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EXECUTIVE SUMMARY

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ENERGY
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OPTIONS AND
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EXECUTIVE SUMMARY

ENERGY FROM PEATLANDS: OPTIONS AND IMPACTS

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STATE OF MINNESOTA

A Report of the CURA Peat Policy Project

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EXECUTIVE SUMMARY

This is a summary of a more extensive report to be published in March of 1981 by the Center for Urban and Regional Affairs, (CURA) at the University of Minnesota. That report and this summary have been developed as part of a study begun at CURA in July 1980. A nine-member panel of University of Minnesota faculty was assembled to oversee the study and to formulate recommendations concerning peatland policy. The panel, chaired by Dean E. Abrahamson of the Humphrey Institute of Public Affairs is drawn primarily from the membership of CURA's All-University Council on Environmental Quality and reflects a variety of backgrounds and disciplines: Perry Blackshear from Mechanical Engineering; Rod Squires from Geography; William Fleischman from Sociology-Anthropology (Duluth); Howard Hobbs and Matt Walton from the Minnesota Geological Survey; Wilbur Maki and Lee Martin from Agricultural and Applied Economics; and Thomas Anding from CURA. In addition, CURA contracted The Minnesota Project to study the legal, regulatory and citizen participation issues associated with peatland development.

The recommendations of the Panel are included in this Executive Summary. They are based on and supported by the information and analysis contained in the full report.

The report provides lawmakers, agency staff, industry officials and citizens with an integrated summary of peatland research. An analysis of the options for using peatlands, and a review of the potential economic, social, and environmental impacts of developing peatlands for energy is included. The existing legal and regulatory framework governing Minnesota peatlands is also examined.

The recommendations of the panel are designed to assist lawmakers and other government officials in their formulation of public policy regarding development of Minnesota peatlands for energy, and to suggest to industry ways to use the state's peatland resource that enhance the state's economy and energy position while minimizing detrimental economic, social, and environmental effects.

BACKGROUND

Minnesota contains 5.9 million acres of peatland, most of which is located in the northern counties of Roseau, Lake of the Woods, Beltrami, Koochiching, St. Louis, and Aitkin. The map in Figure 1, produced by CURA for the University of Minnesota's bioenergy research program, shows the distribution of peatlands and wet mineral soils in Minnesota. While the number of acres in Minnesota's peatland resource is large (exceeded in the United States only by Alaska), the state's commercial reserves are unknown. The acreage that can actually be used will be much less than the 5.9 million-acre resource. Commercial viability depends not only on the surface area, but also on many other factors: the depth and quality of the peat, the size of the peatland, environmental limitations, ownership, transportation networks and necessary public and private service systems needed to support adjacent economic expansion.

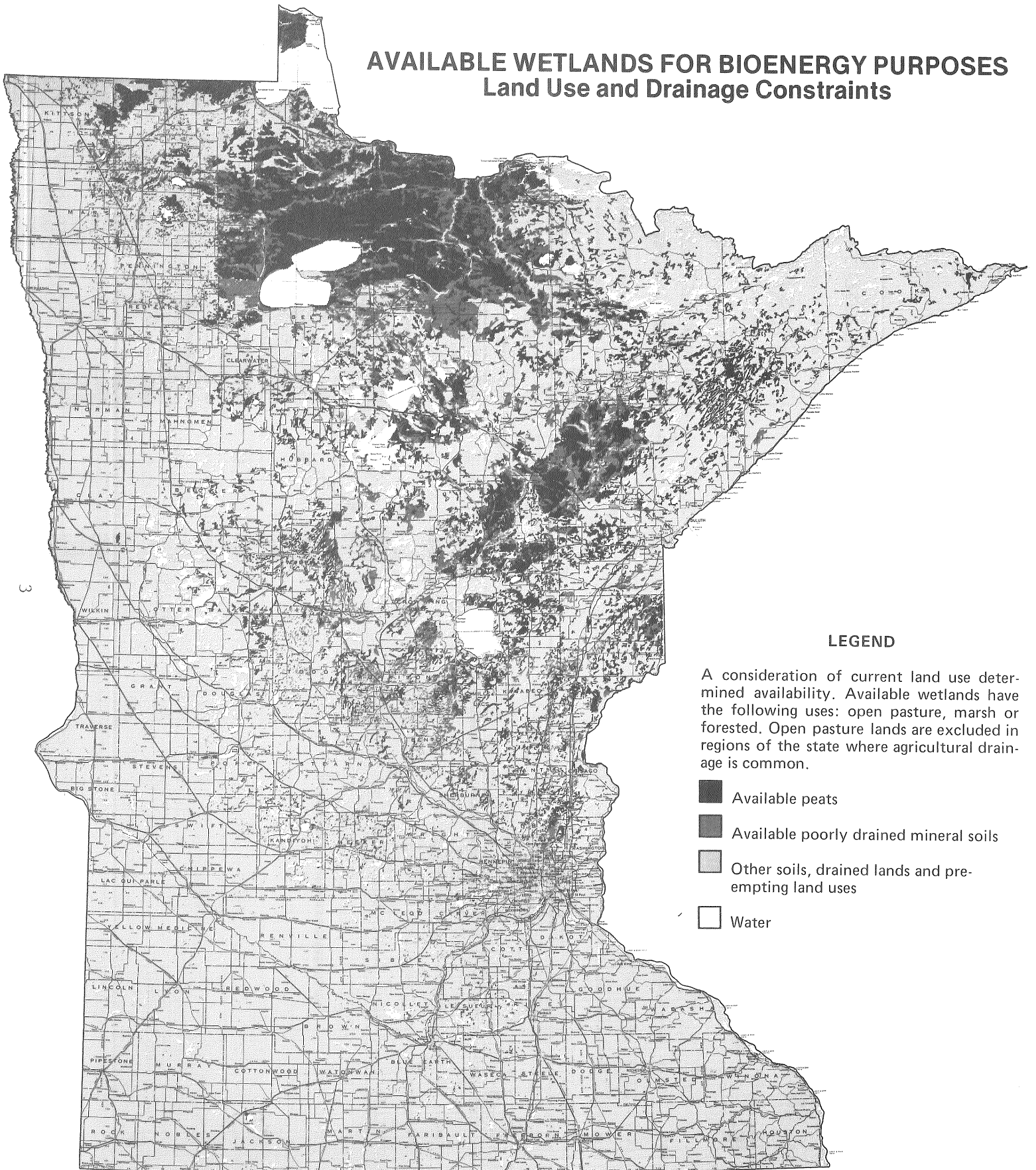
Despite a long history of use elsewhere in the world, peatlands in the United States have traditionally been used only for limited horticultural and agricultural purposes. In some regions they have been regarded as "wasteland," a resource too

difficult and expensive to exploit. This is because the products derived from peatlands have been produced more cheaply from other sources. As these products--especially energy--became more expensive in the United States, commercial use of peatlands has drawn more interest. The interest in developing this Minnesota resource has been generated by projected shortages and increased prices of traditional energy supplies, coupled with the thought that peatland development might improve the economy of northern Minnesota.

Current and anticipated uses of peatlands fall into three categories (see Figure 2). Portions of these lands can be used for nonrenewable resource extraction, renewable resource production, and peatland preservation.

AVAILABLE WETLANDS FOR BIOENERGY PURPOSES

Land Use and Drainage Constraints



LEGEND

A consideration of current land use determined availability. Available wetlands have the following uses: open pasture, marsh or forested. Open pasture lands are excluded in regions of the state where agricultural drainage is common.

- Available peats
- Available poorly drained mineral soils
- Other soils, drained lands and preempting land uses
- Water

Figure 1

Produced by the Center for Urban and Regional Affairs, University of Minnesota, under contract with the Minnesota Energy Agency, December 1980.

ALTERNATIVES FOR UTILIZATION OF PEATLANDS

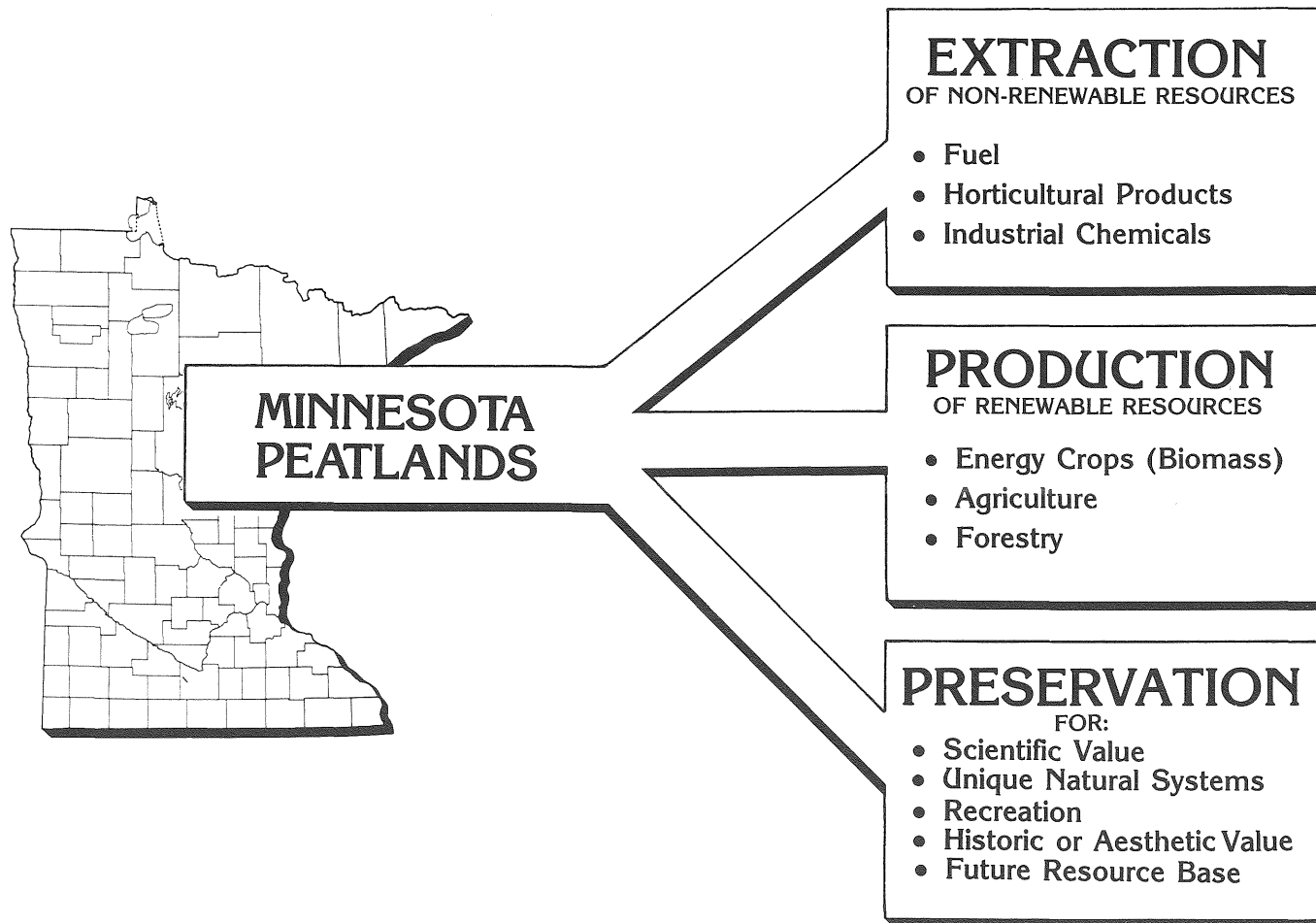


Figure 2

ANALYSIS OF PEATLAND DEVELOPMENT FOR ENERGY

Examining the Options

Mined peat or harvested energy crops can be converted into specific forms of energy through several approaches. They include 1) direct burning to produce processed heat or electricity with or without steam heat, 2) gasification to produce methane, 3) liquefaction to produce alcohol, and 4) briquetting or pelletizing for combustion.

A number of factors should be considered when comparing the economic feasibility and social desirability of these approaches to the development of Minnesota's peatlands for energy. First, the quality and quantity of energy demanded and its value in the market should be identified. The cost of each development approach is also a major concern. Components of total cost include private and public production costs, environmental costs, and user costs. The energy efficiency of each development approach is also of key concern and needs to be determined by considering all energy inputs associated with all aspects of the approach. Finally, the long- and short-term energy supply stability is an important factor when evaluating the desirability of any of these development approaches.

While all of these energy approaches are technically possible, their economic feasibility and social desirability have not yet been demonstrated. Current industry and government proposals for deriving energy from the state's peatlands are geared almost exclusively to large-scale peat gasification. To a much lesser degree, gasification of energy crops is also being considered. This focus on gasification is somewhat puzzling in light of the fact that the major energy-supply problems for the country and the state are related to decreasing supply and increasing prices of liquid fuels. Moreover, Minnesota has given little attention to the direct combustion and briquetting approaches, despite the fact that these have been traditional uses of peat elsewhere in the world.

Examining the Impacts

Any proposal to develop a part of Minnesota's peatlands for energy should be assessed in terms of its economic, social, and environmental effects. These effects and how they occur in a particular situation depend on the nature and scale of a specific project and its particular location in the state. The nature of a project is defined by the energy technologies and related activities associated with it. The scale of a project is its size in relation to other possible development approaches. The location provides the economic, social, and environmental context in which the development project is to occur.

Table 1 outlines the particular economic, social, and environmental impacts related to the nature and scale of a project. The degree to which these impacts are positive or negative depends in part on the characteristics of the particular areas where a project is located.

Anticipating the potential economic, social, and environmental implications associated with the nature and scale of a project is essential for locating a project in a geographic area which can best accommodate those impacts. Such anticipation also makes it possible to plan for minimizing or prevent-

ing detrimental impacts. When a project is sited in an area that cannot accommodate such development, the following detrimental impacts can occur:

1. Development which is rapid and nonorderly and therefore disruptive to existing social and economic systems.
2. Reliance on imported rather than the local work force.
3. Excessive demands or burdens on existing service networks.
4. Budget shortfalls in local governments due to increased expenditures for public services.
5. Increases in the cost of living due to rising demand for goods and services.
6. Inadequate supply and increased prices of housing.
7. Disruption or displacement of local commerce.
8. Environmental impacts which cannot be contained, mitigated, or prevented.

Development of Minnesota's peatlands for energy could enhance the state's economic and energy situations. However, development plans and state policies designed to realize those

Table 1. The Economic, Social and Environmental Impacts Related to the Nature and Scale of a Development Project.

| <u>ECONOMIC IMPACTS</u> | <u>SOCIAL IMPACTS</u> | <u>ENVIRONMENTAL IMPACTS</u> |
|--|---|---|
| <p><u>Jobs and Workers</u></p> <ul style="list-style-type: none"> • number of new jobs created • specific skills required of the labor force • mix of local and imported workers <p><u>Economic Stability</u></p> <ul style="list-style-type: none"> • long- and short-term stability of economic activity in the region • number of jobs which are seasonal or temporary <p><u>Public and Private Services</u></p> <ul style="list-style-type: none"> • commercial and industrial networks needed to provide goods and services to the development project • public services demanded by the development project • public and private services demanded by development-induced population growth • time required to make services available to the population. • ability of government to assume the costs of providing public services <p><u>Local Economies</u></p> <ul style="list-style-type: none"> • range of goods and services available • degree to which commercial enterprises are locally owned and operated • changes in cost of living | <p><u>Jobs and Workers</u></p> <ul style="list-style-type: none"> • stability of employment in affected communities • variety of skills, education and background of workers • mix of local and imported workers living in surrounding communities <p><u>Communities</u></p> <ul style="list-style-type: none"> • rate of economic and social change in affected communities • ultimate size and character of affected communities after development occurs • ability of affected communities to absorb changes in size and character • mix of new and original residents • diversity of religious practices • range of social opportunities • degree to which traditional lifestyles are disrupted • changes in local politics and government | <p><u>Land</u></p> <ul style="list-style-type: none"> • character and extent of land disturbance <p><u>Water</u></p> <ul style="list-style-type: none"> • potential changes in the quality of ground and surface waters • degree to which such changes can be geographically contained <p><u>Air</u></p> <ul style="list-style-type: none"> • character and extent of air pollution • degree to which pollutants can be geographically contained and technically mitigated or prevented <p><u>Wildlife</u></p> <ul style="list-style-type: none"> • potential alterations to native fish and wildlife habitats <p><u>Workers</u></p> <ul style="list-style-type: none"> • potential hazards to the health and safety of the labor force <p><u>Reclamation</u></p> <ul style="list-style-type: none"> • method of reclaiming mined land and the degree to which it can be restored to a usable state following peat extraction |

potential benefits must reflect careful consideration of the energy, economic, social, and environmental implications of peatland development.

The factors of nature, scale and location will influence whether a peatland development project will be of local social and economic benefit. The desirability of a particular energy development approach will depend on the quality and quantity of energy it produces, its value in the market, its cost and energy efficiencies, and its ability to contribute a stable supply of energy to Minnesota, especially over the long term. In this regard, the approach of growing energy crops provides an apparent advantage over extractive approaches, particularly because it produces renewable energy. However, the economic feasibility of any energy approach has yet to be demonstrated in Minnesota.

Appropriate scale is defined not in terms of absolute size, but by the ability of a particular project to provide economic and social benefits and minimal detrimental impacts in a specific location. The suitability of any location will depend on the nature and scale of the project planned as well as the characteristics of the site. Some locations will be inadequate for large-scale projects because they could not absorb the economic, social, and

environmental changes that development will bring. In such locations, consideration of smaller scale projects is more appropriate.

LEGAL AND REGULATORY FRAMEWORK

Because Minnesota has very little experience with peat development, peat is not specifically cited in most state laws governing mineral extraction or land use. Nevertheless, a panopoly of federal, state, and local laws and regulations have general applicability to peatland development. Because peat is not a mineral or a traditional energy source in this country, and because peat extraction is not quite like any other surface use such as agriculture or forestry, the status of peat in this regulatory framework is often unclear.

Research and Development Funding

The federal government's commitment to synfuels has caused peat research and development to focus on large-scale gasification instead of small-scale, renewable uses. There is a need for a broader research focus which state efforts could help fill.

Peatland Development Policy

No level of government has adopted an explicit peat policy. Minnesota is in need of a general policy towards peatland development which integrates goals related to energy, agriculture, economy, and environment.

Land Use and Transfers

Different types of landowners can make peatlands available in different ways. Although the law is unclear, use of peat is generally considered a right of surface ownership and is not included in mineral rights. The state, which owns the largest portion of peatlands, may not sell peatlands but may lease them with the approval of the Executive Council. A wide variety of local planning and zoning authorities may influence decisions to use peatlands.

Certificate of Need and Site Selection

The Certificate of Need for major energy facilities would apply to major peatland developments for energy purposes.

Water Conservation and Drainage

An extremely complex and confusing regulatory structure exists for decisions relating to water use and drainage. Interpretation and coordination will be required to determine how peatland use will fit into the existing framework of laws.

Mining and Reclamation

A major gap in the current regulatory scheme is that no federal or state mining or reclamation laws are written to include coverage of peat mining.

Environmental Regulation and Studies

State and federal laws regarding protection of air and water quality and preparation of environmental impact statements are adequate and appear to apply to peatland development. However, some coordination between the various agencies involved is needed.

Taxation

There are several different taxation methods which should be considered if peatland development is to occur. They include production, occupation, property, and income taxes. In addition, methods of distributing tax revenues must be evaluated to assure fair disbursement to various governmental levels.

Social and Economic Development

Many agencies at federal, state, regional, and local levels of government may be concerned with the social and economic effects of new peatland development. Again, coordination is required to assure comprehensive but not duplicated efforts.

Legal and Regulatory Options

There are three general approaches Minnesota

could take in administering decisions about peatland development. Option #1 would retain the current system but would clarify the ambiguities and fill the regulatory gaps as outlined above. Option #2 would continue emphasis on private initiative but provide for coordination of state regulation. It would create a mechanism for state and local government agencies to work together to simplify the peat decision-making process. Option #3 would create a new public-private structure. A public corporation could be given a range of powers, essentially allowing the state to be more directly involved in initiating the kind of peat development that would be most beneficial in the long run. Because peat could play such an important role in Minnesota's energy, employment, and economic future, and because of the extent of public interest in this predominantly public-owned resource, a creative new structure may be desirable.

Public Involvement

Minnesota citizens will want to be involved in decision-making about the future of the state's peatlands. While Minnesota's regulatory structure allows substantial formal involvement in specific permit processes, broad public in-

put regarding basic policy directions is much more
difficult to achieve.

RECOMMENDATIONS OF THE CURA PEAT POLICY PANEL

Based on its examination of the energy, economic, social, legal, and environmental issues included in its full report, the CURA Peat Policy Panel has formulated recommendations regarding development of Minnesota peatlands. These are directed to all interested in the future of the state's peatlands, including industry, government, and citizens.

Premises Underlying the Recommendations

1. Regions of Minnesota, particularly the Iron Range, are in need of local economic development and may benefit from peatland development.
2. The degree to which economic development is beneficial to citizens depends on the nature and scale of development as evaluated in the context of specific locations.
3. Unless current patterns of energy availability and use are altered, Minnesota and the rest of the nation can expect near- and long-term shortages of traditional fossil fuels accompanied by increasing prices associated with scarcity, decreasing accessibility, and changes in government regulation.

4. Portions of Minnesota's peatlands contain important and in some cases rare biological, geological, aesthetic, or other characteristics which could be disturbed or destroyed by development.
5. Many questions regarding the availability, utilization methods, and the potential economic, social, and environmental effects of peatland development are still unanswered. The recommendations offered in this report are based on research findings currently available.

Recommendations of the Panel

Development of Minnesota's peatlands for energy could improve the state's economic and energy situations. However, development plans and state policies must reflect careful consideration of the energy, economic, social, and environmental implications of peatland development. With this in mind the following recommendations are made.

1. A comprehensive state policy for peatlands should be established. Minnesota needs a coordinated and comprehensive policy for its peatlands. The Legislature should design a policy and establish appropriate institutions broad enough to encompass both public and private developmental interests. The policy should recognize that developing this resource is desirable but that it should occur only if it can be demonstrated that a) there will be positive economic, energy, and social results and b) any detrimental economic, social, and environmental impacts can be prevented or minimized. The Legislature should solicit broad public input by conducting public hearings throughout the state during this process of policy formulation.

2. Certain peatlands should be preserved. Before significant development commitments are made, appropriate governmental agencies, with the participation of citizen groups, should identify the type, size, and location of peatland areas to be preserved in their natural state. Such lands could be preserved for their scientific value, unique natural systems, recreational value, historical or aesthetic importance, or their value as a future resource.
3. An administrative structure should be created. Because so many interests and factors are involved in potential peatland development, it is imperative that a structure be created to coordinate and interrelate these interests and factors. Because the state is the single largest landowner of peatlands and because various state and local agencies have jurisdiction over decisions affecting peatland development, we recommend that the Legislature establish either a new structure that would bring together the public and private interests in peatland

development or a new state coordinating body to oversee development. Because the current regulatory and developmental framework is too fragmented to permit implementation of a rational and comprehensive development policy, the following are proposed:

- a. If the Legislature desires the state to be an initiator of and participant in peatland development, then the Legislature should create one or more public corporations to consist of governmental, citizen, labor, and private industry representation. This corporation could have jurisdiction in some or all areas of peatland development including energy utilization and planning, land use, resource utilization and processing, and regional economic and social development.
- b. If the state elects to remain as a regulator and "lessor," then the existing regulatory and developmental framework needs modification. Specifically, the Legislature should establish a coordinating structure to ensure that the interests of affected state and local agencies are represented in the decision-making process.

- c. Whatever structural model is ultimately selected for regulating and developing peatlands, it is necessary that the existing regulatory processes regarding water, drainage, and other environmental controls be clarified and coordinated.
- d. Because of the wide-ranging impact of peatland development on our state's energy, economic, social, and environmental conditions, it is imperative that opportunities for input from private developers and citizens be provided regardless of the structural model chosen. This input must be obtained before and at frequent points throughout the process. It is not sufficient simply to allow citizens to testify at permit hearings. The citizens of the state must be fully informed about the issues relating to peatlands before development decisions are made.

4. Energy proposals should be carefully evaluated.

The following factors should be considered in determining the desirability of specific proposals:

- a. The quality of energy to be produced compared with the quality demanded.
- b. The quantity of energy produced compared with the quantity demanded, and its value in the market.
- c. Total cost, accounting for all private and public production, environmental and user costs.
- d. Energy efficiency and the net energy contribution of the proposed development.
- e. Stability of the energy supply to be provided.

In this regard, the process of Certification of Need should be used to compare the proposed project's costs and benefits with those of other available alternatives. The existing process should be improved with a review of the criteria for certification. Some categories might be expanded to include smaller peat-related projects. Proponents of projects should demonstrate in detail that their total cost, capital

requirements and net energy contribution are competitive with those associated with general energy conservation strategies.

5. A well defined development policy should be adopted. The specific nature and scale of development should be matched with appropriate locations. The goals of such a policy should be:

- a. Development at a rate which assures orderly economic growth and desired social change.
- b. Development with beneficial long-term economic and social effects. Detrimental economic and social impacts can be prevented or minimized by locating development in areas capable of providing public and private services for whatever population growth may occur.
- c. Energy for use within the area as well as for export.
- d. Enhanced possibilities for containing, mitigating, and preventing detrimental environmental impacts.

Certificate of Need proposals should be specific to particular sites so that specific impacts can be considered and citizens from

the proposed development area can be involved.

6. Development should occur on a suitable scale.

Development of Minnesota's peatlands for energy should occur on a scale which is economically and technically feasible but small enough to:

- a. Promote and protect local economic activity and ensure the greatest possible level of locally owned and operated businesses associated with new development.
- b. Minimize the detrimental economic and social impacts often associated with large-scale development, including the disruption of the economic and social systems of existing communities.
- c. Contain, mitigate, or prevent detrimental environmental impacts by narrowing the geographic area of impact and by reducing the overall impact in any one location.
- d. Promote multiple uses of Minnesota's peatlands so that the resource can be made available to diverse energy and other development interests; and to provide the state with management flexibility over peatlands owned by or under its jurisdiction.

7. Production of wetland energy crops should be emphasized. The economic feasibility of producing

energy from peatlands in Minnesota, including energy crop production approaches, has not been demonstrated. However, we believe that utilization of Minnesota's peatlands for energy crop production is the most prudent approach for the following reasons:

- a. As a renewable energy approach, it offers the longest-term use of Minnesota's peatlands for energy and, thereby, enhances the long-term economic stability of the area.
 - b. This approach is potentially as versatile as extractive approaches because energy crops can be used as a feed stock for direct-burning, liquefaction, gasification, and briquetting.
 - c. This approach preserves Minnesota's finite, nonrenewable peat resource for future generations to use at a time when the state might face a more critical need for the products which can be produced from peat.
8. Conditions for extracting peat should be clearly defined. In situations where small-scale production of energy crops is clearly not technically or economically feasible,

small-scale approaches which require peat extraction--despite their nonrenewable use of the resource--should be encouraged if all of the following can be demonstrated:

- a. Such development will be of clear benefit in providing local economic activity and local employment.
- b. Such development will provide a locally available and usable source of energy.
- c. Detrimental economic, social, and environmental impacts of such development can be prevented or minimized.
- d. Reclamation of the mined peatland to a usable form is possible and will be guaranteed through arrangements with the peatland developer. Potential uses of mined peatlands should be evaluated from economic, social, and environmental standpoints, and a planned optimum mix of end-uses for the region should be projected as a guide to policy and regulation.

Because peat mining is currently not covered by state laws, the state must adopt a peatlands mining and reclamation law and the administrative rules necessary to implement the law.

9. Peatlands slated to become inaccessible should be considered for mining. Those peatlands slated to become inaccessible due to other kinds of development--such as those lands scheduled to become taconite tailings dumps--should be considered for mining. Appropriate state agencies should begin immediately to determine the exact location and acreage of such peatlands.
10. Research and development efforts should be broadened. In keeping with the preceding recommendations, current research and development efforts--now almost exclusively geared to large-scale peat mining, dewatering, and gasification--should be broadened to include research and development in the following areas:
 - a. Economic, social and environmental effects of peatland development.
 - b. Small-scale energy crop production.
 - c. Small-scale peat extraction.
 - d. Small-scale dewatering and conversion of energy crops and peat.
 - e. Methods to contain, mitigate, and prevent detrimental environmental impact.

f. Reclamation.

In order not to rely primarily on federally funded research and development projects, state agencies should expand their work in those research areas that are not currently of interest to the federal government.

11. Demonstration projects should be started. Among other research and development efforts, the state should begin demonstration projects as soon as possible that are consistent with the policies developed in this report. These projects should be funded by industry and government and could be located on peatlands slated to become inaccessible as described in Recommendation 9. Such projects should include examination of the technical and economic feasibility of:
- a. Land preparation for energy crop production and peat extraction.
 - b. Small-scale approaches for energy crop production--both to produce energy on unmined peatlands and as a technique for reclaiming mined peatlands.
 - c. Small-scale approaches for peat mining.
 - d. Small-scale approaches to energy crop and peat utilization.
 - e. Dewatering and conversion of energy crops

and peat.

f. Reclamation approaches.

12. Sufficient lead time is required. Lead time should be required to prepare for potential development impacts. This lead time will allow a sufficient period of time for private and public service providers to prepare for the development project by either expanding or adjusting their supply of services. Leases for peatland development should not be approved until plans for preventing or minimizing the potential impacts have been formulated. Requirements in the lease agreement should include that the developer aid state and local government in the formulation and implementation of plans to prevent or minimize potentially adverse impacts.
13. Peat revenue policy should be established. Because peat is not subject to special treatment under our tax laws, it is doubtful that revenues from our current system of taxes, rents, and royalties will compensate for the costs attendant to peatland development. Therefore, state revenue laws should be written to:
- a. Establish a tax that recognizes the

unique results and costs attendant to both extractive and nonextractive uses.

- b. Tax extractive and nonrenewable uses in ways generally comparable to mineral taxation (with consideration given to both production and occupation taxes).
- c. Tax nonextractive and renewable uses in ways generally comparable to agricultural land taxation.
- d. To the extent permitted by the constitution, establish a preference by the use of favorable tax rates to encourage the utilization of peat to solve Minnesota's energy needs.
- e. That tax revenues, rents, and royalties be distributed in ways designed to compensate fairly the government units absorbing the costs of peatland development.

14. A peatland leasing policy should be established.

As the primary landowner of peatlands, the state's ability to lease peatlands will be a primary means of controlling the nature, scale, and location of development.

- a. For purpose of legal title to lands, peat should be statutorily established as a surface use rather than as a mineral right.

This will recognize that peat is a surface

resource and will be consistent with Minnesota Department of Natural Resources' current administrative treatment of its status.

- b. The state should make full use of its authority to place conditions on a lease in order to ensure that environmental, financial, and other obligations are met by developers.
- c. The maximum number of years currently allowed for leases may be too short for non-extractive uses, and should be reviewed.
- d. The creation of any new decision-making structure to manage and regulate Minnesota's peatlands would include appropriate changes in existing leasing authority. However, if the existing structure is retained, Executive Council approval and legislative consultation should be required for all leases which are major in size or duration.

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