy use.

10. **Cool Roofs.** Attics can become as hot as 150 degrees in the summer. Light colored roofs and effective ventilation have been shown to significantly reduce attic temperatures. Cool roofs are gaining recognition for effectively reducing space cooling energy use.

Commercial Building Technologies

ICF identified the most effective energy efficient technologies for both new and existing commercial buildings. These are listed below in approximate order of energy savings potential.

1. **Commissioning, Auditing, and Baseline Benchmarking**. The process of testing the energy performance of newly installed energy end-use equipment is called "commissioning". This process ensures that equipment is installed properly and is performing as intended. The term "commissioning" is also used to describe a longer term process whereby the energy use of a

building is closely tracked over time, and the efficiency of the energy systems are continuously refined. An assessment of current and historical energy use is an effective starting point in an energy efficiency program. When historical energy use is compared to "industry-average benchmarks", the potential for energy saving upgrades becomes immediately apparent. Further, when a building is audited for energy use, many obvious causes of energy waste / losses are readily identifiable. Many of these "problems" are easy one-time fixes that result in significant energy savings.

2. **High Efficiency Lighting Systems**. High efficiency fluorescent lighting systems (i.e., T-8 lamps, electronic ballasts, with reflectors) are the most cost effective upgrade for most commercial buildings. Compact fluorescent lamps (CFLs) are also recognized as an effective alternative to incandescent lighting in commercial buildings. Occupant sensors have been proven to reduce lighting energy use in some facilities by as much as 30%.

3. **Envelope Improvements**. Some commercial buildings have relatively large amounts of surface area. Improvements to roof insulation and windows can significantly reduce energy use in these facilities.

4. **High Efficiency Fan, Pump & Motor Systems**. Fan energy use is the third largest energy end-use in many commercial buildings. High efficiency motors with variable speed drives can reduce fan energy use by as much a 50%.

5. **High Efficiency A/C Equipment / Systems**. Space cooling is the second largest energy end-use in most commercial buildings. Further, high efficiency space cooling equipment is readily available and cost effective. Thus, cooling systems upgrades are effective means of reducing energy use, especially in the southern states.

6. **High Efficiency Heating Equipment Systems**. Significant improvements are available in space heating equipment. These technologies are effective in the southern states with colder climates.

7. **Control Strategies.** The on-off operation of every piece of energy end-use equipment must be controlled. Numerous control strategies are available for each type of equipment. A careful review of available control strategies for the primary energy-use equipment usually reveals significant opportunities for improvement. Common controls include optimal HVAC start and stop and improved outdoor air damper controls.

8. **Cool Roofs.** Roofs on commercial buildings are typically very large. Light colored roofs have been shown to significantly reduce summer heat gain through roofs. Thereby, cool roofs are gaining recognition for effectively reducing space cooling energy use in commercial buildings.

9. **Combined Heat and Power Systems (Microturbine**s). A recent trend has been to establish on-site electrical power generation capabilities. This technology is primarily used to assure power availability/reliability. However, it is also used in facilities that require significant amounts of heat (e.g. manufacturing processes).

10. **Photovoltaics (PV).** Integral wall/envelope panels with PV are becoming increasingly cost-effective. Use of these PV systems is likely to grow in the next couple of decades.

Building Technologies – Policies / Strategies

Three general types of policies to promote the voluntary adoption of energy efficiency were evaluated. These policies/strategies may include both programmatic activities (e.g., marketing and implementation support and tracking) and incentives. A detailed market assessment is needed to determine the best mix for any given market. The three types of policies are described below:

Passive Strategies. Program administrative costs are low ($100/home for residential programs, and $0.10/ Square Feet (SF) for commercial programs). Primary program activities include: consumer outreach; contractor education; no consumer incentives; and no contractor incentives. Residential technologies promoted include: duct tightening; air sealing; increased attic insulation; and whole house design. Commercial technologies promoted include: commissioning; high efficiency lighting; and envelope improvements. Example programs include: regional utility programs (with limited funds); and national programs like ENERGY STAR®

Active Strategies. Program administrative costs are moderate ($400/home for residential programs, and $0.35/SF for commercial programs). Primary program activities include: consumer outreach; contractor education; multi-media advertising campaign; marketing and technical training; no consumer incentives; and moderate contractor incentives (e.g., $250/home for residential programs, and $0.20/SF for commercial programs). Residential technologies promoted include: duct tightening, air sealing, increased attic insulation, high efficiency HVAC; whole house design; and water heating system improvements. Commercial technologies include: commissioning; high efficiency lighting; envelope improvements; high efficiency motor systems; and high efficiency HVAC equipment. Example programs include: regional utility programs (moderately funded); and state programs with Public Benefits Funds (moderately funded).

Aggressive Strategies. Program administrative costs are high ($1000/home for residential programs, and $0.75/SF for commercial programs). Primary program activities include: consumer outreach; contractor education; multi-media advertising campaign; marketing and technical training; large consumer incentives; and large contractor incentives (e.g. $800/home for residential programs, and $0.55/SF for commercial programs). Residential technologies promoted include: duct tightening; air sealing; increased attic insulation; high efficiency HVAC; whole house design; water heating system improvements; high efficiency windows; high efficiency appliances; high efficiency lighting; and cool roofs. Commercial technologies promoted include: commissioning; high efficiency lighting; envelope improvements; high efficiency motor systems; high efficiency HVAC equipment; and control system improvements. Example programs include state programs with Public Benefits Funds (well funded). Each of the different scenarios has different technology mixes and different penetration rates. The SAMI study assumed penetration rates for each package of strategies based on the year evaluated,

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energy efficiency of construction, and whether the building was new or existing. A model developed by ICF was used to estimate energy use for the baseline case ("business as usual") and for each of the three energy efficiency scenarios. Emission factors for baseline and the scenarios were based on efficiency of the technology, cleanliness of fuel and proportion of energy from different generation possibilities. Dissimilarities exist between the energy use, emissions factors and hence emissions by the above method verses E.H Pechan's, which was used in all other areas of the SAMI assessment. Therefore, results from the building technology incentives should not used in the conjunction with SAMI emissions management options. The emissions factors were defined for each state for the two main pollutants of interest: SO_2 and NOx. Then the emissions from the baseline and each energy efficiency scenario were calculated. The emissions reductions of SO_2 and NOx for each of these scenarios were the difference between the baseline and the given energy efficiency scenario.

Building Technologies – Results

Three primary types of results were generated for residential and commercial buildings in the eight state SAMI region. The first was the total estimated SO_2, and NO_x, emissions from all of the residential/commercial buildings in the SAMI region for each of the three penetration scenarios.
The second type of result produced in this study was the percent reduction in SO_2 and NO_x emissions from the residential/commercial baseline in any given year.
The third type of result was the assessment of the cost-effectiveness of the energy efficiency scenarios. Although the more active and aggressive levels of energy efficiency provide greater savings, they are not more cost-effective. Fairly substantial incentives (up to $800 per home or $0.75/SF of floor area) are required to make these options attractive to consumers.

BACKGROUND AND OBSERVATIONS

INCENTIVES FOR ORGANIZATIONS / INSTITUTIONS

In September 2001, SAMI contracted with BBC Research & Consulting (BBC) to assist SAMI in developing and evaluating potential incentive-based approaches to reducing emissions in the SAMI region. The focus of this work was on institutional (e.g. firm and organizational) emissions and incentives; consumer incentives were examined by SAMI in a separate effort. The incentives evaluation was based around a series of workshops with the SAMI Policy and Technical Oversight Committees (PC/TOC) and, ultimately, with the SAMI Operations Committee. BBC also conducted an e-mail survey of SAMI stakeholders and compiled information from interviews with industry representatives concerning incentive-based approaches. BBC also conducted research on the topics of discussion through review of existing reports and studies, telephone interviews with state and federal administrators of relevant programs and a limited amount of modeling using SAMI's existing emissions inventory and strategy cost estimates.
Key observations from this effort are described in the bullets below:

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Figure 9.1. Estimated Annual SO_2 Emissions¶
from Residential Buildings in the SAMI Region ¶
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---------------------Page Break---------------------
Figure 9.2. Estimated Annual Percent Reduction in SO_2 Emissions ¶
from Residential Buildings in the SAMI Region ¶
<sp>(Relative to Baseline)¶
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- **Definition of incentives --** There is more than one definition of what is meant by an incentive-based approach. SAMI opted to focus on a broad definition for purposes of this evaluation, including both positive and negative types of incentives and flexible compliance options such as trading programs.

- **Pros and cons of incentive-based approaches** -- In general, there are potential advantages and disadvantages of incentive-based approaches relative to more traditional command and control .type regulation:

    - *Pros*: Potential advantages include lower cost of reducing emissions, encouraging those who can do more than comply with existing requirements to do so and recognizing that businesses may be able to identify opportunities and more efficient methods of emission reduction.

    - *Cons*: Potential disadvantages are that effectiveness and compliance costs are difficult to predict and monitoring requirements can be intensive. Many, though not all, incentive-based approaches could be expected to have a relatively modest impact on emissions relative to the levels of reduction found in SAMI's potential strategies.

- **SAMI stakeholder priorities** -- Based upon the survey of SAMI participants, stakeholders have both hopes and concerns regarding incentive-based approaches. Stakeholders were generally in agreement that the most important criteria in evaluating any incentive-based approach was the environmental benefit it could provide at the Class I sites in the region. Stakeholders differed in terms of other criteria, with industry representatives focused on the importance of low cost to emitters, environmental representatives prioritizing the amount of aggregate emissions reduced and governmental representatives focusing on feasibility of implementation and administration.

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- **Industry interviews** -- Approximately 25 face to face interviews were held with representatives of 10 of the largest emitting industries in the SAMI region. In general, these representatives were more supportive than not of voluntary incentive programs, though they cautioned that the incentives must be tangible from the firm's perspective and that some existing incentive programs have not delivered as hoped. Financial incentives, such as tax and rebate programs, got more mixed reviews. While many in industry view trading programs as a flexible compliance mechanism rather than a true incentive-based approach, these representatives were strongly supportive of trading programs if mandatory emission reductions are to be established.

Alternatives Studied

SAMI narrowed the list of potential options down to seven varied alternatives that fall into essentially three groups. These groups might be described as low cost and moderate reductions, high cost and high reductions and flexible compliance options.

1. *Low cost and moderate reductions*. Two voluntary incentive-based mechanisms were developed and analyzed in some detail. These alternatives are based upon the most successful voluntary programs to date in the U.S., but each would face a number of challenges in the SAMI context. Potential SO2 and NOx emission reductions from either program were estimated at 500,000 combined tons per year or less. Potential incentives include public recognition, expedited or extended permitting and/or state income tax credits. Utility sources may be less responsive to voluntary programs than other industries given more extensive regulation of utility emissions up to this point.

   – Alternative A. Sector Based Voluntary Incentive Program. Key elements include formation of sector specific groups to identify best practices for reducing emissions and desired regulatory or compliance incentives for the sector.

   – Alternative B. Targeted Emitter Voluntary Incentive Program. Key elements include specific targeting of the largest emitters in the SAMI region and efforts to generate strong positive public relations regarding participation in the program.

2. *High cost and high reductions*. Three alternatives were analyzed that involve either facilitating the pass through of emission control costs to industry customers, or generating tax revenues and using those revenues to rebate a substantial portion of control costs. These alternatives could be designed to achieve the magnitude of emission reductions envisioned in the SAMI strategies. There is some international, but little U.S., experience with such mechanisms and there would be a number of institutional and political challenges in implementing these alternatives.

   – Alternative C. Utility Cost Recovery Program. Modeled upon the current Clean Smokestacks Bill under consideration in North Carolina. Key elements include automatic pass-through of allowable emission control costs to utility customers outside of the traditional public utility commission review process.

   – Alternative D. Sector Tax and Rebate Program. Key elements include the establishment of new taxes on SO2 and NOx emissions with the revenues used to defray documented abatement costs in the same sector.

   – Alternative E. Cross Sector Tax and Rebate Program. Key elements include additional taxes on the sale of gasoline in the SAMI region, with the revenues used to defray documented abatement costs for utility and industrial point sources.

3. *Flexible compliance approaches*. Two alternatives based on trading programs were analyzed. Each alternative would primarily serve to reduce the costs and economic

impacts if SAMI were to establish a legally mandated regional cap on SO_2 and NO_x emissions.

– Alternative F. Cap and Trade Program. Key elements include the establishment of a regional cap on emissions and trading rules to allow the creation of a regional allowance market. This alternative was designed to essentially reflect the trading assumptions built into the existing SAMI strategies.

– Alternative G. Cross Sector Trading Program. In addition to the elements included in Alternative F, this alternative envisions the establishment of rules to allow mobile source credits to be used in the trading program. While this alternative could potentially further reduce the costs to industry, there is little successful precedent for this approach in the U.S.

CONCLUSIONS

Based upon BBC's research and input from the SAMI committees during this evaluation, several conclusions can be drawn regarding incentive-based approaches focused on institutional participants:

- **There is no "silver bullet"—**there are tradeoffs involved with any of the incentive-based approaches. Generally, those with the lowest costs also offer lower potential benefits (in terms of reductions) and high levels of uncertainty. The study team recognized that SAMI encountered difficulties with an earlier effort to encourage voluntary reductions among regional industries because of concerns that making voluntary reductions would raise the cost of subsequent mandatory reductions to meet forthcoming federal requirements. Similar issues could arise with new SAMI voluntary programs.

- **Appropriate incentive-based mechanisms depend on SAMI's objective**—if SAMI wishes to use incentive-based approaches as an *alternative* to mandatory regulation of emitters, the alternatives in the first or second group might be most appropriate. If SAMI wishes to use incentive-based approaches as a *means of implementing its strategies*, alternatives in either the second or the third group might be the most useful.

- **Implementation issues**—the majority of the alternatives might be *most effective if implemented region-wide*, though Alternative B and C could be reasonably implemented on a state-by-state basis. While administrative implementation is easier, most of the alternatives may require passage of state legislation in order to be implemented.

- **Now may not be the time—**the SAMI Operations Committee indicated concerns that industry retrenchment during the current economic climate may discourage the success of incentive-based approaches. Individual states may wish, however, to consider developing programs based upon one or more of the seven alternatives at appropriate points in the future.

- **New taxes difficult to implement in current political climate**—Alternatives D and E involve new taxes, and Alternative C implies an increase in utility rates charged to customers. All of these will be difficult to "sell" with current political attitudes.

- **Incentives may be applicable to other pollutants and other sources**—this study only looked at incentives that might reduce emissions of SO_2 and NO_X and focused on larger industries/emitters. Similar incentives may work to reduce other pollutants, especially ones that have not been so heavily regulated, and/or for other or smaller industries/sources.

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Deleted: **SUMMARY OF INCENTIVES POTENTIAL EFFECTS ON EMISSIONS¶**
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Both the consumer and organization incentives offer potential for significant emissions reductions and are worth considering. For example, if the top two transportation incentives (in terms of emissions reductions) were implemented along with a moderate set of building incentives, annual NOx emissions would be reduced by about 8% by 2010 and 28% by 2040 (See Table 3). The 2040 reductions in this scenario are estimated to be over 1 million tons. SO_2 emissions would also be reduced significantly, by approximately 4% in 2010 and almost 12% in 2040. Other scenarios, using a different combination of incentives/strategies can be estimated from the projections provided in the ICF report.¶
TABLE 9.3. APPROXIMATE EMISSIONS REDUCTIONS FROM SELECTED CONSUMER INCENTIVES¶
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Transportation Incentives (tc
Aggressive AFV program
VMT-based pricing
Building incentives (active s
Residential
Commercial
TOTAL emissions reductions
Reductions as % of 1990 bas emissions (approximate)
Source: ICF Consulting, Demand Mar

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BBC analyzed each of the organizational incentive options in terms of approximate costs (administrative and implementation/industry) and benefits, with documented assumptions on things such as industry participation and emissions caps. Many of the alternatives offer the potential for significant reductions. As an example, Alternative C – Utility Cost Recovery, modeled after the North Carolina Clean Smokestacks Bill, could potentially reduce NOx emissions by 456,000 tons/year an ... [1]

Summary of Incentives Potential Effects on Emissions

Both the consumer and organization incentives offer potential for significant emissions reductions and are worth considering. For example, if the top two transportation incentives (in terms of emissions reductions) were implemented along with a moderate set of building incentives, annual NOx emissions would be reduced by about 8% by 2010 and 28% by 2040 (See Table 3). The 2040 reductions in this scenario are estimated to be over 1 million tons. SO_2 emissions would also be reduced significantly, by approximately 4% in 2010 and almost 12% in 2040. Other scenarios, using a different combination of incentives/strategies can be estimated from the projections provided in the ICF report.

Table 9.3. Approximate emissions reductions from selected consumer incentives

	NOx reductions (tons/yr)		SO2 reductions (tons/yr)	
	2010	2040	2010	2040
Transportation Incentives (top two)				
Aggressive AFV program	61,736	408,048	n/a	n/a
VMT-based pricing	192,925	510,060	n/a	n/a
Building incentives (active strategy)				
Residential	70,000	170,000	170,000	440,000
Commercial	30,000	100,000	80,000	250,000
TOTAL emissions reductions	*354,661*	*1,188,108*	*250,000*	*690,000*
Reductions as % of 1990 baseline emissions (approximate)	**8.4%**	**28.3%**	**4.2%**	**11.7%**

Source: ICF Consulting, Demand Management Incentive Strategy Evaluation. Final Report, September 6, 2001.

BBC analyzed each of the organizational incentive options in terms of approximate costs (administrative and implementation/industry) and benefits, with documented assumptions on things such as industry participation and emissions caps. Many of the alternatives offer the potential for significant reductions. As an example, Alternative C – Utility Cost Recovery, modeled after the North Carolina Clean Smokestacks Bill, could potentially reduce NOx emissions by 456,000 tons/year and SO_2 emissions by 1,110,000 tons/year by 2010. A separate analysis of reductions in North Carolina if the Clean Smokestacks Bill were implemented shows an estimated 78% reduction (or 56,000 tons) in NOx from 1998 levels by 2009 and 74% reduction in SO_2 (or 130,000 tons) by 2013. Thus, incentives can play an important role in reducing emissions and should be considered for implementation along with regulatory measures.