Environmental Management Technology Leveraging Initiative

Topical Report

October 1994 - September 1995

RECEIVED
FEB 26 1997
OSTI

Work Performed Under Contract No.: DE-FC21-94MC31179

For

U.S. Department of Energy
Office of Environmental Management
Office of Technology Development
1000 Independence Avenue
Washington, DC 20585

U.S. Department of Energy
Office of Fossil Energy
Morgantown Energy Technology Center
P.O. Box 880
Morgantown, West Virginia 26507-0880

MASTER

By
Global Environment and Technology Foundation
7010 Little River Turnpike
Annandale, Virginia 22003

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

Disclaimer

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

**Portions of this document may be illegible
in electronic image products. Images are
produced from the best available original
document.**

GETE

TABLE OF CONTENTS

<u>PURPOSE</u>	<u>1</u>
<u>BACKGROUND</u>	<u>1</u>
<u>METHODOLOGY</u>	<u>2</u>
<u>COMMERCIALIZATION PROCESS</u>	<u>2</u>
IDENTIFICATION	3
SCREENING	5
SELECTION	7
TECHNOLOGY ASSESSMENT	8
MARKET ASSESSMENT	9
TECHNOLOGY BROKERING	9
BUSINESS PLANNING AND START-UP	9
FINANCIAL DEVELOPMENT	10
<u>INFORMATION</u>	<u>10</u>
GLOBAL NETWORK FOR ENVIRONMENT AND TECHNOLOGY	11
TECHNOLOGY DEVELOPMENT	11
CONTENT DEVELOPMENT	13
GNET TECHNOLOGY CENTER	14
GNET MARKET CENTER	14
GNET NEWS CENTER	15
GNET GOVERNMENT CENTER	15
GNET CONVENTION CENTER	16
GNET CONFERENCE CENTER	16
<u>OUTREACH METHODOLOGY</u>	<u>16</u>

<u>ACCOMPLISHMENTS & STATUS</u>	<u>17</u>
COMMERCIALIZATION PROCESS	17
INFORMATION	18
OUTREACH	19
<u>CONCLUSIONS</u>	<u>20</u>

INDEX OF FIGURES

Figure 1 - Technology Screening Criteria.....	4
Figure 2 - An Adaptation of the Technology Investment Decision Model from GETE.....	8
Figure 3 - Commercialization Process Flowchart.....	13

LIST OF ATTACHMENTS

ATTACHMENT A - GETE Standardized Process Acceptance Screening
ATTACHMENT B - Technology Identification & Specification Process Selection Screening

Purpose

The deployment of innovative DOE-EM technologies could provide more cost-effective treatments than remediation technologies and methods currently in use. By building partnerships between the public and private sectors, the technological expertise of federal researchers and engineers and the commercial incentive of industrialists and other non-government interests can combine to help move these technologies "off the shelf" and toward use at contaminated sites.

The GETE approach to achieving this end is: 1) to develop a process which identifies and assesses DOE-developed technologies from the perspective of commercial marketability; assists in bringing these technologies to the attention of the private sector; and aids, if necessary, in business planning and start-up activities, 2) to establish a state-of-the-art electronic communications system, the Global Network of Environment & Technology (GNET), to disseminate information on DOE-developed technologies, as well as information on capital and financing availability, regulatory matters, and commercialization objectives to potential business partners and others, and 3) to undertake public participation and outreach activities designed to address barrier reduction and public acceptance issues.

Background

The Office of Environmental Management(EM) was established in November 1989 and was tasked with cleaning up environmental pollution at DOE facilities, preventing further environmental contamination, and instituting responsible environmental management. The DOE complex environmental challenges are unique and as such, cannot follow an industry standard approach. The mission cannot be fully achieved using existing technology, without incurring high costs and possible long delays. Additionally, barriers exist that prevent newly developed or innovative technologies from entering the marketplace.

The EM's Office of Technology Development (OTD) supports applied research and demonstration efforts to develop and transfer innovative, cost-effective technologies to its site clean-up and waste management programs. The GETE process seeks, at a minimum, to identify and facilitate the use of those technologies that meet the needs of the OTD Focus Areas and which show the best commercial promise. These Focus Areas are: Contaminant Plume Containment and Remediation; Mixed Waste Characterization; Treatment and Disposal; High-Level Waste Tank Remediation; Landfill Stabilization; and Facility Transitioning, Decommissioning, and Final Disposition; Crosscutting-Robotics- Characterization, Monitoring and Sensor-Efficient Separation and Processing.

Methodology

The GETE program is an innovative approach for developing and implementing strategies and methods to transfer DOE technologies and solutions to industry and ultimately use in field applications. There have been previous efforts that have provided some foundation to the "enterprise" concept but a formal process methodology has yet to be implemented.

The one goal of the GETE program is to develop and implement this methodology. Early in the development of the program, a total of 8 tasks were identified as necessary to accomplish the goal of the program. They included:

- Global Network for Environment Technology (GNET) Information
 - Database Integration
 - GNET Structure and Tools
- Technology Identification
 - Technology Assessment
 - Technology Commercialization Barrier Assistance
 - National Laboratory and DOE Complex Interface Assistance
- Market Assessment
- Technology Brokering
- Business Planning and Startup
- Financial Development
- Outreach Materials
- Public Participation Initiatives

These tasks have been grouped into the three major elements of the program: information, commercial assistance, and outreach. The GETE team prepared a work plan to facilitate a level of effort for each of the tasks listed which included development of a process to implement commercialization activities. This process is described in the next section with results and discussion later in the report. The process represents public and private sector input solicited by the GETE team.

Commercialization Process

The GETE commercialization process has been developed to integrate the EM focus areas into successful commercialization activities. It builds on the "Technology Investment Decision Model" proposed by the Office of Technology Development. Further, the success of the process hinges on close coordination and cooperation between the Focus Area manager and the GETE team.

The GETE 20 step commercialization process is divided into three phases of development. They are:

- Identification Phase: During this phase, technologies are identified, screened, and selected for a wide variety of activities collectively referred to as the GETE Assistance Package.
- Qualification Phase: In-depth value assessment of a technology's commercial viability is conducted in this phase in regards to a technology's potential (technology assessment) and market potential (market assessment).
- Commercialization Development Phase: This phase includes Technology Brokering (to both DOE and non-DOE technology consumers); Business Planning and Start-up activities, and Financial Development

These phases are discussed below in a process that is oriented at rapidly selecting those advanced environmental technologies with the best commercial promise. A diagram illustrating the entire process is provided as Figure 1. The specific steps from the chart are referred to in the text and marked (*e.g., step 1*) and also laid out in Figure 3. It should be noted that to be selected, a technology will require substantial supporting data, potential usage, and the market segments it matches.

Identification

Ideally the technology identification process begins with an initial contact with the responsible EM-50 Focus Area Project Managers (*step 1*) and then contact is made with the appropriate field representatives. It is the responsibility of the GETE program to develop a working relationship with the Focus Area contact and maintain the partnership over the life of the various projects to ensure effective utilization of the GETE commercialization activities.

When key Focus Area field personnel are identified, a visit to the field office of the lead organization that is responsible for technologies is arranged (*step 2*). During site visits, GETE personnel outline the goals and objectives of the program and listen to the concerns and opinions of the Focus Areas. If requested, GETE personnel can work with the focus area to develop technology identification criteria that are specific to that group's internal success factors. While it is a goal of GETE to review technologies as early in the technology development cycle as possible, initial efforts in this direction will focus on the more mature technologies.

Technology Availability Program Screening Criteria

Figure 1 - Technology Screening Criteria

The diagram (figure one above) illustrates the first step in the GETE commercialization process. The focus areas, working with GETE, will identify those EM developed technologies that have the highest probability to meet their requirements for environmental remediation. GETE will assist in this sorting out process, as requested by the focus area, to help them determine which technologies (*step 3*)(or private companies which already hold DOE technologies) require assistance in bringing the technology to the marketplace. The process requires the Focus Areas to ask the following three questions:

Is there a private sector company already involved with the technology? If the answer is yes then proceed; if the answer is no, then the focus area must decide whether there is sufficient interest to warrant the search for a commercial partner.

Is the technology nearing commercial readiness? This requires a definition of the status of the technology as defined by the DOE Technology Investment Model (see figure two below). GETE, at the request of the focus area, can become involved early or late in the process depending on the needs of the focus area.

Does the company holding the technology require assistance? This requires the focus area, with perhaps input by GETE, to provide an opinion as to the commercialization capabilities and commitment of the partner. The GETE

commercialization activities are designed to assist those companies that request and/or require such assistance.

Figure 2 - An adaptation of the Technology Investment Decision Model from GETE

The focus area will be asked to rank technologies so that the highest priorities (Top 5) receive the appropriate level of resources. Working together, GETE and the Focus Areas will initially arrive at a list of technologies that appear to be at DOE technology development gates Four through Six (engineering development, demonstration, production and implementation, respectively). While it is a goal of GETE to look at technologies at the earlier gates, efforts in this direction will be implemented as the program matures. It should be noted that GETE is open to review technologies that are identified by other means, such as directly from a national laboratory or from industry. However, these technologies should have a significant EM-50 financial investment, meet a need within DOE, and be of interest to the focus area.

Screening

There are a wide variety of screening activities that must be accomplished but, the direction these activities take will depend upon whether or not there is already a commercial partner. The first screening category, CLASS I, are those technologies

that do not have a commercial partner. The second category, CLASS II, are those technologies that already have such a partner (*step 4*).

The case where GETE must find a commercial partner is defined as Class I assistance. This means that the focus area has strongly expressed interest in a technology, but the technology lacks a commercial partner. GETE's first responsibility is to understand the technology and get a determination as to the status of the technology's Intellectual Property (*step 5*). This step is accomplished by using the GETE standardized "Process Acceptance Screening" [Attachment A]. This list of questions is intended to assist the GETE investigator in rapidly examining a technology in order to determine its general commercial potential. For those successfully screened technologies, the form is also used as a basic check list to assist in collecting relevant data.

It should be noted that several of the questions [Attachment A] are considered to be "deal killers," and negative answers to any of these will make successful commercialization unlikely. This likely will result in the technology not being recommended by GETE for its commercialization support activities. Areas of significant concern include:

- The identification and cooperation of the Principal Investigator
- The status of the Intellectual Property Rights
- The indication that the technology is not a clear improvement over baseline technology
- The existence of regulatory barriers which would limit or prohibit the implementation of the technology.

If a technology has no commercial partner, then GETE, through such venues as GNET or the Commerce Business Daily, can actively seek to find an appropriate commercial partner (*step 13*).

In accordance with the Fairness of Opportunity Plan, GETE has various ways which it may selectively use to find commercial partners:

- publish descriptions of selected technologies, with the appropriate point of contact within GETE, on GNET;
- publish, on a quarterly basis, an opportunity announcement in the Commerce Business Daily, with the appropriate point of contact within GETE, articulating the opportunity for commercializing EM-OTD technologies;
- attend trade shows to provide businesses, especially small and disadvantaged ones, access to commercialization opportunities;

- publish identified technologies in trade journals, technical publications, trade shows and technical conferences, and media announcements; and,
- publish a public notification regarding the general terms of agreement in the Commerce Business Daily once an agreement is reached.

GETE may recruit specific companies it believes would be interested in participating in the commercialization of certain technologies, in which case GETE will publish a public notification in the GNET bulletin board expressing the intention for seeking potential commercial partners. A period of at least 21 days will be allowed for indications of interest prior to seeking to enter into a direct agreement with any organization for the specific technology.

The GETE program practices sound business etiquette. The program maintains a "Proprietary Information Data Log" documenting all information shared with all potential commercial partners concerning a particular technology and ensuring equal treatment to any potential commercial partner.

Selection

After the screening process described above, GETE will make a recommendation back to the Focus Area as to the likelihood of commercializing the technology. Should the answer be negative, GETE assistance with this technology will cease. If the answer is positive, then GETE will proceed with an in-depth review of the technology to formally commit resources for the GETE Assistance Package.

For those technologies that have passed the screening process, the next step is for GETE personnel to complete the "Technology Identification & Specification Process Selection Screening" form (*step 6*)[Attachment B]. This form is designed to help GETE obtain sufficient information upon which to base a commitment of resources decision. GETE personnel will work directly with the Focus Areas, the individual Private Investigator, or company representatives as appropriate, to determine who can best assemble the required information to complete the form. Information that is completed on the form is used by the GETE Team to plan further action. This team will independently review the technology's potential and reach a consensus as to its commercial viability.

Insofar as possible, the screening process is designed to allow early selection of technology for GETE action and support, predicated on a purely commercial basis and with minimal duplication of information gathering. Completion of this form and collecting an adequate level of detail in the answers to the questions are extremely important steps in the commercialization process, since the acceptance of a technology into the GETE process is highly dependent upon a successful evaluation of the technology's commercial potential. Upon completion of the form, the GETE investigator should have derived adequate information to allow the review team to

immediately apply the selection criteria discussed above, this time in its entirety. This review will allow investigators to arrive at a preliminary judgment regarding the potential commercial utility of the technology under consideration. The criteria are subjectively weighted by the Team during the selection process and define the next course of action.

It is at this point that either CLASS I or CLASS II activities will be defined by a formal work plan which outlines the potential level of efforts by GETE (*step 7*); the technology holder; and, as applicable, the private company. Integration will be effected with the Site Technology Coordination Groups (STCG's) (*step 8*). To find commercial partners for CLASS I technologies, activities will likely include doing a preliminary market assessment; preliminary business and financial support planning; and brokering the technology to potential partners (*steps 10, 11, 12, 14*). These activities are all designed to attract a capable commercial partner. Once a partner is found, CLASS I activities associated with this technology become CLASS II activities. NOTE: If the commercial partner has already shown a strong interest in the technology and is evaluated as a very capable company, little or no GETE assistance may be required for commercialization. GETE, however, will follow the commercial progress and will re-evaluate a technology should circumstances change.

Technology Assessment

When the GETE commercialization process was first developed, it was believed that all technologies selected for the GETE Assistance Package would require a formal Technology Assessment (*step 9 or 15 depending on class*). Experience during the first year of activities has shown that this is not the case. Therefore, depending on the technology and its source of origin, a formal assessment will only be performed when agreed to by either the focus areas or GETE.

This technology assessment would include not only a technical evaluation, but also evaluates potential commercial viability, competition, and other such factors in determining if, in fact, the technology is ready or viable for the commercial marketplace. Because this step requires in-depth information, continued liaison with the Focus Areas (and others) is required in order to avoid burdening field activities with multiple requests for information.

Once the information is assembled, the GETE Review Team will perform the technology assessment. Should it be deemed that a statistical based review of the assessment be necessary and required, then it is recommended that an automated system such as the one used by the Plume Focus Area be employed to rate the technology.

Market Assessment

A key activity to be performed and one that is often beyond the reach of the small business is the market assessment (*step 10/16 depending on class*). These assessments will be accomplished with a company when it requires assistance to accomplish this activity. The market assessment phase can be a lengthy process taking two to three months. This assessment facilitates the teaming of the technology with a commercial partner and the subsequent search for financial investors.

The specific procedures and content of the market assessment remains under development. The level of effort has a dynamic range that must be targeted and be consistent with the industry standard incorporated into business plans seeking financial investment.

Technology Brokering

The first activity in this phase is to broker the technology to both DOE and non-DOE technology consumers (*step 17*). To date, it has been GETE's experience that many technologies at the latter Technology Development Gates have already established relationships with a commercial partner, but that does not mean that the technology has been effectively brokered to DOE, financing institutions or other necessary partners. If this is the case, it may be appropriate for GETE to assist in strengthening these relationships.

Technology Brokering also includes those activities connected with making other areas of DOE familiar with the technology as well as the rest of the market identified in the market assessment. A primary vehicle for this will be through the GNET.

Business Planning and Start-up

GETE will assist and review, as necessary, the commercial partner's business plan (*step 11/18 depending on class*). Assistance in this area is based on the assumption that the commercial partner may be a small- or medium-sized company with limited capabilities, or perhaps a principle investigator (PI) willing to start a new business based on the technology. Business planning steps must be agreed upon by all concerned, and for that reason, GETE has developed commercial non-disclosure and teaming agreements.

The process includes collection of information on businesses of assistance paths. This may include listings of state development agency offices, environmental technology incubator and small business administration assistance programs. The information should be available both electronically and on hard copy listings.

Financial Development

Once a business plan has been reviewed, GETE will, if appropriate, assist the company in locating and negotiating financial backing (*step 19*). GETE is prepared to assist these companies to seek and provide access to sources of financial investment.

Commercially Available: The technology can be used by a commercial company at a DOE site for environmental remediation activities without further development (*step 20*).

Commercialization Process Flowchart

Figure 3 - Commercialization Process Flowchart

Information

In May 1994 the Department of Energy (DOE) sought offers for the Environmental Management Technology Leveraging Initiative. The request for proposal introduction states "To optimize the leveraging initiative, establishment of a central collection point for EM developed technology information will be necessary." This

brief introduction statement, for a system such as GNET, is further refined in section 2 of the objectives as follows:

“Optimize the partnering and technology transfer activity by initiating, fostering and maintaining an awareness of DOE developed technology by industry, other government agencies, universities, states and world-wide markets. This will be accomplished by establishing a comprehensive storing, tracking and communication system of DOE/EM developed technology information. Activities to include but not necessarily be limited to, the collection and dissemination of the following information which pertains to transferring technology and partnering: (1) program information to external interested users of EM Technology Development information, (2) summary communication materials describing capabilities of EM technologies available to license, (3) an on-line bulletin board of EM major meetings, testimony, hearings and press releases, (4) world-wide marketing opportunities for EM developed technologies, and , (5) description of mechanisms to enter into partnerships with national and federal laboratories.”

Global Network for Environment and Technology

Integral to the objectives of the GETE program is the creation and maintenance of a network to disseminate commercialization information to stakeholders. Many of the identified barriers to deployment of DOE-developed technologies at DOE sites can be addressed, in part, by providing current and relevant information to stakeholders. Furthermore, it is important that information be provided in a way that is widely accessible and comprehensible. The development and implementation of this component has been guided in great measure by the GETE statement of work, which includes an explicit requirement to deliver:

“a state-of-the-art communications and knowledge database system, i.e., the GNET. ...At a minimum, the GNET shall contain and provide access to...database sections with respect to DOE-developed EM technologies: Domestic Commercial, Domestic Government, and International Market Information.”

GETE delivers information through the Global Network of Environment & Technology (GNET), an on-line information resource. GNET's two main functions are:

- Technology Development; and
- Content Development

Technology Development

GNET began as a client/server system incorporating e-mail, conferencing, “virtual private networks,” chat, and simple file transfer capabilities. The system utilized SoftArc, Inc.'s First Class Client software, which was provided to stakeholders

throughout the environmental technology community, many of whom had participated in the White House Conference on Environmental Technology. Users were able to communicate with one another electronically, collaborate on documents, and hold on-line conferences and chats, and had access to a limited amount of environmental technology information via the GNET server. The time in which First Class Client was the only GNET platform available has been referred to as GNET's Phase I development period.

During this period, the Internet began the explosive growth which continues to this day. Software applications which enabled the presentation of vast amounts of graphically-enhanced information over the Internet became widely available, enabling cost-effective dissemination of data to a global audience via the World Wide Web. It became clear that utilization of this medium to support GETE would allow for a much wider audience "reach," as well as the opportunity to present much more information in a greater variety of formats. Therefore, during Phase II of GNET development, maintenance of the First Class Client communications system continued, and development began on a robust GNET Web site.

During Phase III of GNET's development, most resources will be devoted to maintaining a GNET Web site which contains vast, continually-updated information and data as well as advanced functionality which enables interactivity between stakeholders. In the coming year, plans include the continued development of substantive content. The full integration of EnviroTRADE into GNET is planned subject to , as well as the development of advanced functionality, enabling greater user interactivity.

GNET maintains an array of hardware, server software and software tools that allow it to provide state-of-the art interactive services across the Internet. GNET maintains both Production and Staging/Development servers, allowing it to proceed in a Rapid Application Development (RAD) environment while still maintaining the 100% availability of its on-line services. Duplicate server machines allow it to build and model new applications while current versions remain on-line for users unchanged. The configurations of Production and Development/Staging servers are essentially the same with:

- Compaq Proliant (Rank Mount) servers with RAID arrays and backup systems in a power-conditioned environment.
- Running Windows NT 3.51, supported by Microsoft Developer's Network Level 3 membership.
- The Netscape Commerce Server and Applications Programming Interface as the HTTP (WWW) server.
- GNET Class Libraries, Extended Applications Programming Interface and GNET database scripting extension to HTML.

- GNET's database platform is MS SQLServer which is tightly integrated with the Netscape Commerce Server through the GXI Class Libraries and scripting language.
- GNET maintains and updates Full Text Search, Electronic Publishing, Retail, Billing, forum, Chat and custom-WWW-based applications in this environment
- GNET's systems will enable Retail Transaction Processing, allowing users to purchase items or access to information services on-line using credit cards or purchase orders.

This configuration translates to the ability to present thousands of pages of information to a global audience through the Web-based information resources system, with considerable interactive capabilities. The First Class system supports textual information (although it allows for the transmittal of any type of electronic file); the Web-based information resource system supports textual, graphical, audio and video data. Both systems enable full text searches of information within their repositories. Furthermore, the Web-based information resources system allows for linkage between other information resource providers, enabling GNET users to access data from other providers. The First Class and Web-based systems also allow for the incorporation and dissemination of information from users through bulletin boards and message systems.

Content Development

The development of content is of primary importance to the entire GNET (and GETE) mission. In the development of GNET content, first consideration is given to material that can, in some way, address identified barriers to commercialization. These barriers include:

- Lack of awareness and access by the private sector to DOE-developed technologies;
- Unwillingness to use new technologies due to environmental regulations and enforcement or the perception of those factors;
- Lack of financing by potential partners which prohibits investments in new environmental technologies;
- Unfamiliarity with and a lack of consideration in many government facilities of commercialization objectives;
- Issues relating to property rights of publicly-developed technologies.

Another important consideration is the engagement of private sector interest. By attracting private sector attention to the site, GNET is presenting information on DOE-developed technologies to those most likely to provide the "market pull" which can lead to commercialization. In addition, by building a key "audience" among non-DOE parties, GNET is positioning itself to become a self-sustaining entity.

Thus, in order to satisfy both of these important content development goals, GNET has been organized into the following "Centers." These centers and a description of their contents are listed below:

GNET Technology Center

The GNET Technology Center includes:

- The GNET Technology Database, which provides in-depth profiles of hundreds of innovative environmental technologies developed through DOE EM 50; many of which are available for licensing. Most profiles include full descriptions, some graphics, and contact information. The Technology Database is searchable, with profiles categorized under schemes developed by the DOE OTD Focus Areas, the Federal Remediation Roundtable, and the Technology for a Sustainable Future Initiative.
- Programs and Information, describing U.S. Government programs to assist technology developers and others interested in commercializing a technology or learning more about the environmental technology field.
- Information on the Global Environmental Technology Enterprise (GETE).

GNET Market Center

The GNET Market Center includes information on:

- Contaminated Sites in need of remediation, such as those on the Superfund National Priority List.
- Contracting Opportunities for environmental technology providers, including information on opportunities with U.S. Government agencies and others, as well as background on contracting regulations and other valuable data. This section includes a direct link to [Commerce Business Daily](#).
- Market Information, describing business opportunities and in-depth market conditions for environmental products and services around the world.
- Business & Finance, including data on government programs which can assist small and start-up ventures with loans, grants, and venture capital.

GNET News Center

The GNET News Center includes:

- The Environmental Technologist, a free on-line monthly magazine with articles of interest to the environmental business community.
- The Environmental Marketplace News Summary, a concise executive news round-up, presented each Friday, of the most relevant environmental, technology, and business news, abstracted from more than 750 daily and periodical news sources worldwide.
- GNET News Abstracts, a broad weekly compilation of news items relating to the environment, technology, business, energy, and sustainable development. The complete weekly GNET News Abstracts are available each Friday.
- The GNET Newsbase, a searchable database, updated weekly, of more than 20,000 relevant news and market information abstracts of articles published in the world's leading newspapers, magazines and journals.
- Press Releases, featuring announcements from environment and technology businesses, organizations, and government agencies.
- GNET Calendar of Events, listing conferences, seminars, and other gatherings of interest to the environment and technology community.

GNET Government Center

The GNET Government Center includes:

- Government Resources, with detailed information on the environment & technology programs of the major federal agencies, including the Departments of Energy, Defense, Commerce, and Environmental Protection Agency. This section also contains FY96 budget updates on science and technology programs, provided by exclusively to GNET by the White House Office of Science and Technology.
- State Resources, featuring information on technical, financing, and other state assistance programs for environmental technology ventures.
- International Policy, with information on legal documents, including treaties, agreements, and laws which deal with international environmental matters. Information on ISO 14000, which will establish standards for the

international environmental marketplace in the decades to come, is also available here through the Global Standards Network.

- The GNET Environmental Law Library, featuring brief summaries and the complete versions of important environmental laws, including the Clean Air Act, the Clean Water Act, and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund), and links to other research resources, such as the Federal Register and Code of Federal Regulations.

GNET Convention Center

The GNET Convention Center features:

- The GNET Industry Directory, a comprehensive listing of over 700 environment and technology businesses, organizations, consultants and others, searchable by key word.
- The GNET Trade Show, the focal point of the GNET Convention Center, is an innovative on-line exhibitors' hall showcasing environment and technology companies and organizations and their products and services. This area will be one of GETE's active commercial areas.

GNET Conference Center

- The GNET Conference Center incorporates interactive capabilities which allow environmental professionals to post, read, and respond to messages through on-line forums. Current Conference Center Forums include the Business Assistance Center, the Career Opportunities Center, the Convention Center, GNET Questions and Answers, Government Center, ISO 14000, Interstate Cooperation Initiative, Market Center, News Center, and Technology Center.

Outreach Methodology

GETE outreach activities are designed to assist stakeholders in their efforts to utilize and/or bring to market DOE-developed environmental technologies, and to identify and address existing commercial barriers. The goal of GETE outreach activities is to build greater acceptance of commercialization processes and the use of new environmental technologies both within the DOE complex and the larger stakeholder community.

Further, the agreement requires the creation of "[a] Public Participation Initiative...to assist stakeholders with their relations with the public government with respect to understanding DOE-developed EM technologies." Again, the provision of information is viewed as a way to satisfy this need.

GETE has sought to accomplish its outreach objectives through both traditional and innovative means. Traditional means includes participation in conferences and the production of printed material, while innovative encompasses the development of GNET on-line information resources and forums. Other innovative outreach activities also include development of a national affiliates program and in-depth investigation of strategies to address intellectual property, fairness of opportunity, and conflict of interest issues that arise during the commercialization process in order to understand the barriers confronted during the process.

Future activities will be aimed at greater interactivity with DOE field offices through the complete development of an affiliates program, as well as conferences, seminars, meetings, technical assistance, submission of articles for inclusion in field office publications, and other proactive interactions with states and their communities.

Accomplishments & Status

COMMERCIALIZATION PROCESS

During its first year, GETE has made significant progress in establishing the structure and format for the best utilization of resources. During this formative time, GETE has been able to produce a number of quantitative results, verifying the benefit of the program being established.

GETE has developed and produced a commercialization process methodology, currently under review by DOE Headquarters and METC, as the standard for DOE EM-50 commercialization activities.

GETE has identified well over 200 DOE EM-50 developed technologies, to varying degrees of detail, for the purpose of assisting DOE in the selection of those technologies furthest along the commercialization path. From these GETE has done in depth assessments and analysis of 4, and is currently near the goal of licensing two of the technologies.

GETE has established a list of private sector companies, currently over 30, representing strategic partnerships, teaming agreements, memorandums of understanding, and other arrangements granting GETE ready access to the private sector marketplace for the purpose of showcasing DOE developed technologies.

GETE has developed a series of posters describing progress of GETE commercialization efforts and interactions with individual companies. The Affiliates Program, a DOE-EM 50 initiative implemented through the Global Environmental Technology (GETE), promotes the commercialization of DOE-developed technologies by providing access to the individual technologists responsible for the development of these innovative technologies. The program will create a database of federally funded technologists throughout the National Laboratory system, and the unique talents of those individuals. When industry has a need for those talents, either to better understand and capitalize on a technology created by that technologist, or simply based on the unique expertise of that individual, the Affiliates Program will provide the vehicle through which private industry can access the technologists. The benefits of the program are varied; easy access by industry to these human resources, high technologist availability (up to 50 days per year), reasonable cost, the laboratories retain the individual and their talents, and these technologists can continue to complement the technologies that they may have created as they spin off into commercial ventures promoting higher return on the R & D investment.

GETE has initiated the Affiliates Program, with the pilot program established at Oak Ridge National Laboratory, for the purpose of making DOE technologists more readily available to the private sector to address those problems DOE may be uniquely qualified to solve. This program is expected to succeed and grow to encompass the whole of the National Laboratory System.

INFORMATION

GNET is fully operational on the World Wide Web and is continuing to develop both its technological and content capabilities.

GNET Phase III development was launched October 1, 1995. Phase III provides for global outreach of the GETE program and its mission through the use of the World Wide Web. The GNET web site was reworked to provide for greater ease-of-use and to better address the needs of those who might be interested in licensing or using DOE-developed technology. The site provides information on GETE and the GETE approach to commercialization, DOE-developed environmental technologies, market assessments, contaminated sites data, news and events, government programs, law and policy, and business assistance resources. The site also provides forums for interactive discussions.

GNET provided an on-line interactive communications service for the White House's Technology for a Sustainable Future Initiative, facilitating development of the national environmental technology strategy, "Bridge to a Sustainable Future."

OUTREACH

The results of outreach activities are not immediately measurable since significant periods of time are required to cultivate change. Ultimately, GETE will strive for active participation by DOE technology developers in commercialization activities, as well as broader acceptance by industry and the public of new remediation technologies. This acceptance may be measurable in part using metrics developed to support GETE commercialization activities, i.e., number of technologies identified, number commercialized, number in use, etc.

GETE Public Outreach activities to date have included:

Establishment of a GETE Advisory Board made up of high-level executives from the environmental business sector to provide advice and counsel on future GETE activities relating to private industry.

Development of plans to address fairness of opportunity, intellectual property rights, and conflict of interest with regard to commercialization of DOE-developed environmental technologies.

Publication of the biweekly GETE Update for DOE EM-50, which describes commercialization progress of DOE-developed technologies through GETE, as well as related GETE developments.

Publication of on-line monthly magazine for a wider audience of stakeholders which will feature articles relating to a topic each month related to GETE and its mission.

Release of two CD-ROMs, "Bridge to a Sustainable Future," highlighting U.S. Government environmental technology information and resources, and "Industry Leadership for a Sustainable Future," showcasing American companies offering innovative environmental products and services.

Provision of informational material to various media outlets on GETE and GNET, including Bureau of National Affairs, National Public Radio, Monitor Publications, and others.

Participation in a variety of conferences, seminars and meetings to discuss GETE and GNET, including Applied Research and Technology Colloquium, Green Engineering Roundtable, International Energy and Information Management Symposium, Environmental Decision Support and Resources Coalition at Sandia National Laboratory, Microbial Purification Conference at Rocky Flats, Superfund XV and XVI. Played a key role in the White House Conference on Environmental Technology.

Conclusions

The GETE program has moved forward in developing a formal structure and working relationship with some of the Focus Areas. Continuation of the existing partnerships and cultivating new ones as the balance of the Focus Areas develop their commercialization plans will be done. Considerable accomplishments have been made in defining the commercialization process, establishing a communications network and informing industry of commercialization opportunities. The success of the program is predicated by overcoming one of the largest barriers, "business as usual." The acceptance and use of these GETE facilitated technologies is the ultimate metric for the Program's success.

Attachment A

Screening Criteria

1. The technology is clearly defined, and can be described in commercial application terms.
 - a. The primary applications are well documented.
 - b. Realistic potential secondary applications have been identified.
2. The developer of the technology is identifiable, and can be reached by parties seeking to commercialize the technology.
3. The intellectual property custody trail is well-documented and is determined to be appropriately structured for commercialization purposes. The following pertain:
 - a. The technology has been determined to be eligible for a patent, patents have been applied for (or issued), and a clear licensing process is defined.
 - b. The licensing process matches generally acceptable commercial requirements.
 - c. No serious impediments are apparent to the use/licensing of the patents by commercial for-profit parties.
 - d. DOE has the rights (or can expeditiously obtain the rights) to license the technology.
4. The primary market for the technology is understood, and near term (can be defined as less than two years in some cases) opportunities for application of the technology exist and can be accessed.
 - a. The preliminary market review indicates a substantial market (a market large enough to justify a company entering into it) relative to the investment and operating costs of the technology.
 - c. The competition is documented and this technology offers clear advantages over the competitive technologies.
 - d. Barriers to entry are understood and are determined to be surmountable within a reasonable cost.
 - e. Markets are not limited strictly to DOE activities, i.e., the technology is believed to have a significant commercial, international, or "other government"

market. Note: while the DOE market is of primary importance to commercialization activities, the other markets will add to the technology's attractiveness to private companies.

5. DOE is not supporting other directly competitive approaches to this technology's targeted applications. A technology selected by the commercialization activity should have a clear market niche and be supported by DOE.

6. The investment profile of the technology is documented, and the investment is significant relative to the size of the overall market., and the problem(s) to be solved.

7. The technology has an active supporter within the government establishment.

8. If any regulatory body has reviewed the technology, the response has been positive, and no negative findings have been made concerning the technology.

9. The principal investigator and team remain committed to commercializing the technology and will support/cooperate with innovative commercialization approaches.

10. What are the future DOE funding commitments.

11. Adequate information is known about the technology in order to allow the investigator to define the market(s) into which the technology can be sold.

12. The product meets or betters the approved regulatory standards for the market(s) for which it was developed.

13. The Intellectual Property holder is supportive and committed to commercializing the technology.

14. The cost profiles for acquiring, building, operating, maintaining and dismantling the technology are reasonable in view of the potential market applications and regulatory standards.

15. The cost effectiveness of the technology (cost vs. application) is defined and reasonable.

16. The cost drivers are understood by the principal investigators (PIs) and documented in the data.
17. The technology can be clearly differentiated from existing in-use technology, and the byproducts/residues and final treatment and disposal costs are significantly lower than competitive technologies.
18. The technology has a clear competitive advantage over other competition.
19. The technology is ready for examination, and can be reviewed by potential licensees/users.
20. Data is available that supports the developers' claims regarding the effectiveness of the technology, and the data can be readily obtained.
21. The technology has the potential for capturing significant market share, or in opening new markets in a reasonable period of time. This is important in showing the size of the market to a private company.
22. The resources and financial ability of the "supporters" relative to this technology are known and documented and indicate an ability to follow-through on a commercialization initiative.
23. Any proposed "commercializer" of the technology that already exists is financially capable of following through on its commitments.
24. No unique regulatory barriers exist that will prohibit the usage of this technology. Any barriers that are expected to impede progress with the technology are judged to be surmountable by the investigators.
25. Liability issues are judged by the principal investigator (PI) to be reasonable.

Attachment B

SELECTION PROCESS

1. What is the technology? _____
Primary application? _____
Secondary application? _____

2. Who developed the technology? _____

3. What is the status of the IP?

Who owns it? _____

Where is it patented? _____

What types of patents? _____

Who has licensed it? _____

How has licensing evolved? _____

What is the attitude of the Intellectual Property Holder towards commercialization assistance? _____

4. What is the market for this technology?

Where is it? (Specifically)

1. DOE? _____ DOE _____

2. Other government? _____

3. Domestic Commercial? _____

4. International? _____

How big is it? How big is each segment? _____

How diversified? _____

What primary forces influence it? (Federal, State, Local, International)

How is the market segmented? _____

Is it mature, saturated, fragmented? _____

Where do the specific near term opportunities lie for this technology?

What market advantage does this technology have? (Estimate value)

Who are the primary competitors? (US, Foreign) _____

Who are "easy competitors (i.e. who has ready access to the market this technology will address)?" _____

What are the barriers to entry? _____

5. What other approaches to this market is DOE supporting?

Where? _____

What resources? _____

6. What is the initial investment in this product?

Who Year 1 Year 2 Year 3 Year 4 Year 5 Year 6

7. Who is sponsoring the technology (By name):

EM50 _____

EM30 _____

EM40 _____

DP _____

Lab _____

M&O _____

DOE Regional Office. _____

University _____

Industrial Partner _____

Small Companies _____

Foreign Partners _____

Other Government _____

8. Have any regulatory bodies reviewed any demonstrations of this technology?

Who? _____

Positive response? _____

Negative response? _____

9. Who is the principal investigator and the team? Partner? _____

How are they committed to this technology? _____

10. What is the committed future funding line for this technology?

Funding Source Year 1 Year 2 Year 3 Year 4 Year 5 Year 6

11. Segment the Market Here

What primary problem area does this technology address?

What secondary problems can it be made to address?

What are the test results and at what stages of development?

How does this new technology compare to current technologies doing the same job?(Quantify) _____

What permits/certifications have been approved yet for this technology?

How readily can it be modified to address additional markets?

Is it included in any Records of Decision (ROD's)? Where?

What problems have occurred in the development cycle? How were they addressed? _____

What are the limitations of the technology?

How widespread is knowledge about this product in its primary market?

12. What are the regulatory "clean" standards for the specific markets you plan to address?

13. What are the PI's/ Intellectual Property holder's views on how this product can be privatized?

14. What are the cost profiles?

To acquire intellectual property rights? _____

To build? _____

To operate? (utilities, equipment, disposable supplies, time, etc.)

To train personnel? _____

To maintain? _____

What unique materials are required for the design?

What unique equipment is required for the design?

What is product's projected operating lifetime? Projected technology lifetime?

15. Cost effectiveness: What information is available on the cost effectiveness?

16. What are the cost drivers for use of this technology?

Materials _____

Equipment _____

Software _____

Hardware _____

Labor _____

Time _____

O&M _____

Digging/Drilling/Fabrication/Installation _____

Disposal _____

Regulations _____

17. How is the product differentiated from the competition? What are the primary process components of this technology?

What are the by products? _____

What are the residues? _____

What additional treatment is required? _____

What is the final disposal cost? _____

18. What are the overall competitive advantages of this product?

Cost _____

Simplicity _____

Cleanliness (Pollution prevention) _____

Risk _____

Maintenance _____

Waste stream quality (quantity) _____

Remediation _____

Safety/Health (any obvious deal breakers?) _____

19. How else is this technology unique? _____
20. How difficult is it to "try before buy?" _____
21. Where can it be viewed? _____
22. Who has the data? Where is it published? _____
23. In what way can it best be marketed? _____
24. What "leverage" does it have in opening new markets?

25. What are the resources of the "partners" sponsoring this technology (i.e. company, government agency, financiers)?

26. How rapidly is assistance required?

27. What unique regulatory barriers exist? _____
28. What defines a "good" result in the target market (minimum standards)?

29. How is the company "getting by" in the interim period (before full financing)?

30. Are there significant stockholder concerns about the product/ procedures? Should there be? _____
31. What are the anticipated liability issues?