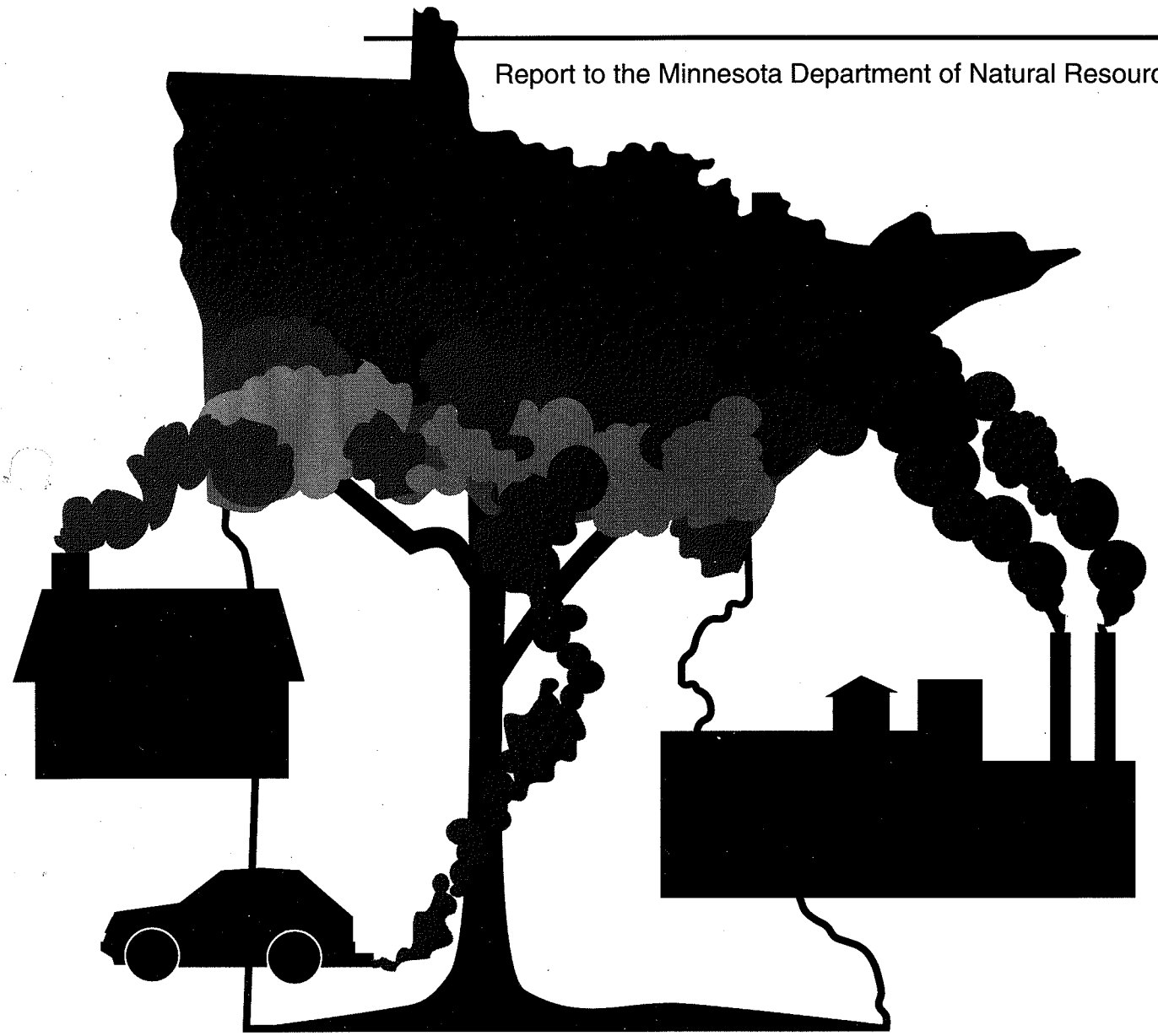
Carbon Fees to Support Minnesota ReLeaf:

Implementation recommendations

Report to the Minnesota Department of Natural Resources



Minnesota Pollution Control Agency

December 1991

Pursuant to 1991 Laws, Chapter 254, Article 2, Section 21, Subd 3

(1) reduction and mitigation of adverse environmental impacts of atmospheric carbon dioxide; and

(2) promotion of energy conservation.

(c) The secondary criteria developed under paragraph (a), clause (1), must include, but are not limited to:

(1) balancing of urban and rural needs;

(2) preservation of existing trees in urban areas;

(3) promotion of biodiversity, including development of disease-resistant and drought-resistant tree species;

(4) erosion control;

(5) enhancement of wildlife habitat;

(6) encouragement of cost sharing with public and private entities;

(7) enhancement of recreational opportunities in urban and rural areas;

(8) coordination with existing state and federal programs;

(9) acceleration of the planting of harvestable timber;

(10) creation of employment opportunities for disadvantaged youth; and

(11) maximization of the use of volunteers.

Subd. 2. **DUTIES OF THE COMMISSIONER OF NATURAL RESOURCES.** By February 1, 1992, the commissioner of natural resources shall transmit to the legislature the implementation plan prepared under subdivision 1, and the recommendations prepared under subdivision 3, together with all recommended legislation to implement the Minnesota releaf program and the supporting fee structure.

Sec 21

Subd. 3. **DUTIES OF THE POLLUTION CONTROL AGENCY.** (a) The pollution control agency, in consultation with potentially affected parties, shall prepare implementation recommendations for applying a fee on carbon dioxide emissions for the Minnesota releaf program. The agency's analysis must include:

(1) a review of the carbon dioxide sources and proposed fee base identified in the study prepared in accordance with Laws 1990, chapter 587, section 2;

(2) recommendations regarding exemptions, if any, that should be granted;

(3) a recommended method for measuring the amount of carbon dioxide emitted by various sources;

(4) a recommended procedure for administering and collecting the fees from the sources described in clause (3); and

CARBON FEES TO SUPPORT MINNESOTA RELEAF: IMPLEMENTATION RECOMMENDATIONS

Report to the Minnesota Department of Natural Resources

In Accordance with Laws of Minnesota 1991, Chapter ~~88~~, Section 21, Subd. 3

DECEMBER 1991 Errata

See App. "C"

Prepared by the Minnesota Pollution Control Agency

William Grant, Principal Researcher

Contributors:
Peter Ciborowski
Frances Gerten
Brian Sweeney

TABLE OF CONTENTS

CARBON FEES TO SUPPORT MINNESOTA RELEAF:
IMPLEMENTATION RECOMMENDATIONS

Report to the Minnesota Department of Natural Resources

CHAPTER I. OVERVIEW

I. OVERVIEW

A. Legislation

The legislation authorizing this study was adopted during the 1991 legislative session as SF 1533, the Environment and Natural Resources Appropriations Bill. Section 21, Subdivision 3 of the bill outlines the specific duties of the Minnesota Pollution Control Agency (MPCA) in preparing its study (see text of legislation in Appendix C). In brief, the MPCA is asked to review relevant portions of the study prepared a year ago under the the direction of the Department of Natural Resources (DNR), "Carbon Dioxide Budgets in Minnesota and Recommendations on Reducing Net Emissions With Trees;"[1] to recommend an administrative process for collecting fees on emitters, as well as appropriate exemptions from the fees; and, to prepare estimates of revenue that would be generated by the fees. The fee structure study and implementation recommendations are to be submitted to the DNR by December 1, 1991. The DNR, in turn, is to prepare implementation recommendations for the Minnesota ReLeaf Program (MN ReLeaf), and submit these with the fee structure recommendations to the Minnesota legislature by February 1, 1992. The DNR's report to the legislature is to include recommended legislation to implement MN ReLeaf and the supporting fee structure.

B. Scope of Study

A substantial and growing body of literature exists on the subject of energy taxes in general, and carbon dioxide (CO2) fees in particular. A number of European countries and Japan have adopted or are actively considering some sort of tax on the use of carbon-based fuels. In this country, Representative Pete Stark (D., California) has introduced legislation (H.R. 1086) that would impose a $30 per ton carbon tax. Minnesota Senator Paul Wellstone has recently introduced The Sustainable Energy Transition Act of 1991 (S.2020) that would establish a tax on carbon contained in fossil fuels at the rate of $.30 per barrel of oil when fully phased in. In Minnesota, the 1991 Energy Omnibus Bill asked the Department of Public Service (DPS) to study the environmental and economic impacts of a $75 per ton tax on

fossil fuels. The policy thrust behind these initiatives is to reduce the potential for catastrophic global warming by forcing a massive shift to alternative fuels and conservation of carbon-based fuels. At the same time, these carbon tax proposals would raise enormous revenues that might be used to fund large-scale alternative energy research and development and energy conservation efforts, with enough surplus to help reduce the federal budget deficit. The Stark proposal, for example, would raise $35 billion per year when phased in over five years.

This study, as directed by the legislature, is significantly narrower and more detailed in scope. The MPCA has been asked to look at a fee structure to support the MN ReLeaf Program. The thrust behind MN ReLeaf is to plant trees to conserve energy and sequester carbon in an effort to control the release of so-called "greenhouse gasses" to the atmosphere. In this way, MN ReLeaf and the supporting fee structure share the goal of avoiding global warming with the various carbon tax proposals. It should be clear, however, that carbon fees at the level proposed to support MN ReLeaf will not have the same economic impacts expected of carbon taxes proposed at the federal level. The $.60 to $.75 per ton fee on carbon emissions proposed here is not expected or intended to force switches to alternative fuels or cause massive energy conservation. While there may be some fuel switching and increased conservation at the margin, the principle outcome of these fees will be the creation of a dedicated fund to aggressively expand tree planting efforts statewide.

Unfortunately, most of the carbon tax literature to date has focused on broad theoretical and economic issues rather than on implementation issues specific to a carbon tax. A number of approaches suggested in the literature, including the approach recommended by the DNR last year,[2] were reviewed during the preparation of this report. Two of these - the emissions fee recommended last year and a carbon content fee - are examined in detail with a recommendation to support a carbon content fee. A description of both approaches and discussion of the relative merits of each can be found in Chapter II. Suggested legislative language to implement both approaches can be found in Appendix B. Exemptions to the fee are recommended to reduce the

administrative burden of collecting fees on some low-carbon fuel types. A fee offset for investment in alternative tree planting programs is also proposed. The fee exemption and offset proposals are contained in Chapter III. A discussion of the CO2 measurement methodology recommended by the MPCA can be found in Chapter IV. Fee collection and administration issues receive extensive treatment in Chapter V, together with a summary of legislation necessary to implement both the emissions fee and carbon content fee. The revenue implications of the two fee structures are examined by fuel type, economic sector, and geographic distribution in Chapter VI. Impacts of the proposed fees on typical residential, large industrial and utility fuel suppliers are analyzed in Chapter VII.

C. Meetings with Affected Parties

The MPCA staff met with representatives of various groups affected by the fees and those with a strong interest in energy/environmental issues affecting the state. Representatives of Minnesota's larger electric utilities, natural gas utilities, and liquid fuel suppliers each were invited to separate meetings with MPCA staff during the month of November 1991. (A list of meeting attendees can be found in Appendix D.) These meetings were intended to share information about the progress of work on the study as well as to receive input to the study. Much of the discussion at these meetings dealt with concerns about using carbon fees to support MN ReLeaf. However, there were also a number of helpful technical suggestions and offers of data assistance. MPCA staff also attended a meeting of the energy/environmental consortium, Minnesotans for an Energy Efficient Economy, to make a brief presentation of study progress and receive input.

D. Contributors to the Study

The MPCA contracted with three persons to complete specific portions of the study. Peter Ciborowski provided a partial update to his study, "Carbon Dioxide Emissions in Minnesota: Part I. CO2 Emissions Inventory," included, in part, as an appendix to the DNR's study a year ago.[3] Mr. Ciborowski also conducted the assessment of fee impacts on typical

residential, and industrial energy users (Chapter VII). Frances Gerten was brought on as an emergency employee of the MPCA to examine the fee collection and administration issues to be faced by the Department of Revenue if the fee structure were adopted. Ms. Gerten, an attorney and recent Department of Revenue employee was also responsible for drafting much of the fee structure legislative language. Brian Sweeney prepared the tree planting offset proposal (Chapter III) for this report. Mr. Sweeney, the recent Director of Government Affairs for the Boise Cascade Corporation in Minnesota, held extensive discussions with representatives of the forest products industry and interested electric utilities in preparing the offset proposal.

E. Recommendations

1. The MPCA recommends that a carbon content fee be implemented with revenue generated by the fee dedicated to the MN ReLeaf Program. The MPCA presents analysis herein of both a carbon content fee and an emissions fee and recommends the carbon content fee for reasons of equity and administrative efficiency. A fee of $.60 per metric ton of carbon in storage prior to use is recommended. A fee at this rate will raise approximately $13.5 million dollars based on 1990 fuel use statistics. It is recommended that the fee be applied on all carbon-based fuels except as provided in the exemptions recommendation that follows. Fuel types liable for the fee include coal, solid waste, natural gas, and petroleum fuels.

2. The MPCA recommends that exemptions be granted on the use of all biomass fuels (i.e., wood, ethanol, crop wastes, etc.) due to their relatively minor contributions to the carbon balance and their renewability. Other fuels that make only small contributions to the carbon inventory in Minnesota (i.e., sludge, waste oil, medical wastes, etc.) should also be exempted to improve administrative efficiency. User exemptions for several classes of users are considered in the study but rejected for reasons of administrative efficiency.

3. The MPCA recommends that firms or individuals be permitted to invest directly in tree planting programs to receive a dollar-for-dollar

offset up to the amount of fee they would otherwise owe. Such programs must expand on existing tree planting efforts that the firm may be engaged in, or be contributions to volunteer or community-based efforts to plant trees.

4. The MPCA recommends that carbon in storage (or emitted) be estimated from reports of quantities of fuel consumed in the state, rather than by mechanical means. It is recommended that fuel use reporting systems already in place at the MPCA and the DPS be used for this purpose.

5. The MPCA recommends that fee collection and administration be the responsibility of the Minnesota Department of Revenue, with specific duties delegated to the MPCA and the DPS. The fee would apply to the amount of carbon contained in the fuel prior to its use based on estimates compiled by the MPCA. The incidence of the fee would vary slightly with each fuel type at the supplier or large user level as described herein. Persons liable for the fee would file a return annually, but make estimated deposits of the fee quarterly.

6. The MPCA recommends that all revenue generated through the fee collection process be placed in the Natural Resources Fund for appropriation by the legislature to the MN ReLeaf Program.

CHAPTER II. IMPLEMENTATION APPROACHES

II. IMPLEMENTATION APPROACHES

Policy analysts have considered a number of approaches to the implementation of a fee on CO2 emissions. It is not within the scope of this study to examine all of these approaches in detail. However, two approaches, a CO2 emissions fee and a carbon content fee, will receive extensive consideration within this report. These approaches were selected for further analysis due to their ability to raise stable revenues for the MN ReLeaf Program, and to accomplish this through the imposition of fees on suppliers and/or users of carbon-based fuels. Other approaches considered either failed to raise predictable revenues (e.g., emissions trading schemes like the Clean Air Act), or failed to target carbon-based fuels directly (e.g., an energy fee on all fuels). What follows is a description of the two approaches considered in this study along with a discussion of the pros and cons of each. Estimates of potential revenue and fee impacts for both approaches can be found in Chapters VI and VII respectively; discussion of fee collection and administration issues relative to each approach can be found in Chapter V.

A. Carbon Dioxide Emissions Fee

The CO2 Work Group in its report to the Minnesota legislature[1] recommended that a fee be charged on emitters of CO2. A fee on emitters was attractive to the work group given the close relationship between fossil fuel use and emissions that may contribute to the greenhouse effect. The fee was proposed as a means of creating a dedicated fund for the purpose of planting trees in Minnesota. The work group found planting trees to be an effective CO2 emissions reduction strategy in two ways. First, trees absorb CO2 and convert it to carbon in the form of wood during active growing periods. As much as ten percent of CO2 emissions are currently removed by growing trees. Second, trees shelter buildings and modify the local climate thereby reducing consumption of fuel for heating and cooling buildings. This reduced fuel use contributes to reductions in CO2 emissions in a manner that may be as much as fifteen times as effective as planting trees simply to sequester carbon.[2] The

work group also realized that imposing a fee on CO2 emissions would send a negative price signal to the users of carbon-based fuels. The price signal itself may cause substantial emissions reductions, although this was considered unlikely at the fee rate needed to support MN ReLeaf.

In spite of its attractiveness as a policy tool for combating global climate change, imposing a fee on CO2 emissions is not an administratively simple policy to implement. The greatest difficulty is in tracking emissions back to their sources, particularly when those sources are relatively small. Fortunately, it is not necessary to monitor emissions directly with mechanical emissions detectors to estimate CO2 emissions with acceptable accuracy. The relationships between fuel usage and CO2 emissions are stable and well known for each fuel type (see Chapter IV for a complete discussion of emissions measurement methodology). It would still be costly and difficult, however, to measure the amounts of fuel used by the millions of small users in the state in order to calculate the fee that each user owed.

The large emitters of CO2 are generally subject to emissions fees mandated by the Clean Air Act on sulfur dioxide, nitrogen dioxides, particulates, and volatile organic compounds. Large emitters (referred to as "point sources") typically include electric utilities, industrial plants, waste incinerators and other manufacturing facilities. Emissions of these so-called "criteria pollutants" are reported at least annually to the MPCA. Carbon dioxide is not a criteria pollutant and therefore not monitored or reported. However, each point source also reports fuel use from which CO2 emissions can be derived as described in Chapter IV. The point sources are readily identifiable making the application of a new fee on CO2 emissions relatively easy. Point sources, however, account for less than half of statewide CO2 emissions. Emissions from the other "non-point" sources are not monitored directly. To do so would be enormously impractical, requiring some means of determining emissions from every vehicle, home furnace, grain dryer, and other small source in the state. This means that CO2 emissions can not be traced directly to emitters for over half of the statewide emissions pool.

The CO2 Work Group recognized this difficulty and recommended alternative approaches to applying fees in the other fuel use sectors. For the transportation sector the work group first considered applying a fee directly on motor fuels. This would be applied as an excise tax at the pump (or the refinery or terminal) on top of existing state and federal excise taxes. However, taxes on motor fuels imposed by the state are constitutionally dedicated to the State Highway User Tax Distribution Fund (Article 14, Sections 5 and 10). An additional levy for CO2 emissions could be applied, but the revenue it would generate could not be recaptured by MN ReLeaf. Other approaches to applying a CO2 fee on the transportation sector are similarly problematic (for a complete discussion, please see the work group report at pp. 82-83). The only viable alternatives appear to be adding a surcharge on driver's license fees or the motor vehicle registration fee. Either of these would take the form of a user fee on all drivers regardless of actual fuel use. A highly fuel efficient car would be taxed the same amount as a high mileage gas "guzzler," meaning that this portion of the fee would not be based on CO2 emissions. This may raise some equity concerns, but would allow for raising revenues from the transportation sector proportionate to this sector's total emissions.

Applying a CO2 emissions fee on the residential, commercial, agricultural and non-point source industrial sectors also raises practical difficulties. As one can imagine, there are a myriad of sources in these sectors which are individually small in terms of fuel use and emissions, but which cumulatively account for roughly one quarter of statewide CO2 emissions. Within these sectors, natural gas is the predominant fuel type accounting for at least half of these emissions. The other fuel sources represented in these sectors are primarily wood and non-transportation liquid fuels. With the exception of natural gas, which can be tracked and levied at the utility level, these sources are not easy to track to the emitter level for the reasons mentioned above. The work group's recommendation for these sectors was to apply a fee on natural gas utilities in the same manner as on electric utilities and the other point sources. No specific recommendation was made for the remaining emissions from these sectors which represent over one tenth of total emissions statewide. This implies a de facto exemption for the non-point source liquid fuels under the emissions fee approach.

The administration of an emissions fee in Minnesota would involve at least three state agencies. From discussions with each of these, we would recommend that the Department of Revenue oversee administration of the fee. Department of Revenue would, in turn, delegate to DPS the collection of fees on vehicle registrations. Further, the Department of Revenue would be responsible for assessing and collecting fees from the point sources and the natural gas utilities, and handle overall enforcement of the fee collection process. The MPCA would be responsible for fee determination calculations after consulting with the DNR (see Chapter V for a complete discussion of the fee collection and administration process).

B. Carbon Content Fee

Given the administrative difficulties and potential inequities of a fee on CO2 emitters, the MPCA felt obliged to consider another approach. The principle objectives in designing an alternative approach were to reduce the total number of fee payers to simplify fee collections, and to improve the overall equitability of the fee structure. This was accomplished by attaching the fee at the fuel supplier or large user level, rather than directly on fuel users. Fuel suppliers and large users such as the point sources and natural gas utilities would be assessed in the same manner as they would under the emissions fee approach described above. In the liquid fuel category, however, a fee at the supplier level would replace the vehicle registration fee. This would accomplish several objectives: the number of fee payers would be reduced substantially to the number of liquid fuel refineries and terminals in the state; fees on the liquid fuels would be assessed on the basis of actual fuel use; and, the de facto exemptions on non-transportation liquid fuels would be eliminated.

Fees applied at the supplier level would not be attributable to emissions directly, but rather to assumed emissions after the fuel is purchased by the ultimate user. Because it would be applied at the supplier rather than the end-user (i.e, emitter) level, the fee would be calculated on the basis of carbon contained in the fuel as opposed to actual emissions of CO2 upon combustion. As with the carbon emissions fee approach, where

emitters are responsible for their share of emissions, a carbon content fee design is premised on the notion that carbon "storers" should pay a fee in proportion to their share of total carbon in storage. It is further assumed that carbon "storers" (i.e., liquid fuel suppliers, point sources, and natural gas utilities) will pass along the carbon content fee in the price of fuel to their customers. In this way, the carbon content fee approach assures that actual emitters, or those causing CO2 to be emitted (e.g., electric utility customers), will pay the fee.

The carbon content fee approach assures that all carbon fees will be levied volumetrically, because it would not be necessary to employ user fees as proxies for volumetric fees in any of the fuel type categories. And since all fuel types would be assessed, the fees would be spread to a larger base under the carbon content alternative. This results in lower fees per ton of carbon for all fuel types with the exception of those fuels with de facto exemptions under the emissions fee approach.

Fee administration would also be simplified under a carbon content fee structure. The Department of Revenue would be well placed to administer the fee given a much smaller number of identifiable fee payers. The MPCA and DPS would supply fuel use data which they now collect, and MPCA would be responsible for determining fee calculation methods after consulting with the DNR (see Chapter V).

C. Fee Calculations

Sources of CO2 in Minnesota were extensively inventoried in an appendix to the work group report, both by fuel type and fuel use sector. The emissions inventory is updated here using the most recent fuel use data collected by the DPS (1990)[3] and the MPCA Emissions Inventory System (1988).[4] Estimates of carbon* produced in the state are calculated from both the emissions and carbon content perspectives (see Tables VI.1 and VI.3). Under the emissions approach, metric tons of carbon are found by first converting fuel use in U.S. physical units to million British Thermal Units (MMBTU) using typical energy content constants found in Table A.1. Million BTU's for each

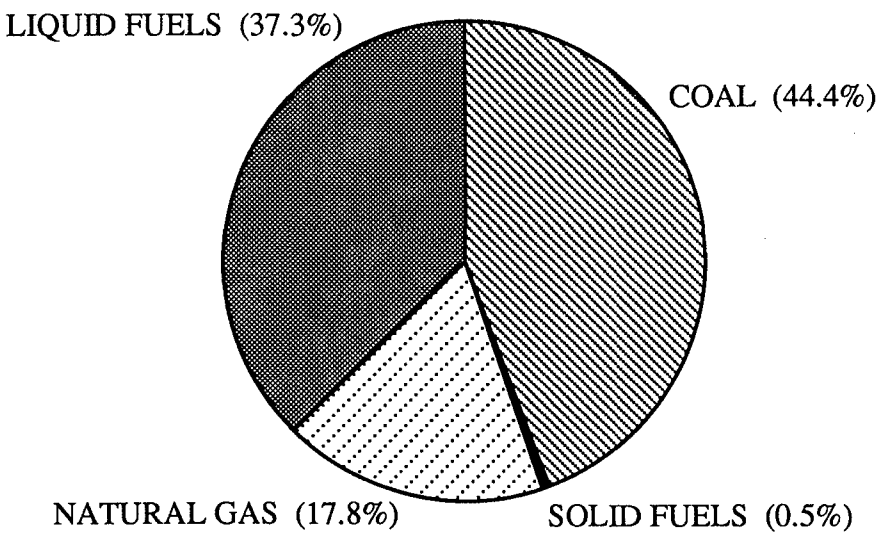
fuel type are then multiplied by the kilograms carbon per MMBTU constants found in Table A.2., then divided by 1000 to yield metric tons of carbon. Under the carbon content approach, metric tons of carbon are found by first converting fuel use in physical units to weights using the volume-to-weight conversions reported in Table A.3 (this is necessary because natural gas and liquid fuels are measured by volume rather than weight) to yield U.S. tons of fuel. These are converted to metric tons after dividing by the constant value, 1.1023. Metric tons of fuel are multiplied by the fuel-specific carbon content fractions found in Table A.4. to arrive at metric tons of carbon.

Use of these two calculation procedures produce only slight differences in estimates of total carbon in the state - 23.0 million metric tons under the emissions approach versus 21.9 million metric tons using the carbon content calculation. Figure II.1 compares the carbon sources by fuel type for the respective fee calculation methods. As one would expect, these percentages of carbon by fuel type are very similar between fee calculation methods. Carbon contents by fuel type prior to combustion vary somewhat from carbon released in the form of CO2 at combustion. These differences are not large but would result in lower carbon bases for most fuels under the carbon content calculation compared with carbon contents calculated after combustion. Of course, these differences could be normalized to reflect after-combustion carbon contents, if necessary. It should also be noted that fees on suppliers could be calculated on the basis of after-combustion emissions using the practical assumption that all of the fuel sold would eventually be burned.

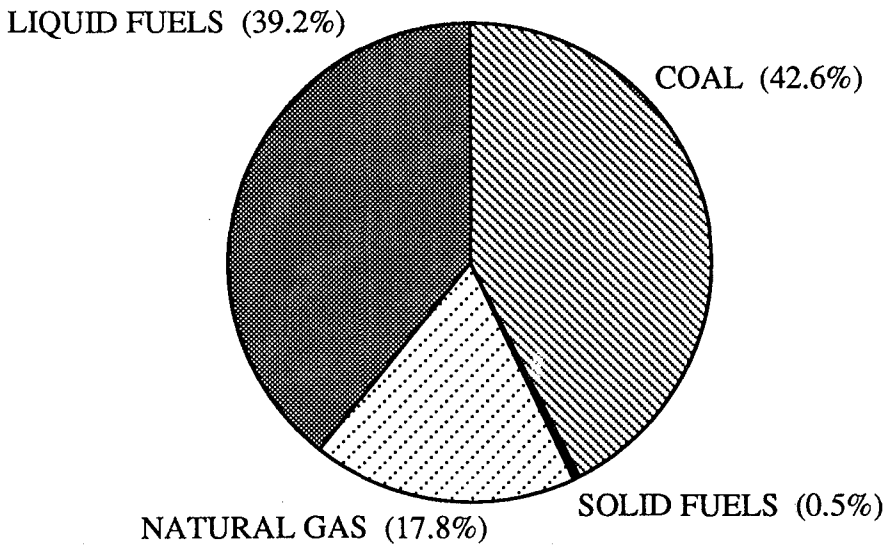
*Throughout this report we will refer to emissions in terms of tons of carbon rather than tons of CO2. This has been done for the sake of consistency when comparing the emissions fee approach to the carbon content approach. This is possible given the static relationship between carbon in the fuel and CO2 released at the point of combustion. To find tons of CO2 emitted from a ton of carbon, multiply the tons of carbon by the constant 3.667. So, for example, the 23 million metric tons of carbon estimated using the emissions computation is equivalent to 84.3 million metric tons of CO2 emitted in 1990.

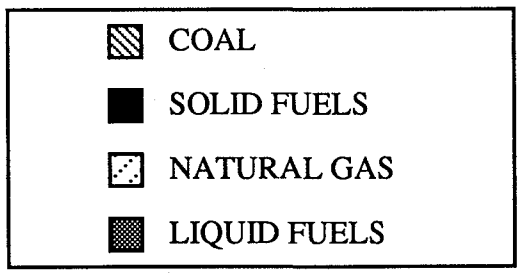
Figure II.1

Carbon Sources by Fuel Type
Alternative A*



Carbon Sources by Fuel Type
Alternative B†

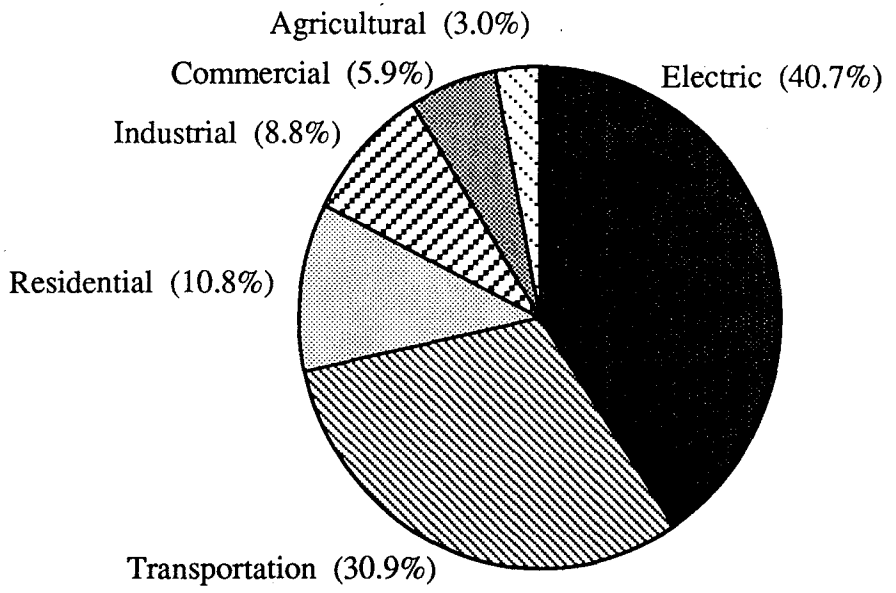




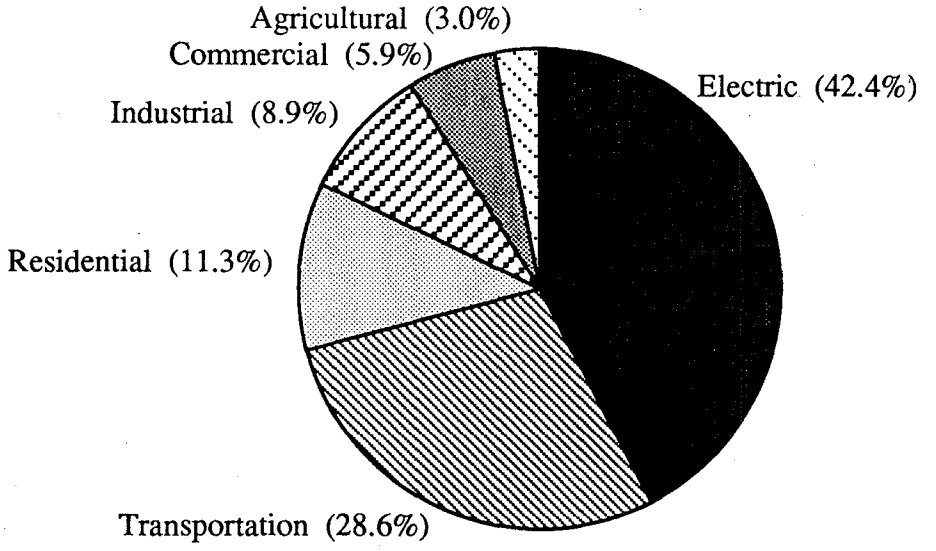
* Based on 1990 fuel use data from the Regional Energy Information System database, Minnesota Department of Public S ice; derived from Table VI.1.

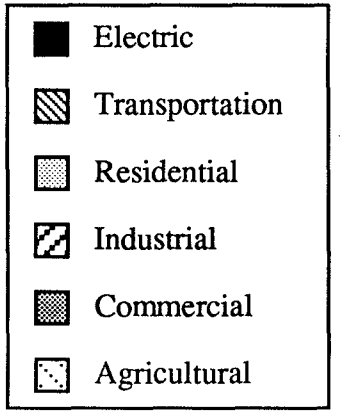
† Based on 1990 fuel use data from the Regional Energy Information System database, Minnesota Department of Public Service; derived from Table VI.2.

Carbon Sources by Economic Sector Alternative A*



Carbon Sources by Economic Sector Alternative B†





* Based on 1990 fuel use data from the Regiona Energy Information System database, Minnesota Department of Public Service; derived from Table VI.3.

† Based on 1990 fuel use data from the Regiona Energy Information System database, Minnesota Department of Public Service; derived from Table VI.4.

Figure II.3

Carbon Fee Approaches: Comparitive Analysis

	CARBON CONTENT FEE	CO2 EMISSIONS FEE
FUEL: USERS:	1. Point sources including electric utilities, industrial sources, incinerators 2. Natural gas utilities 3. Petroleum fuel suppliers	1. Point sources including electric utilities, industrial sources, incinerators 2. Natural gas utilities 3. Motor vehicle owners (through registration surcharge)
FEE CALCU-LATION:	Carbon content of fuel X quantity of fuel sold or purchased X fee rate (k)	For point sources: CO2 emissions/yr. X fee rate (k) For natural gas utilities: Calculated emissions from quantity sold X fee rate (k) For motor vehicles: registration surcharge
ADMIN.:	Department of Revenue with cooperation from MPCA, Public Service	Pollution Control Agency, Department of Revenue, Department of Public Safety
PROS/ CONS (+/-):	+ Spreads fee to all emitters + Relatively easy to administer - May be constitutional issues in enacting fee on motor fuels; requires new legislation	- Small emitters not levied on volume, or not levied at all - Relatively difficult to administer + May be piggybacked on existing fees with new legislation

From the carbon content inventory of 21.9 million metric tons of carbon emitted, the electric utilities produced roughly 42 percent of all in-state emissions, the transportation sector 29 percent, and residential, commercial, industrial, and agricultural sectors together generating the remaining 29 percent in 1990 (see Figure II.2). The MPCA's goal in establishing fee rates is to recover revenues by economic sector in proportion to emissions (or carbon stored) by that sector. This is accomplished in both approaches by setting uniform fee rates across fuel types, and multiplying the fee rate by the metric tons of carbon emitted/stored within each fuel type. The only exception to this arises in the case of the emissions fees due to the use of a proxy, the vehicle registration surcharge, in the liquid fuel category. In this case, the registration surcharge was set to collect an amount of revenue proportional to emissions from the transportation sector. The second goal in setting fee rates is to assure that the total revenue collected from all sources equals the amount deemed necessary to fund the MN ReLeaf Program, or roughly $13.5 million in 1992. Please see Chapter VI for a complete set of revenue estimates under both fee structures.

D. Comparative Analysis

Perhaps the easiest way to highlight the differences between the two approaches described, and compare their relative advantages, is to put them side-by-side (see Figure II.3).

Legislation would be needed to adopt either of the two fee structures. As the CO2 Work Group discovered, any proposed fee on motor vehicle fuels must satisfy the state constitutional directive that revenue from such fees be dedicated to the State Highway User Tax Distribution Fund. The carbon content fee approach may be difficult to enact for this reason. The legislative language suggested in Appendix B to adopt the carbon content fee is perhaps one method of addressing the constitutional issue. Instead of proposing a fee on the use of motor vehicle fuels, the fee instead would be applied prior to use on carbon contained in the fuel, rather than the fuel itself. This is a fine but important distinction between a fee on fuel usage and a fee on a substance, carbon, which is intrinsic to the fuel. The

emissions fee approach may be somewhat simpler to address legislatively, but requires additional language to implement. Fee language on point sources and natural gas utilities would be similar under both approaches. Additional language to implement the motor vehicle registration fee would also be needed. See Chapter V for a summary of new legislation required and Appendix B for suggested legislative language.

CHAPTER III. EXEMPTIONS/OFFSETS

III. EXEMPTIONS/OFFSETS

The legislation requiring this study (see Appendix C) asks that the MPCA make "recommendations regarding exemptions, if any, that should be granted," to the CO2 fee. There are a number of possible candidates for exemption from the fee, some for reasons of good environmental policy, and others for more practical reasons related to implementation of the fee structure. The legislature may also want to consider fee offset options that allow for alternative methods of fee payment and that accomplish CO2 reductions and MN ReLeaf Program goals in other ways.

A. Exemptions

1. Fuel Type Exemptions

Exemptions for alternative/renewable fuel types may be warranted on several grounds: a) because the carbon they release upon combustion is reabsorbed with the next crop, these fuels achieve a nearly net neutral carbon balance;* and, b) these fuels typically release less carbon per BTU of energy than the nonrenewable fuels. Fuel types in this category include ethanol, methanol, wood, wood wastes, agricultural crops, and crop residues. Peat fuel would not be exempted because, once harvested, peat is not renewable. Exempting these fuels also makes practical sense. Tracking these sources back to the supplier or emitter levels would be extremely difficult, particularly in the case of wood and other biomass burned directly without refinement. Further, it has been the state's policy to exempt ethanol from certain state motor vehicle fuel exise taxes to encourage its use as an additive to traditional motor vehicle fuels. Charging a CO2 emissions fee on ethanol may partially undermine this policy. As a practical matter, however, it may be difficult to exempt ethanol on a gallon-for-gallon basis due to the fact that ethanol is often blended with gasoline before reaching the supplier. It would be possible to allow suppliers to deduct the ethanol component from their total fee, but this may prove to be administratively difficult.

*For a complete discussion of net carbon balances of fuels like wood and ethanol see Ciborowski and Burdette (1991), "Carbon Dioxide Emissions in Minnesota," particularly Part II, "Ethanol and Alternative Fuels."

Under the emissions fee approach, several fuel types would receive a de facto exemption. This is again due to the difficulty in tracking emissions at the emitter level. De facto exemptions would apply to all non-point source fuels with the exception of natural gas which would be levied at the utility level. Fuel types in this category include non-point source distillate (No. 1) and residual (No. 6) fuel oil, jet fuel, propane, coal and solid wastes. The surcharge on motor vehicle registrations would be a proxy for applying fees directly on gasoline and diesel fuels. In addition, a number of fuels would receive exemptions under both approaches due to their relatively minor contributions to the carbon inventory. These fuels include sludge, solvents, waste oil, kerosene, hazardous waste and medical waste.

2. User Exemptions

A second category of exemptions that could be considered are those for specific types of fuel users. The types of users that have been suggested as candidates for exemption include agricultural businesses, wood and paper product industries, and certain users of aviation fuels. In the case of agricultural businesses and wood and paper product industries, the arguments for exemption are along two lines. First, both types of businesses are engaged in replanting crops or reforestation. This causes sequestration of at least some portion of the carbon released during other operations related to their respective businesses. Second, these businesses may be doubly or triply liable for emissions fees if they burn fuels on-site, purchase electricity, and transport products to be refined or sold. In the case of aviation fuels, there is an argument for partial exemption due to the fact that only a small portion of the fuel purchased in Minnesota is actually burned here. In fact, one large airline based in the Twin Cities has won partial exemption, or apportionment, of its federal jet fuel excise tax burden on these grounds.

These arguments for user exemptions are not without merit. The relatively modest burden imposed by CO2 fees being considered here, however, does not justify the complex administrative structures that would be necessary to allow this type of exemption. Under the emissions fee approach, non-transportation related agricultural fuels (gasoline, propane, and diesel)

would receive a de facto exemption; under the carbon content approach, agricultural fuel fees would amount to less than half a million dollars. One can imagine an exemption application process that would require farmers to report fuel use by type of fuel that would be both burdensome for farmers and costly to administer at the state level. Forest products industries engaged in new or expanded reforestation and forest management programs will be eligible for offsets to their fee liabilities, as will others liable for the fee that decide to invest in tree planting as an alternative to paying a portion of the fee (see discussion of fee offsets below). Aviation fuels also receive a de facto exemption under the emissions fee approach, and total liability under the carbon content fee is again less than $.5 million.

B. Tree Planting Offsets

1. Discussion

In the most recent study regarding industry reforestation efforts in Minnesota (1990 figures), industry was responsible for planting 2442 acres of trees. An additional 323 acres were seeded, and a natural regeneration process, mostly from aspen forest, occurred on 6533 acres. In total, approximately 9,298 acres were put back into a tree growth cycle by industry. This occurred almost exclusively in rural areas in northern Minnesota and in almost all cases on lands owned by the companies themselves. This contrasts with approximately 11,100 acres harvested on forest industry property. In other words, in recent years there has been an approximate net balance in industry's harvesting and tree planting cycle.

These numbers are relevant when discussing a carbon fee offset program. The consideration of granting offsets to companies that already have tree planting programs to replenish harvested stocks raises the difficult policy issue of appearing to grant special revenue incentives for a particular industry (only three forest products companies and one utility have forested lands) over others. For this reason, the MPCA is recommending that no offset be granted to companies who are planting trees as part of their normal course of business to replenish harvested stocks.

A more equitable and certainly simpler proposal is to allow "dollar for dollar" offsets for all affected companies - regardless of land ownership - for incremental tree planting (above and beyond the present practice of replenishing harvested stocks as part of a company's normal business practices). Offsets would be achieved by direct planting, in-kind contributions or simply by contributing money to a program, organization or community which has an active reforestation program in place. In addition, offset consideration should be given to tree planting activities which encourage energy conservation and which might involve volunteerism via community involvement of youth groups, non-profit organizations, etc.

It is conceivable that industry would become so involved in an offset program that the MN ReLeaf Program would realize little if any revenues. Since the goal of the program is to plant trees throughout Minnesota, it should not matter how that occurs (via industry initiatives, a state run program or a combination of both). On the other hand, in order to effectively manage a program, a designated revenue stream must be identified. The MPCA offset proposal (below) is based on the premise that no matter what the impact, industry's involvement is imperative. In fact, other states and municipalities throughout the county who have already developed successful tree planting programs have done so only because of strong industry leadership and support.

2. Proposal

The key to the successful implementation of an offset program will be simplicity. Therefore, special exemptions to the offsets will, wherever possible, be avoided. Suggested legislative language to implement this proposal is included in Appendix B.

The offset program will have the following components.

1) "Dollar for Dollar" offsets will occur against a company's carbon fee for incremental tree planting (i.e. planting, above and beyond the present practice of replenishing harvested stocks as part of a company's normal business

practice). This will be based on the amount of trees directly planted, in-kind contributions for tree planting (supplying stock, materials and personnel to plant the trees) or directly contributing to a program, organization or community that has an active reforestation program in place. An offset will be allowed up to the total amount of carbon fee for each company.

2) As noted above, carbon "storers" (i.e., liquid fuel dealers, point sources and natural gas utilities) will pass along the carbon fee in the price of fuel to their customers. Recognizing this, an affected company will be allowed to claim offsets with a special filing to be developed by the Department of Revenue for tree planting efforts up to the amount of their utility bill increase. The actual increase in fuel costs plus fee liability for on-site burning for each affected industrial entity will be measured by the utility in conjunction with the MPCA.

3) The amount of offsets will be approximately $125-$175 per acre for tree planting in rural areas ($25 per acre for seeding) and from $75-$350 per tree in urban areas (all tree planting efforts must have a maintenance component to them). These numbers should be based on the actual costs for tree planting and will be determined by the DNR.

To clarify, the offset program will not include an offset for companies that are simply replenishing harvested stocks as part of their normal business practice. Current and recent historical data will be used to determine the base line for normal business practices for each affected company. Further, there will be no offsets granted for natural regeneration. An offset will only be allowed up to the total amount of the carbon fee for each company, meaning that there will be no refunds for calculated offsets in excess of fee liabilities.

3. Projected Impact of Offsets

The offset program, along with the carbon fee itself, is potentially an incentive for industry to either reduce CO2 emissions or become part of a MN ReLeaf tree planing effort. An attempt to try to gauge the extent of industry's response to these two incentives (in particular the offset program), and thus to be able to quantify the net impact to the projected revenue stream, is difficult.

Two out of the three potential revenue sources (utilities and industry) would be impacted by the offset program (the transportation revenue source would not). These two major sectors are projected to contribute roughly two thirds of the revenue for the MN ReLeaf Program. Therefore, extensive and broad-based industry support of the MN ReLeaf Program could theoretically adversely impact the potential revenue source for the MN ReLeaf program. The trade-off is that the MN ReLeaf program will presumably achieve its results (a viable tree planting program) via a slightly different formula than was originally intended, i.e., more industry contributions, in-kind efforts and voluntary resources will replace revenues which otherwise would have come from a carbon fee.

Under the fee proposal, there are approximately 200 affected corporate entities. Perhaps as many as 10 percent can be expected to participate in the offset program in the first two years. Of the potential participants only four or five have large land ownership and thus an ability to grow a substantial number of trees on their own property. Table III.1 reflects a theoretical offset program which includes two large participants, three additional large landowners and fifteen smaller participants in the program ($150 will be used to calculate the average cost of reforestation for an acre of land in rural Minnesota and $225 will be used to calculate the average cost of planting a tree in an urban area).

Table III.1

Companies	Acres	Trees	Costs	Total
1	750		x $150	$112,500
2		750	x $125	$168,750
3,4,5	1500		x $150	$225,000
6-13 (8)		800	x 225	$180,000
14-20 (7)	700		x $150	$105,000
				$791,250

Once again, it is difficult, if not impossible, to gauge industry's specific response to this program. Additional estimates based partially on an analysis of industry's fee liability and its ability and willingness to become involved in an offset program suggests the above figure could range from $350,000 up to $3 million. The participation in the offset program would probably increase in out-years as the program becomes more widely known and the positive public effects of industry's involvement in MN ReLeaf are realized.

CHAPTER IV. MEASUREMENT OF CO2 EMISSIONS

IV. MEASUREMENT OF CO2 EMISSIONS

Carbon dioxide is released when any carbon-based fuel is burned. For purposes of estimating CO2 emissions, the amount of CO2 released during combustion varies only slightly within fuel types. CO2 emissions can be calculated for any fuel by multiplying the amount of fuel used by the amount of CO2 released per unit of fuel burned. This passive monitoring approach allows for easy calculation of CO2 emissions, and thus fees, given the general availability of fuel consumption statistics. Of course, measurement of CO2 emissions is relevant only to the emissions fee approach outlined in Chapter II above. The carbon content approach (also described in Chapter II) considers only the carbon content of the fuel before it is burned. Large fuel users, such as electric utility power plants, generally have the capability to monitor emissions actively with Continuous Emissions Monitors (CEM's). CEM's are mounted on the plant's smokestack and continuously measure the pollutant make-up of the plant's exhaust gas. Active monitoring of CO2 emissions will yield actual CO2 emissions reports varying only slightly from estimated emissions using the approach described above.

For the purpose of estimating CO2 emissions for the emissions fee approach, we rely on the estimates of carbon per unit of fuel derived by Ciborwski and Burdette in "Carbon Dioxide Emissions in Minnesota."[1] More specifically, we rely on Ciborowski's "Case B" (See Table A.2) estimates which consider only in-state emissions of CO2, rather than attempting to account for out-of-state emissions resulting from fossil fuel use in Minnesota (Ciborowski's "Case A"). The "Case B" estimates also are adjusted for that fraction of fuel that typically remains unoxidized upon combustion. One other significant note about these estimates is that they consider both CO2 released at the point of combustion as well as emissions resulting from the extraction, processing, and transportation of finished fuel products. As Ciborowski notes, coal, oil and natural gas require significant energy inputs during the extraction and refining processes, and in transporting finished fuels to market. Typical energy contents of the fuels considered in this report used to convert fuel use in physical units to millions of BTU's are found in Table A.1.

Estimates of the carbon content of fuels by weight are taken from Masters and Roddy (1985),[2] and for the liquid fuels from estimates by the American Petroleum Institute[3] (see Table A.4). These estimates, when compared to estimates of carbon emissions described above, fail to account for the significant factors of unoxidized fractions of fuel upon combustion and energy inputs associated with extraction, processing and transportation. Carbon content calculations could be adjusted to account for these, however, these adjustments are nearly equal in absolute terms and are of opposite signs. For those fuels measured by volume rather than weight (i.e., liquid fuels and natural gas) a volume-to-weight conversion was performed to arrive at metric tons of carbon in the fuel. These conversions are listed in Table A.3.

CHAPTER V. FEE COLLECTION AND ADMINISTRATION

V. FEE COLLECTION AND ADMINISTRATION

A. Emissions Fee Approach

The emissions fee would be administered and collected at three different points. A fee would be charged on all point sources, the natural gas utilities and on motor vehicle registrants. The fee would be based on estimated emissions of carbon emitted by the point sources, and on emissions assumed from the use of natural gas. The same fee rate would apply to the tons of carbon emitted regardless of fuel type. The vehicle registration surcharge would be separately established but would be uniform regardless of rate or volume of emissions across all vehicles. The fees would be principally administered by the Department of Revenue except as described below. Finally, the MPCA will annually review the fee structure to set appropriate fee rates, after consulting with the DNR to determine the funding requirements of the MN ReLeaf Program.

1. Point Sources

The Department of Revenue would collect fees annually from the various stationary facilities subject to the requirement to obtain a permit from the MPCA under Title V of the federal Clean Air Act. The emissions fee would apply to all carbon-based fuels burned at these facilities including bituminous and subbituminous coal, lignite, coke, solid waste and refuse-derived fuel, propane, distillate and residual fuel oil, and natural gas received directly from a pipeline company. Natural gas and electricity supplied by a local distribution utility will not be assessed the fee since it is expected that the utility will include the higher cost of the fee in its rate to the point source customer. The MPCA will be responsible for providing the Department of Revenue with a list annually of point source owner/operators. With this listing, the MPCA will submit fuel use reports and metric tons of carbon emissions estimates generated from the MPCA's Emissions Inventory System (EIS). Point source owner/operators will be required to file annual returns with the Department of Revenue, with estimated deposits to be

made quarterly. The remaining provisions for collection, enforcement, and administration of the fee are discussed below in the summary of legislation to implement the fee (see section C.).

2. Natural Gas

A fee on the carbon emitted or stored prior to the burning of natural gas would be administered and collected by the Department of Revenue. The fee would by imposed upon the first receipt of natural gas in the state. The liability for the fee would be on the utilities and individual consumers ("bypass customers") to whom the natural gas was delivered by the pipeline companies. All pipeline companies serving Minnesota would be required to file an annual information return reporting all transfers of natural gas to utilities and bypass customers in the state. No payment of fees would be required to be remitted with this report. The presumption would be that all of the gas delivered will be burned in the state, with the burden on the receiver of the gas to prove the contrary. The fee rate would apply to the carbon estimated to be emitted upon burning the gas (see estimation methodology, Chapter IV). By applying the fees on the natural gas utilities, who supply gas to residential, commercial, and industrial customers not taking delivery directly from a pipeline, it is assumed that the fee will be passed directly to the actual emitters of CO2 in the price of the fuel. The return will be filed annually with estimated deposits to be made quarterly. The fee rate will be established annually by the MPCA after consultation with the DNR as described above.

3. Motor Vehicle Registration Surcharge

The vehicle registration surcharge is a proxy fee under the emissions fee approach to capture motor vehicle CO2 releases. The DPS would be responsible for collecting this fee annually from all vehicles registered in passenger car and light truck categories including vehicles in these categories otherwise exempt from license fees. Included in these vehicle categories are automobiles, station wagons, ambulances, hearses and vans, as

well as pickup trucks rated 3/4 tons or less that are assigned passenger license plates. The rate of surcharge will be established annually by the MPCA after consultation with the DNR as described above. The surcharge will be paid to the registrar at the time a vehicle is registered, or in the case of an exempt vehicle, at a time set by DPS. Revenues collected by the DPS shall be transferred to the Natural Resources Fund to be appropriated by the legislature.

B. Carbon Content Approach

Under the carbon content approach, an assessment would be imposed on the carbon content of fuel before it is burned. The assessment rate will be established annually by the MPCA, in consultation with the DNR, and will be designed to collect each year, in the aggregate, from the persons liable for the assessment, the amount appropriated by the legislature to MN ReLeaf. The rate would apply to the percentage of carbon estimated to be contained in the type or subtype of fuel. The percentage of carbon used would be based on estimates compiled by the MPCA (see Chapter IV). The Department of Revenue would administer the assessment. The incidence (point of collection) of the assessment would vary slightly with each fuel type as described below. Persons liable for the assessment would file a return annually, but make estimated deposits quarterly.

1. Coal

The carbon content of coal (including bituminous, sibbituminous, lignite, and coke) would be assessed upon the first receipt of the coal in the state for burning. Liability for the assessment would be on the first person or entity to receive the coal with the intent to burn it. (This would most likely be a "point source"). It will be presumed that the first non-supplier to receive the coal in the state intends to burn it, with the burden of proving otherwise on the receiver.

2. Natural Gas

The carbon content of natural gas would be assessed in much the same way as under the CO2 emissions fee approach. The only difference would be that rather than basing the assessment on the estimated amount of carbon emitted upon burning, the assessment would attach to the carbon content of the gas before burning.

3. Solid Waste and Refuse-Derived Fuel

The carbon content of solid waste and refuse-derived fuel would be assessed upon incineration. The liability for the assessment would be on the owner or operator of an incinerator that burns either product. Currently, electric utilities, municipalities, and large industries are the only burners of these fuel types.

4. Liquid Fuels

The carbon content of liquid fuels (including gasoline, propane (LPG), jet fuel, fuel oil, and diesel fuel) would be assessed upon the first sale of petroleum products in the state. With regard to all petroleum products, "first sale" will be defined to mean the transaction on which the motor fuels tax attaches. Liability for the assessment would be on those persons liable for the motor fuels tax on the same transaction. For liquid fuels not subject to the motor fuels tax, "first sale" would be defined to have the same meaning as "received" does in the motor fuels area. (That definition describes the unloading of fuel in this state and who is considered to have "received" the fuel upon unloading in various situations.) Liability would be on the person who "received" the fuel. All pipeline companies serving Minnesota would be required to file an annual information return reporting all deliveries of propane into the state. No payment would be required to be remitted with the report.

The burden would be on the taxpayer to prove that the fuel will not be consumed in Minnesota. Provision will be made for payment of the assessment by anyone with possession of fuel on which the assessment has not been paid. This is necessary both to ensure all-inclusive application of the assessment and for those instances where the seller is not subject to Minnesota's jurisdiction (e.g. an out-of-state seller).

C. Fund Disposition

All revenue generated, under either approach, will be required to be deposited in the Natural Resources Fund for use exclusively in the MN ReLeaf Program. To ensure that the fund is not depleted disproportionately by administrative costs, at least 80 percent of revenues deposited must be used for cost-share grants under MN ReLeaf. The remaining funds will be distributed, in amounts determined by the legislature, among agencies participating in administration of the program and collection of revenue (i.e., DNR, MPCA, Department of Revenue, DPS).

D. Summary of Suggested Legislation

This subsection summarizes the legislation required to implement either approach. Full text of the proposed legislation is attached as Appendix B.

1. Emissions Fee Approach

The legislation creates a fee program designed to collect the amount needed to meet the appropriation made by the legislature to the MN ReLeaf Program. The MPCA will annually set by rule the fee rate designed to collect, in the aggregate, from the sources named, the amount needed to fund MN ReLeaf. The three sources are the point sources, natural gas receivers, and motor vehicle registrants.

a. Point Sources

The legislation imposes a fee on the point sources. The point sources must report fuel use to the MPCA which, in turn, will report that fuel use to the Department of Revenue. Only that natural gas received directly from a pipeline must be reported. Revenue will administer and collect a fee based on the carbon estimated to be emitted when the fuel is burned. The fuel types included are those enumerated in Section V.A.1. above.

b. Natural Gas Receivers

The legislation imposes a fee on person who first receive natural gas in the state. Pipelines must file informational returns reporting transfers of natural gas to Minnesota utilities or bypass customers.

2. Carbon Content Approach

a. The legislation to implement the carbon content approach creates a new statutory chapter. Imposition of the assessment is established in the beginning of the chapter. There are separate statute sections describing each fuel type's substantive provisions because there are several important aspects of the assessment which vary according to each fuel type. Those are, specifically, the incidence of and liability for the assessment, and any presumptions and burdens of proof, all of which are described in V.B. above.

In addition, liquid fuels are the only fuel type which will be assessed upon the first sale in the state and, therefore, a compensating assessment is imposed on the possession of liquid fuel on which the assessment has not been paid. Coal and natural gas are both assessed upon first receipt and solid waste and refuse-derived fuel upon incineration.

Finally, for natural gas and liquid fuels, the legislation imposes reporting requirements on persons not liable for the assessment. Information returns must be filed by pipelines delivering natural gas or propane into the state.

The legislation describes the fuels to which the assessment specifically does not apply, as described in Chapter III. above.

b. Procedural Provisions

The legislation contains all the procedural provisions necessary for the administration and enforcement of the assessment by the Department of Revenue. These provisions apply to all fuel types under the carbon content approach as well as to the payment of fees under the emissions approach.

c. Returns

All persons liable for payment must file an annual return relating to the amount due for the preceding year. The return is due by April 15 each year. Any amount not already deposited for the year must be remitted with the return.

d. Payments

All person liable for payment must file a declaration of estimated amount due for the calendar year by March 15. The amount must be paid in four installments on the 15th of March, June, September, and December.

e. Disposition of Funds

The proceeds of the tax, including interest and penalties, must be deposited in the Natural Resources Fund for use in the MN ReLeaf program. The legislation provides that 80 percent or more or the amount deposited must be used for cost-share grants under MN ReLeaf, with the remaining amount to be distributed among the agencies participating in the administration of the program.

f. Exchange of Information

In order to effectively administer the tax, the Commissioner of Revenue must have access to information on fuel burned in the state which is reported to the MPCA and the DPS. The legislation provides for the exchange of that information and provides for it to remain non-public information.

g. Offsets

The amount due may be offset by certain tree planting and forest management activities performed by the person liable for payment. The offset activities must be approved by the DNR. Claims for refund may be made for the amount of increase in utility fees experienced by the person responsible for payment of fees resulting from their own fuel use.

h. Enforcement

The legislation includes the customary collection and enforcement provisions necessary for proper administration. The relevant sections, taken largely from Minnesota Statutes, Chapter 289A, deal with refunds of overpayment, assessment, examinations, audit, statutes of limitations, penalties and interest, appeals by the taxpayer, and rulemaking power of the Commissioner of Revenue.

i. Effective Date

The effective date for the legislation is July 1, 1993.

CHAPTER VI. REVENUE ESTIMATES

VI. REVENUE ESTIMATES

A. Scenarios Analyzed

Estimates of revenue potentially available under the proposed fee structures are examined below. For both fee structures, three levels of revenue are tested: the $13.5 million dollar level proposed by the MPCA, a lower level of approximately $7 million, and a higher level at $20 million. A well-utilized tree planting offset provision, as described in Chapter III.B, could reduce revenue under any of the scenarios by as much as $.8 million.

B. Fuel types

Tables VI.1 and VI.2 summarize the carbon content fee (Alternative A) revenue estimates by fuel type and unit cost respectively. The fuel use data reported in both tables is 1990 data from the DPS Regional Energy Information System (REIS). Tables VI.3 and VI.4 are summaries of the emissions fee (Alternative B) revenue estimate. Fuel use data in the solid and liquid fuel categories are from the MPCA's EIS (1988) to allow disaggregation of point source fuel use from statewide fuel use. Natural gas usage reported in Tables VI.3 and VI.4 is from the REIS database.

It is difficult to compare revenue estimates for the two approaches given the need for a proxy fee on motor vehicle registrations under the emissions fee case. Table VI.5 presents the hypothetical case of a fee calculated using the emissions fee approach, but collected at the supplier level as under the carbon fee approach. Using a $.60 per metric ton of carbon fee rate* allows for a more direct comparison between the two approaches. Note that this hypothetical scenario yields somewhat greater revenue ($13.8 million as opposed to $13.2 million) from a slightly larger base of carbon emissions (23 million metric tons versus 21.9).

*As mentioned earlier, this report uses carbon rather than CO2 as the base on which fees will be determined. The relationship between CO2 and carbon is 3.667 to 1. This means that a $.60/ton fee on carbon is equivalent to a $.16/ton fee on CO2.

The impacts by fuel type are not consistent, but the liquid fuels and natural gas fare somewhat worse under the hypothetical emissions fee than do the solid fuels.

C. Economic Sectors

Fee impacts on the various economic sectors under the carbon content fee are summarized in Table VI.6, with the individual sector analyses presented in Tables VI.7 - VI.12. Minor differences in metric ton calculations between these tables and Table VI.1 are due to rounding. Again, the use of a uniform fee rate applied assures that each sector will contribute to MN ReLeaf according to its relative contribution to the statewide carbon inventory. It is important to note that these estimates of fee impacts by sector do not consider the extent to which electric utilities will pass the increased costs of the fee through to their customers. It is not unreasonable to expect a 100 percent passthrough of such costs. This means that actual impacts on the electrically intensive residential, commercial, industrial, and agricultural sectors are substantially underestimated here.

The estimation of revenue from the various economic sectors and the revenue expected from the natural gas utilities and the motor vehicle surcharge under the emissions fee approach is presented in Table VI.13. Estimating impacts on the economic sectors under the emissions fee approach is again complicated by the vehicle surcharge proxy. Revenue estimates by economic sector appear significantly lower than those estimated under a carbon content fee (Table VI.6) due to the fact that only point source fuel use reports were used to generate the estimates. This follows from the manner in which fees would be assessed under an emissions fee approach. For the same reason, impacts could not be estimated on the transportation, residential, and agricultural sectors, since there are no single sources in these sectors large enough to be included in the point source inventory. Here too, these estimates do not consider the extent to which electric utilities will pass

fees through in the form of higher rates to their customers. Nor do these estimates consider smaller commercial and industrial fuel users who are not required to report as point sources.*

D. Geographic Regions

A regional analysis of carbon sources and fees was performed to serve as a factor in fund allocation decisions under MN ReLeaf. In other words, one consideration in determining where dollars for tree planting in the state will be distributed is the original source of those funds from the payment of carbon fees. The only source of data that allowed for analysis of fuel use by region was the MPCA's EIS. This is somewhat unfortunate since emissions from point sources account for less than half of statewide CO2 emissions. A proxy approach, along the lines of the emissions fee approach, was used to generate regional estimates. Data from the EIS were combined with a breakout of motor vehicle registrations by county, and an assumed distribution of natural gas consumption based on numbers of households by region from the State Demographers Office. While this approach is less than satisfactory from an analytical perspective, it may be acceptable as a means of establishing a geographical weighting factor as part of a larger fund distribution formula. Table VI.14 summarizes this regional analysis for the six DNR administrative regions, with the individual regions analyzed in Tables VI.15 - VI.20. Regions 1-6 are illustrated with the map and accompanying listing of counties within each region in Figure VI.1.

*Firms that do not emit more than 25 tons of any of the criteria pollutants are not required to report emissions and fuel use to the MPCA.

Table VI.1

Carbon Content Fee Summary: Alternative A*

Fuel Type	Fuel Use (Phys. Units)	Volume to Weight Conv.	Fuel Weight (Short Tons)	Fuel Weight (Metric Tons)	Carbon Content§	Metric Tons Carbon	REVENUE 1 Fee Rate = $.60	REVENUE 2 Fee Rate = $.30	REVENUE 3 Fee Rate = $.90
COAL (Short Tons)									
Bituminous	925,600	1.00000	925,600	839,699	60%	503,819	$302,292	$151,146	$453,437
Subbituminous	20,159,600	1.00000	20,159,600	18,288,669	50%	9,144,335	$5,486,601	$2,743,300	$8,229,901
Lignite	56,500	1.00000	56,500	51,256	28%	14,352	$8,611	$4,306	$12,917
Coke	95,500	1.00000	95,500	86,637	92%	79,706	$47,824	$23,912	$71,735
Subtotal	21,237,200		21,237,200	19,266,261		9,742,212	$5,845,327	$2,922,664	$8,767,991
SOLID FUELS (Sh. Tons)									
Municipal/Solid Waste	185,049	1.00000	185,049	167,875	26%	43,648	$26,189	$13,094	$39,283
Refuse Derived Fuel	224,267	1.00000	224,267	203,454	32%	65,105	$39,063	$19,532	$58,595
Subtotal	409,316		409,316	371,329		108,753	$65,252	$32,626	$97,877
NATURAL GAS (Mill Cu Ft)	283,300	22.73000	6,439,409	5,841,794	67%	3,914,002	$2,348,401	$1,174,200	$3,522,601
LIQUID FUELS (Gallons)									
Gasoline	2,077,500,000	0.00280	5,817,000	5,277,148	85%	4,485,576	$2,691,345	$1,345,673	$4,037,018
Propane (LPG)	331,100,000	0.00210	695,310	630,781	85%	536,164	$321,698	$160,849	$482,548
Jet Fuel	345,900,000	0.00275	951,225	862,946	85%	733,504	$440,102	$220,051	$660,153
No. 2 Fuel Oil	307,300,000	0.00355	1,090,915	989,672	85%	841,221	$504,733	$252,366	$757,099
No. 6 Fuel Oil	64,900,000	0.00355	230,395	209,013	85%	177,661	$106,597	$53,298	$159,895
Diesel	520,500,000	0.00355	1,847,775	1,676,290	85%	1,424,847	$854,908	$427,454	$1,282,362
Subtotal	3,647,200,000		10,632,620	9,645,850		8,198,972	$4,919,383	$2,459,692	$7,379,075
TOTAL			**38,718,545**	**35,125,234**		**21,963,938**	**$13,178,363**	**$6,589,181**	**$19,767,544**

* Based on 1990 fuel use data from the Regional Energy Information System database, Minnesota Department of Public Service.

§ Fraction by weight

Carbon Content Fee Unit Cost: Alternative A*

Fuel Type	Fuel Use (Phys. Units)	REVENUE 1 Fee Rate = $.60	$ per Phys Unit	REVENUE 2 Fee Rate = $.30	$ per Phys Unit	REVENUE 3 Fee Rate = $.90	$ per Phys Unit
COAL (Short Tons)							
Bituminous	925,600	$302,292	$0.3266	$151,146	$0.1633	$453,437	$0.4899
Subbituminous	20,159,600	$5,486,601	$0.2722	$2,743,300	$0.1361	$8,229,901	$0.4082
Lignite	56,500	$8,611	$0.1524	$4,306	$0.0762	$12,917	$0.2286
Coke	95,500	$47,824	$0.5008	$23,912	$0.2504	$71,735	$0.7512
Subtotal	21,237,200	$5,845,327		$2,922,664		$8,767,991	
SOLID FUELS (Sh. Tons)							
Municipal/Solid Waste	185,049	$26,189	$0.1415	$13,094	$0.0708	$39,283	$0.2123
Refuse Derived Fuel	224,267	$39,063	$0.1742	$19,532	$0.0871	$58,595	$0.2613
Subtotal	409,316	$65,252		$32,626		$97,877	
NATURAL GAS (Mill Cu Ft)	283,300	$2,348,401	$8.2894	$1,174,200	$4.1447	$3,522,601	$12.4342
LIQUID FUELS (Gallons)							
Gasoline	2,077,500,000	$2,691,345	$0.0013	$1,345,673	$0.0006	$4,037,018	$0.0019
Propane (LPG)	331,100,000	$321,698	$0.0010	$160,849	$0.0005	$482,548	$0.0015
Jet Fuel	345,900,000	$440,102	$0.0013	$220,051	$0.0006	$660,153	$0.0019
No. 2 Fuel Oil	307,300,000	$504,733	$0.0016	$252,366	$0.0008	$757,099	$0.0025
No. 6 Fuel Oil	64,900,000	$106,597	$0.0016	$53,298	$0.0008	$159,895	$0.0025
Diesel	520,500,000	$854,908	$0.0016	$427,454	$0.0008	$1,282,362	$0.0025
Subtotal	3,647,200,000	$4,919,383		$2,459,692		$7,379,075	
TOTAL		**$13,178,363**		**$6,589,181**		**$19,767,544**	

* Based on 1990 fuel use data from the Regional Energy Information System database, Minnesota Department of Public Service.

Emissions Fee Summary: Alternative B*

Fuel Type	Fuel Use (Phys. Units)	Fuel Use MMBTU	kg Carbon/ MMBTU	Metric Tons Carbon	REVENUE 1 Fuel Fee Rate = $.75 MV Reg Rate = $1.25	REVENUE 2 Fuel Fee Rate = $.35 MV Reg Rate = $.70	REVENUE 3 Fuel Fee Rate = $1.00 MV Reg Rate = $2.00
COAL (Short Tons)							
Bituminous	559,886	12,317,492	24.8	305,474	$229,105	$106,916	$305,474
Subbituminous	17,094,388	297,442,351	26.3	7,822,734	$5,867,050	$2,737,957	$7,822,734
Lignite	47,371	691,617	17.2	11,896	$8,922	$4,164	$11,896
Coke	87,062	2,437,736	31.8	77,520	$58,140	$27,132	$77,520
Subtotal	17,788,707	312,889,196		8,217,623	$6,163,218	$2,876,168	$8,217,623
SOLID FUELS (Sh. Tons)							
Solid Waste	190,201	1,749,849	24.8	43,396	$32,547	$15,189	$43,396
Refuse Derived Fuel	219,115	2,432,177	25.8	62,750	$47,063	$21,963	$62,750
Subtotal	409,316	4,182,026		106,146	$79,610	$37,151	$106,146
NATURAL GAS (Mill Cu Ft)	283,300	283,300,000	14.5	4,107,850	$3,080,888	$1,437,748	$4,107,850
LIQUID FUELS (Gallons)							
Propane (LPG)	7,068,000	646,722	16.1	10,412	$7,809	$3,644	$10,412
No. 2 Fuel Oil	35,005,000	4,855,194	19.0	92,249	$69,187	$32,287	$92,249
No. 6 Fuel Oil	50,049,000	7,492,335	20.8	155,841	$116,880	$54,544	$155,841
Subtotal	92,122,000	12,994,251		258,501	$193,876	$90,476	$258,501
SUBTOTAL EMISSIONS		613,365,472		12,690,121	$9,517,591	$4,441,542	$12,690,121
MOTOR VEHICLE REGISTRATIONS (3,170,364 vehicles)					$3,962,955	$2,219,255	$6,340,728
TOTAL					**$13,480,546**	**$6,660,797**	**$19,030,849**

* Based on 1988 fuel use data from the Emissions Inventory System database, Minnesota Pollution Control Agency.

Emissions Fee Unit Cost: Alternative B*

Fuel Type	Fuel Use (Phys. Units)	REVENUE 1 Fuel Fee Rate = $.75 MV Reg Rate = $1.25	$ per Phys Unit	REVENUE 2 Fuel Fee Rate = $.35 MV Reg Rate = $.70	$ per Phys Unit	REVENUE 3 Fuel Fee Rate = $1.00 MV Reg Rate = $2.00	$ per Phys Unit
COAL (Short Tons)							
Bituminous	559,886	$229,105	$0.4092	$106,916	$0.1910	$305,474	$0.5456
Subbituminous	17,094,388	$5,867,050	$0.3432	$2,737,957	$0.1602	$7,822,734	$0.4576
Lignite	47,371	$8,922	$0.1883	$4,164	$0.0879	$11,896	$0.2511
Coke	87,062	$58,140	$0.6678	$27,132	$0.3116	$77,520	$0.8904
Subtotal	17,788,707	$6,163,218		$2,876,168		$8,217,623	
SOLID FUELS (Sh. Tons)							
Solid Waste	190,201	$32,547	$0.1711	$15,189	$0.0799	$43,396	$0.2282
Refuse Derived Fuel	219,115	$47,063	$0.2148	$21,963	$0.1002	$62,750	$0.2864
Subtotal	409,316	$79,610		$37,151		$106,146	
NATURAL GAS (Mill Cu Ft)	283,300	$3,080,888	$10.8750	$1,437,748	$5.0750	$4,107,850	$14.5000
LIQUID FUELS (Gallons)							
Propane (LPG)	7,068,000	$7,809	$0.0011	$3,644	$0.0005	$10,412	$0.0015
No. 2 Fuel Oil	35,005,000	$69,187	$0.0020	$32,287	$0.0009	$92,249	$0.0026
No. 6 Fuel Oil	50,049,000	$116,880	$0.0023	$54,544	$0.0011	$155,841	$0.0031
Subtotal	92,122,000	$193,876		$90,476		$258,501	
SUBTOTAL EMISSIONS		$9,517,591		$4,441,542		$12,690,121	
MOTOR VEHICLE REGISTRATIONS (3,170,364 vehicles)		$3,962,955		$2,219,255		$6,340,728	
TOTAL		**$13,480,546**		**$6,660,797**		**$19,030,849**	

* Based on 1988 fuel use data from the Emissions Inventory System database, Minnesota Pollution Control Agency.

Hypothetical Carbon Content/Emissions Fee*

Fuel Type	Fuel Use (Phys. Units)	Fuel Use MMBTU	kg Carbon/ MMBTU	Metric Tons Carbon	REVENUE 1 Fuel Fee Rate = $.60	REVENUE 2 Fuel Fee Rate = $.30	REVENUE 3 Fuel Fee Rate = $.90
COAL (Short Tons)							
Bituminous	925,600	20,363,200	24.8	505,007	$303,004	$151,502	$454,507
Subbituminous	20,159,600	350,777,040	26.3	9,225,436	$5,535,262	$2,767,631	$8,302,893
Lignite	56,500	824,900	17.2	14,188	$8,513	$4,256	$12,769
Coke	95,500	2,674,000	31.8	85,033	$51,020	$25,510	$76,530
Subtotal	21,237,200	374,639,140		9,829,665	$5,897,799	$2,948,899	$8,846,698
SOLID FUELS (Sh. Tons)							
Solid Waste	185,049	1,702,451	24.8	42,221	$25,332	$12,666	$37,999
Refuse Derived Fuel	224,267	2,489,364	25.8	64,226	$38,535	$19,268	$57,803
Subtotal	409,316	4,191,815		106,446	$63,868	$31,934	$95,802
NATURAL GAS (Mill Cu Ft)	283,300	283,300,000	14.5	4,107,850	$2,464,710	$1,232,355	$3,697,065
LIQUID FUELS (Gallons)							
Gasoline	2,077,500,000	259,687,500	19.8	5,141,813	$3,085,088	$1,542,544	$4,627,631
Propane (LPG)	331,100,000	30,295,650	16.1	487,760	$292,656	$146,328	$438,984
Jet Fuel	345,900,000	46,696,500	19.8	924,591	$554,754	$277,377	$832,132
No. 2 Fuel Oil	307,300,000	42,622,510	19.0	809,828	$485,897	$242,948	$728,845
No. 6 Fuel Oil	64,900,000	9,715,530	20.8	202,083	$121,250	$60,625	$181,875
Diesel	520,500,000	72,193,350	20.4	1,472,744	$883,647	$441,823	$1,325,470
Subtotal	3,647,200,000	461,211,040		9,038,818	$5,423,291	$2,711,645	$8,134,936
TOTAL		**1,123,341,995**		**23,082,780**	**$13,849,668**	**$6,924,834**	**$20,774,502**

* Based on 1990 fuel use data from the Regional Energy Information System database, Minnesota Department of Public Service.

Table VI.6

Carbon Content Fee: Economic Sector Summary

Fuel Use Sector	Metric Tons Carbon	% Carbon	REVENUE 1 Fee Rate = $.60	REVENUE 2 Fee Rate = $.30	REVENUE 3 Fee Rate = $.90
ELECTRIC	9,302,778	42%	$5,581,667	$2,790,833	$8,372,500
TRANSPORTATION	6,273,078	29%	$3,763,847	$1,881,923	$5,645,770
RESIDENTIAL	2,472,074	11%	$1,483,244	$741,622	$2,224,867
INDUSTRIAL	1,955,300	9%	$1,173,180	$586,590	$1,759,770
COMMERCIAL	1,305,378	6%	$783,227	$391,613	$1,174,840
AGRICULTURAL	656,732	3%	$394,039	$197,020	$591,059
TOTAL	**21,965,340**	**100%**	**$13,179,204**	**$6,589,602**	**$19,768,806**

Carbon Content Fee: Electric Sector

Fuel Type	Fuel Use (Phys. Units)	Volume to Weight Conv	Fuel Weight (Short Tons)	Fuel Weight (Metric Tons)	Carbon Content*	Metric Tons Carbon	REVENUE 1 Fee Rate = $.60	REVENUE 2 Fee Rate = $.30	REVENUE 3 Fee Rate = $.90
COAL (Short Tons)									
Bituminous	550,600	1.00000	550,600	499,501	60%	299,701	$179,820	$89,910	$269,731
Subbutiminous	19,336,800	1.00000	19,336,800	17,542,230	50%	8,771,115	$5,262,669	$2,631,334	$7,894,003
Lignite	56,000	1.00000	56,000	50,803	28%	14,225	$8,535	$4,267	$12,802
Coke	51,700	1.00000	51,700	46,902	92%	43,150	$25,890	$12,945	$38,835
SUBTOTAL	19,995,100		19,995,100	18,139,436		9,128,190	$5,476,914	$2,738,457	$8,215,371
SOLID FUELS (Sh. Tons)									
Solid Waste	159,000	1.00000	159,000	144,244	26%	37,503	$22,502	$11,251	$33,753
Refuse Derived Fuel	173,600	1.00000	173,600	157,489	32%	50,396	$30,238	$15,119	$45,357
SUBTOTAL	332,600		332,600	301,733		87,900	$52,740	$26,370	$79,110
NATURAL GAS (Mill Cu Ft)	5,700	22.73000	129,561	117,537	67%	78,750	$47,250	$23,625	$70,875
LIQUID FUELS									
No.2 Fuel Oil	2,800,000	0.00355	9,940	9,018	85%	7,665	$4,599	$2,299	$6,898
No.6 Fuel Oil	100,000	0.00355	355	322	85%	274	$164	$82	$246
SUBTOTAL	2,900,000		10,295	9,340		7,939	$4,763	$2,382	$7,145
TOTAL			**20,467,556**	**18,568,045**		**9,302,778**	**$5,581,667**	**$2,790,834**	**$8,372,501**

* Fraction by weight

Table VI.8

Carbon Content Fee: Transportation Sector

Fuel Type	Fuel Use (Phys. Units)	Volume to Weight Conv.	Fuel Weight (Short Tons)	Fuel Weight (Metric Tons)	Carbon Content	Metric Tons Carbon	REVENUE 1 Fee Rate = $.60	REVENUE 2 Fee Rate = $.30	REVENUE 3 Fee Rate = $.90
NATURAL GAS (Mill Cu Ft)	11,800	22.73000	268,214	243,322	67%	163,026	$97,816	$48,908	$146,723
LIQUID FUELS									
Gasoline	2,010,600,000	0.00280	5,629,680	5,107,212	85%	4,341,130	$2,604,678	$1,302,339	$3,907,017
Propane (LPG)	7,000,000	0.00210	14,700	13,336	85%	11,335	$6,801	$3,401	$10,202
Jet Fuel	345,900,000	0.00275	951,225	862,946	85%	733,504	$440,102	$220,051	$660,153
No.6 Fuel Oil	100,000	0.00355	355	322	85%	274	$164	$82	$246
Diesel	374,000,000	0.00355	1,327,700	1,204,482	85%	1,023,809	$614,286	$307,143	$921,428
Subtotal	2,737,600,000		7,923,660	7,188,297		6,110,053	$3,666,032	$1,833,016	$5,499,047
TOTAL			**8,191,874**	**7,431,619**		**6,273,078**	**$3,763,847**	**$1,881,924**	**$5,645,771**

Table VI.9

Carbon Content Fee: Residential Sector

Fuel Type	Fuel Use (Phys. Units)	Volume to Weight Conv.	Fuel Weight (Short Tons)	Fuel Weight (Metric Tons)	Carbon Content	Metric Tons Carbon	REVENUE 1 Fee Rate = $.60	REVENUE 2 Fee Rate = $.30	REVENUE 3 Fee Rate = $.90
BITUMINOUS COAL	5,900	1.00000	5,900	5,352	60%	3,211	$1,927	$963	$2,890
NATURAL GAS (Mill Cu Ft)	113,000	22.73000	2,568,490	2,330,119	67%	1,561,180	$936,708	$468,354	$1,405,062
LIQUID FUELS									
Propane (LPG)	194,200,000	0.00210	407,820	369,972	85%	314,476	$188,686	$94,343	$283,028
No.2 Fuel Oil	216,700,000	0.00355	769,285	697,891	85%	593,207	$355,924	$177,962	$533,886
Subtotal	410,900,000		1,177,105	1,067,863		907,683	$544,610	$272,305	$816,915
TOTAL			**3,751,495**	**3,403,334**		**2,472,074**	**$1,483,245**	**$741,622**	**$2,224,867**

Carbon Content Fee: Industrial Sector

Fuel Type	Fuel Use (Phys. Units)	Volume to Weight Conv	Fuel Weight (Short Tons)	Fuel Weight (Metric Tons)	Carbon Content	Metric Tons Carbon	REVENUE 1 Fee Rate = $.60	REVENUE 2 Fee Rate = $.30	REVENUE 3 Fee Rate = $.90
COAL (Short Tons)									
Bituminous	182,500	1.00000	182,500	165,563	60%	99,338	$59,603	$29,801	$89,404
Subbituminous	822,800	1.00000	822,800	746,439	50%	373,220	$223,932	$111,966	$335,898
Lignite	500	1.00000	500	454	28%	127	$76	$38	$114
Coke	43,800	1.00000	43,800	39,735	92%	36,556	$21,934	$10,967	$32,901
Subtotal	1,049,600		1,049,600	952,191		509,241	$305,544	$152,772	$458,317
SOLID FUELS (Sh. Tons)									
Solid Waste	26,100	1.00000	26,100	23,678	26%	6,156	$3,694	$1,847	$5,541
Refuse Derived Fuel	50,700	1.00000	50,700	45,995	32%	14,718	$8,831	$4,415	$13,246
Subtotal	76,800		76,800	76,800		20,875	$12,525	$6,262	$18,787
NATURAL GAS (Mill Cu Ft)	81,000	22.73000	1,841,130	1,670,262	67%	1,119,076	$671,445	$335,723	$1,007,168
LIQUID FUELS (Gallons)									
Propane (LPG)	42,300,000	0.00210	88,830	80,586	85%	68,498	$41,099	$20,549	$61,648
No.2 Fuel Oil	38,500,000	0.00355	136,675	123,991	85%	105,392	$63,235	$31,618	$94,853
No.6 Fuel Oil	48,300,000	0.00355	171,465	155,552	85%	132,219	$79,332	$39,666	$118,997
Subtotal	129,100,000		396,970	360,129		306,109	$183,666	$91,833	$275,499
TOTAL			**3,364,500**	**3,059,382**		**1,955,300**	**$1,173,180**	**$586,590**	**$1,759,770**

Table VI.11

Carbon Content Fee: Commercial Sector

Fuel Type	Fuel Use (Phys. Units)	Volume to Weight Conv.	Fuel Weight (Short Tons)	Fuel Weight (Metric Tons)	Carbon Content	Metric Tons Carbon	REVENUE 1 Fee Rate = $.60	REVENUE 2 Fee Rate = $.30	REVENUE 3 Fee Rate = $.90
BITUMINOUS COAL	186,600	1.00000	186,600	169,282	60%	101,569	$60,942	$30,471	$91,413
NATURAL GAS (Mill Cu Ft)	71,900	22.73000	1,634,287	1,482,615	67%	993,352	$596,011	$298,006	$894,017
LIQUID FUELS									
Propane (LPG)	18,900,000	0.00210	39,690	36,007	85%	30,606	$18,363	$9,182	$27,545
No.2 Fuel Oil	49,300,000	0.00355	175,015	158,773	85%	134,957	$80,974	$40,487	$121,461
No.6 Fuel Oil	16,400,000	0.00355	58,220	52,817	85%	44,894	$26,937	$13,468	$40,405
Subtotal	84,600,000		272,925	247,596		210,457	$126,274	$63,137	$189,411
TOTAL			**2,093,812**	**1,899,494**		**1,305,378**	**$783,227**	**$391,614**	**$1,174,841**

Table VI.12

Carbon Content Fee: Agricultural Sector

Fuel Type	Fuel Use (Phys. Units)	Volume to Weight Conv.	Fuel Weight (Short Tons)	Fuel Weight (Metric Tons)	Carbon Content	Metric Tons Carbon	REVENUE 1 Fee Rate = $.60	REVENUE 2 Fee Rate = $.30	REVENUE 3 Fee Rate = $.90
LIQUID FUELS									
Gasoline	66,900,000	0.00280	187,320	169,936	85%	144,445	$86,667	$43,334	$130,001
Propane (LPG)	68,700,000	0.00210	144,270	130,881	85%	111,249	$66,749	$33,375	$100,124
Diesel	146,500,000	0.00355	520,075	471,809	85%	401,038	$240,623	$120,311	$360,934
TOTAL						**656,732**	**$394,039**	**$197,019**	**$591,058**

Table VI.13

Emission Fee: Economic Sector Summary

Fuel Use Sector	Tons Carbon/ # Registrations	REVENUE 1 Fee Rate = $.75 MV Rate = $1.25	REVENUE 2 Fee Rate = $.35 MV Rate = $.70	REVENUE 3 Fee Rate = $1.00 MV Rate = $2.00
ELECTRIC	7,764,745	$5,823,559	$2,717,661	$7,764,745
INDUSTRIAL	644,535	$483,401	$225,587	$644,535
COMMERCIAL	172,991	$129,743	$60,547	$172,991
NATURAL GAS	4,107,850	$3,080,888	$1,437,748	$4,107,850
SUBTOTAL	12,690,121	$9,517,591	$4,441,542	$12,690,121
MOTOR VEHICLES	3,170,364	$3,962,955	$2,219,255	$6,340,728
TOTAL		**$13,480,546**	**$6,660,797**	**$19,030,849**

Table VI.14

Regional Summary

FUEL TYPE	Fuel Use in Physical Units							TOTAL METRIC TONS CARBON	REVENUE Fee Rate = $.75 MV Fee Rate = $1.25
	REGION 1	REGION 2	REGION 3	REGION 4	REGION 5	REGION 6	REGION TOTALS		
COAL (Short Tons)									
Bituminous	0	109,820	4,470	176,104	106,828	162,792	560,014	305,544	$229,158
Subbituminous	411,620	4,359,287	8,280,778	158,708	0	3,883,995	17,094,388	7,822,734	$5,867,051
Lignite	47,371	0	0	0	0	0	47,371	11,896	$8,922
Coke	12,579	13,860	0	4,081	12,388	44,154	87,062	77,520	$58,140
Subtotal	471,570	4,482,967	8,285,248	338,893	119,216	4,090,941	17,788,835	8,217,694	$6,163,271
SOLID FUEL (Short Tons)									
Solid Waste	76,680	30	5,258	1,474	82,406	24,353	190,201	43,396	$32,547
Refuse Derived Fuel	0	45,500	0	53,165	120,450	0	219,115	62,750	$47,063
Subtotal	76,680	45,530	5,258	54,639	202,856	24,353	409,316	106,146	$79,610
NATURAL GAS (MMCF)*	22,664	19,831	31,163	33,996	25,497	150,149	283,300	4,107,850	$3,080,888
LIQUID FUEL (1000 Gallons)†									
Propane	724	403	188	93	419	847	2,674	3,939	$2,954
No.2 Fuel Oil	1,003	2,294	1,998	711	1,211	26,796	34,013	89,634	$67,226
No.6 Fuel Oil	5,244	6,978	3,580	5,985	884	23,049	45,720	142,361	$106,771
Subtotal	6,971	9,675	5,766	6,789	2,514	50,692	82,407	235,934	$176,951
TOTAL FUELS								12,667,624	$9,500,718
MOTOR VEHICLES§	254,682	224,203	356,940	377,231	306,736	1,611,966	3,131,758		$3,914,698
TOTAL									**$13,415,416**

* Natural gas distributions are based on number of households by region for 1990 as reported by the State Demographer, Minnesota State Planning Agency.

† Liquid fuel useage differs from that reported in Table VI.2 due to usage attributable to non-stationary sites.

§ 1990 motor vehicle registrations in the passenger and pickup truck vehicle categories reported by the Minnesota Department of Public Safety; difference in total registations reported in Table IV.2 is due to registrations of unknown county origin.

Table VI.15

Region 1: Northwest

FUEL TYPE	FUEL USE	METRIC TONS CARBON	REVENUE Fee Rate = $.75 MV Reg Rate = $1.25
COAL (Short Tons)			
Subbituminous	411,620	188,366	$141,275
Lignite	47,371	11,896	$8,922
Coke	12,579	11,200	$8,400
SOLID FUEL (Short Tons)			
Solid Waste	76,680	17,495	$13,121
NATURAL GAS (MMCF)	22,664	328,628	$246,471
LIQUID FUEL (1000 Gallons)			
Propane	724	1,067	$800
No.2 Fuel Oil	1,003	2,643	$1,982
No.6 Fuel Oil	5,244	16,329	$12,247
TOTAL FUELS		577,624	$433,218
MOTOR VEHICLES	254,682		$318,353
TOTAL			**$751,571**

Table VI.16

Region 2: Northeast

FUEL TYPE	FUEL USE	METRIC TONS CARBON	REVENUE Fee Rate = $.75 MV Reg Rate = $1.25
COAL (Short Tons)			
Bituminous	109,820	59,918	$44,939
Subbituminous	4,359,287	1,994,897	$1,496,173
Coke	13,860	12,341	$9,256
SOLID FUEL (Short Tons)			
Solid Waste	30	7	$5
Refuse Derived Fuel	45,500	13,030	$9,773
NATURAL GAS (MMCF)	19,831	287,549	$215,662
LIQUID FUEL (1000 Gallons)			
Propane	403	594	$446
No.2 Fuel Oil	2,294	6,045	$4,534
No.6 Fuel Oil	6,978	21,728	$16,296
TOTAL FUELS		2,396,109	$1,797,082
MOTOR VEHICLES	224,203		$280,254
TOTAL			**$2,077,336**

Table VI.17

Region 3: Central

FUEL TYPE	FUEL USE	METRIC TONS CARBON	REVENUE Fee Rate = $.75 MV Reg Rate = $1.25
COAL (Short Tons)			
Bituminous	4,470	2,439	$1,829
Subbituminous	8,280,778	3,789,449	$2,842,087
SOLID FUEL (Short Tons)			
Solid Waste	5,258	1,200	$900
NATURAL GAS (MMCF)	31,163	451,863	$338,897
LIQUID FUEL (1000 Gallons)			
Propane	188	277	$208
No.2 Fuel Oil	1,998	5,265	$3,949
No.6 Fuel Oil	3,580	11,147	$8,360
TOTAL FUELS		4,261,640	$3,196,230
MOTOR VEHICLES	356,940		$446,175
TOTAL			**$3,642,405**

Table VI.18

Region 4: Southwest

FUEL TYPE	FUEL USE	METRIC TONS CARBON	REVENUE Fee Rate = $.75 MV Reg Rate = $1.25
COAL (Short Tons)			
Bituminous	176,104	96,082	$72,062
Subbituminous	158,708	72,628	$54,471
Coke	4,081	3,634	$2,726
SOLID FUEL (Short Tons)			
Solid Waste	1,474	336	$252
Refuse Derived Fuel	53,165	15,225	$11,419
NATURAL GAS (MMCF)	33,996	492,942	$369,707
LIQUID FUEL (1000 Gallons)			
Propane	93	137	$103
No.2 Fuel Oil	711	1,874	$1,406
No.6 Fuel Oil	5,985	18,636	$13,977
TOTAL FUELS		701,494	$526,121
MOTOR VEHICLES	377,231		$471,539
TOTAL			**$997,659**

Table VI.19

Region 5: Southeast

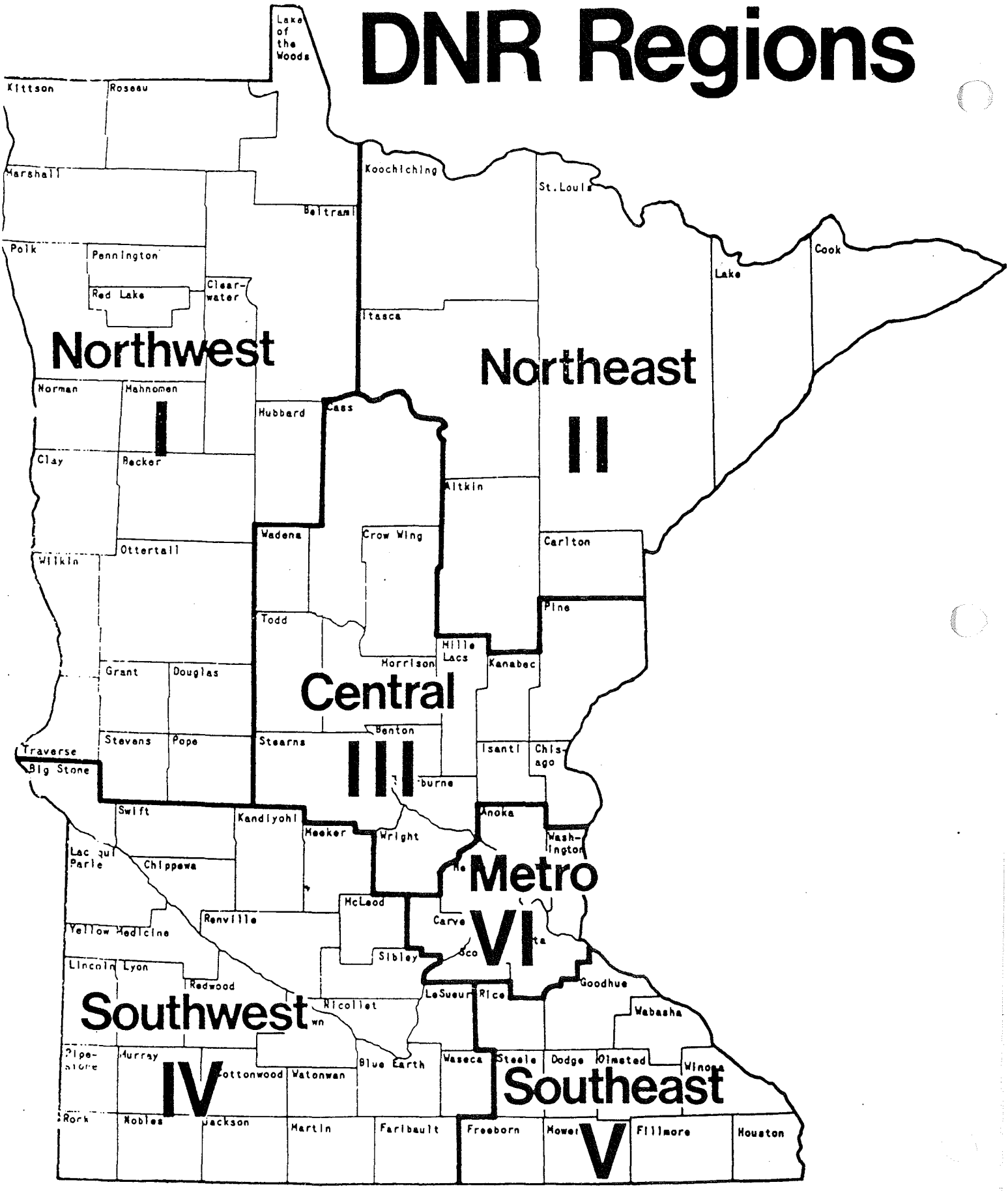
FUEL TYPE	FUEL USE	METRIC TONS CARBON	REVENUE Fee Rate = $.75 MV Reg Rate = $1.25
COAL (Short Tons)			
Bituminous	106,828	58,285	$43,714
Coke	12,388	11,030	$8,273
SOLID FUEL (Short Tons)			
Solid Waste	82,406	18,802	$14,102
Refuse Derived Fuel	120,450	34,494	$25,871
NATURAL GAS (MMCF)	25,497	369,706	$277,280
LIQUID FUEL (1000 Gallons)			
Propane	419	617	$463
No.2 Fuel Oil	1,211	3,191	$2,393
No.6 Fuel Oil	884	2,753	$2,065
TOTAL FUELS		498,878	$374,159
MOTOR VEHICLES	306,736		$383,420
TOTAL			**$757,579**

Table VI.20

Region 6: Metro

FUEL TYPE	FUEL USE	METRIC TONS CARBON	REVENUE Fee Rate = $.75 MV Reg Rate = $1.25
COAL (Short Tons)			
Bituminous	162,792	88,819	$66,614
Subbituminous	3,883,995	1,777,394	$1,333,046
Coke	44,154	39,315	$29,486
SOLID FUEL (Short Tons)			
Solid Waste	24,353	5,556	$4,167
NATURAL GAS (MMCF)	150,149	2,177,160	$1,632,870
LIQUID FUEL (1000 Gallons)			
Propane	847	1,248	$936
No.2 Fuel Oil	26,796	70,615	$52,961
No.6 Fuel Oil	23,049	71,769	$53,827
TOTAL FUELS		4,231,876	$3,173,907
MOTOR VEHICLES	1,611,966		$2,014,958
TOTAL			**$5,188,865**

Figure VI.1


DNR Regions
Lake of the Woods
Kittson
Roseau
Marshall
Koochiching
St. Louis
Beltrami
Polk
Pennington
Red Lake
Clear-water
Itasca
Lake
Cook
Northwest
Northeast
II
Norman
Mahnomen
Hubbard
Cass
Clay
Becker
Aitkin
Wadena
Crow Wing
Carlton
Wilkin
Ottertail
Pine
Todd
Mille Lacs
Kanabec
Morrison
Grant
Douglas
Central
Benton
Traverse
Stevens
Pope
Stearns
III
Isanti
Chis-ago
Big Stone
Swift
Kandiyohi
Anoka
Meeker
Wright
Wash-ington
Lac qui Parle
Chippewa
Metro
McLeod
Renville
Carver
VI
Yellow Medicine
Sibley
Lincoln
Lyon
Goodhue
Redwood
LeSueur
Rice
Nicollet
Wabasha
Southwest
Pipe-stone
Murray
Blue Earth
Waseca
Steele
Dodge
Olmsted
Winona
IV
Cottonwood
Watonwan
Southeast
Rock
Nobles
Jackson
Martin
Faribault
Freeborn
Mower
Fillmore
Houston
V

Counties by DNR Region

Region I

Becker
Beltrami
Clay
Clearwater
Douglas
Grant
Hubbard
Kittson
Lake of the Woods
Mahnomen
Marshall
Norman
Otter Tail
Pennington
Polk
Pope
Red Lake
Roseau
Stevens
Traverse
Wilkin

Region II

Aitkin
Carlton
Cook
Itasca
Koochiching
Lake
St. Louis

Region III

Benton
Cass
Chisago
Crow Wing
Isanti
Kanabec
Mille Lacs
Morrison
Pine
Sherburne
Stearns
Todd
Wadena
Wright

Region IV

Big Stone
Blue Earth
Brown
Chippewa
Cottonwood
Faribault
Jackson
Kandiyohi
Lac Qui Parle
Le Sueur
Lincoln
Lyon
Martin
McLeod
Meeker
Murray
Nicollet
Nobles
Pipestone
Redwood
Renville
Rock
Sibley
Swift
Waseca
Watonwan
Yellow Medicine

Region V

Dodge
Fillmore
Freeborn
Goodhue
Houston
Mower
Olmsted
Rice
Steele
Wabasha
Winona

Region VI

Anoka
Carver
Dakota
Hennepin
Ramsey
Scott
Washington

CHAPTER VII. FEE IMPACT ESTIMATES

VII. FEE IMPACTS

A. Typical Residential

A little less than one-quarter of all statewide CO2 emissions result directly or indirectly from energy use in the residential sector of the economy. In 1988 these emissions amounted to nearly 5 million metric tons of carbon. Residential energy consumption in space heating and nonspace heating electrical usage is given in Table VII.1 for the Minneapolis - St. Paul metropolitan area and the city of Duluth. The data for average residential energy usage were supplied in the case of electricity by Northern State Power and Minnesota Power; in the case of natural gas by Minnegasco and Duluth Water and Gas; and, in the case of fuel oil, by ICO Inc. of Duluth.

Table VII.1

Average Energy Usage in Minnesota Residences

Metro Residence	145 Mcf Natural gas 6901 kWhr Electricity
Duluth Residence #1	165 Mcf Natural gas 8268 kWhr Electricity
Duluth Residence #2	800-1000 gals Fuel Oil 8268 kWhr Electricity

Based on Table VII.1 it is possible to calculate CO2 emissions from direct fuel uses in residential space heating using Table A.1 and Table A.2 of Appendix A. On an average annual basis, these emissions amount to about two to two and one-half metric tons of carbon per residence, or about 8 to 10 tons of CO2 per residence per year.

This study recommends the institution of a $0.60/MT(C) tax on emissions (see Chapter I above). At a rate of taxation of $0.60/MT(C), the average annual residential fuel billing for space heating could be expected to rise about $1.25 to $1.60.

Electricity can be generated as the result of combustion of fossil fuels, which results in the net release of CO2 to the atmosphere, or via nonfossil sources of energy such as hydropower or nuclear power. In order to calculate the effect on the average rate payer's electrical billing of a tax on CO2 emissions, it is necessary first to determine for any one utility that fraction of total electrical generation that is fossil fuel-based.

Total electrical generation and electricity purchases are shown in Tables VII.2 and .3 for Northern States Power and Minnesota Power respectively. In the case of NSP's electrical system, about 50 percent of all electricity on the system in 1990 was generated via fossil fuel combustion. In addition, about 15 percent of total electrical sales was purchased electricity from other state utilities, some unknown amount of which would have been fossil fuel-based. This means that in 1990 for Northern States Power between 50 percent and 65 percent of all electricity sold was generated through the combustion of fossil fuels. In the case of Minnesota Power, this value ranges from 60 to 75 percent.

Table VII.2

Northern States Power Electricity Generation and Purchases, 1990 (in mW hr(e))a

Hydro	77,600	
Nuclear	12,802,528	
Wind	276	
Manitoba hydro	1, 439,234	
MAPP purchased power	6,371,928	(15.4%)
subtotal	20,691,626	
Fossil fuels	20,606,566	(49.9%)
Total	41,298,192	
Total CO2 emissions	5,388,591.4 MT (C)b	

Source: Northern States Power

a
Prior to transmission line losses

b
21,779,627 short tons of CO2

Table VII.3

Minnesota Power & Light Electricity Generation and Purchases, 1989 (in mW hr(e))a

Hydro	561,938	
Square Butte	1,859,667	
MAPP purchased power	1,570,261	(15.6%)
subtotal	3,991,866	
Fossil Fuels	6,055,504	(60.3%)
Total	10,047,370	
Total CO2 emissions	1,845,826 MT (C)b	

Source: Minnesota Power

a
Prior to transmission line losses

b
7,460,466 short tons of CO2

To calculate the amount of carbon emitted per kW hr of that electrical usage associated with fossil fuel combustion, utility provided estimates of carbon emissions are utilized (see Table VII.2 and .3). Carbon emissions per kW hr of that electrical usage associated with fossil fuel combustion for Northern States Power would be:

$$\frac{5{,}388591.4 \text{ metric tons of carbon}}{(20{,}606{,}566 \text{ mW hr of electricity})(0.95)}$$

where about 95 percent of electrical production reaches the final consumer and 5 percent is lost in transmission. This results in an emission of carbon per kilowatt hour of electricity of 0.00028 metric tons of carbon (MT(C)), which taxed at a rate of $0.60/MT(C) results in a rate of taxation per kW hr of $0.000165.

Annual electrical consumption in the typical metropolitan Twin Cities residence is some 6,901 kW hours. If 50 to 65 percent of the electricity sold on NSP's system in 1990 was generated via the combustion of fossil fuels, on an average annually some 3,443 to 4,522 kW hrs of electrical usage in the typical Twin Cities metropolitan residence would be directly associated with fossil fuel combustion. At an emission rate of 0.00028 MT (C) per kW hr, this results in an emission of about 1 MT(C) per year per Metropolitan residence, and an associated increase in annual electrical billings of $0.57 to $0.75 upon the imposition of a $0.60/MT(C) tax (see Table VII.4).

For the Minnesota Power system, the carbon emission per kW hr of electrical use that is associated with fossil fuel combustion would be (for 1989):

$$\frac{1{,}845{,}826 \text{ MT(C)}}{(6{,}055{,}504.2 \text{ mW hr})\ (o.95)}$$

or 0.00032 MT(C)/kW hr. The average Duluth residential usage is estimated to be 8,268 kW hrs, of which 60 to 75 percent is generated as a result of the combustion of fossil fuels or 4,983 to 6,275 kW hr. At 0.00032 MT(C) per kw hr, electrical usage in the typical Duluth household will result in the release to the atmosphere of about one and one-half to two metric tons of carbon. Thus, as a result of a carbon tax of $0.60MT (C), the average Duluth household's annual electrical billing would rise by between $1 and $1.25.

The aggregate effect of a $0.60/MT(C) tax on CO2 emissions is shown in Table VII.4. Based on the preceding analysis, the average annual residential expenditure on electricity and space heating should rise by between $2 and $3.

Table VII.4.

Residential Cost of CO2 Taxation @ $0.60/MT (C)

	CO2 (in MT(C))	Tax Cost
Metropolitan Residence		
Space heating	2.10	$1.26
Electricity	0.95 to 1.24a	$0.57 to $0.75
Total	3.05 to 3.34	$1.83 to $2.01
Duluth Residence #1		
Space heating (Natural gas)	2.39	$1.44
Electricity	1.6 to 2.01b	$0.96 to $1.21
Total	3.99 to 4.4	$2.40 to $2.65
Duluth Residence #2		
Space heating (Fuel oil)	2.11 to 2.62	$1.27 to $1.57
Electricity	1.6 to 2.01	$0.96 to $1.21
Total	3.71 to 4.63	$2.23 to $2.78

a
@0.000275262 MT(C)/kW hr (e) for NSP customers.

b
@0.000320861 MT(C)/kW hr (e) for Minnesota Power customers.

In Table VII.5 the calculated residential tax burdens presented in Table VII.4 are recalculated for tax rates ranging from $0.30/MT(C)to $1.00.MT(C). Based on this analysis, the total extra annual cost to the typical residential rate payer would be minor, in the range of $1 to $4 for the types of taxation considered in this study.

Table VII.5

Residential Cost of CO2 Taxation (in$/MT(C) at Various Tax Rates

	Taxation Rate (in$/MT(C))					
	0.30	0.35	0.6	0.75	0.90	1.00
Metro	0.92- 1.01	1.07- 1.17	1.83- 2.01	2.29- 2.51	2.75- 3.02	3.05- 3.35
Duluth #1	1.20- 1.35	1.40- 1.55	2.40- 2.65	3.00- 3.31	3.60- 3.98	4.00- 4.42
Duluth #2	1.12- 1.39	1.30- 1.62	2.23- 2.78	2.79- 3.48	3.35- 4.17	3.72- 4.63

B. Selected Industrial

Fuel use and electricity consumption data were obtained for six of the largest industrial companies in the state. Koch Refining, North Star Steel, and Champion International purchase electricity from NSP; and USS/Minntac, National Steel Pellet and Boise Cascade are supplied by Minnesota Power. Table VII.6 shows metric tons of carbon calculated using both methodologies, and fees at the $.60 and $.75 levels. On-site fuel use data is from the 1988 EIS, while electric use is 1990 data reported by the respective utility companies. Several companies were concerned that their specific fuel use and electricity consumption data not be revealed in this report, so only the emissions calculated for each company are presented in Table VII.6. The calculative procedure is identical to that employed in the case of residential fuel use. To simplify the results display, the midpoint of the range of fossil fuel use on the NSP and MP systems were used -- 57.5 percent and 67.5 percent respectively. Readers should be cautioned that the carbon and fee estimates in Table VII.6 are only estimates. Actual fee calculations under either approach would be strongly influenced by such thing as actual fossil fuel use on the electric utility systems, allocation of fees through rates as

determined by the Minnesota Public Utilities Commission, and actual fuel use and electricity consumption during the year for which fees are being assessed.

Table VII.6

Estimated Fees: Selected Industrial

COMPANY	CARBON CONTENT FEE Metric Tons Carbon*	Fee Range @ $.60	EMISSIONS FEE Metric Tons Carbon**	Fee Range @ $.75
Koch Refining	341,041	$204,625	351,357	$263,518
North Star Steel	57,131	$34,279	57,620	$43,215
Champion Intl	101,766	$61,060	101,805	$76,354
USS/Minntac	390,647	$234,388	393,530	$295,148
National Steel Pellet	159,649	$95,789	160,889	$120,667
Boise Cascade	103,147	$61,888	104,973	$78,730

* Carbon Content Calculation method

** Emissions calculation method

C. Electric Utilities

Table VII.7 shows estimated fees for the state's seven largest generation and transmission utilities, as well as a combined estimate for municipal waste-to-electricity incinerators. Fuel use data used to derive these estimates are 1988 EIS data. Readers should bear in mind that electric utilities will almost certainly be able to pass fees through directly to their customers in the form of higher rates. Therefore, while electric utilities will be responsible for fee payments, actual fee liabilities will be spread to all customers through rate allocation systems determined by the Minnesota Public Utilities Commission. This is why higher electric costs associated with fees on the utilities are assumed in the residential and industrial sector fee estimates above.

D. Natural Gas Utilities

Finally, fee estimates for the states three largest natural gas utilities are shown in Table VII.8. Calculations of carbon and fees under both approaches are based on 1990 total sales volumes reported by the three companies. As is the case with electric utilities, natural gas utilities are expected to pass fees through to their customers in the form of higher rates.

Table VII.7

Estimated Fees: Electric Utilities

Alternative A*

UTILITY	Metric Tons Carbon	REVENUE 1 Fee Rate = $.60	REVENUE 2 Fee Rate = $.30	REVENUE 3 Fee Rate = $.90
NORTHERN STATES POWER	5,568,153	$3,340,892	$1,670,446	$5,011,338
MINNESOTA POWER	1,888,000	$1,132,800	$566,400	$1,699,200
SMMPA	72,642	$43,585	$21,793	$65,378
INTERSTATE POWER	51,920	$31,152	$15,576	$46,728
VIRGINIA PUBLIC UTILITY	50,764	$30,458	$15,229	$45,688
HIBBING PUBLIC UTILITY	37,004	$22,202	$11,101	$33,304
OTTERTAIL POWER	34,885	$20,931	$10,466	$31,397
MUNICIPAL INCINERATORS	49,546	$29,728	$14,864	$44,591
Total	**7,752,914**	**$4,651,748**	**$2,325,874**	**$6,977,623**

Alternative B†

UTILITY	Metric Tons Carbon	REVENUE 1 Fee Rate = $.75	REVENUE 2 Fee Rate = $.35	REVENUE 3 Fee Rate = $1.00
NORTHERN STATES POWER	5,618,623	$4,213,967	$1,966,518	$5,618,623
MINNESOTA POWER	1,904,586	$1,428,440	$666,605	$1,904,586
SMMPA	73,703	$55,277	$25,796	$73,703
INTERSTATE POWER	53,152	$39,864	$18,603	$53,152
VIRGINIA PUBLIC UTILITY	51,289	$38,467	$17,951	$51,289
HIBBING PUBLIC UTILITY	37,332	$27,999	$13,066	$37,332
OTTERTAIL POWER	34,955	$26,216	$12,234	$34,955
MUNICIPAL INCINERATORS	49,890	$37,418	$17,462	$49,890
Total	**7,823,530**	**$5,867,648**	**$2,738,236**	**$7,823,530**

* Carbon content calculation method
† Emissions calculation method

Table VII.8

Estimated Fees: Natural Gas Utilities

Alternative A*

UTILITY	Metric Tons Carbon	REVENUE 1 Fee Rate=$.60	REVENUE 2 Fee Rate=$.30	REVENUE 3 Fee Rate=$.90
MINNEGASCO	1,579,112	$947,467	$473,734	$1,421,201
NORTHERN STATES POWER	1,020,887	$612,532	$306,266	$918,798
PEOPLES NATURAL GAS	774,193	$464,516	$232,258	$696,774
Total	**3,374,192**	**$2,024,515**	**$1,012,258**	**$3,036,773**

Alternative B†

UTILITY	Metric Tons Carbon	REVENUE 1 Fee Rate=$.75	REVENUE 2 Fee Rate=$.35	REVENUE 3 Fee Rate=$1.00
MINNEGASCO	1,657,327	$1,242,995	$580,064	$1,657,327
NORTHERN STATES POWER	1,071,449	$803,586	$375,007	$1,071,449
PEOPLES NATURAL GAS	812,537	$609,402	$284,388	$812,537
Total	**3,541,313**	**$2,655,983**	**$1,239,459**	**$3,541,313**

* Carbon content calculation method
† Emissions calculation method

APPENDIX A

Table A.1

Typical Energy Contents of Fuels Considered in this Study[1]

Fuel Type	Energy Content
Bituminous Coal	22.0 MMBTU/short ton
Subbituminous Coal	17.4 MMBTU/short ton
Lignite	14.6 MMBTU/short ton
Coke	28.0 MMBTU/short ton
Solid Waste	9.2 MMBTU/short ton
Refuse Derived Fuel	11.1 MMBTU/short ton
Natural Gas	1000 MMBTU/million cubic feet
Gasoline	125.0 MMBTU/1000 gallons
Propane (LPG)	91.5 MMBTU/1000 gallons
Jet Fuel	135.0 MMBTU/1000 gallons
No. 2 Distillate Fuel Oil	138.7 MMBTU/1000 gallons
No. 6 Residual Fuel Oil	149.7 MMBTU/1000 gallons
Diesel	138.7 MMBTU/1000 gallons

Table A.2

Rates of Carbon Dioxide Release Assumed for Fuels Considered in this Study[2]

Fuel Type	Emissions (kg Carbon/million BTU)
Bituminous Coal	24.8
Subbituminous Coal	26.3
Lignite	17.2
Coke	31.8
Municipal Solid Waste	24.8
Refuse Derived Fuel	25.8
Natural Gas	14.5
Gasoline	19.8
Propane (LPG)	16.1
Jet Fuel	19.8
No.2 Fuel Oil	19.0
No.6 Fuel Oil	20.8
Diesel	20.4

Table A.3

Volume to Weight Conversions[3]

Fuel Type	Volume Units	Weight (lbs) per Volume		Weight (Tons) per Volume	
Natural Gas	Million Cubic Feet	45455	lbs/MMCF	22.73	Tons/MMCF
Gasoline	Gallons	5.6	lbs/Gallon	0.0028	Tons/Gallon
Propane	Gallons	4.2	lbs/Gallon	0.0021	Tons/Gallon
Jet Fuel	Gallons	5.5	lbs/Gallon	0.00275	Tons/Gallon
No.2 Fuel Oil	Gallons	7.1	lbs/Gallon	0.00355	Tons/Gallon
No.6 Fuel Oil	Gallons	7.1	lbs/Gallon	0.00355	Tons/Gallon
Diesel	Gallons	7.1	lbs/Gallon	0.00355	Tons/Gallon

Table A.4

Average Carbon Contents of Fuels Considered in this Study[4]

Fuel Type	CARBON CONTENT % By Weight
Bituminous Coal	60
Subbituminous Coal	50
Lignite	28
Coke	92
Municipal Solid Waste	26
Refuse Derived Fuel	32
Natural Gas	67
Gasoline	85
Propane (LPG)	85
Jet Fuel	85
No.2 Fuel Oil	85
No.6 Fuel Oil	85
Diesel	85

Source Notes for Conversion Tables in Appendix A.

1. Taken from P. Ciborowski and D.L. Burdette, "Carbon Dioxide Emissions in Minnesota," for the Minnesota Pollution Control Agency, January 1991, Table A2; Sources: For bituminous and subbituminous coal and coke, J.N. Brobjorg, Northern States Power Co., "Internal Memorandum on NSP Carbon Dioxide Emissions," Minneapolis, Minn., May 1990. For lignite, R.M. Rotty and C.D. Masters, "Carbon Dioxide from Fossil Fuel Combustion: Trends, Resources, and Technological Implications," in Atmospheric Carbon Dioxide and the Global Carbon Cycle, J. Trabalka (ed.), DOE/ER-0239 (Washington, D.C.: U.S. Department of Energy, 1985). For all remaining fuels, Minnesota Department of Public Service, Minnesota Energy Data Book (St. Paul, Minn., 1990).

2. From P.Ciborowski and D.L. Burdette, "Carbon Dioxide Emissions in Minnesota," for the Minnesota Pollution Control Agency, January 1991, Table 9. Rates of Carbon Dioxide Release for Different Fuels Assumed in This Study: Case B.

3. Sources: Personal communications with the American Gas Association, the American Petroleum Institute, and the National LP Gas Association.

4. For solid fuels and natural gas, from P. Ciborowski and D.L. Burdette, "Carbon Dioxide Emissions in Minnesota," for the Minnesota Pollution Control Agency, January 1991, Table A1, from R.M. Rotty and C.D. Masters, "Carbon Dioxide from Fossil Fuel Combustion: Trends, Resources, and Technological Implications," in Atmospheric Carbon Dioxide and the Global Carbon Cycle, J. Trabalka (ed.), DOE/ER-0239 (Washington, D.C.: U.S. Department of Energy, 1985). For liquid fuels, personal communication with Jim Williams, American Petroleum Institute, October 1991.

APPENDIX B

Carbon Content Approach: Alternative A

.01 Definitions.

Subdivision 1. Terms. For purposes of this chapter, the following terms have the meaning given them unless the language or context clearly indicates that a different meaning is intended.

Subd. 2. Coal. "Coal" mean bituminous coal, subbituminous coal, lignite, and coke.

Subd. 3. Commissioner. "Commissioner" means the Commissioner of Revenue.

Subd. 4. Liquid fuels. "Liquid fuels" means gasoline, propane, aviation gasoline, fuel oil, and diesel fuel. "Gasoline," "aviation gasoline," "fuel oil," and "diesel fuel" have the meanings given to them in section 296.01.

Subd. 5. Minnesota ReLeaf. "Minnesota ReLeaf" means the tree planting program established in section 00.01.

Subd. 6. Natural gas. "Natural gas" means a naturally occurring mixture of hydrocarbons and nonhydrocarbon gases found in porous geologic formations beneath the earth's surface, the principal constituent of which is methane.

Subd. 7. Person. "Person" means an individual, partnership, corporation, association, governmental unit or agency, or public or private organization of any kind, under a duty to comply with state law because of its character or position.

Subd. 8. Primary carbon-based fuels. "Primary carbon-based fuels" means coal, mixed municipal solid waste and refuse-derived fuel, natural gas, and liquid fuels.

Subd. 9. Propane. "Propane" means the chemical C3 H8 in its commercial forms including propane butane mixes in which propane constitutes greater than ten percent of the mixture by weight.

.02 Assessment Imposed.

Subdivision 1. Imposition. An assessment program is created to fund the Minnesota ReLeaf Program established in section 00.01. The assessment program shall be administered by the Commissioner of Revenue. The Commissioner of the Minnesota Pollution Control Agency shall adopt rules in accordance with the procedures in section 16A.128 that will result in the collection each year, in the aggregate, from the sources listed in subdivision 2, of the amount appropriated by the legislature from the Natural Resources Fund for the Minnesota ReLeaf Program and any additional amounts permitted by section 16A.128, subdivision 1a.

Subd. 2. Liability. The liability for the assessment is incurred at the times and by the persons specified in this subdivision.

(a) The carbon content of coal is assessed upon the first receipt of coal in the state for burning. Liability for the assessment is on persons who receive coal for burning. Any person who receives coal shipped or brought into Minnesota has the burden of proving that the coal was not received for burning in Minnesota.

(b) The carbon content of natural gas is assessed upon the first receipt of natural gas in the state. Liability for the assessment is on persons in the state who first receive natural gas from outside of the state. Any person who receives natural gas piped, shipped, or otherwise brought into Minnesota has the burden of proving that the natural gas was not received for consumption in Minnesota.

(c) The carbon content of mixed municipal solid waste and refuse-derived fuel is assessed upon incineration of the fuel in the state. Liability for the assessment is on persons who burn mixed municipal solid waste and refuse-derived fuel in the state.

(d) The carbon content of liquid fuels is assessed upon the first sale of liquid fuels in the state. As used in this subsection, "first sale" means the transaction to which the motor fuels tax imposed in Chapter 296 attaches. Liability for the assessment is on persons who are liable for the motor fuels tax on the same transaction. For any liquid fuel not taxable under Chapter 296, "first sale" means "received" in this state as that term is defined in section 296.01, subdivision 13, and liability for the assessment is on those persons who "received" the fuel. Any person who has title to or possession of liquid fuel containing carbon upon which the assessment has not been paid and who knows that it has not been paid, is liable for payment of the assessment.

Subd. 3. Assessed fuels. Only those carbon-based fuels specifically enumerated are subject to the assessment. For example, fuels not assessed under this chapter include, but are not limited to: ethanol, methanol, wood, wood wastes, agricultural crops, crop residues, sludge, solvents, waste oil, kerosene, hazardous waste, and medical waste.

Subd. 4. Calculation of assessment. The assessment applies to the amount of carbon contained in the fuel prior to burning. Calculation of the amount of carbon shall be based on the estimated carbon content of the fuel according to fuel type or subtype. The Minnesota Pollution Control Agency shall adopt rules to set the estimates of carbon content to be used in the calculation.

Subd. 5. Fund disposition. All funds collected under this chapter shall be deposited in the Natural Resources Fund for appropriation to the Minnesota ReLeaf Program. Not less than eighty percent of the funds deposited shall be used for cost-share grants under the ReLeaf Program. Of the amount not used for cost-share grants, a portion shall be appropriated for administration and collection of the assessment as follows: (percent) to the Department of Revenue, (percent) to the Minnesota Pollution Control Agency, and (percent) to the Department of Public Safety. The remaining amount is appropriated to the Department of Natural Resources for administration of the ReLeaf Program.

.03 Offsets and DNR Refunds.

Subdivision 1. Qualified reforestation programs. The assessment imposed in this chapter may be offset by the amount spent on a qualified reforestation program. For purposes of this section, "qualified reforestation program" means a program designed to implement or support tree planting or forest management in this state in accordance with specifications established by the Department of Natural Resources. The Department of Natural Resources shall adopt rules necessary to establish those specifications.

Subd. 2. Claim for offset; certificates. The offset must be claimed at the time the annual return is filed with the Commissioner of Revenue. All claims for offset must be accompanied by a certificate, in a form prescribed by the Commissioner of Natural Resources, which certifies the amount of offset to be allowed by the claimant. Claims for offset may not exceed the claimants fee liability incurred under this chapter. In no event will the Commissioner of Revenue issue a refund under this section.

Subd. 3. Department of Natural Resources Refunds. If a person spends an amount on a qualified reforestation program in excess of their liability under this chapter, they shall be paid a refund upon making a claim for refund with the Department of Natural Resources, in a form prescribed by the Commissioner of Natural Resources, up to the amount of their acquired liability, as described in subdivision 4.

Subd. 4. Acquired liability. "Acquired liability" means the liability acquired by a person in the form of increased utility costs attributable to utilities passing their liability under this chapter onto their customers. Each utility serving persons within this state must, upon request by a person seeking to offset its acquired liability, inform that person in writing of the amount of the utility's liability that it has passed onto that person. For each year in which a utility has received such a request, it must file a report with the Minnesota Pollution Control Agency which summarizes the information provided to the requesters and the data it relied on to compile that information.

.04 Administration and Enforcement

Subdivision 1. Annual returns. Every person subject to the assessment must file a return relating to the assessment due for the preceding calendar year with the Commissioner by April 15 each year, in the form prescribed by the Commissioner. Payment of the assessment to the extent not paid in full pursuant to subdivision 3, shall be submitted with the return.

Subd. 2. Declaration of estimated assessment. Every person required to pay an assessment under this chapter must make a declaration of estimated assessment due for the calendar year if it can reasonably be expected to be in excess of $1,000. The declaration of estimated assessment must be filed by March 15 of the current year. The amount of estimated assessment with respect to which a declaration is required must be paid in four equal installments on or before the 15th day of March, June, September, and December.

An amendment of a declaration may be filed in any interval between installment dates prescribed above but only one amendment may be filed in each interval. If an amendment of a declaration is filed, the amount of each remaining installment shall be the amount which would have been payable if the new estimate had been made when the first estimate for the calendar year was made, increased or decreased, as the case may be, by the amount computed by dividing:

(1) the difference between (A) the amount of estimated assessment required to be paid before the date on which the amendment was made, and (B) the amount of estimated assessment which would have been required to be paid before that date if the new estimate had been made when the first estimate as made, by

(2) the number of installments remaining to be paid on or after the date on which the amendment is made.

The Commissioner of Revenue may grant a reasonable extension of time for filing any declaration but the extension shall not be for more than six months.

Subd. 3. Failure to pay estimated assessment. The provisions of section 115B.24, subdivision 3 apply to failure of a person to pay estimated assessment due under this chapter.

Subd. 4. Refunds. The provision of section 289A.50 apply to the refunds claimed and made under this chapter. Refunds of overpayments of estimated assessment shall be made as provided in section 289A.56, subdivision 2.

Subd. 5. Information returns. Pipeline companies that transport natural gas or propane into Minnesota must file with the commissioner an annual information report on a form prescribed by the commissioner. No payment is required to be remitted with this report. The report must be filed on or before April 15 each year. Any person required to file an informational report that fails to do so by the time period established by law will be assessed a $25 penalty for each month the return remains unfiled.

Subd. 6. Exchange of information. Notwithstanding the provisions of sections 13.68 and 116.075, the Department of Public Service and the Minnesota Pollution Control Agency may provide the Commissioner with the information necessary for the enforcement of this chapter. The information disclosed must retain its nonpublic nature to the extent that it was so classified prior to disclosure to the Commissioner. Information obtained in he course of an audit of the taxpayer by the Commissioner shall be nonpublic for private data to the extent that it is not directly divulged in a return.

Subd. 7. Duties of the agencies. The Department of Public Service and the Minnesota Pollution Control Agency must provide to the Commissioner the names and addresses of all persons known to them who are subject to the assessment under this chapter, together with any information which they possess concerning the amount of carbon to be assessed. Upon request by the Commissioner, those shall examine returns and reports filed with the Commissioner and notify the Commissioner of any suspected inaccurate or

fraudulent declaration or return. An agency may assist in auditing any person subject to the assessment under this chapter when requested by the Commissioner.

Subd. 8. Rules. The Commissioner may adopt rules necessary to administer this chapter.

Subd. 9. Enforcement. The following audit, penalty, and enforcement provisions apply to the assessment imposed in this chapter: sections 289A.35 through 289A.37; 289A.38, subdivision 1, 2, 5 and 6; 289A.40, subdivision 1; 289A.41; 289A.42, subdivision 1; 289A.55; 289A.60, subdivisions 1 through 10, 13, 18, and 19; 289A.63, subdivision 1, 2, and 7 through 10; and 289A.65.

Section _____ are effective July 1, 1993.

Carbon Emissions Approach: Alternative B

.01 Fee Program

A fee program is created to fund the Minnesota ReLeaf Program established in section 00.01. The fee program shall be administered by the Commissioner of Revenue. The Commissioner of the Minnesota Pollution Control Agency (MPCA) shall adopt fee rules in accordance with the procedures in section 16A.128 that will result in the collection each year, in the aggregate, from the sources in sections .02 and .03, of the amount appropriated by the legislature from the Natural Resources Fund for the Minnesota Releaf Program and any additional amounts permitted by section 16A.128, subdivision 1A.

.02 Emissions Fee

Subdivision 1. Definitions. For purpose of sections .01 through .07 the following terms have the meaning given them unless the language or context clearly indicates that a different meaning is intended.

(a) Carbon-based fuels. "Carbon-based fuels" means bituminous coal, subbituminous coal, lignite, coke, municipal solid waste, refuse-derived fuel, natural gas delivered directly from a pipeline company, propane, distillate oil (Numbers 1 and 2), and residual oil (Numbers 4, 5 and 6), and specifically excludes ethanol, methanol, wood and wood bark, agricultural crops, crop residues, sludge, hazardous wast, medical waste, waste oil, process gas, gasoline, kerosene, and waste solvent.

(b) Commissioner. "Commissioner" means the Commissioner or Revenue.

(c) Person. "Person" means an individual, partnership, corporation, association, governmental unit or agency, or public or private organization of any kind, under a duty to comply with state law because of its character or position.

(d) Point Source. "Point source" means an owner or operator of a stationary source, emission facility, or emissions unit who reports under the emissions inventory system administered by the Minnesota Pollution Control Agency.

(e) Receiver of Natural Gas. "Receiver of natural gas" means a person in the state who first receives natural gas piped, shipped, or otherwise brought into Minnesota from outside of the state.

Subd. 2. Imposition. The Commissioner shall collect an annual carbon emissions fee from all point sources, based on the amount of carbon-based fuels combusted by them and from receivers of natural gas, based on the amount of natural gas received. A receiver of natural gas has the burden of proving that the natural gas was not received for burning in Minnesota.

Subd. 3. Fee Calculation; Rules. The annual fee established pursuant to section .01 applies to the amount of carbon emitted upon combustion of carbon-based fuel. Calculation of the amount of carbon emitted shall be based on an estimate of carbon emissions resulting from burning, rather than the actual measured emissions of carbon. The Minnesota Pollution Control Agency shall adopt rules to set the estimates of carbon emitted to be used in the fee calculation.

.03 Motor Vehicle Registration Fee.

Subdivision 1. Administration. The Commissioner of Revenue is charged with the administration of the motor vehicle registration fee. The Commissioner may prescribe all rules necessary for the proper administration of the fee. The collection of the fee shall be carried out by the motor vehicle registrar who shall act as the agent of the Commissioner of Revenue and who shall be subject to all rules prescribed by the Commissioner of Revenue. The provisions of section .04, subdivision 10 relating to the Commissioner's authority to assess, audit and collect the fee are applicable to the motor vehicle registration fee.

Subd. 2. Imposition. The annual fee established pursuant to section .01 must be paid for each motor vehicle, including a motor vehicle that is exempt from the license fees under section 168.012 or 473.448. For purposes of this subdivision, "motor vehicle" has the meaning given in section 116.60, subdivision 7, and "registrar" has the meaning given in section 168.33. The fee established by this subdivision must be paid to the registrar at the time the motor vehicle is registered.

.04 Enforcement of Emissions Fee

Subdivision 1. Application. The provisions of this section apply to the fees imposed in section .02.

Subd. 2. Annual returns. Every person subject to a fee must file a return relating to the fee due for the preceding calendar year with the Commissioner by April 15 each year, in the form prescribed by the Commissioner. Payment of the fee, to the extent not paid in full pursuant to subdivision 3, shall be submitted with the return.

Subd. 3. Declaration of estimated fee. Every person required to pay a fee must make a declaration of estimated fees due for the calendar year if the fee can reasonably be expected to be in excess of $1,000. The declaration of estimated fee must be filed by March 15 of the current year. The amount of estimated fee with respect to which a declaration is required must be paid in four equal installments on or before the 15th day of March, June, September and December.

An amendment of a declaration may be filed in any interval between installment dates prescribed above but only one amendment may be filed in each interval. If an amendment of a declaration is filed, the amount of remaining installment shall be the amount which would have been payable if the new estimate had been made when the first estimate for the calendar year was made, increased or decreased, as the case may be, by the amount computed by dividing:

(a) The difference between (1) the amount of estimated fee required to be paid before the date on which the amendment was made, and (2) the amount of estimated fee which would have been required to be paid before that date if the new estimate had been made when the first estimate was made, by

(b) the number of installments remaining to be paid on or after the date on which the amendment is made.

The Commissioner of Revenue may grant a reasonable extension of time for filing any declaration but the extension shall not be for more than six months.

Subd. 4. Failure to pay estimated fee. The provisions of section 115B.24, subdivision 3 apply to failure of a person to pay estimated fee due under this subsection.

Subd. 5. Refunds. The provisions of section 289A.50 shall apply to refunds claimed and made under sections .01 through .02. Refunds of overpayments of estimated fee shall be made as provided in section 289A.56, subdivision 2.

Subd. 6. Information returns. Pipeline companies that transport carbon-based fuels into Minnesota must file with the Commissioner an annual information report on a form prescribed by the Commissioner. No payment of any fee is required to be remitted with this report. The report must be filed on or before April 15 each year. Any person required to file an informational report that fails to do so by the time period established by law will be assessed a $25 penalty for each month the return remains unfiled.

Subd. 7. Exchange of information. Notwithstanding the provisions of sections 13.68 and 116.075, the Department of Public Service and the Minnesota Pollution Control Agency may provide the Commissioner with the information necessary for the enforcement of the program fee. The information disclosed must retain its nonpublic nature to the extent that it was so classified prior to disclosure to the Commissioner. Information obtained in the course of an audit of the taxpayer by the Commissioner shall be nonpublic or private data to the extent that it is not directly divulged in a return.

Subd. 8. Duties of the agencies. The Department of Public Service and the Minnesota Pollution Control Agency must provide to the Commissioner the names and addresses of all persons known to them who are subject to the fee together with any information which they possess concerning the amount of carbon subject to a fee. Upon request by the Commissioner, those agencies shall examine returns and reports filed with the Commissioner and notify the Commissioner of any suspected inaccurate or fraudulent declaration or return. An agency may assist in auditing any person subject to the fee when requested by the Commissioner.

Subd. 9. Rules. The Commissioner may adopt rules necessary to administer the fees.

Subd. 10. Enforcement. The following audit, penalty, and enforcement provisions apply to the fee imposed in section 116.88: sections 289A.35 through 289A.37; 289A.38, subdivisions 1, 2, 5 and 6; 289A.40, subdivision 1; 289A.41;

289A.42, subdivision 1; 289A.55; 289A.60, subdivisions 1 through 10, 13, 18 and 19; 289A.63, subdivisions 1, 2 and 7 through 10; and 289A.65.

.05 Offsets and Department of Natural Resoureces Refunds

Subd. 1. Qualified Reforestation Programs; Rules. The fees imposed in section .02 may be offset by the amount spent on a qualified reforestation program. For purpose of this section, "qualified reforestation program" means a program designed to implement or support tree planting or forest management in this state in accordance with specifications established by Department of Natural Resources. The Department of Natural Resources shall adopt rules necessary to establish those specifications.

Subd. 2. Claim for offset; certificates. The offset must be claimed at the time the emissions fee annual return is filed with the Commissioner of Revenue. All claims for offset must be accompanied by a certificate, in a form prescribed by the Commissioner of the Department of Natural Resources, which certifies the amount of offset to be allowed by the claimant. Claims for offset may not exceed the claimant's fee liability incurred under section .02. In no event will the Commissioner of Revenue issue a refund under this section.

Subd. 3. Department of Natural Resources Refunds. If a person spends an amount on a qualified reforestation program in excess of their fee liability incurred under section .02, thy shall be paid our fund upon making a claim for refund with the DNR, in a form prescribed by the Commissioner of the Department of Natural Resources, up to the amount of their acquired fee liability, as described in subdivision 4.

Subd. 4. Acquired Fee Liability. "Acquired fee liability" means the fee liability acquired by a person in the form of increased utility costs attributable to utilities passing their emissions fee liability onto their customers. Each utility serving persons within this state must, upon request by a person seeking to offset its acquired fee liability, inform that person in writing of the amount of the utility's fee liability that it has passed onto that person. For each year in which a utility has received such a request, it must file a report with the Minnesota Pollution Control Agency which summarizes the information provided to the requesters and the data it relied on to compile that information.

.06 Fund Disposition.

All fee receipts collected under sections .01 through .05 shall be deposited in the Natural Resources Fund for appropriation to the Minnesota Releaf Program established in section 00.01. Not less than eighty percent (80%) of the funds deposited shall be used for cost-share grants under the Releaf Program established in section 00.01. Of the amount not used for cost-share grants, a portion shall be appropriated for administration and collection of the fees as follows: (percent) to the Department of Revenue, (percent) to the Minnesota Pollution Control Agency and (percent) to the department of public safety. The remaining amount is appropriated to the Department of Natural Resources for administration of the Minnesota Releaf Program.

Sections _____ are effective July 1, 1993.

APPENDIX C

(h) Tree and Shrub Planting for Energy in Minnesota Communities 1,250,000

This appropriation is to the commissioner of administration for a grant to the commissioner of natural resources to develop research-based guidelines and publications and to provide matching grants for energy conservation tree planting. $950,000 of this appropriation is available only as cash flow permits.

Sec. 20. [88.86] [MINNESOTA RELEAF PROGRAM.]

The Minnesota releaf program is established in the department of natural resources to encourage, promote, and fund the planting, maintenance, and improvement of trees in this state to reduce atmospheric carbon dioxide levels and promote energy conservation.

Sec. 21. [IMPLEMENTATION PLAN.]

Subdivision 1. [DESCRIPTION.] (a) The commissioner of natural resources in cooperation with the commissioners of the pollution control agency and department of agriculture shall prepare and submit to the legislative commission on Minnesota resources an implementation plan for the Minnesota releaf program containing the following elements:

(1) primary and secondary criteria for selecting projects for funding under the Minnesota releaf program; and

(2) recommended procedures for processing grant applications and allocating funds.

(b) The primary criteria developed under paragraph (a), clause (1), must include, but are not limited to:

(1) reduction and mitigation of adverse environmental impacts of atmospheric carbon dioxide; and

(2) promotion of energy conservation.

(c) The secondary criteria developed under paragraph (a), clause (1), must include, but are not limited to:

(1) balancing of urban and rural needs;

(2) preservation of existing trees in urban areas;

(3) promotion of biodiversity, including development of disease-resistant and drought-resistant tree species;

(4) erosion control;

(5) enhancement of wildlife habitat;

(6) encouragement of cost sharing with public and private entities;

(7) enhancement of recreational opportunities in urban and rural areas;

(8) coordination with existing state and federal programs;

(9) acceleration of the planting of harvestable timber;

(10) creation of employment opportunities for disadvantaged youth; and

(11) maximization of the use of volunteers.

Subd. 2. [DUTIES OF THE COMMISSIONER OF NATURAL RESOURCES.] By February 1, 1992, the commissioner of natural resources shall transmit to the legislature the implementation plan prepared under subdivision 1, and the recommendations prepared under subdivision 3, together with all recommended legislation to implement the Minnesota releaf program and the supporting fee structure.

Subd. 3. [DUTIES OF THE POLLUTION CONTROL AGENCY.] (a) The pollution control agency, in consultation with potentially affected parties, shall prepare implementation recommendations for applying a fee on carbon dioxide emissions for the Minnesota releaf program. The agency's analysis must include:

(1) a review of the carbon dioxide sources and proposed fee base identified in the study prepared in accordance with Laws 1990, chapter 587, section 2;

(2) recommendations regarding exemptions, if any, that should be granted;

(3) a recommended method for measuring the amount of carbon dioxide emitted by various sources;

(4) a recommended procedure for administering and collecting the fees from the sources described in clause (3); and

(5) an estimate of revenue that would be generated by the fees.

(b) The agency shall submit implementation recommendations to the commissioner of natural resources by December 1, 1991.

Sec. 22. [LEGISLATIVE COMMISSION ON MINNESOTA RESOURCES PARTICIPATION.]

The commissioners of natural resources and pollution control agency shall include the preparation of the plans required for the implementation of the Minnesota releaf program as part of the tree and shrub planting project funded in article 1, section 14. In compliance with article 1, section 14, an amended work plan for the tree and shrub planting project including the Minnesota releaf plans shall be submitted to the legislative commission on Minnesota resources for approval.

APPENDIX D

APPENDIX D

MEETINGS WITH AFFECTED PARTIES: ATTENDEES

1. Electric Utilities, November 5, 1991

   Janet Anderson, Northern States Power

   Keith Hanson, Minnesota Power

   Tom Houghtaling, Minnesota Power

2. Natural Gas Utilities, November 12, 1991

   Conrad Miller, Peoples Natural Gas

   Ray O'Connell, Midwest Gas

   Kris Sundberg, Minnegasco

   Susan Turbes, Minnegasco

3. Liquid Fuel Suppliers, November 22, 1991

   Darrel Bunge, Minnesota Petroleum Council

   Douglas Finstrom, Minnesota Corn Processors

   Richard Jergenson, Minnesota Corn Processors

   Larry Johnson, Minnesota Ethanol Commission

   Richard Larsen, Amoco Oil

   Bill Mahre, Minnesota Propane Association

   John R. Manspeaker, Minnesota Corn Processors

APPENDIX E

APPENDIX E: END NOTES

CHAPTER I. OVERVIEW

1. "Carbon Dioxide Budgets in Minnesota and Recommendations on Reducing Net Emissions with Trees: Report to the Minnesota Legislature," Minnesota Department of Natural Resources, Division of Forestry, St. Paul, MN, January 1991.

2. Minnesota Department of Natural Resources, Ibid., January 1991.

3. P. Ciborowski and D.L. Burdette, "Carbon Dioxide Emissions in Minnesota," for the Minnesota Pollution Control Agency, January 1991.

CHAPTER II. IMPLEMENTATION APPROACHES

1. "Carbon Dioxide Budgets in Minnesota and Recommendations on Reducing Net Emissions with Trees: Report to the Minnesota Legislature," Minnesota Department of Natural Resources, Division of Forestry, St. Paul, MN January 1991.

2. Minnesota Department of Natural Resources, Ibid., January 1991.

3. Minnesota Department of Public Service, from the Regional Energy Information System database, data for 1990.

4. Minnesota Pollution Control Agency, from the Emissions Inventory System database, data for 1988.

CHAPTER IV. MEASUREMENT OF CO2 EMISSIONS

1. P. Ciborowski and D.L. Burdette, "Carbon Dioxide Emissions in Minnesota," for the Minnesota Pollution Control Agency, January 1991.

2. C.D. Masters and R.M. Rotty, "Carbon Dioxide from Fossil Fuel Combustion: Trends, Resources, and Technological Implications," in Atmospheric Carbon Dioxide and the Global Carbon Cycle, J. Trabalka (ed.), DOE/ER-0239 (Washington, D.C.: U.S. Department of Energy), 1985.

3. Personal communication with Jim Williams, American Petroleum Institute, October 1991.