

The National Alliance of Clean Energy Business Incubators



An NREL Initiative

- Status and Progress To Date -

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Prepared under Task No. 7200.2050



NREL

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NREL is a U.S. Department of Energy Laboratory
Operated by Midwest Research Institute • Battelle • Bechtel

Contract No. DE-AC36-99-GO10337

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Preface

Commercializing any technology is a difficult process – it is often as much art as it is “science.” Effectively facilitating the commercialization of any technology, including clean energy technology, can be an even more daunting challenge – since the facilitator has little control over much of the process. Facilitating commercialization thus focuses on removing the barriers that those commercializing technology face and must overcome.

There are numerous tools that have been used to address market barriers for clean energy technologies. They range from demonstration projects to “buy-downs” to policy initiatives aimed at making the technologies being commercialized more economically and otherwise attractive. We suggest that facilitating commercialization can be an effective complement to these tools. It is an approach that will be self-sustaining long after many incentives disappear and will deliver substantial economic and societal benefits.

In particular, we believe that strategic alliances among select business incubators providing an array of business and financial services to start-up clean energy companies will facilitate the commercialization and deployment of clean energy technologies. Incubators have played an invaluable role in the rise of the digital economy, providing unparalleled access to business networks and mentoring, as well as venture and other capital. We believe that the probability of clean energy companies’ market success can be significantly increased through these business start-up services.

We believe that this initiative has the potential to be “ground-breaking.” It provides rich connections to state and local entities, while leveraging existing infrastructure and resources, and it is learning intensive. It couples regional economic development with technology development and commercialization – to the benefit of all stakeholders. It is designed to deliver these benefits effectively at a very modest cost, and by complementing current technology transfer approaches, it will hopefully add significantly to our arsenal of effective tools to strongly catalyze the commercialization process.

This paper is a working document. Its intent is to provide a basis for discussion both internally and with potential collaborators, as well as to document our thinking and progress up to this point in time.

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Executive Summary

Abstract: The National Alliance of Clean Energy Business Incubators is a National Renewable Energy Laboratory (NREL) initiative to help emerging clean energy companies take more effective advantage of opportunities stimulated by the restructuring of the utility markets, sustainability concerns, and more stringent environmental regulations. NREL will catalyze strategic alliances among select business incubators across the country to provide an array of business and financial services to start-up clean energy companies. Incubators have played an invaluable role in the rise of the digital economy, providing unparalleled access to business networks, mentoring, and venture capital. We believe that clean energy companies' market success can be significantly increased by making the same business start-up services available to them.

Opportunity and Need

The deregulation and restructuring of the electric utility industry, coupled with growing environmental concerns, is creating unprecedented opportunities for new clean energy companies across the country. Electric utility restructuring is speeding the development of green marketing and distributed generation,¹ for which clean energy technologies are well suited. Also, there has been a steady flow of policy initiatives such as systems benefits charges and portfolio standards that will strengthen the clean energy sector.

On a broader scale, environmental concerns related to global warming and local air quality are stimulating the creation of local, state, and national initiatives to support the commercialization and market development of clean energy technologies. Local communities are working to attract new businesses to stimulate economic development, create jobs, and provide a sound tax base while contributing to the sustainable development of their communities.

To take advantage of these opportunities, start-up companies need to prepare themselves to be "business successful." However, lessons learned in 11 NREL Industry Growth Forums² indicate that many clean energy companies lack the market focus necessary to succeed. Weaknesses were most evident in businesses strategies for marketing, market development and creation, and understanding the competition. Firms waited far too long—well into the technology validation process—before paying serious attention to marketing strategies and customer development. The value propositions and business plans were typically only partially formulated, with important pieces of the management team missing. Left unfilled, these gaps can significantly slow enterprise development and reduce the probability of commercial success.

A Proposed Solution – National Clean Energy Business Incubator Alliance

To remedy this situation, NREL is leading the development of a National Clean Energy Incubator Alliance to provide clean energy businesses with an array of business and financial resources. NREL envisions establishing an alliance with eight to 12 successful technology-based business incubators in key states or regions.

¹ For an interesting picture of what the distributed generation and the deregulated environment might offer, see "Distributed Generation: A Hot Corner," by J.F. Schuler Jr., *Public Utilities Fortnightly*, (Oct. 15, 1998). An analogy with the opportunities that resulted in the telecommunications industry as a result of deregulation in 1982 is presented. Also, see "The Distributed Future," by Joseph Iannucci, Susan Horgan, and James Eyer, *Electric Perspectives*, (May-June 1998), Volume 23, Number 3, p. 20.

² "NREL Industry Growth Forums – Lessons Learned," by L.M. Murphy. (June 1999). NREL/MP-720-25870

Less than 20 years ago, the average venture capital fund had \$20 million in committed capital and an average investment per deal was \$1 million. Today, the average fund size is \$250 million and the average investment has risen to \$7 million per deal. With this kind of capital available, venture funds have shifted their focus to investment opportunities in the later stage of development—those with higher cost but significantly less risk. This has left fewer resources available to nurture critical early-stage companies. Not only have financial resources to these companies declined, but also resources that provide operating guidance and support necessary during those first months. Incubators bridge this gap by supplying the resources that young, high-potential companies need to make them a strong player in today’s investment world.

Incubators are ideally suited to help businesses develop the market focus that the financial and economic development communities require. Incubators improve the chance of a start-up succeeding by helping to fill enterprise development needs and immersing the entrepreneurs in a “business formation” environment. This environment includes continuous contact and advice in areas such as:

- Instituting and maintaining balance between market and technology development
- Developing a robust strategy for a sustained competitive advantage
- Identifying management team additions, including managers with start-up experience and marketing and financial experts.

Incubators provide client companies with a sense of place and the opportunity to interact, share experiences, and learn from other companies, as well as develop personal relationships with other entrepreneurs. They foster technology venturing based on innovative ways of linking public-sector initiatives and private-sector resources. Incubators have relationships with financial experts, investors, and investor networks. There is strong evidence that participation in a well-qualified incubator significantly increases the likelihood of a company’s success.³ These concepts are illustrated in Figure S-1, below.

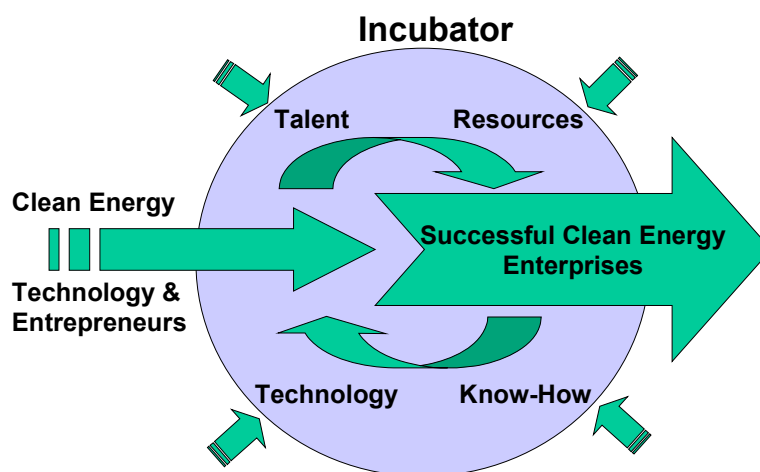


Figure S-1. Technology incubators combine emerging technical ideas and talent with “enterprise development” talent and know-how, and provide resources to help clean energy companies succeed.

³ “Business Incubators Work – The Results of the Impact of Incubator Investments Study,” by L. Molnar et al. (August 1997). NBIA Publications, National Business Incubation Association.

Key features of the incubator alliance include:

- National scope and reach
- Leverage of existing investments (relationships and funding) in established incubators
- Access to a wide range of expertise/advisors
- Improved linkages to regional market development opportunities

Clearly the NREL Incubator Alliance is strategically important to the clean energy industry, and, just as important, local communities will benefit from new jobs, taxes, and other benefits. Foundations, state energy offices, public-interest environmental groups, and governmental agencies share Alliance objectives. This alliance has great potential to mobilize, mutually serve, and integrate a wide range of stakeholder groups having consistent objectives. Incubators will have additional paying clients and a new technology cluster. Local communities will add jobs and an industry that fosters sustainable development. Local universities will gain a new commercialization pathway for their clean energy entrepreneurs and “real world” entrepreneurial experience and opportunities for its business and engineering faculty and students. As illustrated in Figure S-2, below, there is strong rationale for collaboration with numerous groups whose objectives are served by the success of a clean energy industry.

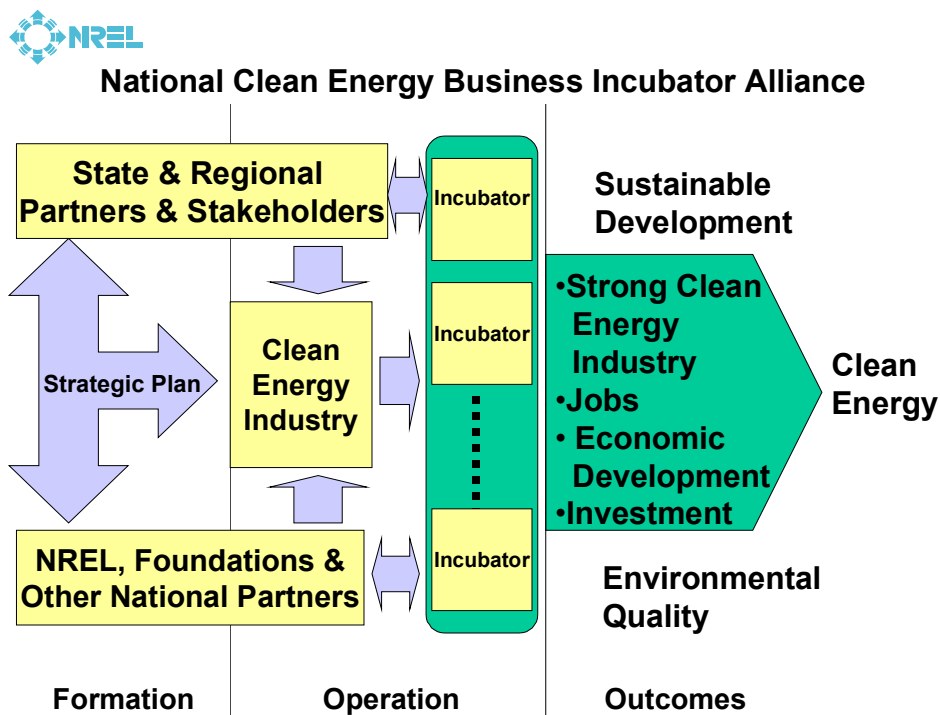


Figure S-2. The Alliance focuses on incubators as a key element in moving clean energy technology into the marketplace. It provides an opportunity for cost-effective collaboration with stakeholders that share the Alliance’s goals for a successful clean energy industry.

Progress to Date

We have made swift progress on alliance formation in California and Texas—states with highly qualified incubators and favorable economic development environments for clean energy technology businesses. Alliance activity began in Texas, though state efforts are proceeding roughly in parallel and are tailored to the needs of each state.

In Texas, where there is growing public-sector support for clean energy technologies and a world-class technology incubator—the Austin Technology Incubator (ATI)—NREL has been working closely with ATI on the addition of a clean energy component to its portfolio of Internet, telecommunications, and e-commerce businesses. NREL developed a comprehensive briefing book on clean energy. We brought Texas decision-makers, including ATI, to the 12th NREL Industry Growth Forum to meet leaders of entrepreneurial businesses and investors interested in clean energy. In addition, we briefed the ATI board of directors on the initiative, receiving their endorsement of the concept and recommendations on mechanisms for involving the larger energy and financial community. This work proceeded in parallel with the formation of a working group that enthusiastically agreed to collaborate on the initiative. With the Texas working group support in place, we began identifying and contacting potential candidate companies for the incubator. We also sent letters and announcements on this opportunity to a broad group of industry members and researchers, and a NREL/ATI joint press release to increase awareness of the initiative⁴. More than 260 entrepreneurs and other companies with an interest in clean energy have been contacted.

In California, NREL is working to secure funding for assisting an incubator to expand its portfolio to include clean energy. A stakeholder working group reviewed the strategy and objectives of the initiative, and will serve as advisors on program implementation.

We are working to secure funding for clean energy entrepreneurs to participate in the incubators. State agencies have expressed interest in supporting this effort.

Key Findings

Presentations and briefings on the concept—whether to federal or state government, incubators, or other organizations—have been well received. Discussion has begun in several other states (*including New York, Washington, Georgia, Connecticut and Massachusetts*) where interest is high. While the response from stakeholders has been enthusiastic toward supporting the initiative, many are only in a position to offer in-kind services. The challenge often is to coordinate and take effective advantage of various stakeholder capabilities.

The framework for the Alliance will necessarily differ by region, reflecting differences in players and stakeholders, methods of operation and preferred working relationships, and opportunities for clean energy and economic development. System benefit charges and portfolio standards also vary significantly from region to region, as do the local economic development incentives.

Selection of the right incubator and the clarity of the incubator's commitment are also critical. Further, developing the clean energy portfolio requires that the incubator develop access to the appropriate expertise⁵ in clean energy as well as a cadre of technical, industry, and investor

⁴ Interestingly, this press release resulted in a number of states contacting NREL about working with us in the future.

⁵ Generally, this means developing a minimal level of expertise in-house.

advisors knowledgeable in energy technology and markets. These are key elements in the incubators' efforts to build their reputation in the clean energy field.

Incubator managers have been enthusiastic about the prospect of developing a clean energy portfolio element in their organizations. The context for the clean energy portfolio element is significantly different from that which they are more accustomed to, for example, in the telecommunications industry. Differences exist, for instance, in capital investment requirements, initial return on investment, early market availability, and facility requirements. Clean energy portfolio development and adequate flow of qualified companies to the incubators are critical to long-term sustainability of incubators' clean energy activities. They require incubator resources for capacity expansion into energy matter and for companies' business incubation fees. Balancing these complicating factors is the fact that the clean energy element adds long-term robustness and diversity to the portfolio.

We have made excellent progress and are highly encouraged, but cannot yet claim success in this initiative. While the activities in Texas and California have been positive and the participants are committed to making the initiative a success, the initiative is not yet self-sustaining—NREL must support further development of the initiative. NREL can add value by facilitating communication between and among the Working Groups and other stakeholders, and identifying local champions for future activities.

Recommendations

We recommend following the proven strategy of building on success—forming alliances with well-established and successful technology-based business incubators. We will devote increased attention to deal flow of qualified candidates into the incubator, and we will continue to engage and integrate robust regional and national networks to address issues of implementation and operation.

The Alliance will be implemented in a three-step integrated process.

- Pilot Phase, 2000-2001
- National Expansion, 2001-2004
- Building Sustainability, 2003-2005

As pilot programs move into successful operation, efforts will shift to pursuing funding for national expansion, adding approximately five to nine incubators to the Alliance. The Alliance will then shift its focus to catalyzing and facilitating networks and mechanisms for portfolio development and deal flow to build the initiative's sustainability.

Conclusion

The opportunities to foster local economic development through clean energy businesses positioned to compete in emerging energy markets are compelling. Opportunities created by the convergence of the deregulation of the energy industry, rapid development of distributed generation options, green marketing initiatives, policy initiatives such as systems benefits charges and portfolio standards, and environmental concerns are real and now.

NREL's mission emphasizes technology development and fostering sound technical ideas and technical talent, as well as "facilitating," rather than directly carrying out, technology deployment and commercialization. Given this mission, incubators are natural technology transfer partners.

Incubators, supported by this Alliance, will prepare clean energy enterprises to succeed in the marketplace. NREL's facilitation of the Alliance is an effective and low-cost approach to helping clean energy entrepreneurs accelerate their move into the marketplace and improve the probability of success.

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Section 1 - Introduction

Background

Among the DOE National Labs, the NREL mission is uniquely focused on developing and facilitating deployment of renewable, energy efficiency and other clean energy technologies,⁶ and this mission has remained essentially the same for all 22 years of NREL's existence. In particular, the NREL mission includes a directive to "... facilitate the commercialization of renewable and related energy efficiency technologies," and it was established with a charter to "...nurture the development of the solar energy industry."⁷ It is important to note that NREL does not commercialize technology, but it abets the process in many ways through facilitating the deployment and commercialization of technology. The industry is ultimately responsible for transferring and deploying its own technology in the commercial marketplace.⁸

NREL has fostered this avenue of technology transfer through its cooperative and cost shared R&D since its inception, and it is constantly looking for innovative ways to speed up and enhance this process by working with and mobilizing interested stakeholders and potential partners.

In implementing this mission, NREL has fostered⁹ the development of innovative technology and the growth of entrepreneurial talent to encourage the formation of successful private sector technology-based businesses, believing that this is a good way of bringing new technology to the marketplace. Business formation offers one of the most direct and visible paths to commercialization,¹⁰ a path that appears to be particularly appropriate and timely for the opportunities and needs at hand.

Opportunity

A number of unprecedented opportunities are emerging for clean energy companies that prepare themselves in a timely manner. For instance, the deregulation of the energy industry is speeding the development of distributed generation options.¹¹ Moreover, green marketing initiatives and policy initiatives (such as utility-based systems) benefit charges, and portfolio standards can be used by entrepreneurs in many areas around the country (see Figures 1 and 2, next pages).

⁶ In subsequent discussions, the term "clean energy technology" will be used to encompass renewable energy, energy efficiency, and other technologies such as fuel cells.

⁷ Section 10, Public Law 93-473, 1974. Also the National Research Council report titled "Establishment of a Solar Energy Research Institute. 1974," further describes the original intent in establishing what is now NREL.

⁸ "What are the Appropriate Roles for Government in Technology Deployment? A White Paper," by Pieturskiewicz, Jon (1999). NREL/BK-700-26970. August 1999.

See Peitruskiewicz (1999) for a good overview of "What are the Appropriate Roles of Government in Technology Development?"

⁹ To this end NREL has, since its inception, allocated about 50% of its budget to competitive subcontracts to involve primarily industry, but also with a good number of university participants as well, in collaborative R&D in prescribed areas, and along technology lines (e.g. wind and photovoltaics).

¹⁰ There are others, e.g. licensing.

¹¹ For an interesting picture of what the distributed generation, and the deregulated environment might offer, see "Distributed Generation: A Hot Corner," by J.F. Schuler Jr., *Public Utilities Fortnightly*, (Oct. 15, 1998). An analogy with the opportunities that resulted in the telecommunications industry as a result of deregulation in 1982 is presented.

State Policies for Renewable Electric Resource Development

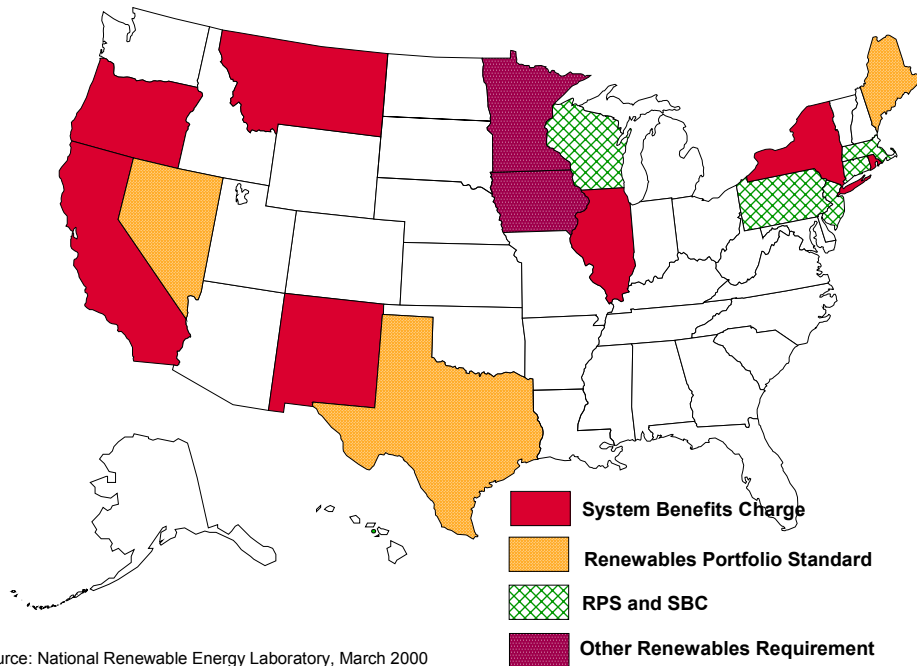


Figure 1. System benefit charges and renewable portfolio standards currently available to clean energy entrepreneurs – shown on a national scale.
Source- http://www.eren.doe.gov/greenpower/images/dereg_map.gif

Deregulation is accelerating distributed generation and the associated technology for local/remote generation and power quality, as well as the transmission and distribution improvements, including sensors and communication technologies to control, manage, and monitor energy flows. Moreover, integrating power sources such as wind, photovoltaics, fuel cells, and micro-turbines will require innovative hardware, software, and service solutions.

Environmental concerns are strongly emerging from global warming initiatives that will only add opportunities (and probably different markets¹²), for clean energy entrepreneurs and their companies. Local communities are looking for new businesses that will contribute to local economic development by providing jobs and a more sound tax base; they are seeking industries that will support sustainable development. They often provide incentives for such companies to locate in their regions. Renewables, energy efficiency, and other clean energy options will be attractive to these communities, and the associated companies will be able to take advantage of incentives.

¹² Though the markets may well converge in the future, according to some utility experts.

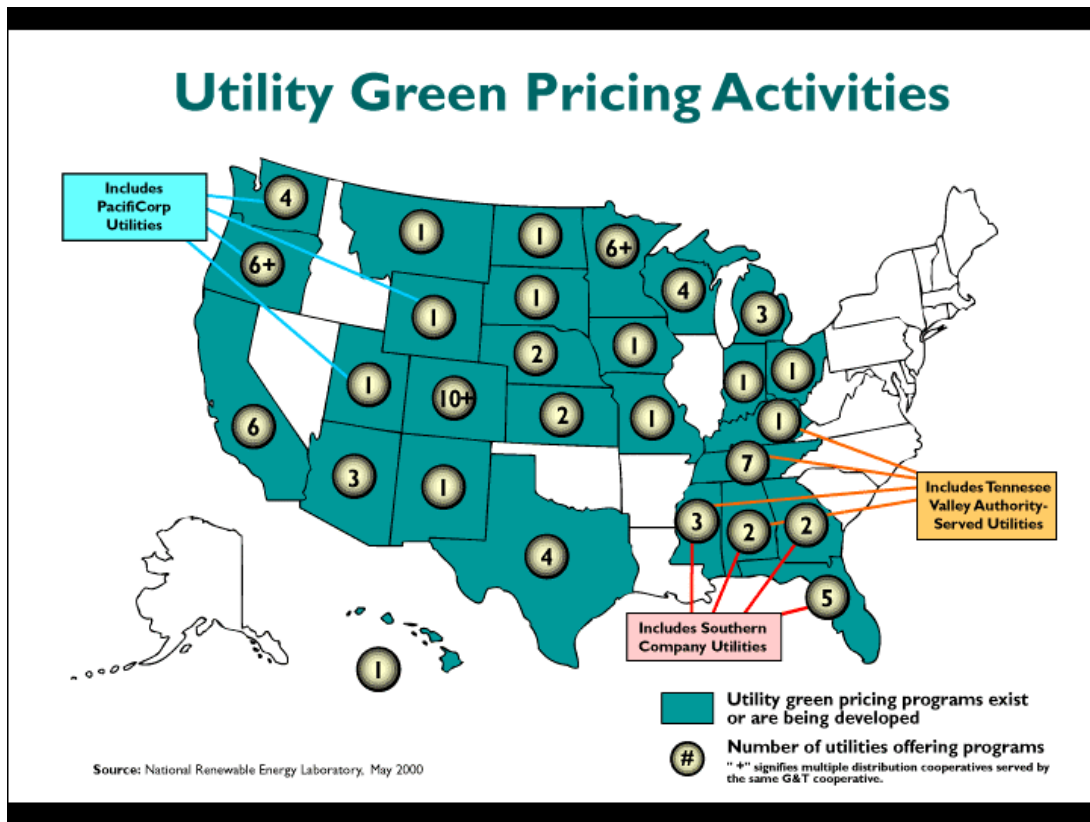


Figure 2. Green pricing opportunities available for clean energy entrepreneurs – shown on a national scale. Source - http://www.eren.doe.gov/greenpower/images/pricing_map.gif.

Need

The NREL Industry Growth Forums grew out of the recognition in the mid-1990s that many fewer clean energy companies participating in NREL/DOE sponsored technology development were successfully commercializing their technologies than had been anticipated. While there were a number of factors believed to be responsible for this, a major one was that the appropriate linkages with the financial communities were not being developed.¹³ Without this linkage with the financial community, the necessary funding to move the technology from the laboratory stage to manufacturing and the commercial marketplace was not available. This is important since, although the DOE may play a large role in the R&D and initial validation of the technology, an additional amount of investment on the order of a factor of 10 or greater can still be needed.

The NREL Industry Growth Forums were developed to catalyze linkages with the financial investment community. Lessons to date from these forums, along with the implications for future activities to accelerate the development of commercially viable clean energy entrepreneurial ventures, are summarized below.

¹³ Another major reason is related to markets for these technologies. Some new perspectives on this resulted from the Forums, which are discussed later. See also Appendix A.

Section 2 - Lessons Learned from the NREL Industry Growth Forums

NREL's Industry Growth Forum Program brings small or start-up companies in the clean energy industries¹⁴ together with venture capitalists and senior business executives to learn about business growth strategies as well as to facilitate new linkages and possible partnerships. Twelve Industry Growth Forums have been held since 1995.

The forums focus on the needs of small clean energy companies. They provide an opportunity for these companies to improve their “business cases”—core business concepts and overall strategies. The program allows the managers of these small companies to explore financing options and get expert insight and advice to resolve business-related development issues. The forums also allow the financial community to assess potential investments in clean energy companies and to start a dialogue within the clean energy industry. In addition, the forums provide a window for NREL and DOE to see where clean energy companies are in their “business growth”¹⁵ development process, as well as what is needed to grow healthy companies that can successfully bring technology into the marketplace.

The first 11 forums have facilitated the formation of at least 17 strategic partnerships. They have also helped to identify a number of “business growth” weaknesses that appear to be common to many start-up companies. Key findings include:

- Many participating clean energy firms are still in the process of making the transition from a technology-driven R&D or project-based company to a commercial market-driven manufacturing (or processing) enterprise. This transition is very important, as it is a prerequisite to attracting equity financing.
- Most of these firms could be greatly assisted in their enterprise development by filling business-related know-how and talent gaps in addition to the well-recognized financial gaps. For example, the most pronounced business growth weaknesses evidenced in the forums are in the marketing and market development/creation areas. In particular, these firms typically wait far too long—well into the technology validation process, and beyond—before paying serious attention to marketing and market creation strategies as well as market and customer development issues.
- While recognizing that equity financing issues may not currently be the greatest deterrent to growth for many clean energy companies, financial issues are—and will remain—daunting even as the more fundamental “business growth” issues are addressed. Still, addressing the enterprise development know-how and talent gaps is a prerequisite to attaining the needed funding.
- The forums provide a key—previously missing—piece of the “facilitating commercialization” puzzle. In particular, the forums have given many of the companies their first live experience with a cadre of venture investors, and the forums have created what is essentially a financial marketplace for clean energy.

The table below highlights the “gap” between where the “typical” clean energy start-up company attending the forums is in its enterprise development process, and where it needs to be to improve its chances of success and ultimately to get the financial investment they need to bring its technology to the marketplace.

¹⁴ For convenience, we will often just say renewable energy companies, but the Industry Growth Forum Program works with many energy efficiency companies as well.

¹⁵ For lack of a better descriptor, we will use the term “business growth” to describe the process of growing the small business into a commercial enterprise capable of sustaining itself and thriving over time.

**Table I. Enterprise Development Gaps – Know-how, Talent, and Financial –
as Identified by NREL Industry Growth Forums¹⁶**

Gap in-	EERE Companies Typically Have	Investors Want
Strategy	Single technology focus with limited profitability horizon	Market focus with sustained high profitability and technology platforms that can serve multiple markets
Product	Protected; technical benefits (a technology is not a product)	Protected; market driven and clear customer benefits
People	Strong R&D management; a desire to remain the boss	Well-rounded and experienced management team
Markets	Technology push; often for more sponsored R&D; competition often not well understood	Market creation and technology pull from many identified customers (\$100M/yr) and poised for rapid growth. A sound plan for dealing with the competition
Financing	Inadequate justification, return on investment (ROI) and exit strategy	Use of funds to grow business providing high ROI (40%) a clear exit strategy (~5 yrs)
Business Plan	Incomplete or nonexistent	A comprehensive picture of all of the above – to bring the technology to market

¹⁶ Based on panelist/investor perspective and feedback.

Section 3 - Assessing Options to Fill the Gaps

NREL considered three options for filling the gaps highlighted by the forums. First, we considered the possibility of building and implementing, or contracting for, the required expertise at NREL to do this job. Second, we considered developing a stand-alone dedicated national incubator for renewable energy, energy efficiency, and other clean energy companies. Third, we examined the possibility of developing an Incubator Alliance with a number of high-quality existing technology business incubators that would also be national in scope.

The first strategy of providing the appropriate business acumen and training through NREL was not selected because of the cost and the limited effectiveness that this approach was considered to offer. Moreover, the required level of activity and focus is beyond the scope of what NREL can expect to do in its deployment facilitation role. Finally, as we will see below, this approach, whether through NREL directly or through an NREL subcontract, will not provide the richness of the additional resources, contacts, and insights available through the other options; especially those associated with linkages to the economic development community.

This left us with the two incubator options. Incubators are an intriguing and, we believe, robust option for helping clean energy companies bridge these “gaps,” which we discuss next. In particular, we discuss how incubators can address issues identified by the forum—and more.

Incubators Accelerate Technology Transfer¹⁷ and Economic Development

Less than 20 years ago, the average venture capital fund had \$20 million in committed capital and an average investment per deal was \$1 million. Today, the average fund size is \$250 million and the average investment has risen to \$7 million per deal. With this kind of capital available, venture funds have shifted their focus to investment opportunities in the later stage of development—those with higher cost but significantly less risk. This has left fewer resources available to nurture critical early-stage companies. Not only have financial resources to these companies declined, but also resources that provide operating guidance and support so necessary during those first months. Incubators bridge this gap by supplying the resources that young, high-potential companies need to make them a strong player in today’s investment world.

George Kozmetsky¹⁸, with the Austin Technology Incubator and the University of Texas at Austin, notes, “business incubation concentrates on alliances as an economic development strategy. Technology venturing is based on creative and innovative ways of linking public-sector initiatives and private-sector resources within and across regional and national boundaries for promoting economic growth. “... Technology venturing is an integrative activity.” Moreover, “technology venturing within a community is largely based on effectively linking four critical factors: 1. Talent – people; 2. Technology – ideas; 3. Capital – resources; and 4. Know-how – knowledge.”

The purpose of incubators is to create linkages and integrate the contributions from stakeholder organizations engaged in activities ranging from technology development to economic development. Finally, there is strong evidence that well-qualified incubators can significantly

¹⁷ See Appendix B for a brief overview discussion on incubator types and modes of operation.

¹⁸ See the preface to “The Art and Craft of Technology Business Incubation - Best Practices, Strategies, and Tools from More Than 50 Programs.” By L. Tornatzky et al. 1996. National Business Incubation Association

increase the rate and numbers of successes, relative to companies not participating in the incubators.¹⁹

Using Kozmetsky’s four critical factors as a baseline, it is seen that NREL has traditionally focused on the “technology – ideas”, and on the technical “talent – people” elements of these factors, and more recently, to a limited extent, on the “capital-resources” factor. This is due in large part to NREL’s mission and scope limitations that permit facilitating (or catalyzing), rather than direct, commercialization and deployment.

Incubators can address the enterprise development gaps that exist with many of the entrepreneurial clean energy technology companies, by adding enterprise development know-how and talent as well as a broad spectrum of capital and other resources (see Figure 3, below).

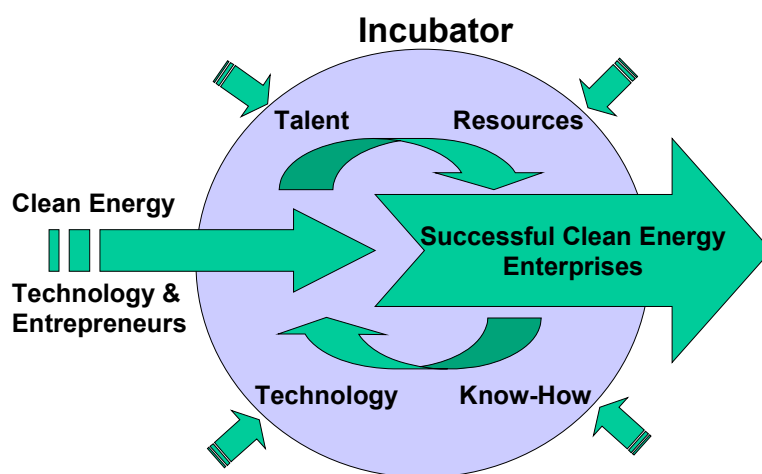


Figure 3. Technology incubators complement emerging technical ideas and technical talent with additional “enterprise development” talent and know-how, as well as with other resources, resulting in successful clean energy enterprises.

Adding Business Know-How and Talent

Incubators address all areas of business enterprise development and enterprise development know-how. They do this by immersing the individual companies in a learning environment that is rich in business expertise—giving the client companies an opportunity for constant and intensive interaction with, and access to, helpful resources. In addition, this environment provides a sense of urgency that is consistent with real world market needs. Most important, the incubator keeps the client company focused on the market, the market drivers, the competition, and distribution channels, as described in Table II, next page.

¹⁹ “Business Incubators Works – The Results of the Impact of Incubator Investments Study,” by L. Molnar et al. (August 1997). NBIA Publications, National Business Incubation Association.

Table II. Incubation Centers Can Support All Facets of Business Enterprise Development

Business Plan Development	Expert assistance/advice on developing the road map for commercializing the technology
Business Model	Strategy for establishing sustainable competitive advantage
People	Identification of key management team needs and candidate recommendations
Markets	Market identification, creation and development strategies, and methods to reach markets; establish balance between market and technology development
Product	Product differentiation, intellectual property protection, and framing product description in terms of customer benefits and market needs
Financing	Resource allocation. Structuring presentations to address How much? For What? How to be repaid? Access to contacts

The “markets” row is highlighted to emphasize that with a correct market focus, all elements of the enterprise development will be impacted. For instance, the business model will build on the market creation strategy, the description of the product in terms of customer benefits (which must consider the market applications), the key marketing people, and the customer base that will be key in justifying the financing.

Moreover, incubators also can provide enterprise development talent (people), as well as access to additional resources and the corresponding crucial linkages with the local economic development community.

Other Resources and Capital from Incubators

Just as important, incubators offer another significant benefit—the opportunity to link technology development with economic development—a combination that is of high value to the incubators, the local community, government (federal and local), and NREL—whose mission, of course, includes environmental concerns. This is because incubators most often have a formal relationship with, and frequently have some form of subsidy from, the local community to help in the growth and development of the region.

There are often local business incentives to attract new companies, such as tax incentives and the availability of SBA resources, as well as incentives that can make doing business there potentially more profitable and therefore more attractive. For example, in regions that are attractive from NREL’s perspective, there are often green market opportunities, portfolio standards, and systems benefits charges that local clean energy companies can take advantage of—and the incubators can often help their clients to take optimum advantage of these opportunities.

Moreover, incubators often have relationships with a range of financial experts, investors, and investor networks, including angels and venture capitalists.²⁰ NREL will add the network of investors who have supported the NREL Growth Forums. Successful incubators also are

²⁰ See Appendix B for a summary of how angel financiers work, as well as helpful references, and some representative angel networks.

frequently adept at helping to catalyze public and private financing (cost-shared) packages for their clients.

Frequently, high-quality incubators have ties to local universities, or—at a minimum—they have access to high-quality universities. The universities are a source of entrepreneurs (about 20% of NREL subcontract dollars go to a wide network of universities to develop new ideas), and both science/engineering and business school talent for projects such as marketing studies or solving engineering problems. They are a potential source of new talent when incubator companies are looking for new employees.

Most good incubators have a rigorous set of entrance requirements and a well-defined and formal matriculation process. The matriculation process is guided by a combination of incubator staff and expert advisors, and is explained more fully in Appendix B. Typically, successful incubators liberally complement their formal programs with informal venues such as “brown bag lunches” with informative speakers and opportunities for networking with potential partners.

Choosing a Dedicated Energy Incubator or an Alliance With a National Scope

The second option of developing a dedicated incubator for clean energy was deemed suboptimal because of operational and other limitations. These included cost (about \$1.5M/yr), time (it can take a new incubator 7-10 years to reach a high level of effectiveness)²¹.

A National Alliance (as will be discussed more fully below) can effectively address the issues with a single dedicated incubator—and more. For instance, a national scope is important not only because there are many clean energy companies across the nation, but also because the benefit from these clean energy technologies and the associated businesses and jobs are important in many communities nationwide. Further, there are many regional opportunities based on indigenous resources, policies, and local economic development. Moreover the national scope of the Alliance (including the diversity among select, quality incubator programs) can potentially better serve the many key stakeholders, such as investors and large energy companies that have a national reach. Finally, by taking advantage of the existing expertise, infrastructure, and investment in high-quality existing incubators, it appears probable that we can provide a “much better product at significantly lower cost,” and we can do so in a much shorter time frame.

These considerations led us to focus on the national alliance as the preferred method for helping clean energy entrepreneurial ventures address their development needs.

²¹ Relationships take time to develop, not only for the company but for the incubator and its advisors.

Section 4 – A National Alliance of High-Quality, Technology-Focused Business Incubators

Our vision is to form an alliance among eight to 12 successful high-quality, technology-focused incubators. These alliance partners would nurture the development of the most promising clean energy companies into vibrant businesses for the benefit of the companies themselves, the incubators, the local community (and numerous related stakeholders), and the environment (see Figure 4, below).²²

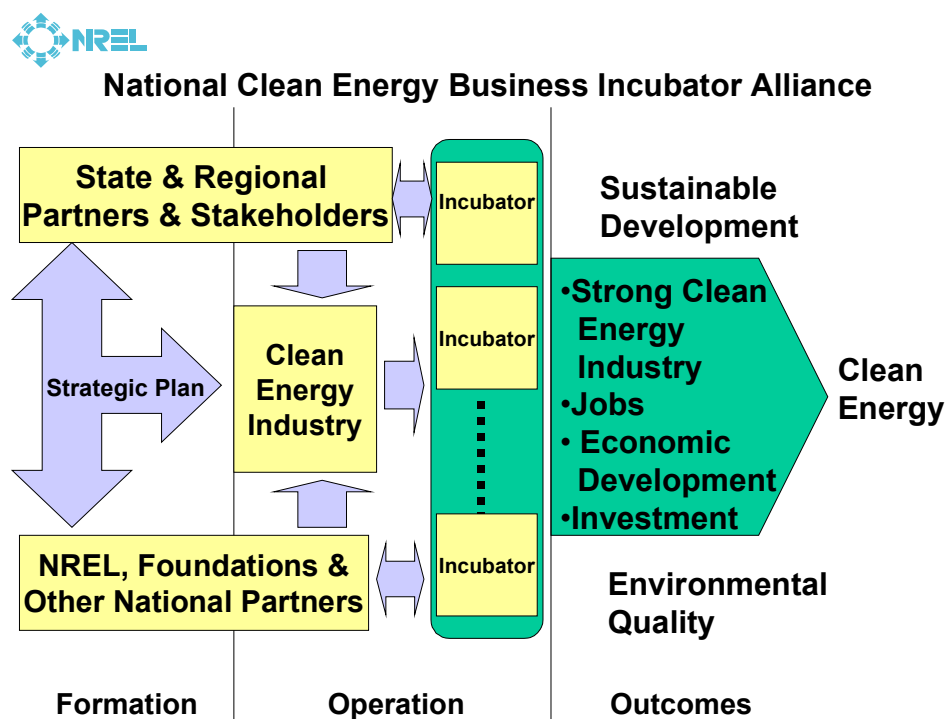


Figure 4 illustrates that, while the National Clean Energy Technology Incubator Alliance focuses on incubators as a key element in moving clean energy technology into the marketplace, it also relies on collaboration to reach outcomes that are consistent with the goals of numerous stakeholders.

Providing Value

The Incubator Alliance will allow broader-scale application and impact of NREL/DOE capabilities and contributions to the incubators, and the industry participants including:

- Access to:
 - Technical support for incubator clients²³
 - The network of clean energy experts and advisors
 - Technical talent and technology champions
 - Technical innovations that have had significant R&D investment by DOE, including NREL's intellectual property
- Participation in the NREL Industry Growth Forums and links to NREL's network of investors interested in clean energy technology-based businesses

²² And, of course, for the benefit of the NREL/DOE mission.

²³ Subsidized support that is phased in over time is planned

- Continued development and mobilization of national partners such as the EPA, foundations, and regional DOE Offices in support of the Alliance
- Up-to-date information of strategic value to entrepreneurs, including that related to:
 - Green marketing
 - Policy Developments
 - Strategic Licensing
 - Distributed Generation Opportunities and Challenges
 - Federal Energy Management Program (FEMP) opportunities to market and deploy their products; as well as to potentially partner with energy service companies
 - Overall management and coordination of the National Alliance program, including strong communication links among stakeholders

The Alliance will help incubators build a clean energy portfolio element and assist the incubators in seeking out and attracting clean energy companies in the region.

- The Alliance will be designed for phased implementation to enable applications of lessons learned and to control costs.

Mobilizing Alliance Stakeholders

Although the incubators and the clean energy companies that will enter the incubators are the focal point of this initiative, other stakeholders are extremely important. They will support both the incubators and the clean energy companies. For instance, stakeholders will help identify and generate company deal flow for the incubators. In some cases, financial support for incubator tuition and facilities rental may be provided. Moreover, broad-based institutional support within the states/local regions is an immeasurable help in demonstrating the importance of clean energy. The challenge is to coordinate our activities to maximize benefit to all involved

Each state has unique features, attributes, and opportunities for benefiting and contributing to the alliance. Often, state energy office clean energy objectives are consistent with those of NREL/DOE. These state energy offices have limitations rather similar to that of NREL with respect to being able to “facilitate” but not be involved directly in commercialization activities.²⁴ They often have established links to economic development activities within their states. Some states have economic development offices that work with regional/municipal economic development offices. These agencies add value to the initiative by providing expert advice on policies and programs that support new business development and community economic development.

- We also believe that the Incubator Alliance will provide an opportunity for foundations to effectively address their clean energy, economic development, and other “public good” objectives by supporting this initiative.

There are other groups that the Alliance will serve implicitly because its goals will be consistent with that of the NREL Incubator Alliance, and their support will be solicited. The EPA and the Regional DOE offices are examples. The national and regional industry trade associations such as the Solar Energy Industry Association and the state affiliates are also important stakeholders.

²⁴ There are obviously many other local and even national organizations such as Department of Commerce supported agencies such as SBDCs (see Appendix B for a short description) that can and should play a role in these activities.

Summary of Value Creation for Stakeholders

Because the alliance brings together these stakeholders and critical elements for success in an effective process, significant value can be created. The value creation for the major stakeholders is described in Table III, below.

Table III. Value Created by the National Incubator Alliance for Various Stakeholders

Stakeholder	Value Created by Alliance
Clean Energy Businesses	Market focus; greater chance of success; more attractive to investors; quicker to marketplace; technical and other support
Incubation Centers	Paying clients; expanded access to investors; new technology cluster; opportunity to work with other incubators to form partnerships
Local Community	Jobs; clean industry for sustainable development; improved tax base; new technology cluster
Local Universities	Pathway for commercializing university technologies; real world learning opportunities and projects for engineering and business students
Foundations	Opportunity for highly leveraged investment in initiative providing multiple public benefits—economic development, environmental quality, and sustainability
Investors	More and better investment opportunities with better-prepared companies; opportunity to track progress of potential partners in incubator
Large Energy Companies	Help in nurturing the development and providing opportunity to track progress of potential spin-offs, acquisitions, and other strategic partners; opportunity to play active role in advising Alliance and networking with other key stakeholders.
NREL/DOE	Linkage of NREL/DOE technology development with economic development. Faster commercialization and utilization of RE technology, stronger RE industry

Section 5 - Implementation Progress and Findings to Date

Implementation Strategy

We have used a simple four-part strategy to begin implementation of this initiative:

1. Selecting the incubator, providing expert assistance and information on clean energy technology and market prospects, and supporting development of a clean energy portfolio element
2. Developing and mobilizing a Working Group in each state (region) to support the Incubator Alliance
3. Focusing the initial efforts of the Working Group on advising on strategy and identifying potential clean energy company candidates for the incubators.
4. Share successful approaches and lessons learned among initiative participants and supporters

Progress

We have initiated alliance formation in California and Texas—states with highly qualified incubators and favorable economic development environments for clean energy technology businesses. The efforts are proceeding in parallel and are tailored to the needs of each state.

Texas Progress. We have made swift progress in Texas, the first venue for the alliance concept. Texas has a favorable economic development environment, growing public sector support for clean energy technologies, and a world-class technology incubator, the Austin Technology Incubator (ATI).²⁵

ATI's reputation and track record, its interest in clean energy technologies, and its willingness to collaborate with other incubators quickly identified it as a key alliance partner. NREL has been working closely with ATI on the addition of a clean energy component to its portfolio. After getting concurrence from the Working Group (described below), we developed a comprehensive "Briefing Book" on clean energy. NREL brought people from Texas, including ATI, to the 12th NREL Industry Growth Forum to meet investors interested in clean energy and representative entrepreneurial businesspersons. In addition, we briefed the ATI board of directors on the initiative, receiving their endorsement of the concept and recommendations on securing the involvement of the larger energy and financial community.

Simultaneously, we requested the support and participation of state agencies and other local organizations, since they are crucial to the success and sustainability of this initiative. We believe that the incubator initiative must be integrated with other local efforts sharing one or more of the initiative goals—to stimulate economic growth, promote clean energy technology commercialization, and improve the environmental quality of communities.

NREL held preliminary discussions with several targeted state agencies and other groups, and then formed a Working Group to support the initiative and involve other key stakeholders in the planning and implementation process. The Working Group includes representatives from:

- The National Renewable Energy Laboratory (NREL)
- IC²-Austin Technology Incubator (IC²/ATI) at the University of Texas, Austin

²⁵ See Appendix D for a more complete description of ATI

- State Energy Conservation Office (SECO)
- General Land Office (GLO)
- Texas Department of Economic Development (TDED)
- Texas Energy Coordination Council (TECC)
- Texas Natural Resource Conservation Commission (TNRCC)
- Texas Renewable Energy Industries Association (TREIA)
- DOE Denver Regional Office (DOE-DRO)

The Working Group enthusiastically agreed to work together in support of this initiative and agreed that a memorandum of understanding (MOU) would be helpful to move forward and work together on the initiative. Using this MOU, the working group intends to jointly manage and further evolve the Alliance towards its objectives with a minimum of structure.²⁶

With working group support in place, we began identifying and contacting potential candidate companies for the incubator. We also focused on increasing awareness of the initiative by sending out letters and announcements on this opportunity to a broad group of active industry members and researchers, and sent out a joint press release with ATI to more widely disseminate information on the initiative²⁷. More than 260 entrepreneurs and other companies with an interest in clean energy have been contacted so far. Another part of our strategy, still underway, is to follow up with targeted discussions with short-listed candidates. Finally, we have a “list serve” in place to speed communication within the working group.

California Progress. We have also made considerable progress in California. We tailored a “Briefing Book” for use by Working Group, which is composed of the following organizations, also linked by a “list serve”:

- NREL
- California Energy Commission (CEC) and staff
- Candidate Incubators²⁸
- Bay Area Council
- California Institute for Energy Efficiency (CIEE) / University of CA
- DOE Far West Regional Office
- Gold Strike Partnership / CA Trade and Commerce Agency
- Coalition to Advance Sustainable Technology (COAST)
- Center for Energy Efficiency and Renewable Technology (CEERT)
- California Solar Energy Industry Association (CALSEIA)
- San Diego Regional Energy Office
- Tri-Valley Technology Enterprise Center (includes two other national labs)

We have been working closely with California Energy Commission staff to tailor the initiative for the California environment, and have helped them prepare materials and brief commissioners. The commission is considering making funds available through the public-interest research program to support contractor-company incubation services.

The incubator selection has been somewhat different in California than in Texas. We have had numerous discussions with several leading candidates. Differences arise because some

²⁶ See Appendix E for the MOU and “broadcast materials” that were prepared and used in Texas.

²⁷ Interestingly, this press release resulted in a number of states contacting NREL about working with us in the future.

²⁸ We have ongoing discussions with several qualified incubator candidates in California.

incubators are public or university-based (though nonprofit) while others are private (also nonprofit), and financial requirements are different. More “up-front” resources are needed to develop facility and staff capacity for a clean energy element.

Findings

Presentations and briefings on the concept—whether to federal government, state government, incubators, or other organizations—have been very well received, and response has been quite encouraging. The linkage of technology development with economic development is attractive to the people we have talked with to-date. Discussion has begun in several other states where interest in the initiative is high.²⁹ While the overwhelming response from stakeholders has been enthusiasm about supporting the initiative, many are only in a position to offer in-kind services.

With the enthusiasm from stakeholders comes complexity—due both to the large number of stakeholders and the additional efforts necessary to ensure opportunities to participate in the initiative. NREL can add value by facilitating communication between and among the Working Groups and other stakeholders. Another challenge is to identify how we can best utilize stakeholder contributions and keep them engaged. To date, the primary areas of engagement for these groups have been helping to identify candidates for the incubator, broadcasting the opportunity, and providing input on strategy and approach. Finally, we note that our efforts to line up sufficient funding for clean energy entrepreneurs to participate in the incubators seem to be successful; agencies in both states have expressed interest in supporting this effort, though funding mechanisms have to be identified.

The framework for the Alliance will necessarily differ by region, reflecting differences in players and stakeholders, methods of operation and preferred working relationships, and opportunities for clean energy and economic development. System benefit charges and portfolio standards also vary significantly from region to region, as do the local economic development incentives. Moreover, the resources within the states are often quite disaggregated. We believe that involving a state-based subcontractor with knowledge of the local situation in specific day-to-day issues will be a key element of success for this effort.

Selection of the right incubator and the clarity of the incubator’s commitment are also critical. Further, developing the clean energy portfolio requires that the incubator develop expertise in clean energy as well as a cadre of technical, industry, and investor advisors and other participants knowledgeable in energy technology and markets. We have become cognizant of another very real need of incubators: We must work with them, as one incubator director noted, “to help them become well recognized for clean energy.” This will occur as the incubator enhances its reputation over the long haul through high-quality and successful graduates.

Incubator managers are excited by the prospect of developing a clean energy portfolio element for their incubator. The context for the clean energy portfolio element is significantly different from that which they are more accustomed to in the Internet and telecommunications industries. For instance, the telecommunications and Internet industries often have lower capital investment requirements, higher potential return on investment (at least initially), and more robust and easily reached markets (again initially), as well as less potentially onerous facility needs than the clean energy companies. Clean energy portfolio development and deal flow to the incubators are critical to long-term sustainability of incubators’ clean energy activities. They require incubator resources for capacity expansion into energy matter and for companies’

²⁹ These include Georgia, Pennsylvania, Wisconsin, Washington, Connecticut, and New York

business incubation fees. Balancing these complicating factors is the fact that the clean energy element adds long-term robustness and diversity to the portfolio. In addition, incubators must be willing to work with satellite incubators, because since the companies may be too widely dispersed and have facility requirements that cannot be met by the primary incubator.

Obviously, the lead incubator is a key player in each region. Each incubator has somewhat different requirements for company entrance and operation. More important, incubators have significantly different funding and support bases and opportunities. For instance, in Texas, ATI is a state agency, and the cost to the company entering the incubator likely will be significantly lower than in California. We have defined many but not all of the requirements for supporting incubators and company participants in Texas and California. Progress is made in a learn-as-we-go mode; we will adapt approach and strategy, as needs dictate. For instance, in Texas we have identified an option for obtaining laboratory facilities close to ATI, but don't yet have a sense of how important this will be.

We believe that the Internet may be an important tool, not only for providing low-cost and high-quality information, but for distance learning as well. For instance, the information on NREL's home page, such as that for green marketing and FEMP opportunities, may be a good complement to incubator resources for evaluating market opportunities. In addition, there are many state Web sites that identify specific market opportunities.

Key Challenges and Issues

We have made excellent progress and are highly encouraged, but cannot yet claim success in this Initiative. While the activities in both states have been positive and the participants are committed to making the initiative a success, the initiative is not yet self-sustaining. NREL must support further development of the initiative. NREL can add value by facilitating communication between and among the Working Groups and other stakeholders, and identifying local champions for future activities.

We see that the key challenges in establishing sustainability are deal flow and clean energy portfolio development. To this end, we must secure resources for incubators—for capacity expansion into energy matters, and for companies' business incubation fees. In addition, we must build and effectively use supporting networks—Working Groups, Incubator Board, National Board, Growth Forum, and Venture Capital—in a coordinated fashion. Learning and adaptation based on our findings in the process is essential.

Recommendations

Strategy – Areas of Increased Emphasis

We recommend following the proven strategy of building on success—forming alliances with the best technology-based business incubators. The top priority will be expanding efforts to ensure adequate deal flow of qualified candidates into the incubator. We will continue to engage and integrate robust regional and national networks to address: securing technical and financial resources for clean energy portfolio development, and building sustainability of the initiative by identifying local champions to lead the state or regional initiative.

Some Tactics

We must not “remove the catalyst too quickly.” The Alliance will continue in the pilot phase for 12 to 18 more months to get the benefit of lessons learned and incorporate them into the path forward. We recommend that the Alliance be rolled-out in a three-step integrated process.

- Pilot Phase, 2000-2001
- National Expansion, 2001-2004
- Building Sustainability, 2003-2005

Pilot Phase. We will follow an iterative five-step improvement process for the pilot phase, which will include involving the incubators in refining the Alliance development and implementation process before implementing the concept on a national scale. The steps are:

1. Identify incubator and refine local needs and initiative requirements
2. Address needs and engage Incubator Boards
3. Work with pilot incubators to jointly pursue fund-raising efforts for the clean energy element
4. Identify and “formalize” local champion(s)
5. Evaluate and improve the National Alliance Strategy

As pilot programs move into successful operation, efforts will shift to pursuing funding for national expansion based on the pilot program success. Efforts to build the initiative to national scope will be supported by NREL’s State and Local Initiative group (SALI)

National Expansion. The improved process for implementing and enlarging the Alliance will incorporate lessons learned in the pilot phase, as well as input from the advisory boards and networks that we are now forming. Subsequently, we will add five to nine additional incubators to the Alliance.³⁰

Good incubators almost always employ a network of advisors and experts to help companies chart a path to business success. We will support these networks and additionally envision a national network as key to this initiative, especially because of the national nature of this initiative as well as potential synergisms. This national network will complement the regional networks and will include large energy companies, venture firms, angel investors, nonprofits, and government organizations with an active interest in supporting the clean energy industry. Network participants will:

- Serve on incubators’ boards
- Help identify and recommend candidates for the incubators
- Review and advise companies on business plans and strategies
- Mentor incubator businesses
- Sponsor clean energy companies for incubation services
- Provide expertise on technology and markets
- Advise on national alliance strategy

Participants in the network will give and receive benefits, such as an early window on emerging technologies and market trends; access to technologies that expand current businesses or impact existing customers; early exposure to new business opportunities; a reputation as a leader in environmentally sustainable technologies and markets.

³⁰ We expect that many of these additions will be among the qualified incubators that already have expressed strong interest.

We seek incubators that have strong reputations, capabilities, and potential to nurture technology-focused clean energy businesses into successful market-focused enterprises. Through discussions with numerous incubators and a review of the literature, we have identified characteristics that will lead to success in this arena. While not every incubator we select will have all of the desired attributes, we look to find as many of the following as possible:

- A technology focus (required)
- A desire to build a clean energy “portfolio” element in their incubator (required³¹)
- A strong track record of success, and well recognized in the incubator community³²
- Access to an extensive network of supporters and/or strategic partners including those with:
 - Know-how – lots of smart people, including expert advisors in an array of business areas (e.g. management, marketing, finance, distribution, strategic planning, etc.), as well as in related technical areas (e.g. manufacturing)
 - Talent such as marketing, management, legal and accounting specialists, that may potentially join or form strategic partnerships with the entrepreneurial firms
 - Financial resources such as venture capitalists, angel investors, banking, and other debt financing organizations, and grant making entities
- Access to university entrepreneurs as well as business and engineering students
- Access to, and with a willingness to recruit, good entrepreneurial candidates
- A strong and effective board of directors
- Adequate sponsorship and a financially sound operation
- A sound selection and matriculation process with milestones, regular reviews of progress and plans, quality control, and management oversight
- Good facilities and adequate administrative support, with a good environment for learning from other incubator clients
- A location in a state/region that is supportive of clean energy deployment, including, but not limited to the availability of:
 - Systems benefits charges,
 - Portfolio standards,
 - Green markets, and
 - State agencies with a consistent set of goals for deploying clean energy technology
- A willingness to work, and/or partner, with other incubators and possibly in a virtual mode

Building Sustainability. The Alliance will continue catalyzing and facilitating mechanisms to build Alliance sustainability. These mechanisms include:

- Building and leveraging regional and national networks and advisors
- Using NREL Industry Growth Forums
- Establishing networking forums such as forum.com, the Clean Energy Network, and the planned Houston meeting of senior energy and business leaders
- Transfer ownership for the initiative to local lead organizations through the empowering of champions in the incubators and in the state agencies – and focusing these partners on deal flow and securing the required local funding for the Alliance efforts³³
- Sharing lessons learned and “what works” among Alliance incubators

³¹ This may not exist initially, but the likelihood of it evolving must be strong.

³² Incubators become recognized leaders based on the successful companies they graduate.

³³ For instance, to effectively accomplish the development of the clean energy portfolio, as well as demonstrate commitment to the portfolio element, incubators need dedicated staff. To accomplish this we must work with the incubators to identify and secure resources for dedicated staff that will focus on developing deal flow for the incubator, and developing an understanding of CE issues and opportunities, as well as establishing effective interactions with the state working groups and other related networks.

Section 6 - Concluding Thoughts

The opportunities to foster local economic development through clean energy businesses positioned to compete in emerging energy markets are compelling. Opportunities created by the convergence of the deregulation of the energy industry, rapid development of distributed generation options, green marketing initiatives, policy initiatives such as systems benefits charges and portfolio standards, and environmental concerns are real and now. To attain the benefits of sustainable development, as well as large-scale deployment of clean energy technologies and environmental quality, a major challenge is for entrepreneurs with clean energy technologies to rapidly develop market-focused businesses that can thrive by exploiting these emerging market opportunities.

NREL's mission emphasizes technology development and fostering sound technical ideas and technical talent, as well as "facilitating," rather than directly carrying out, technology deployment and commercialization. Given this mission, incubators are natural technology transfer partners. Incubators, supported by this Alliance, will prepare clean energy enterprises to succeed in the marketplace. NREL's facilitation of the Alliance is an effective and low-cost approach to helping clean energy entrepreneurs accelerate their move into the marketplace and improve the probability of success.

Beyond the incubators, it is essential for the success of this initiative to build and use a robust national network of other key stakeholders (e.g. angel and venture investors, large energy companies, government organizations, nonprofits, etc.) that will benefit from and have an active interest in supporting the clean energy industry. This national network will complement, and add significant value to, the regional networks surrounding the individual incubators. For instance network participants will assist in developing deal flow, serve on incubators' boards, review and advise companies on business plans and strategy, mentor incubator businesses, sponsor clean energy companies for incubation services, provide expertise on technology and markets, and advise on National Alliance strategy.

By collaboratively taking advantage of the capabilities and contributions of quality incubators,³⁴ as well as those from the regional and national networks, the cost of commercializing clean energy technologies should be reduced, and the rate and number of market successes should be noticeably improved.

³⁴ As well as the existing infrastructure and the corresponding sunk investment in these incubators.

Appendix A - The Market Focus Imperative and New Opportunities

I. The Market Focus and Creation Imperative

New entrepreneurial businesses need a strong market focus in order to be successful—and clean energy companies are no exception. Understanding the market implies that a firm understands its customers, what its customers want, why they want it, how much they will spend, and what other alternatives are available. NREL's Industry Growth Forums have shown³⁵ that many of the participating companies do not fully understand their target market and have not developed practical strategies to enter the marketplace. These companies have not made the transition from a technology-focused development company to a market-focused business. Yet, industry experts and venture capitalists who have attended our Forums contend that this transition is crucial to business success. More specifically, participating Forum panelists/investors have noted that:

- “The jury is still out on when renewables can create significant markets,” and that,
- A narrow technology development focus has fostered a mindset that “ignores market realities” and “lessens the pressure on these companies” to attain a market focus.

However, this uneven focus on technology issues is not unique to the clean energy community. A strong market focus does not come naturally after years of refining and developing a new technology.³⁶ In fact, one can argue that there is a predisposition in most entrepreneurial ventures to skew the investment to technical development at the expense of market development, creating what is usually a critical imbalance.³⁷ A timely example appeared recently in a Wall Street Journal article,³⁸ where Motorola's multibillion Iridium project was said to be “at risk” for want of an appropriate market focus. The Forums have only confirmed this tendency.

II. Unprecedented Opportunities

An upsurge in market and private investment opportunities in the advanced clean energy and related information technology field is being stimulated by four trends in the global power industry: the restructuring and deregulation of the electric utility industry, increasing environmental concerns, rising demand for power, and the rapid development of sophisticated information and communication technologies.

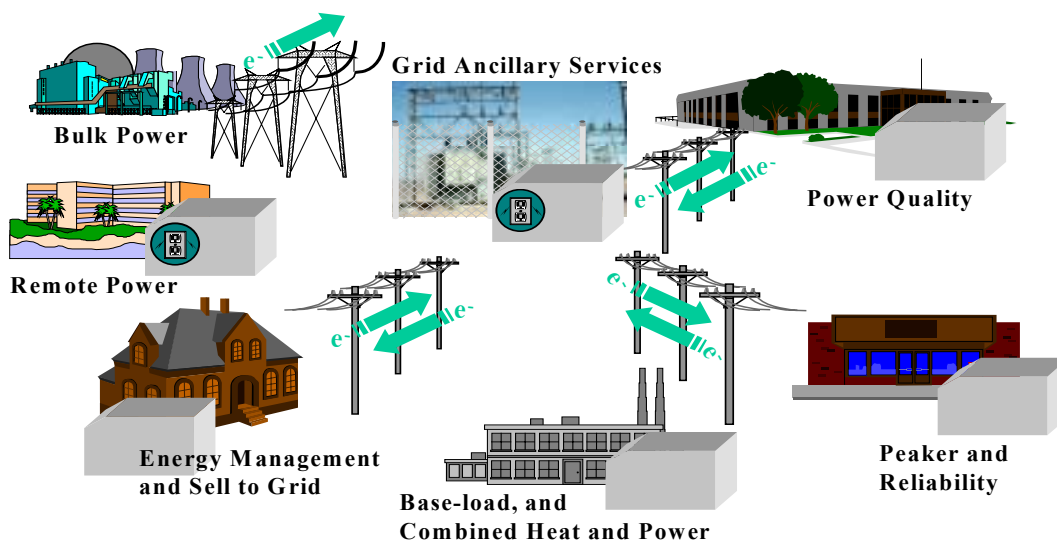
³⁵ “NREL Industry Growth Forums – Lessons Learned,” by L.M. Murphy. (June 1999). NREL/MP-720-25870.

³⁶ There is a growing body of literature on this subject; see for instance: *The Breakthrough Illusion: Corporate America's Failure to Move from Innovation to Mass Production*, by Richard Florida and Martin Kenney.

³⁷ See the discussion on “The Ratio of Marketing Investment to Engineering Investment (exclusive of promoting or selling), the Marketing/Engineering Investment Ratio.” © 1992-1999 Ralph E. Grabowski at <http://www.marketingvp.com>. See also figure shown in <http://www.marketingvp.com/include/i-800.htm>

³⁸ *Losses in Space* “Iridium's Downfall: The Marketing Took a Back Seat to Science – Motorola and Partners Spent Billions on Satellite Links for a Phone Few Wanted,” by Leslie Cauley, (Wednesday, August 18, 1999), p. 1.

Figure A-1: Distributed Power Is Emerging as a New Way of Producing Electric Power Close to the Consumer



Source: Merwin Brown -Private Communications

Electric Restructuring

The deregulation of other major industries³⁹ has traditionally stimulated a growth in firms offering innovative products and services. This is currently the case in the energy industry. In this new competitive environment, electricity providers are finding that customer centric change is a necessary precondition for success. This change is forcing electricity providers to take the lead role in the introduction of innovative products and services tailored to the needs of business and residential customers. The many opportunities, such as those with distributed generators and as depicted in Figure A-1, above, are anticipated to spawn a wide range of innovative products including those for power quality, peaking and reliability, remote power, and grid ancillary services. To underscore the potential value of these markets, and the need for innovation, EPRI⁴⁰ in a recent press release, noted that “... power quality disruptions already cost \$50B annually, ” and this number is increasing rapidly. The restructuring and deregulation of the energy sector is also speeding the development of distributed generation options.⁴¹

Therefore, to achieve greater market share and differentiate one seller from another, electricity will be sold with more added-value products. Electricity is, after all, identical wherever and by whomever it is sold. New companies will enter the power marketplace because they believe they have greater value-adding skills than the existing suppliers do. Competitors will have to compete not just on price but on added value to maintain and win customer loyalty.

³⁹ For an interesting picture of what the distributed generation and the deregulated environment might offer, see “Distributed Generation: A Hot Corner,” by J.F. Schuler Jr., *Public Utilities Fortnightly*, (Oct. 15, 1998). An analogy with the opportunities that resulted in the telecommunications industry as a result of deregulation in 1982 is presented.

⁴⁰ “Decline in Research and Capital Investment Jeopardizes Electricity Reliability,” Kurt Yeager, EPRI press release, Palo Alto, California, (Oct. 29, 1999).

⁴¹ For a good overview of what is happening in distributed power, see <http://erendev.nrel.gov/distributedpower/>. The library section contains “hot-links” to many current reports on the topic.

Customer-centric change will be a necessary precondition for success, requiring energy providers to take effective leadership in the introduction of innovative products and services tailored to the needs of business and residential customer segments. Beyond the adoption of new pricing structures, energy providers are already offering a range of energy management solutions; the most advanced providing usage information from intelligent meters delivered over the Internet to a personalized Web page. This data can be used to forecast future consumption patterns and recommend appropriate pricing schemes.

More fundamentally, a number of utilities are offering electricity, gas, telephone, and water services to their customers, a model well established by the German Stadtwerke and companies in the UK, such as Scottish Power. This offers the benefits of maximizing revenue per customer, and the potential over time for cost efficiencies across the value chain from purchasing through marketing, sales, metering, billing, collection, customer operations, network development, and maintenance. However, there are numerous hurdles to be overcome in terms of regulation, processes, skills, structures, and systems before these benefits are fully realized.

At the same time, the reduction in prices brought about by competition, coupled with continuing regulatory actions and the need to provide returns to shareholders, will exert a strong downward pressure on costs. Combined with rising service expectations of customers faced with real choice, this will demand the accelerated adoption of process, organizational, and systems improvements throughout entire operations. Parallel to this development, will be the establishment of a robust power marketing industry.

Green marketing initiatives⁴² and policy initiatives such as portfolio standards and distribution-based systems benefits charges can be used by entrepreneurs in many areas around the country.

Environmental Concerns

Environmental issues will continue to play an important role in driving technology choice in the power industry. Around the globe, nations are adopting more stringent air and water legislation with widely varying monitoring and enforcement provisions. Nevertheless, the trend towards more stringent standards remains. Reduction targets will continue to revolve around emissions of suspended particles, sulfur dioxide, CFCs, SO_x, NO_x, and mercury.

Additionally, in light of the historic 1997 World Climate Treaty, there will be increasing pressure to curb emissions of greenhouse gasses. In Kyoto, industrialized countries agreed to bring emissions of carbon dioxide (CO₂) and five other gases held responsible for global warming down to 5.2 percent below 1990 levels by around 2010.

How this treaty will impact technology choice is still uncertain and somewhat controversial. Most major issues are still unresolved. For example, details of the proposed international emission trading mechanisms and the Clean Development Mechanism are still undecided. Moreover, the treaty faces almost certain defeat in the Senate because it fails to require developing countries like China and Mexico to cut their emissions. Nonetheless, it is safe to say that there will continue to be commitments to the reduction of emissions by utilities, the industrial sector, and large oil and gas firms.

⁴² See <http://www.eren.doe.gov/greenpower/home.shtml> for a good overview of the many green markets and the associated deregulation across the country.

Already, large multinationals are looking for technologies that can help them meet public commitments to emission reductions. Firms such as Shell, BP Amoco, and Enron are making large investments to develop or buy advanced clean energy technologies, both as a new business opportunity and as a future risk management tool for emission reductions.

Rising Demand for Power

The growth in the power industry will continue over the next 10 years. General Electric estimates the global power market to be 506 GW in the 1997-2005 period. About 53% of these capacity additions will be in Asia, primarily China, South East Asia, and India. There will also be robust growth in South America, Eastern Europe, and Russia.

Bechtel estimates the global power market to be 352 GW in the 1997-2001 period, with 172 GW open to private power developers. 172 GW is estimated to be worth \$142 billion.

The Rise of the Digital Economy

Like all other market sectors, the power industry has been heavily impacted by the revolution in information technologies. Electric utilities are spending an average of 2.1% of their revenues and dedicating almost 4% of their work force to updating their information technology systems. Increasing demands by large commercial and industrial customers, along with residential customers, for information about energy usage has created a huge demand for energy data and communications services. Over the next decade, the rate of information exchange between energy service providers and their customers will increase by several orders of magnitude.

Moreover, the arrival of business-to-business and business-to-customer e-commerce is resulting in a massive increase in the infrastructure needed to support full-time data-processing centers, high-speed data transfer, data warehouses, communications and routing hubs, and computerization of many corporate functions such as supply chain management, manufacturing, sales transactions, and customer relationship management. The performance of this new infrastructure is highly dependent on the availability of electricity as at a high level of reliability and quality.

And finally, the average cost of an outage will increase as business depends increasingly on e-commerce. All other things being equal, this should increase the demand for distributed energy that can improve, at a competitive cost, the local reliability and quality of power supply at power-sensitive facilities.

III. Market Growth

Currently, clean energy (mostly renewables) comprise 3% of U.S. energy supply and 8% globally, but because of the strong market forces and technological progress, this percentage is predicted to rise steadily over the coming decade. Table A-1 illustrates the dramatic growth rate of the world's renewable energy use compared to more traditional energy sources during the last decade. This type of growth is predicted to continue over the next decade, as the price of electricity from clean energy technologies continues to decline (see Figure 1).

Table A-1. Trends in Global Energy Use By Source, 1990-98

Energy Source	Annual Rate of Growth
Wind Power	22%
Photovoltaics	18%
Geothermal Power	6%
Natural Gas	4%
Oil	2%
Nuclear Power	1%
Coal	0%
<i>Source: Worldwatch</i>	

Hopes for this growth in the use of clean energy technologies have been bolstered by the growing recognition of the potential benefits of distributed generation (DG). Globally, the DG market will grow because of the technologies' modularity, short lead-time, and ability to bypass the grid. Increasing numbers of utilities, energy service providers, and power sensitive industries are using or investigating opportunities to use distributed generation for niche applications. The U.S. Department of Energy (DOE) forecasts explosive growth in DG, accounting for as much as 20 percent of all new domestic power generation capacity additions through 2010.

There is already a well-established market for small-scale generation (50kW to 30MW), on the order of 18 GW, or \$15 billion annually. The smaller 20kW to 5 MW market is approximately 12 GW per year and has grown about 5% per year over the last decade.

The current global DG market is dominated by three mature technologies: internal combustion (IC) engine generator-sets, small gas turbines, and small hydroelectric systems. Baseload IC engines are currently the most significant player with 85% of the existing market. However, significant advances in new clean and distributed generation technologies are anticipated to change the make-up of the existing market.

Examples of a few particularly attractive clean energy technology development areas are summarized below.

1. Wind: The wind market today is supplied by a mature and dynamic industry. The cost of generating electricity with wind has fallen dramatically since the mid-1970s, when the U.S. DOE estimated that it cost \$1 per kilowatt-hour. By 1998 the cost had dropped to only 4-5 cents per kilowatt-hour, and projections suggest that a further reduction to about 2-3 cents by 2010 is attainable. According to Mike Robinson, acting Wind Director at NREL, there are 13.5 gigawatts of installed wind capacity in the world today and the market is growing at 20%+ per year.
2. Biomass: The biomass power market includes a range of conversion options, including direct combustion and gasification of biomass and combustion of methane gas from solid waste landfills. Promising opportunities are in small biomass gasifier systems for diesel fuel displacement and for utility scale systems, attractive options are in black liquor in IGCC configurations. Black Liquor and biomass gasification technologies provide unique efficiency and cost advantages that can be utilized by pulp and paper industry cogeneration facilities.

The North America pulp and paper industry alone represents a \$20 billion captive power and cogeneration market over the next 10 years.

3. **Photovoltaics:** In the past 20 years, the U.S. has spent about \$1.4 billion on developing solar thermal and photovoltaic systems. Aided by that investment, U.S. companies now capture 44 % of the estimated \$1.1 billion in annual sales of solar products worldwide. In 1996, worldwide sales of photovoltaic products totaled over 90 megawatts, up 14% from 1995 and in 1997; PV shipments were up another 42%. Moreover, PV sales are expected to double every five years through 2010. By 2005, the world PV manufacturing market is estimated to be \$2 billion and double to \$4 billion by 2010 with gross margins increasing to 70%. According to Frost & Sullivan, in 1996, PV sales represented 20.5% of the distributed generation equipment market in North America. There is currently more demand in the market than capacity, and companies are rushing to add manufacturing capacity to keep up.
4. **Microturbines:** Microturbines are a known and understood technology that will begin significantly impacting the market over the next several years. Engineered especially for small users, microturbine generators offer relatively clean, reliable, on-site energy for about half the cost of peak-time power. The microturbine is fueled by natural gas and typically produces between 36 and 75 kilowatts, which can power a small commercial enterprise, fast-food restaurant, or several residences.

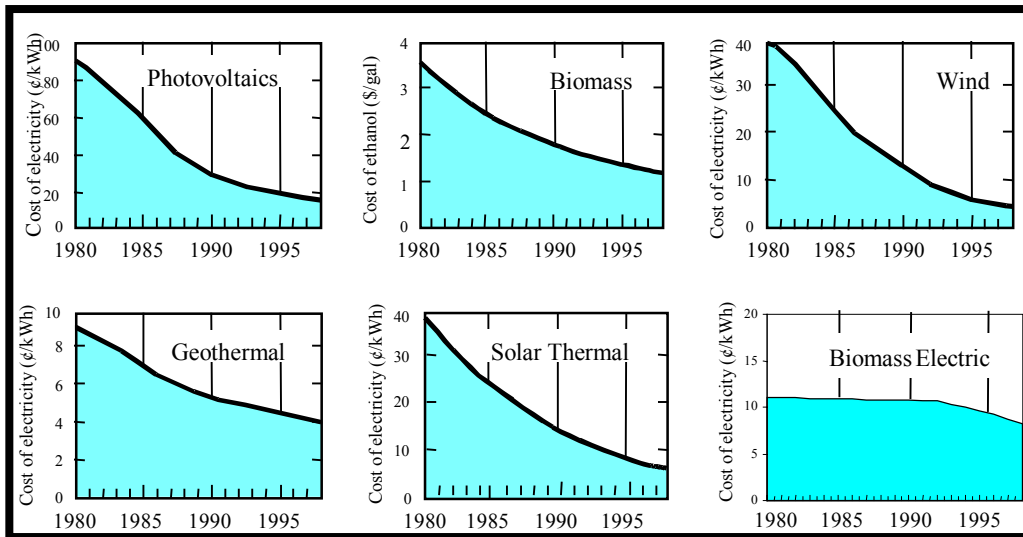


Figure A-2. Decreasing cost of energy from CETs

5. **Fuel Cells:** High-efficiency solutions such as fuel cells will be used for both stationary power as well as transportation. Niche markets for fuel cells include high-quality power and zero emissions attainment areas. Microturbines and fuel cells' broad fuel versatility make it an excellent choice to reduce emissions of waste gases from oil production, coal mines, landfills and other sources. Between 2000 and 2005, microturbines and fuel cells will begin to make an impact on the market, reaching almost 2500 MW of installed capacity⁴³.

⁴³ Internal Bechtel Market Study

Significant cost reductions are anticipated over the next several years from increased production volume and manufacturing efficiencies. Other cost reductions will be realized through use of new materials and design improvements.

IV. Market Challenges

Though the future is bright for clean energy technologies, they still face the same challenges as other disruptive technologies. Rather than selling into large existing markets, there is often a need for market creation or segmentation—quite a challenge for a lone start-up company. Moreover, off-peak energy prices have hovered at all-time lows, pricing many new energy technologies out of the existing DG market except for a few niche applications.

Though this challenge is not unique to clean energy technologies, it does not plague many of the other available venture opportunities (e.g. telecommunications). If clean energy technologies are going to compete for these venture dollars, special attention must be paid to these differences.

How cost and other performance issues will play in the emerging market is still uncertain. Other factors such as reliability, emissions, and maintenance cost will become increasingly important, making it difficult to compare technologies on a cost-only basis. In some cases green power will be preferred or incented, or other features such as reliability and power quality will provide a quantifiable economic value that can be assessed along with the cost of electricity.

Challenges faced by clean energy firms that differentiate them from traditional high-tech start-ups include:

- **Market Size and Growth Rate Projections** - Venture investors typically prefer technology businesses that are poised for rapid growth, with large markets (\$100M/yr. minimum. as noted in the Industry Growth Forums) and with a corresponding potential for a high return on investment.⁴⁴ Unfortunately, clean energy supply technologies are, in the U.S. and OECD countries,⁴⁵ largely “disruptive” (ala Harvard’s Christensen model⁴⁶) in nature, leading to a need for a focus on market niches that are left unprotected by entrenched competitors – they are not typically technologies that will have an immediate and huge return on investment (such as some Internet or communication technologies).
- **Strong Competition** - Clean energy technologies provide a product (e.g. electricity and/or heat), and a service that can be supplied with many other technologies, though their corresponding by products and delivery characteristics can be quite different from the competition.

⁴⁴ Often investors don’t get all of their preferences, but this then requires that the “story” must be all the more “bullet proof.”

⁴⁵ In international markets the story is quite different. For instance, worldwide PV sales have been increasing by more than 20%/yr driven mostly by international markets for the past several years. See “Economic PV – a shift in thinking,” by Paul Maycock., *Renewable Energy World.*, Vol. 2, No.5., (Sept. 1999), p. 72.

⁴⁶ See *The Innovator's Dilemma*, by Clayton M. Christensen, (June 1997), Harvard Business School Pr; ISBN: 0875845851; see also a recent related review article “Danger, Stealth Attack,” by Toni Mack and Mary Summers, *Forbes*, (January 25, 1999), pp. 88-93.

- **Entrenched International Players** - There are a number of international markets for clean energy technologies that are currently more robust than U.S. markets. Many non-U.S. companies are already establishing a presence in these markets that could spell big difficulties for U.S. firms and the U.S. clean energy industry in the future. The additional complexity and opportunities of the international arena argue for a better understanding of these markets, and their characteristics, as well as special methods to reach those markets.
- **Electric Utility Policies** – Until recently, electric utilities have been monopolies in the business of selling kilowatt-hours at a consistent level of reliability. They have a culture that opposes any entities (including customers) that compete with them by generating kilowatt-hours, and –some argue – legitimate concerns for employee safety and system integrity. Utilities have a lot of control over the installation of generation systems on customer premises, sometimes even when the system is not grid-connected.
- **High First Cost** – Advanced clean energy technologies such as photovoltaics, fuel cells, and microturbines, which are currently manufactured in low volume, have higher first costs (but better efficiencies) than reciprocating engines (which have a reputation for reliability and availability by low efficiency and higher emissions and maintenance costs). Economic payback for some technologies can be unacceptably long for many customers. As markets grow and these technologies are better able to take advantage of manufacturing economies of scale, this factor will be mitigated.
- **Technical Risk** – Many of the new clean energy technologies are not widely deployed in commercial use, although dozens of demonstration projects and field-test pilot programs have been completed. There has not been enough performance history and there are not enough reference customers to allay potential customers concerns about technical performance. Many of these customers are corporate energy or utility managers who may be putting their jobs and companies at risk by installing systems based on new technologies.
- **Regulatory Uncertainty** – The policies and rules associated with restructuring are still being developed (and sometimes challenged). Rule making varies by state and timing. Many of these rules directly affect the economics of clean energy technologies, creating a level of uncertainty that inhibits purchasing decisions.

V. Strategies for Overcoming Market Challenges

Though several challenges have been identified, there are also many strategic avenues for overcoming these obstacles. The successful clean energy companies will be those with superior technology and superior understanding of the market challenge to bring to bear in formulating a business model that addresses the barriers head-on.

Potential strategies include:

Partnering - Market development for clean energy technologies can be enhanced by forming alliances and partnering with existing energy companies—including established distributors of power technologies, gas and electric utilities, particularly those with green marketing programs, or local partners or alliances for international projects. These relationships should be integrated into a coherent market strategy that will meet the needs of intended customers and investors.

Target and Leverage Utility, State and Local Programs – Entrepreneurs can target specific geographic areas or utility programs taking advantage of and leveraging all available state and local resources. Entrepreneurs can track “green markets,” and other “special opportunity” markets such as those created by portfolio standards, and systems benefits charges that often occur in conjunction with restructured markets.

Advocacy and Participation in Public Policy Debates - There is often significant opportunity to impact the development of policies, codes, and regulations within a target market. It is unwise to adopt a wait-and-see attitude to policy decisions. Public opinion is generally on the side of clean energy technologies, and entrepreneurs should consider intervening as policy advocates. As much as possible, it is desirable to develop a working relationship with regulators and policymakers on evolving rules.

Investigate and Adopt Innovative Financing Schemes – Clean energy entrepreneurs need to pay considerable attention to the financial details of how they approach selling or developing clean energy projects. Firms can adopt forward pricing schemes, use creative project financing, or develop leasing arrangements to make their technologies more financially attractive. It would also be wise to develop a comprehensive value proposition that presents tools that calculate all benefits—quantitative savings and revenue generation, qualitative benefits, and strategic benefits of each technology offering.

Develop Plan to Minimize Customer Risk and Build Reputation for Reliability – Entrepreneurs should consider low-priced demonstration projects to recruit reference customers (customers who can share their experience with the product with other potential customers). Other strategies include willingness to assume some penalties for under-performance, availability of field-test data to potential customers, and highly responsive customer service. Firms can also consider outsourcing the entire service with guarantees and penalties, including hiring the energy user’s utility or energy service manager to provide service.

Appendix B – A Brief Discussion of Incubator Characteristics and the Way they Operate⁴⁷

Incubators vary quite widely in capabilities, offerings, and focus as well as in the way they charge for their services. Of course they vary in their level of success as well. However, there is strong evidence that incubators can improve the rate and number of business successes.⁴⁸ While most incubators have Web pages that give a more detailed picture of their organization and their modus operandi, we provide a brief comparative overview of some major features of incubators and “incubator-like” organizations of likely interest.

Some business incubators are technology focused, while others emphasize “service businesses,” and others serve minority-owned businesses only. Technology incubators may have a further specialization such as medical or telecommunication technologies. Some offer only office space and shared administrative services to their clients, while others offer a wide range of expert advice on business topics complemented by laboratory facilities.

Many incubators feel that “on-campus” involvement gives the incubator client a sense of place, the opportunity to interact, and the method to share experiences and learn with (and from) other companies, as well as develop personal relationships. Moreover, an equal number of quality incubators, such as the RPI and the EC-2 Annenberg incubators, recognize the practical needs for supporting “off-campus” companies and offer “virtual” incubator services as well as traditional “on-campus” services. Some are totally “virtual” (e.g. ARCH⁴⁹) incubators that offer expert services, but have offices only for the incubator staff who work with the client start-up companies on an “out company” basis, and who focus largely on market development issues.

Many good technology incubators have a fairly rigorous set of entrance requirements as well as a fairly well-defined matriculation process. For instance, they often require that company entrants be beyond the R&D stage, have a working product prototype, and at least a rudimentary business plan with a realistic market development strategy, as well as an exit strategy for investors. Length of time varies somewhat but nominally, most programs are geared to graduating companies in about two years. The stay for software companies is typically about one and a half years or less.

A good number of the incubators use a mentor/case manager approach where a client company is assigned to a specialist⁵⁰ who nurtures the company through the process, prods them to get them prepared for presentations and strategic meetings including formal reviews of progress, and meeting investors and other potential strategic partners. The case manager also often helps make contacts with other advisors, and helps arrange for other needed resources. Often the

⁴⁷ For a much more complete and excellent description, see “The Art and Craft of Technology Business Incubation - Best Practices, Strategies, and Tools from More Than 50 Programs,” L. Tornatzky et al., (1996), National Business Incubation Association. Another excellent and recent resource is “ITechnology Innovation Centers: A Guide to Principles and Best Practices,” (December), by Chuck Wolfe., draft, (December 1999). A study carried out under the direction of California GoldStrike Partnership and funded by the U.S. Department of Commerce, Economic Development Administration, and administered by the California Trade and Commerce Agency, Office of Strategic Technology.

⁴⁸ See, for example, “Business Incubators Works – The Results of the Impact of Incubator Investments Study,” by L. Molnar et al., (August 1997). NBIA Publications, National Business Incubation Association. Notice, especially, pp. 13-20.

⁴⁹ ARCH is the acronym for the Argonne, University of Chicago incubator in Chicago, Illinois.

⁵⁰ The Georgia Institute of Technology Economic Development Institute calls them “venture catalysts.”

case manager assembles an informal set of advisors made up of other incubator staff. Typically, the good incubators liberally complement their formal programs with informal venues such as “brown bag lunches” with informative speakers and other opportunities for networking with potential strategic partners (e.g. “mixers”).

The level of “know-how” services offered by the incubator also varies. For instance, The Enterprise Network (TEN), in the San Francisco Bay area, has a bevy (more than 400) of expert advisors, venture and angel investors and other business experts, while other organizations seem to do quite well with 50 to 60, or fewer. Of course, local business and academic environment will have a large impact on the number and type of experts and advisors available to the incubator. Good incubators also have ties to top-name universities, and the associated entrepreneurial, technical, and business talent. The deans of high-profile business schools can often play an important role in support of incubators. A number of the incubators that are part of universities have cited the importance of the incubators in enriching the educational experiences of faculty as well as business, science, and engineering students with an entrepreneurial interest.

Support for the incubators and the clients come in many different shapes and forms as well. According to the National Business Incubation Association (NBIA), about 80% of all incubators have some form of subsidy. Virtually all incubators are tied to local economic development in some way. Most incubators are “not for profit” (501(c)(3) corporations), but there are some important exceptions. They can be public, private, university based, or hybrid. For example:

- At the Georgia Institute of Technology Advanced Technology Development Center (GIT/ATDC), clients pay for rent that is itself subsidized by the state. The state supports the operations of the incubators (there are six associated incubators). They don’t take any equity positions in the companies, as they are a 501(c)(3) corporation. They do a quite notable job in “packaging” public and private funding opportunities including seed funding from the state, matching funds from various organizations including endowments and foundations, and federal resources such as SBIR grants.
- TEN is a 501(c)(3) corporation that charges the clients about \$50K/yr. for services and office space. NASA-AMES is a major customer of TEN, accounting for about one-third of their business, and paying the tab for the companies they send to TEN. TEN does not currently take any equity position in the businesses.
- The Austin Technology Incubator (ATI) takes equity positions in the businesses they help develop. They are not a 501(c)(3) but a state agency that’s part of the University of Texas. Their performance is tied to their success.
- ARCH (discussed briefly above) is also a 501(c)(3) corporation, and though not technically an incubator, acts like a virtual incubator and takes equity positions in companies⁵¹ it helps. ARCH also acts as the licensing office for the university, and the license royalties it receives from companies using Argonne/University of Chicago technology offset the costs associated with helping new businesses grow and licensing their technologies. It has taken about eight-nine years for this approach to become self-supporting.
- Besides its relationship with TEN, discussed above, NASA has sponsorship relationships with local regional incubators corresponding to all of its major centers. As with TEN, these are not NASA incubators, but frequently they are supported by NASA as well as by numerous organizations and the local economic development community. For instance, the NASA-Goddard is a major contributor to the Emerging Technology Center in Baltimore, Maryland (about 35% of its funding now, or about \$400K/yr) that would allow up to 12 NASA

⁵¹ It takes equity by taking warrants or options to buy stock at a specific price, and then later redeems them for a profit.

spin-outs to attend at no cost to the NASA spin-outs. Other organizations involved in funding of this incubator, and who place clients in this incubator, include the University of Maryland, Johns Hopkins Medical School, and Johns Hopkins Laboratory.

- Technology Ventures Corporation (TVC) is a 501(c)(3) that was formed by Lockheed/Martin as part of their management contract for Sandia Labs in support of the DOE. TVC focuses on making the business case for start-ups based on technology innovations from Sandia and Los Alamos Labs. They also hold a yearly venture forum to spread the word on their companies and help the entrepreneurial companies form linkages with the investment community.

SBDCs can Complement Incubators

Small Business Development Centers (SBDCs)⁵², which are sponsored by the Small Business Administration (SBA), have some functions that parallel those of many incubators, such as helping with business plan development. However, SBDCs are **not** virtual incubators, or incubators “without walls.” In particular SBDCs are typically geared to the general needs of small businesses within a region. They provide: training via workshops and seminars; one-on-one consulting (e.g. for business plan development); and information on a short-term basis. Unlike incubators, however, they operate on a “walk-in” basis; they take all comers. Moreover, they do not focus on a selected technology sector (e.g. like telecommunications), as do incubators.

SBDCs typically receive up to 50% of their funding from the SBA (and the rest from local economic development organizations), are frequently based in, and managed by educational institutions, and they often are housed near incubators. Though different from incubators as explained above, they are increasingly collaborating with incubators to provide complementary services (e.g. for business planning), especially where there are opportunities to preclude the duplication of resources.

Incubator Associations (NBIA and PIN)

The National Business Incubation Association (NBIA) is the most prominent incubator association in the United States, having more than 500 members with numerous members from every state. Their Web site at <http://www.nbia.org/> is quite informative.

There are a number of smaller, more specialized associations. For instance, the Pacific Incubator Association (PIN) is composed of nearly 50 incubators on the West Coast that have businesses with likely ties to the Pacific Rim. PIN is currently developing a Web site.

Finally, while good incubators can be selective in admitting client companies, the NBIA provides some criteria that potential client companies should consider in selecting an incubator to best meet their needs. These follow on the next page.

⁵² See "NBIA Review," Volume 15, No. 6, (December 1999), for a good summary review of SBDCs

Incubation Search Guidelines (from the National Business Incubation Association)

Tips for finding the right business incubator

Just as incubators screen prospective clients, so too should entrepreneurs screen prospective incubators. Here are some questions to ask when considering entering an incubation program.

Finding a Quality Program

Track record

- ◆ How well is the program performing?
- ◆ How long has the program been operating?
- ◆ Does it have any successful graduate companies and if so, how long have they been in business independent from the incubator?
- ◆ What do other clients and graduates think of the program?

Graduation policy

- ◆ What is the program's graduation policy, i.e. what are the incubator's exit criteria?
- ◆ How flexible is the policy?
- ◆ How long, on average, have clients remained in the program? (Incubators typically graduate companies within three years.)

Qualifications of manager and staff

- ◆ How long has the current staff been with the program?
- ◆ How much time does staff spend onsite?
- ◆ Have they had any entrepreneurial successes of their own?
- ◆ Do they actively engage in professional development activities or are they a member of a professional/trade association knowledgeable in incubation best practices?

Finding the Right Match

Does the incubation program offer the services and contacts you need?

Is access to a particular market critical? Then consider finding an incubator that specializes in that market. Special-focus incubators are programs that work with companies within a particular niche, such as gourmet foods, biotechnology, the arts, and software. What services do you need to make your venture successful? Business plan development, legal and accounting advice, marketing, Internet access manufacturing facilities? Be sure the program offers what you need or can connect you to service providers who can meet those needs.

Do you meet the incubator's criteria?

Find out the incubator's qualifications for accepting clients before applying. For example, some incubators expect prospective clients to have fully developed business plans, whereas others require a less developed idea and offer business plan development assistance.

Is the program's fee structure right for you?

Most for-profit incubators exchange space and services for an equity share in their client companies, whereas most nonprofits charge fees for space and services. If a large cash infusion and speed to market are essential for your business success, then giving up equity in your company in order to quick cash may be right for you. But if you believe you have the skills to raise your own funding (with some assistance), don't want to give up any equity in your venture, and are willing to build your company more slowly, then paying fees for services and space may be a better choice.

Appendix C: Angels⁵³

As previously noted, venture capital⁵⁴ financing is not usually obtainable for start-ups. This is because the stage of development of many current clean energy technology companies is not appropriate for many venture firms. Private "angel" financing is much more likely. But the angels themselves can be difficult to find. This is because they often do not want to deal with a lot of unwanted contact and, unlike venture firms, they do not have to seek out new clients to stay in business. Angels typically require a 25% return on investment (versus 35%–40% for VCs). As compared to venture capitalists, angels typically

- Are many more in number (~250,000); and there are numerous groups of angels (see Table C-1)
- Are harder to find—there is no analog to “Pratt’s Guide”
- Do not have to invest
- Tend to invest in areas that are more technically and operationally familiar
- Have a longer time constant and are less risk averse (because they are typically more familiar with the business)
- Lend at smaller levels (often under \$1M)
- Require less equity (smaller piece of business)
- Require a somewhat lower return on investment, typically about 25% vs. about 35%–40% for the venture community
- Are less involved in the day-to-day business operations
- Are located physically closer to the business entity they are involved with (often within a 50-mile radius)
- Often work together to share risks and do formal due diligence and require a solid business plan
- Accept a relatively higher percentage of deals.

Many angel networks are nonprofit, but may still require from \$150–\$1,500 to network your business plan with investors. There are a number of networks that can make finding the right angel, matched to the needs of the company, a less daunting chore. The staff at Equitus (a private, for-profit company) have a database on about 8,000 angels, including profiles of the corresponding investment style and requirements for each.

⁵³ For an excellent discussion of angel financiers, see *Finding Your Wings: How to Locate Private Investors to Fund Your Venture*, by Gerald Benjamin, (1997), John Wiley and Sons. Available in bookstores. It describes 10 different types of angels along with their perspectives and operational approaches. See NREL’s “Resource Guide for EERE Entrepreneurs,” on the Web at: <http://www.nrel.gov/technologytransfer/resourceguide.html>.

⁵⁴ For an excellent and thorough discussion of venture capital process, see *The Venture Capital Cycle*, by Paul Gompers and Josh Lerner, The MIT Press, Cambridge, Mass. (1999).

**Table C-1: A Sampling of Angel Networks
(many are nonprofit; fees generally required)**

Angel Network	Phone	Internet Address http://www. +
ACE-NET: Angel Capital Electronic Network. A national network of angels in operation since late 1996. Part of Small Business Administration Office of Advocacy. Not many deals have been done yet.	202-205-6983	sba.gov/ advo/acenet.html
Active Angels. Seattle, WA. Managed by Sound Point Ventures. Provides a novel approach for angel investors to invest collaboratively, encouraging learning and fostering community.	206-932-3850	activeangels.com
Technology Capital Network. Cambridge, MA. Affiliated with the Massachusetts Institute of Technology. Earliest capital network (started in 1984).	617-253-7163	Web page currently under development
The Capital Network. Austin, TX. Mostly early-stage technology ventures. Some investors are corporations looking for strategic alliances. Offers an array of services. A node on ACE-Net. Affiliated with U. Texas.	512-305-0826	thecapitalnetwork. com
Environmental Capital Network. Ann Arbor, MI. Concentrates on businesses with an environmental connection.	313-996-8387	BizServe.com/envir onmental.capital. network/
Investors Circle. San Francisco, CA. Concentrates on businesses operating in such "socially responsible" areas as health, education, energy conservation, and community development. Has about 180 investors.	415-929-4900	no Web site
Western Investment Network. Seattle, WA. Concentrates on businesses in the Northwest.	206-441-3123	no Web site
Equitus. Specializes in structuring development stage and expanding companies to acquire capital. They are a member of Tushchener & Co. Inc. (a full-service security brokerage firm) and have a proprietary database of some 7,500 private investors. For profit company. (See Benjamin, 1997).	303-377-4580	equitus.com
Pacific Venture Capital Network. Irvine, CA. Part of an array of services for the entrepreneur, all affiliated with the Graduate School of Management at the University of California at Irvine. A node on ACE-Net.	714-509-2990	accelerate.uci.edu/
Colorado Capital Alliance, Inc. Boulder, CO. Works closely with local incubators and other state agencies.	303-499-9646	angelcapital.org

Appendix D: Austin Technology Incubator (ATI)

ATI Overview

- The Austin Technology Incubator (ATI) was founded in 1989 by Dr. George Kozmetsky and is directed by Laura Kilcrease.
- ATI is a branch of the IC² Institute of the University of Texas at Austin, which reports to the chancellor (not to a dean).
- ATI is one of about 20 sub-organizations within the IC² Institute. ATI is nonprofit though they are not a 501(c)(3).
- ATI is technology focused with an emphasis on telecommunications, software development, and e-commerce, and is starting a new area of emphasis on biotech with two-three companies.
- ATI's focus is on wealth creation—not jobs.

At any one time, ATI may have between 12-15 companies in residence. Approximately 100 companies have entered the incubator, and 56 have graduated. There are currently 15 companies (and 300 people) in the incubator. About 30 companies have entered the incubator but have not graduated for various reasons, including acquisition and failure to meet milestones. Typically, companies graduate after the second round of funding. ATI typically has one-two failures per year.

ATI has access to about 15 local venture firms, and they use IC² and ACE-NET for “Angels.” They don’t have a seed fund but are hoping to develop one sometime in the near future. The number of advisors to ATI is in the hundreds.

ATI is located in a single building (50,000 ft²), and they indicated that they are bursting at the seams from company growth (one company grew from a handful of employees, to more than 50 in about 18 months). There are no lab facilities on site. They admit that manufacturing is a “bit of a challenge.” The space requirement and lack of labs has led to their starting to work with “off campus” companies, though they admit this has some problems and have to work harder to make sure the companies take advantage of ATI resources and get the help they need.

Appendix E: Texas Materials

- E-1. Memorandum of Understanding (pages 37-41)
- E-2. Opportunity Notice and Attachment – mailed to 260+ potential incubator candidate participants and other stakeholders (pages 42-44)
- E-3. Broadcast Announcement of Opportunity – for Bulletin Boards (page 45)
- E-4. Framework for a Summary Business Plan (page 46)
- E-5. Press Release on Alliance with ATI (final page, separate document)

**MEMORANDUM OF UNDERSTANDING
BETWEEN
TEXAS GENERAL LAND OFFICE (GLO)
IC²-AUSTIN TECHNOLOGY INCUBATOR (IC²/ATI)
TEXAS ENERGY COORDINATION COUNCIL (TECC)
TEXAS DEPARTMENT OF ECONOMIC DEVELOPMENT (TDED)
TEXAS RENEWABLE ENERGY INDUSTRIES ASSOCIATION (TREIA)
TEXAS COMPTROLLER OF PUBLIC ACCOUNTS, STATE ENERGY
CONSERVATION OFFICE (hereinafter SECO)
NATIONAL RENEWABLE ENERGY LABORATORY (hereinafter NREL)
UNITED STATES DEPARTMENT OF ENERGY (DOE), DENVER REGIONAL OFFICE
(DOE-DRO)**

I. PURPOSE

- A. This Memorandum of Understanding (MOU) is entered into by and among the federal, state, regional, and local entities of NREL, IC²/ATI, SECO, GLO, TDED, TECC, TREIA, and DOE-DRO to support a common interest in developing a Texas component to the National Clean Energy Technology Incubator Alliance (the Alliance). The Alliance will nurture the “enterprise” development of clean energy businesses, as well as foster a robust and commercially successful clean energy industry and local economic development in the state of Texas.
- B. To this end, the Parties agree to establish by this MOU, and to participate in, a working group (the Working Group) to implement the collaborative activities and the joint objectives of this MOU.

II. BACKGROUND

- A. NREL, a DOE-owned national laboratory, is committed to facilitating the deployment and commercialization of renewable, energy efficiency and other clean energy technologies. NREL is establishing the Alliance as a way of fostering the commercialization and deployment of these technologies. Texas is a key state in this effort.

III. PURPOSE

- A. The purpose of this MOU is to: (i) acknowledge the Working Group’s intent to refine and implement a plan toward the common objective of fostering the creation of a robust and commercially successful clean energy industry as well as economic development within the state of Texas through nurturing the development of Texas-based clean energy companies; (ii) define the Working Group’s initial activities in this direction; and (iii) set forth some guiding principles as the Working Group refines and implements its plan to reach the first two objectives.

IV. FORMS OF COLLABORATIVE ACTIVITIES

- A. Initial collaborative efforts of the Working Group will be coordinated by NREL. The initial efforts of NREL will focus on, but not be limited to, addressing the most immediate needs of IC²/ATI and the industry participants, particularly those needs related to:
1. The identification of qualified clean energy businesses that can participate in IC²/ATI;
 2. Access to information on relevant technologies and market issues;
 3. Access to knowledgeable investors, and advisors – especially those that support the NREL Industry Growth Forums; and
 4. The identification of financial and other support for incubator companies, as required consistent with IC²/ATI operational requirements, for the participating clean energy companies.
- B. Initial collaborative efforts of IC²/ATI will focus on, but not be limited to, considering ways of providing business incubation services to promising companies that can attract capital in the clean energy sector, including, but not limited to such items as:
1. Assistance in developing business strategies;
 2. Assistance in developing and refining the marketing and funding proposals;
 3. Assistance in business infrastructure; and
 4. Assistance in locating relevant university students and faculty resources that can support these efforts.
- C. Each Party will designate a representative to serve as a principal point of contact (PPC), who shall be responsible within their respective organizations for: (i) the oversight of this MOU within their respective organizations; (ii) the implementation of this MOU; and (iii) the resolution of issues cutting across the Party's organizational lines.

V. LONGER-TERM GUIDING PRINCIPALS

- A. The Working Group intends to jointly manage and further evolve the Alliance toward its joint objectives using the following guiding principals:
1. Work with a minimum of structure, consistent with rapidly and effectively defining and addressing the requirements and needs for the long-term sustenance and success of this Alliance and the Clean Energy Industry participants;

2. Encourage communication among PPCs responsible for each organization's activities;
 3. Hold annual meetings, and other periodic meetings, as deemed necessary through the PPCs, to: (i) discuss matters of mutual interest; (ii) review progress toward objectives; and (iii) jointly develop "lessons learned" as part of the ongoing process; and
4. Make future contributions to the Alliance based on need and available resources, such as the development and mobilization of additional partners in support of this effort.

VI. COSTS

This MOU will not be used to obligate, budget, commit, or request appropriation of funds, and does not create any such contractual duties or obligations with respect to any funds, for any activities performed under this MOU.

VII. PUBLICITY

No publicity or advertising regarding activities carried out under this MOU will be issued by any of the Parties without prior coordination between the Parties. All public statements, press releases, papers, reports, and any other publicity associated with the activities conducted under this MOU will appropriately recognize each Party.

VIII. LIABILITY

No warranty of any kind is made by any Party for any materials, information or services that may be furnished to another Party under this MOU.

IX. EFFECTIVE DATE AND TERMINATION

- A. This MOU shall be effective as of the date of the last signature below, and expire in twenty-four (24) months thereafter, unless extended by written instrument mutually signed by duly authorized representatives of the Parties. Any Party may terminate its participation herein at any time, upon thirty (30) days written notice thereof to the other Parties.

X. ENTIRE AGREEMENT

- A. This MOU is not intended to create legally binding obligations between the Parties and contains the entire understanding and agreements of the Parties with respect to the subject matter hereof, and supersedes all prior understandings regarding such subject matter, or any portion thereof. No entity or agency of the State of Texas that is a party to this MOU shall be required to indemnify any other Party to this MOU, and any provision to the contrary is void.

APPROVED AND AGREED TO:

FOR GENERAL LAND OFFICE

NAME: _____

TITLE: _____

DATE: _____

Mailing Address for Notices

Larry Soward
Senior Deputy Land Commissioner
Texas General Land Office
1700 North Congress
Austin, TX 78701

FOR IC²-AUSTIN TECHNOLOGY INCUBATOR

NAME: _____

TITLE: _____

DATE: _____

Mailing Address for Notices

Joel Wiggins
Associate Director
Austin Technology Incubator
3925 W. Braker LN.
Austin, TX 78759

FOR TEXAS ENERGY COORDINATION COUNCIL

NAME: _____

TITLE: _____

DATE: _____

Mailing Address for Notices

Jerry Matthews, Ph.D.
Executive Director
Texas Energy Coordination Council
10100 Burnet Rd, CEER R-7100
Austin, TX 78758

FOR TEXAS DEPARTMENT OF ECONOMIC DEVELOPMENT

NAME: _____

TITLE: _____

DATE: _____

Mailing Address for Notices

Jeff Moseley
Executive Director
Texas Department of
Economic Development
P.O. Box 12728
Austin, Texas 78711-2728

FOR TEXAS RENEWABLE ENERGY INDUSTRIES ASSOCIATION

NAME: _____ Mailing Address for Notices
Russel E. Smith
Executive Director
TITLE: _____ Texas Renewable Energy
Industries Association
DATE: _____ P.O. Box 16469
Austin, TX 78761-6469

FOR TEXAS COMPTROLLER OF PUBLIC ACCOUNTS, STATE ENERGY CONSERVATION OFFICE

NAME: _____ Mailing Address for Notices
Billy Hamilton
Deputy Comptroller
TITLE: _____ State of Texas
Comptroller of Public Accounts
DATE: _____ P. O. Box 13528
Austin, TX 78711-3528

NATIONAL RENEWABLE ENERGY LABORATORY

NAME: _____ Mailing Address for Notices
Jon Pietruszkiewicz
Associate Director
TITLE: _____ Deployment Facilitation
National Renewable Energy Laboratory
DATE: _____ 1617 Cole Blvd., MS 2724
Golden, CO 80401

FOR UNITED STATES DEPARTMENT OF ENERGY (DOE), DENVER REGIONAL OFFICE

NAME: _____ Mailing Address for Notices
William Becker
Director
TITLE: _____ Denver Regional Office
1617 Cole Blvd., MS 1721
DATE: _____ Golden, CO 80401



March 13, 2000

Mr. xxxxxx
Yyyy company
Address
Address

Dear Mr. xxxxx

Do you want to jump-start the development of your business by tapping the resources, insights, expertise, and extensive business and financial networks of one of the nation's premier, and most successful, business incubators?

The National Renewable Energy Laboratory (NREL) and the Austin Technology Incubator (ATI) are pleased to announce a new opportunity for emerging clean energy businesses. NREL and ATI have formed a strategic alliance to help Texas-based energy companies make the difficult transition from a technology focused, start-up company to a successful market-based enterprise.

NREL is the U.S. Department of Energy's premier laboratory for the commercialization of renewable, energy efficiency, and distributed energy technologies. NREL will build upon this expertise and will leverage its relationships with international institutions, the venture capital community, multi-lateral lending institutions and national, state, and local governments to help ATI jump-start clean energy businesses in Texas.

ATI, an internationally recognized business incubator, will provide firms with its strategic, financial, and management services while immersing them in an energized business setting. ATI has a solid reputation for transforming fledgling, technology-based companies into successful market-based businesses. Their mission is to provide the necessary business resources and professional services that will take their technology start-ups to the global marketplace. Since 1989, ATI has graduated more than 50 companies, five of which have gone public. Cumulatively, these businesses have created more than 2,000 jobs with revenues approaching \$800 million. See a further description of ATI benefits in Attachment 1.

As part of our initial launch, we are looking for companies that are technology-based, poised for strong growth, and no more than 24 months from the market entry stage. Technological areas of interest include, but are not limited to: renewable power generation, distributed generation and storage, power quality, communications and controls, as well as clean energy related information technology, end-use consumer products, and distribution automation.

Through this new alliance, NREL and ATI want to make the same opportunities and services that have propelled the telecommunications and computer sectors available to the clean energy industry. We believe that this alliance will provide entrepreneurs with a valuable source of business advice, market information, and exposure to the growing energy venture community.

If this opportunity is of interest, please review [ATI Selection Process](#) as well as further contact information in Attachment 2. If you have further questions regarding this opportunity, please do not hesitate to contact us directly.

Sincerely,

Dr. Joel Wiggins
Austin Technology Incubator

Lawrence M. (Marty) Murphy
National Renewable Energy Laboratory

Attachment 1

ATI Advantages

ATI facilitates the growth and development of emerging technology companies by advising early-stage, high-risk companies and providing them with the necessary assistance to make their technology-based ventures succeed. Services provided to member companies include:

Mentoring and Advisory Services

- Each incoming company is offered a "CEO Mentor." This will be a person with extensive business experience or specific industry insight who will work with the company on a limited basis to advise it on matters of particular importance to the company.
- Specialized mentors also will be made available to the companies to assist with particular strategic areas or to provide project-oriented consultation. These arrangements may begin as a pro bono arrangement with an option for both parties to graduate to a paid relationship.
- ATI organizes a regular seminar series in which industry experts discuss areas of importance to growing technology companies. Only ATI companies are invited to these seminars, and mentoring relationships are frequently fostered during these events.
- Each ATI company is offered an annual advisory committee review in which resident companies make a presentation of their current business plan and status and receive a critique and valuable advice from this team of industry and business experts.
- ATI directors meet with each ATI company at regular intervals to discuss the company's needs, ATI's services, and maintain a current perspective of the company's progress and upcoming issues to be addressed.
- All companies are afforded access to in-house consulting by professional ATI staff and University of Texas interns, including public relations assistance by ATI personnel.

Access to ATI Conference Facilities & Equipment

- ATI offers on-site and off-site companies access to numerous conference rooms, including one designed for audio-video computer presentations.

Facility Access and Services for Resident Companies

- Although limited at all times by space availability, ATI generally offers flexible, expandable office space to cater to the unpredictable needs of growing start-up companies.
- ATI provides resident companies with valuable office services, including two shared T1 lines for Internet connections, complete telecom services, and shared fax machine, copiers, receptionist, and mail services.

Access to Academic Resources

- As a creation of the University of Texas at Austin, ATI maintains a close relationship with students, faculty, research, and other university resources, which provide an experiential learning facility for resident companies.
- ATI facilitates graduate and undergraduate internships from a variety of disciplines and coordinates class project activities with the Graduate School of Business.
- As a part of the [IC² Institute](#), ATI companies have access to IC² Fellows and relationships with many corporate and university partners; and ATI companies receive reduced rates for many of the numerous IC² business development and education programs.

Free Membership in On-Site Industry Organizations

- The [Texas Electronic Commerce Association](#) is the premiere trade association representing and promoting the electronic commerce industry in Texas.

- [The Capital Network \(TCN\)](#) is the largest, nonprofit capital network in the nation, matching entrepreneurial ventures with investment capital.
- The Austin Software Council provides education, networking opportunities, and seminars for the Austin region's software community.
- We are currently examining what industry organizations would benefit our new clean energy companies.

Access to ATI's "Know-How Network"

- The Know-How Network is a network of professional service providers who volunteer their time or offer their services at discounted rates to assist the start-up ventures at ATI. This service network includes hundreds of individuals and companies across a wide range of areas such as legal, accounting, human resources, insurance, and many others

ATI Synergies

- One of the most valuable services offered by ATI is exposure to other resident companies. Collaboration between ATI companies is commonplace, and ATI fosters peer-to-peer group meetings in which particular sectors (e.g. marketing, information technology, etc.) network to discuss issues pertinent to their areas.
- ATI companies are exposed to ATI and IC² visitors from around the world, presenting investor and customer opportunities

Additional Benefits

- ATI companies have access to the newly formed Global Business Accelerator, which assists companies in expanding their customer base or operations to international markets.
- As an aggregator of small business enterprises, ATI has obtained discounted prices from various businesses for goods and services essential to growing companies.

-Entrepreneurs-

Jump-Start the Development of Your Business.... by tapping the resources, insights, expertise, and extensive business and financial networks of one of the nations premier, and most successful, business incubators.

ATI &

Clean

Energy

Technologies

Technological areas of interest include, but are not limited to:

- Renewable power generation,
- Distributed generation and storage,
- Power quality, communications and controls,
- Clean energy related information technology,
- End-use consumer products, and
- Distribution automation.

If you have further questions regarding this opportunity, please contact:

Jane Pulaski
512.926.8472
jpulaski@flash.net

The National Renewable Energy Laboratory (NREL) and the Austin Technology Incubator (ATI) are pleased to announce a new opportunity for emerging clean energy businesses.

NREL and ATI have formed a strategic alliance to assist Texas-based energy companies make the difficult transition from a technology focused, start-up company to a successful market-based enterprise.

✱

ATI will provide new energy firms with strategic, financial, and management services while immersing them in an energized business setting.

Since 1989, ATI has graduated more than 50 companies, five of which have gone public. Cumulatively, these businesses have created nearly 2,000 jobs with revenues approaching \$800 million.

✱

ATI is looking for:

- companies that are technology-based,
- poised for strong growth, and
- 24 months from the market entry stage.

✱

To be considered, ATI requires that candidate companies submit an executive summary or business plan that demonstrates an innovative, technology-based product idea or business concept. If your company meets the selection criteria and you would like to apply for entrance to the ATI/NREL Clean Energy Incubator, please mail or e-mail your executive summary or business plan to:

**Austin Technology Incubator
3925 West Braker Lane, Suite 400
Austin, Texas 78759
e-mail: atiinfo@ati.utexas.edu**

Framework for a Summary Business Plan⁵⁵

Incubators frequently will ask prospective clients for a business plan or a summary business plan. In the absence of a business plan, and/or if the specific incubator does not have a prescribed format for the business plan summary, we suggest that the Summary Business Plan contain the information described below. The information should be brief and can be addressed in only a few short paragraphs (not more than two pages), with the exception of the company brochure (if available) and the vitae that are requested below. This information will provide a good overview of the business and associated opportunities as well as help the associated business incubator become familiar with the candidate's organization. We suggest that, initially at least, all information provided should be nonproprietary.

Company Information

Company Description: Include ownership of the co. (e.g. privately owned, a subsidiary of a larger co., a U.S. company, etc.), how long in existence, and the type of business (e.g. a developer and manufacturer of a specific technology). Attach a company brochure, if available.

Business Strategy: What is your key business (e.g. the low cost provider) to obtain a sustainable competitive advantage? Do you have a business plan (do **not** attach)?

Product: Describe your product or service in terms that general consumers can understand. What is unique about your product /service in terms of customer benefits? Any patents?

Management Team: Who are the principals in your company and how is their experience relevant to your type of growing business? Please attach short bios on your key managers.

Employees: Describe the number and make-up of staff.

Markets and Customers: What are the markets, and who are the customers, that you serve? How large (\$'s) are the markets? Approximately what share of that market do you have now and what share do you anticipate in three years? What is your key development strategy?

Competitive Position: Who is your competition and how will you keep others from effectively competing with you?

Key Achievements to Date: Describe major milestones met to date. For example, key patents, technology validation and demonstration projects completed, sales levels attained, purchase letters of intent from key customers, etc.

Sales: What is the current sales range and gross profits for your company? How large do you expect them to be in three years, and what are the key underlying assumptions?

Goals: What are the two key goals that you want to accomplish through participation in the incubator?

Key Success Factors: What are the two-three key factors that will determine the success of your business?

⁵⁵ This framework is based on the information NREL requests from potential participants for the NREL Industry Growth Forums

For more information contact:
Kerry Masson (303) 275-4083
E-mail: kerry_masson@nrel.gov

Clean Energy Technology Incubator Initiative Launched in Texas

Golden, Colo., April 26, 2000—The Austin Technology Incubator (ATI) and the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) have formed a strategic alliance to support the growth and development of technology-based start-up companies in the energy sector.

ATI -- a program of the IC² Institute of The University of Texas at Austin -- will provide qualified companies with strategic, financial and management services while immersing them in an energized business setting. NREL will build upon this expertise and leverage its relationships with international institutions, the venture capital community, multi-lateral lending institutions and national, state and local governments to help ATI jumpstart clean energy businesses in Texas.

A variety of Texas state agencies — including the State Energy Conservation Office, the General Land Office, the Texas Natural Resources Conservation Commission, the Texas Energy Coordination Council and the Texas Department of Economic Development — are participating in the effort, as is the Texas Renewable Energy Industries Association.

NREL and ATI are looking for companies that are technology based, poised for strong growth and less than 24 months from market entry. The alliance is interested in a broad range of company types, from technology-based spin-offs and fledgling start-ups to research-based companies. Technological areas of interest include renewable power generation, distributed generation and storage, power quality, communications and controls, fuel cells, energy conservation, clean energy-related information technology, end-use consumer products and distribution automation.

"We're asking potential businesses to review the selection criteria and submit an executive summary or business plan that demonstrates an innovative, technology-based product idea or business concept," said Dr. Joel Wiggins, director of ATI's operations. "If the information looks like it's a good fit for the clean energy initiative, ATI will help the candidate refine its plan for consideration into the incubator."

- more-

"Clean energy businesses offer great economic development potential for Texas," said Dub Taylor, Director of the State Energy Conservation Office. "The Texas electric utility restructuring law passed last year mandating 2000 megawatts of new renewable energy generation by 2009. This makes Texas one of the most attractive markets for renewable energy in North America and this Clean Energy Incubator initiative is timed perfectly to capitalize on a growing market."

Clean energy technologies are a new area of interest for ATI. "We're very excited to add clean energy as a new sector within ATI," said Wiggins. "We believe that technological change is impacting the energy industry, driven in part by the growing demand for electricity worldwide, the threat of climate change and the Internet economy. As we have seen with information and communications technologies, we believe the rewards are potentially huge for innovators and investors at the forefront of new, clean energy systems."

In the past four years, NREL has been helping move energy-based businesses from the research and development stage to market through a series of forums that put companies in touch with financial and business leaders. "The forums showed us just how difficult it is for entrepreneurial companies to make the transition from a technology-focused start-up to a market-focused business," said Dr. Marty Murphy, NREL Project Manager for the Clean Energy Technology Incubator Initiative.

"We want to make the same services that are available to the "dot.com" and telecommunications companies, available to young clean energy companies. This alliance with ATI will help by immersing entrepreneurs in a business environment where the correct balance of market and technology development can move these companies successfully into the marketplace," Murphy said.

ATI is an internationally recognized business incubator with a solid reputation for transforming fledgling, technology-based companies into successful market-based enterprises. Since 1989, ATI has graduated more than 50 companies, five of which have gone public. These businesses have created more than 2,000 jobs with revenues approaching \$900 million.

NREL is the U.S. Department of Energy's premier laboratory for renewable energy and energy efficiency research, development and technology deployment. NREL plans several similar renewable energy and energy efficiency incubator alliances around the country.

For more information about the ATI/NREL Clean Energy Incubator, contact Dr. Joel Wiggins, ATI at (512) 305-0033 or Dr. L. Marty Murphy, NREL at (303) 275-3050.

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CLEAN ENERGY FOR THE 21ST CENTURY

Visit NREL on-line at <http://www.nrel.gov/media/>
for up-to-date news releases, photos and information.

NR-01200