

**A Proposal For**

**DEVELOPMENT OF EUROPEAN MARKETS AND SOURCES  
FOR LIGNITE TECHNOLOGY**

To

North Dakota Lignite Research Council

By

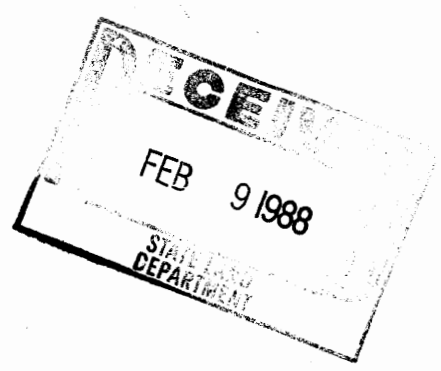
The University of North Dakota School of Engineering and Mines Foundation

Principal Investigator: Dr. H. Peter Hombach

Amount of request: \$25,000

Phase 1: \$5,000

Phase 2: \$20,000



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SCHOOL OF ENGINEERING AND MINES  
BOX 8103, UNIVERSITY STATION  
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(701) 777-3132

February 26, 1988

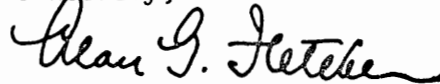
Mr. Timothy L. Kingstad, Secretary  
Executive Committee  
Lignite Research Council  
North Dakota State Land Department  
State Capitol  
Bismarck, ND 58505

Dear Mr. Kingstad:

The University of North Dakota School of Engineering and Mines Foundation is pleased to submit the enclosed proposal entitled: "Development of European Markets and Sources for Lignite Technology". This program will open new European markets for North Dakota lignite technology and will offer exposure to European technologies which may lead to enhanced or expanded utilization of North Dakota lignite.

We look forward to working with the Council to advance and enhance the many ways in which North Dakota lignite can serve the region's and the nation's energy and materials needs.

Sincerely,



Alan G. Fletcher, President  
School of Engineering and Mines  
Foundation

AGF/slc

Enclosure

DEVELOPMENT OF EUROPEAN MARKETS AND SOURCES  
FOR LIGNITE TECHNOLOGY

**SUMMARY**

The program will allow lignite-related industries and research institutions operating in North Dakota to scan opportunities for technology transfer and development with European counterparts. Conducted by the UND-NDSU Technology Transfer Office in Europe (TTO), the program will identify European markets for technology developed in the utilization of North Dakota lignite and, likewise, European technology which can be licensed or developed in North Dakota.

The support of the North Dakota Lignite Research Council will allow the UND-NDSU TTO to have as one of its foci, the interests of the North Dakota lignite community. Presently representing the two major universities of the state, the Grand Forks Region Economic Development Corporation, and Northern States Power Company, the TTO is operated by the UND School of Engineering and Mines Foundation as a service to North Dakota entities desiring a permanent marketing presence in the European Community on a shared service basis.

The proposed program contains two phases. Phase One will support a delegation of representatives from the North Dakota lignite community, in conjunction with university personnel, to visit West German government, energy, and chemical industry representatives. The visit is proposed for late April, 1988. Phase Two is programmatic support for the TTO to represent the interests of the State of North Dakota and the private sector as related to lignite development.

The Phase One request is for \$5,000 to be expended during the second quarter of 1988. The Phase Two request is for an additional \$20,000 to be expended during the period of July 1, 1988 - June 30, 1989, or at such time as the Council may join subject to available funds.

DEVELOPMENT OF EUROPEAN MARKETS AND SOURCES  
FOR LIGNITE TECHNOLOGY

**OBJECTIVES**

The overall objective is the establishment of successful business ventures and additional research programs, either new or expanded, resulting from cooperative European-North Dakota technology transfer supporting the utilization of lignite and associated wastes and by-products. The principal sub-objectives are as follows:

1. Identify potential European markets for technology associated with the utilization of North Dakota lignite. New ventures resulting from these markets will bring new business and profits to North Dakota lignite industries.
2. Identify European technology which could be utilized profitably in North Dakota industries related to the utilization of lignite and its waste and by-products. This will enhance North Dakota lignite utilization through expansion of existing industries and through European investment in new businesses in North Dakota.
3. Facilitate meetings between the appropriate North Dakota and European groups to explore the possibilities for research or business agreements.
4. Assist in contract negotiation between North Dakota and European groups.

## BACKGROUND

Perhaps the first major example of successful technology transfer between North Dakota and Europe occurred with the introduction of the sugar beet and related processing technology from France and Germany. During the nineteenth century, sugar beets had become established as a primary source of sugar in Europe. In 1891, Earle J. Babcock, then Professor of Chemistry at UND, conducted the first assessment of soil and growing conditions to determine if the sugar beet was adaptable to North Dakota. The results were positive and North Dakota proceeded to nurture the industry.

It is the intent of the proposal to perform a similar function in emerging technological areas related to the utilization of lignite and the waste products and by-products which result from the utilization of lignite. Specifically, this proposal invites the State of North Dakota and the lignite interests operating within the state to participate in a program of technology assessment and testing which may lead to the development and commercialization of products or processes in North Dakota based on European experience. Likewise, the project will seek opportunities to license North Dakota-derived technologies developed for the utilization of lignite and related wastes and by-products.

The UND-NDSU Technology Transfer Office in Europe (TTO), which is administered by the UND School of Engineering and Mines Foundation, provides the means for executing this program. This proposal would allow the TTO to direct a major portion of its effort to develop business opportunities associated with North Dakota lignite and the waste and by-products which result from utilization of lignite.

A partial listing of TTO accomplishments to date and projects under consideration clarifies the objectives and the methodology of the TTO. Although the TTO received official authorization from the University of North Dakota School of Engineering and Mines (UNDSEM) Foundation on October 1, 1987, Dr. Hombach, the Director, has actively pursued many TTO projects throughout the year leading up to the official announcement. Support for these prototype projects has been through the UND School of Engineering and Mines, the Grand Forks Region Economic Development Corporation, and Dr. Hombach's personal efforts.

1. Third International Conference on Technology Centers (Berlin, 1986): Dr. Hombach was an invited speaker at the workshop on "International Marketing and Technology Transfer". He manned an exhibition booth for UND at the Berlin International Convention Center as part of this conference. Contacts at this exhibition included representatives from Spain, Italy, Sweden, Ireland, Great Britain, South Africa, Luxembourg, and Hungary.
2. High purity silicon for semiconductor applications: Dr. Hombach has met with the vice president for marketing of a major European silicon manufacturer and presented a basis for this company to locate a manufacturing facility in North Dakota. This firm's interest continues as Dr. Hombach provides additional supportive information for this proposed facility.

3. North Dakota manufacturing facilities for European companies: Dr. Hombach has identified additional European companies with potential interest in manufacturing in North Dakota. A site visit is in the planning stage for representatives of some of these companies to see North Dakota and to talk with various company and economic development representatives.
4. Government cooperation: Dr. Hombach has initiated communication and good will between the State of North Rhine-Westphalia and the State of North Dakota. A visit to Essen by North Dakota Attorney General Nick Spaeth on October 5-6, represented North Dakota's follow-up to the government contacts arranged by Dr. Hombach in West Germany.
5. Coal gasification: Dr. Tino van der Zeyde, a Dutch expert in coal gasification with over 30 years of experience at the SASOL site in South Africa, visited the Great Plains Gasification Plant and explored research opportunities with GPGP. This trip was initiated and coordinated through Dr. Hombach and UNDSEM.
6. Visit to North Dakota by West German electric utility executive: In June, 1987, Dr. Herbert Troescher, Vice President of RWE, the largest electric power producer in North Rhine-Westphalia, and manager of ETEC, an organization designed to foster new technology-oriented industries in the region, visited North Dakota to assess business and research opportunities. Dr. Hombach initiated and coordinated this trip. Based on Dr. Troescher's favorable report, RWE invited Professor C. D. Turner, in UNDSEM's Department of Civil Engineering, to visit West Germany to develop a working relationship with potential technology transfer clients. The trip focused on environmental technology topics presented during Dr. Troescher's visit to North Dakota.
7. Follow-up visit to Essen, West Germany, by Professor C. D. Turner in July, 1987: Five contractual areas of interest were identified and discussed in detail. Preliminary proposals are being review by West Germany energy companies.
8. Aerospace technology: Dr. Hombach has initiated discussions with the German space agency DFVLR on behalf of UND's Center for Aerospace Studies.
9. Energy technology: Many additional energy-related technologies have been identified by Dr. Hombach as candidates for cooperative development between West German and North Dakota companies. These range from the potential use of oxidized lignite for wastewater purification to the use of lignite char for  $SO_x - NO_x$  removal in flue gas.

## GOALS

The principal activity of the TTO will be the identification of technology transfer opportunities and the facilitation of contacts between interested parties. As a broker of information, the TTO cannot guarantee successful business transactions. Successful contracts or business deals will ultimately be consummated by other industry or research entities. The goals of the TTO, therefore, are to initiate a base level of marketing activity in the European Community which generates contacts of interest to the lignite community in North Dakota.

The specific goals of this proposal are as follows:

### Phase One:

- \* Arrange governmental, industrial, research, and economic development contacts related to the lignite (brown coal) industry in West Germany for visitation by a North Dakota delegation of energy and university representatives in the spring of 1988.
- \* Outline a follow-up contact and development program for pursuing those technologies available in West Germany, and other parts of the European Community, which may be of interest to North Dakota parties as a result of the delegation visit.

### Phase Two:

- \* Outline at least five technology exchange or business venture opportunities which would be of interest to members of the North Dakota lignite community.
- \* Facilitate and summarize the findings of at least three meetings between North Dakota and European groups to explore technology transfer opportunities based on the opportunities outlined above.
- \* Host one conference in North Dakota on cooperative European-North Dakota business ventures with a strong emphasis on lignite-related technologies.

## METHODS

### Phase One

A North Dakota delegation of two representatives from the lignite industry, to be accompanied by two/three university representatives, is proposed for 1988 (April/May). The delegation will visit representatives of the State of North Rhine-Westphalia, the City of Essen, electric utility and coal mining companies, chemical and materials companies, and other businesses representing West German efforts to diversify its electrical generation load and to minimize environmental problems. The trip will be arranged and hosted by Dr. Hombach.

The contacts and technology transfer opportunities made during the delegation visit will be summarized by the TTO and made available to interested companies for their follow-up with the assistance of the TTO. A program plan for additional follow-up work on behalf of North Dakota lignite interests will be prepared as a prerequisite to the funding of Phase Two. Phase One will be complete by June, 1988.

### Phase Two

Phase Two will allow the TTO to emphasize lignite development efforts within its program plan. The specific program efforts and time commitments of the TTO are determined by specific sponsor interests. It is proposed that the Chairman of the Lignite Research Council, or designee, will be a member of the Advisory Board to the TTO if Phase Two is adopted.

Phase Two will include preparation of "opportunity abstracts" by the TTO based on contacts made in Europe and in North Dakota. These abstracts will consist of preliminary market plans designed to allow evaluation of the business prospect by financial and management personnel.

The TTO will facilitate meetings of North Dakota and European business interests by expediting background information exchange and conducting preliminary market and technical investigations prior to making arrangements for face-to-face discussions and associated travel.

The TTO will assist contract negotiation and administration, if desired, by interested business parties. This assistance will include: currency exchange transactions, translation services, background information on business methods of a particular company, information on the necessary legal services for contract negotiation, communication with the appropriate foreign consuls and embassies to expedite contracts and agreements.

Dr. Hombach maintains an alternating schedule of approximately two months in North Dakota, followed by two months in West Germany and other parts of Europe. While in North Dakota, Dr. Hombach works with the sponsors of the TTO and the research community of the state to identify technology interests and opportunities for development in Europe. While in Europe, Dr. Hombach develops contacts for the opportunities identified in North Dakota and will identify additional technologies and business opportunities which match the interests of the TTO sponsors in the state.



Under Phase Two, the TTO will report on the activities of the TTO, relative to lignite business/technology opportunities, to the Chairman of the Lignite Research Council, or his designee.

### **TIMETABLE**

#### Phase One

Preliminary contacts for the North Dakota delegation to West Germany have already been made. Formalization of these contacts will be made immediately upon confirmation of support for Phase One. An April/May, 1988, target date for the visit is proposed, subject to the timetable of the North Dakota and German participants.

#### Phase Two

The ongoing marketing activities of Phase Two, subject to available funds, would commence on July 1, 1988, and continue through June 30, 1989, under this proposal. At the completion of this period, the North Dakota Lignite Research Council, or individual lignite companies, would have the option of renewing sponsorship of the TTO. Individual companies may, at any time, provide sponsorship support of the TTO to secure individualized services.

"Opportunity abstracts" will be developed throughout the course of the year and submitted as they are developed. Meeting reports relative to lignite technologies or business ventures will be submitted within two weeks of prospect contact. An annual report will be prepared summarizing the highlights of the year's activities, together with a proposed program plan and budget for the coming year.

### **PERSONNEL AND QUALIFICATIONS OF APPLICANT**

Appendix A includes vita of Dr. H. Peter Hombach, Director of the TTO; Mr. Don Mathsen, Director of Development of the UND School of Engineering and Mines; and Dr. David Watt, Manager of Program Development for the UND School of Engineering and Mines. Mr. Mathsen will serve as the principal North Dakota contact for the TTO during Dr. Hombach's presence in Europe. Dr. Watt will provide liaison support and project development services for TTO sponsors and clients.

The TTO is a program of the UND School of Engineering and Mines Foundation. The Foundation is a 501(c)3 not-for-profit North Dakota corporation established for the purpose of encouraging and facilitating technology transfer and educational programs. The Foundation's Board of Trustees is enclosed in Appendix B. In addition to the TTO, the Foundation administers the Center for Innovation and Business Development (CIBD), which provides marketing and business plan and invention evaluation services to small businesses and entrepreneurs in North Dakota and the surrounding region.

Via the CIBD, the Foundation sees approximately 300 product/process ideas per year from North Dakota and regional entrepreneurs/inventors. In addition, the Foundation provides a mechanism for the School of Engineering and Mines to commercialize technologies derived in its research laboratories.

The TTO in Europe is presently being established as a GmbH in West Germany. The GmbH is a limited liability corporation. Thus, the maximum financial exposure of any participant in the TTO program is limited to the sponsorship funds. The TTO provides currency exchange services through a bank account with Sparkasse Essen, which has direct transfer access to an account with the First Bank of Grand Forks.

Presently, the TTO represents the University of North Dakota, North Dakota State University, and the Grand Forks Region Economic Development Corporation and Northern States Power Company. Other sponsors are being sought.

The TTO has offices in Essen, West Germany, and in the Development Office of the UND School of Engineering and Mines at Grand Forks. Essen is located in the State of North Rhine-Westphalia in the heart of West Germany's brown coal region. The West German coal and electrical generation industry is dominated by Rheinisch-Westfaelisches Elektrizitaetswerk (RWE) which is headquartered in Essen. With 126 power plants in West Germany, RWE is a major developer and user of state-of-the-art coal conversion technologies.

While the populations of North Dakota and West Germany are significantly different, the economic pressures are similar. West Germany is undergoing strong pressure to diversify its economic base, particularly with respect to its natural resource production industries. Major programs have been established to produce new technology-oriented industries. One of the missions of the TTO will be to encourage the business leaders of these emerging European companies to consider North Dakota as the base of their North American operation for both the U.S. and Canada.

## BUDGET

The TTO has been launched with local funds from the University of North Dakota (\$20,000), the Grand Forks Region Economic Development Foundation (\$5,000) and Northern States Power Company (\$10,000) for a total match against this proposal of \$35,000, as per Appendix C<sup>1</sup>. Additional support of the TTO from individual companies is being invited through the forum of the Lignite Research Council.

Phase One requests \$5,000 to be applied against the cost of sending a delegation of North Dakota energy and university representatives to West Germany to establish a rapport on possible technology transfer and cooperative business opportunities. The travel costs of the entire delegation will be reimbursed equally by the Foundation to the level of this award. Any additional travel costs not covered will be the responsibility of the individual participant or his/her company. No indirect costs or handling fees will be associated with administering these funds.

Phase Two requests \$20,000 to be applied to the programmatic operating costs of the TTO for the period of July 1, 1988, to June 30, 1989, for the purpose of focusing program activities on the specific interests of the lignite community in North Dakota. A portion of these funds will be dedicated toward the organization of a conference in North Dakota for Fall, 1988, at which European energy and business representatives will participate with appropriate North Dakota counterparts to further discuss cooperative business and technology opportunities.

It is the goal of the Foundation that the TTO become financially self-sufficient at the earliest possible time. This will be accomplished by placing a service fee on every contract or financial agreement originated and developed by the office. For contracts involving sponsors of the TTO, this fee will be negotiable subject to contract size, but within the range of 3-10% of the total. For contracts not involving sponsors of the TTO, this fee will be a minimum of 10%, plus direct expenses.

Support of Phase B of the proposal will cover the direct expenses associated with developing contacts for lignite related programs. Consequently, fees on agreements involving lignite technologies or business activity will be limited to 10% of the total. If an individual energy lignite-related company becomes a sponsor, in addition to the participation of the Lignite Research Council, that company will be eligible for the lower negotiable rates.

<sup>1</sup> The TTO was formally launched on October 1, 1987. A small amount of the total \$35,000 has been expended for the operating costs of the Office; however, the remaining balance exceeds the 50 percent matching requirement of the program.

**PROPOSED BUDGET FOR EUROPEAN TECHNOLOGY TRANSFER OFFICE**

Request of North Dakota Lignite Research Council

Phase One:

Travel Costs for North Dakota Energy Delegation To West Germany:	\$ 5,000.00
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Phase Two:

Salaries and Benefits	\$ 15,000.00
Supplies and Promotional Materials	2,000.00
Travel (within Europe)	<u>3,000.00</u>
Total Phase Two	20,000.00

Cost Sharing:

University of North Dakota (Appendix C)	\$20,000.00
Grand Forks Region Economic Development Corporation (Appendix C)	5,000.00
Northern States Power (Appendix C)	10,000.00
Other Participants (Invited)	<u>20,000.00</u>
Total Program	\$ <u>80,000.00</u>