State and Industry Partnerships: Advancing U.S. Industrial Competitiveness through Energy Efficiency and Advanced Energy Technology Investments

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List of Abbreviations

Center	Ohio Center for Industrial Energy Efficiency
CHP	Combined Heat and Power
DOE	U.S. Department of Energy
EEPM	Ohio Energy Efficiency Program for Manufacturers
DOE ITP	U.S. Department of Energy Industrial Technologies Program
IAC	Industrial Assessment Center
MEGA	Manufacturers' Energy-Efficiency Grant Assistance Program
MEP	Manufacturing Extension Partnership
NASEO	National Association of State Energy Officials
NIST	National Institute for Standards and Technology
NYSERDA	New York State Energy Research and Development Authority
OER	Idaho Office of Energy Resources
ODOD	Ohio Department of Development, Office of Energy
REAP	Rural Energy for America Program
SBC	Systems Benefits Charge
SEN	*Save Energy Now*
SEO	State Energy Office
TASCO	The Amalgamated Sugar Company
USDA	U.S. Department of Agriculture

Executive Summary

The industrial sector is a critical part of the U.S. economy and supports an estimated 18.6 million direct and indirect jobs, or about one in six of private sector jobs in 2009. The sector also represents about 30% of energy consumption in the United States[i] and therefore presents a major opportunity for dramatic energy intensity reductions, while improving productivity and economic vitality. In an economy that heavily emphasizes the imperative of preserving U.S. competitiveness and creating jobs, U.S. manufacturing will play a pivotal role in economic recovery. As the world's largest manufacturing economy, the U.S. produces roughly twenty percent of the global manufactured products.[ii] Tellingly, if the U.S. manufacturing sector were its own country, it would rank as the world's eighth largest economy.[iii]

Through targeted programs and supporting activities, state governments can foster a thriving private sector, equip manufacturers to capture efficiency and productivity gains, and ensure continued economic growth. States' long-standing economic development priorities have taken on renewed urgency and current efforts at the state level are significantly focused on the manufacturing sector. Generally funded at modest levels, State Energy Offices (SEOs) typically provide technical assistance, training and education to increase the impact of other federal and utility programs. Typically, industrial projects are larger and require higher levels of funding, and with the large influx of stimulus funding from the American Reinvestment and Recovery Act (ARRA) channeled to states primarily through the State Energy Program, many SEOs invested in these programs as never before.

Through a comprehensive review of all 56 State and Territory Energy Offices, completed in 2011, the National Association of State Energy Officials (NASEO) systematically captured a snapshot of state industrial energy efficiency and clean energy programs underway. Of the 56 SEOs in the United States, more than 35 administer energy programs for manufacturers and the industrial sector. The diversity of programs available is a testament to the states as laboratories of innovation that are responsive to the unique needs of their local communities and industries. States enable private sector companies to continue investing and growing through loan programs, incentives and grants coupled with technical assistance, project management support, and free or subsidized audits and assessments to empower companies to improve energy efficiency and productivity in their facilities. To maximize the use of resources, the majority of these programs leverage other programs and activities administered by utilities, regional energy efficiency groups, U.S Department of Energy (DOE) Industrial Technology Program's (ITP) initiatives such as *Save Energy Now* (SEN) and regional Industrial Assessment Centers (IAC), and the National Institute for Standards and Technology's (NIST) Manufacturing Extension Partnership (MEP).

Through increased funding from the State Energy Program, many longstanding industrial energy efficiency programs expanded and reached aggressively into new areas. Total current energy efficiency investment available to the industrial sector through State Energy Offices amounts to over $870 million.[1] Of that amount, state funds from systems benefit charges,[2] state

[1] This figure only includes programs that the state energy offices operate and fund in their state. There may be other state programs offered through other channels that are not included here. The funding included here generally spans

appropriations, proceeds from greenhouse gas credit sales, and public bond financing initiatives accounts for $456 million. The remainder of funding, around $345 million[3], comes from the federal government, and is invested by states according to priorities developed in partnership with the private sector and documented in their State Energy Program plans. In the case of DOE ITP's *Save Energy Now* (SEN) grants to State Energy Offices (about $22.1 million[4]), programs are implemented according to ITP direction in collaboration with regional and state-level partners.

In support of DOE ITP's national industrial energy efficiency objectives, many SEOs provide outreach, training, resources, and technical assistance to manufacturers and industrial facilities in their states to help them operate more efficiently by identifying and reducing energy use in key industrial processes and systems and adopting energy management strategies. Twenty-three SEOs support ITP initiatives through existing activities in their state or region. Additionally, states apportioned close to $280 million of ARRA funds through the State Energy Program exclusively for industrial programs.[iv] These programs built on existing efforts in training and technical assistance support and sought to improve the energy efficiency in industrial facilities and catalyze investment and production in clean energy technology through technology demonstrations, pilot projects, and plant retooling. These deployment efforts have attained immediate results and will continue to have lasting economic impact into the future.

Existing relationships with manufacturers in their states, allowed SEOs to launch programs which attended to the specific needs of manufacturers in their state while responding to strategic state policy and economic development priorities. Years of laying the groundwork with private industry through assessments, audits and technical assistance, supported by DOE and deployed by states, has resulted in a slate of ready projects—many of which simply lacked an infusion of capital to get off the ground. Mutual trust, cultivated over the course of years and even decades through the SEOs' continuous presence as a trusted source of technical assistance, enabled SEOs to target their outreach and achieve high subscription rates for their programs. Finally, established partnerships with other relevant stakeholders and program administrators such as utilities, regional energy efficiency groups, and federal agencies including the DOE's ITP and the NIST's MEP program, allowed SEOs to coordinate their new and expanded programs with existing resources available to manufacturers.

Though it will be some time before the results of these industrial projects are available, the high levels of investment SEOs dedicated to the industrial sector with their augmented resources signifies a major recognition of the opportunities in that sector to reduce energy intensity and increase productivity and competitiveness. It also positions the states as leaders in the

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the years ranging from 2009-2012. More specific information on performance periods will be captured in future updates to this body of work.

[2]Terminology differs among states. For example, other interchangeable terms include public benefits charge and societal benefits fund.

[3] Another $71 million in funding is accounted for in funding or public university cost share, private sector leverage, and funding from other state agencies.

[4] This amount can be further segmented between SEN grants funded with ARRA resources in and future rounds of SEN funding which will come directly from ITP spread across several years. These amounts total $6.5 million and $15.6 million respectively (Glatt, e-mail). SEN awards to universities, regional groups, IACs and other state partners are not included in this count.

development of burgeoning energy efficiency and clean energy markets. As program administrators and key partners in other regional and state-wide programs, SEOs play a vital and increasingly expanded role in this area.

Looking ahead, as the peak of recent funding declines, whether and how SEOs sustain the momentum of these programs and how their role in industrial energy efficiency will evolve remains to be seen. Though it is still too early to analyze the results of these new programs, the ability of SEOs to draw on existing relationships built over years of collaboration with industry, utilities, other state agencies, and state, regional, and national partners provided the necessary infrastructure to identify and implement projects quickly. Regardless, experiences so far have shown that SEOs will continue to add value in utilizing their existing partnership and information network as a ready platform for ongoing support and deployment of state-level programs and training in the industrial sector. Future study will focus on drawing lessons learned from these state programs and partnerships.

Methodology for Data Collection

The primary objective of this report is to present a comprehensive catalogue of the industrial energy efficiency programs operated by the 56 SEOs.[5] Information was collected from SEOs initially through online and literature searches and verified in individual correspondence with each SEO. Additional phone interviews were conducted when further clarification was needed or to develop a deeper understanding of a particular state's program development, motivation, and results to date. At least one state in each of NASEO's seven regions was interviewed to illustrate the diversity of form and intention that comprises such programs. A few state experiences are highlighted in this report. These states were selected for their geographical, funding, and program diversity, as well as for their success in leveraging a wide range of partnerships to launch and expand their industrial programs. A list of these interviews can be found in the References section.

In order to gain a better understanding of how SEOs invest their funds and how they may leverage other state, regional, and national programs, NASEO collected data only on programs that are administered by the SEOs or programs which receive direct funding from SEOs. Programs which are run by the State Public Utility Commissions, utilities, or other third-parties with minimal connection to the SEO were not included. The DOE's IAC network, which is hosted at universities across the country, is recognized as a critical asset to the national industrial efficiency landscape, but only included in states where IACs are closely affiliated with their SEO and receives direct funding from them.

Finally, the data collected here represents only a snapshot of recent and ongoing activities. The state programs represented in this report do not share a single timeline and the programs which were included range from the 2009 to 2012. As NASEO continues to refine this information in

[5] At the time of writing, Puerto Rico, Rhode Island and California have not confirmed information on their industrial energy efficiency programs, and they are not included in the final figures presented here with one exception: SEN program funding to California is confirmed and included in the total for state SEN programs.

subsequent updates, more attention will be paid to identifying the time frames associated with each state program.

Overview of State Industrial Energy Efficiency Programs

Funds available to assist industrial energy efficiency and competitiveness in the states total over $873.9 million.[6] When combined with substantial private sector cost-share and investments, the impact of these funds is greatly amplified. Of that amount, state funds from systems benefit charges,[7] state appropriations, proceeds from greenhouse gas credit sales, and public bond financing initiatives accounts for $456.7 million or 52%. The remainder comes from private sector leveraging and the federal government. Federally-provided funding is invested by states according to priorities in their State Energy Program plans, or, in the case of DOE's *Save Energy Now* (SEN) grants to State Energy Offices, is implemented in collaboration between ITP and state and regional partners.

The following table shows all energy efficiency and clean energy development programs exclusively targeted towards a state's manufacturing and industrial sector that are funded through SEOs. These programs include energy assessments and audits, technical assistance, training, and access to capital through loans or grants to implement projects. Programs that encompass multiple sectors, such as commercial or agriculture, are not included in Table 1.0 but are presented in Table 2.0.

Table 1.0: State Programs Targeting Only Industrial Sector

State	Program Name	Description	Total Funding
Alabama	E3: Reducing Industrial Energy Intensity in Alabama	Audits, TA, Training	$900,000
Arizona	Manufacturers' Energy-Efficiency Grant Assistance (MEGA) Program	Grants	$2,735,000
Arkansas	Arkansas Industrial Energy Technology Loan Program	Financing	$9,757,658
Arkansas	Arkansas Green Technology Grant Program	Grants	$3,049,653
California	California Partnership for Improving Industrial Plant Productivity	Audits, TA	$1,332,634
Colorado	Colorado Industrial Energy Challenge	Audits, TA	$1,650,000
Georgia	Regional Save Energy Now	Audits, TA, Training	$533,000
Georgia	Southeast Industrial Energy Alliance	Audits, TA	$900,000
Georgia	Certified Energy Manager Training Program	Training	$400,000
Georgia	Industrial Energy Efficiency Grant Program	Grants, TA	$2,000,000
Idaho	Idaho Save Energy Now - Industries of the Future	Audits, TA	$900,000
Illinois	Midwest States Save Energy Now (SEN) Partnership Program	Audits, TA	$1,398,537
Illinois	Large Energy User Grant Program	Grants	$14,000,000
Indiana	Purdue Technical Assistance Program-Industrial	Audits, TA	$1,042,900

[6] This figure only includes programs which the state energy offices operate and fund in their state. This amount generally spans the years ranging from 2009-2012.
[7] Terminology differs among states. For example, interchangeable terms include public benefits charge and societal benefits fund.

State	Program Name	Description	Total Funding
	Energy Efficiency Assessment Initiative		
Kentucky	Kentucky Program for Industrial Energy Efficiency	Audits, TA	$899,861
Kentucky	Industrial Facility Retrofit Showcase	Grants, Incentives	$4,400,000
Louisiana	Louisiana Save Energy Now	Audits, TA	$890,774
Maine	Large Project Grants	Grants	$14,501,044
Maryland	Save Energy Now for Maryland Industries	Audits, TA	$733,765
Massachusetts	Massachusetts Save Energy Now	Audits, TA	$1,400,000
Michigan	State of Michigan Regional Delivery of the DOE Save Energy Now Program to Meet the Goals of EPACT (2005) and EISA (2007)	Audits, TA	$830,550
Michigan	Clean Energy Advanced Manufacturing Program	Grants, Loans	$49,380,000
Minnesota	Implementing an Industrial Energy Efficiency Program in Minnesota	Audits, TA	$922,252
Minnesota	Emerging Renewable Energy Industries Grant		$4,000,000
Mississippi	Reducing Industrial Intensity in the Southeast	Audits, TA	$1,141,393
Missouri	Best Price Energy Efficiency Program	Grants	$3,000,000
Missouri	Industrial Pilot Projects	Incentives	$1,800,000
Montana	Industrial Energy Assessment Program	Audits, TA	$100,000
Montana	Industrial Energy Audits	Audits	$150,000
New Jersey	New Jersey Industrial Energy Program	Audits, TA	$900,000
New York	New York Industrial Partnership Network	Education, Audits, TA	$900,000
New York	Industrial and Process Efficiency Incentive Program	Grants, Incentives	$122,000,000
Ohio	Energy Efficiency Program for Manufacturers[8]	Audits, TA, Grants	$ 26,256,391
Pennsylvania	Comprehensive Statewide Pro-Active Industrial Energy Efficiency Program	Audits, TA	$847,257
South Carolina	Save Energy Now - South Carolina	Audits, TA	$1,040,291
Texas	Supporting Texas Manufacturing to "Save Energy Now"	Audits, TA	$1,080,595
Utah	Utah Industrial Efficiency Program	Education	$300,000
Virginia	Southeastern Industrial Efficiency Alliance	Audits, TA, Training	$211,050
Washington	Save Energy Now: State, Regional and Local Delivery	Audits, TA	$1,340,652
West Virginia	Industries of the Future- WV Assessment	Audits, TA	$150,000
West Virginia	Projects with Industry	Training, Workforce Development, Audits, TA	$120,000
West Virginia	E3	Training, TA, Audits	$94,375
West Virginia	Regional Assessment/Implementation SEN Delivery System Partnership	Audits, TA	$1,288,050
Wisconsin	Clean Energy Business Loan Program	Financing, Grants	$53,700,000
Wisconsin	Recovery Act: Expanding the WisconSEN Program	Audits, TA	$1,179,000
TOTAL			**$336,156,682**

[8] The Ohio Energy Efficiency Program for Manufacturers is an integrated program that encompasses the Ohio Center for Industrial Efficiency and Targeting Industrial Efficiency programs (Kasun, interview).

These above programs, which exclusively target the industrial sector, are funded by a mix of State Energy Program funds, DOE-ITP funds, and state and private sector leveraged funds and cost-share. Of the total figure, federal funds equal $200.3 million and state and private sector leveraging equal $135.7 million. In general, the infusion of additional money channeled into the flexible State Energy Program from ARRA enabled the creation and significant expansion of many of these programs. In many cases, these programs built upon and complemented existing work accomplished over time through DOE-supported SEN awards to states.

Additionally, a diverse portfolio of programs that provides different kinds of support to the industrial sector is important. Often, these programs may encompass more than just the industrial sector, as states design flexible programs that can accommodate multiple classes of end-users. Table 2.0 provides a summary of all programs for which manufacturers and industrial companies may be eligible, though they may not be the sole eligible parties. Commonly, these programs include the commercial sector, local governments, and the agricultural sector in addition to the industrial sector. It is difficult to isolate how much funding from these programs only benefit the industrial sector, yet these programs are important to note as they provide a more complete picture of a state's overall investment and support for industry and manufacturers.

Unlike the programs detailed in Table 1.0, a higher proportion of these programs include funding from a local source: e.g., a Systems Benefits Charge (SBC), public bonds, general appropriations, revenues generated from energy efficiency. Only about 27% the funding available in these other programs comes from the federal government.

Table 2.0: State-Level Programs Targeting Multiple Sectors

State	Program	Description	Sectors Served[9]	Total Funding
Alabama	Alabama Saves Revolving Loan Program	Financing	I, C	$60,000,000
Arizona	State Energy Program Technical Assistance	Audits, TA	I, Ag	$15,000
Colorado	Direct Lending Revolving Loan Program	Financing	I, C, P, N	$11,000,000
Florida	Florida Energy Opportunity Fund	Financing	I, C	$36,089,000
Idaho	Low Interest Energy Loans	Financing	I, C, Ag, P, Res	$750,000
Iowa	Agricultural/Industrial/Commercial Loan Program	Financing	I, C, Ag	$1,500,000
Maine	Cash Incentives (No Name Given)	Incentives	I, C, Ag	$4,900,000
Maryland	Jane E. Lawton Conservation Loan Program	Financing	I, C, P	$2,500,000
Massachusetts	Alternative Portfolio Standard (for CHP)	Incentives	I, C, P	$9,000,000
Michigan	Retired Engineer Technical Assistance Program	Audits, TA	I, C, P	$1,000,000

[9] "I" stands for the industrial sector; "C" stands for the commercial sector, including non-profits; "P" stands for the public sector, including institutional buildings and state and local governments; "Ag" stands for the agricultural sector; and "Res" stands for the residential sector.

State	Program	Description	Sectors Served[9]	Total Funding
Michigan	Energy Efficiency Technology Demonstration	Grants	I, P	$1,750,000
Minnesota	Energy Efficiency Revolving Loan Fund		I, C	$10,000,000
Minnesota	Energy Programs in Commercial and Industrial Buildings	Grants	I, C, P	$4,100,000
Mississippi	Commercial and Industrial	Audits, TA	I, C	$90,000
Nebraska	Dollar and Energy Saving Loan Program	Financing	I, C, Ag, P, Res	$11,307,475
New Hampshire	Expanded Business Energy Efficiency Program	Audits, Incentives	I, C	$922,000
New Jersey	New Jersey New Construction	Incentives, TA	I, C	$9,275,463
New Jersey	New Jersey Retrofit	Incentives, TA	I, C	$36,478,000
New Jersey	New Jersey Pay for Performance New Construction	Audits, Incentives	I, C	$7,487,495
New Jersey	Combined Heat and Power	Incentives	I, C, P	$18,000,000
New Jersey	New Jersey Pay for Performance	Audits, Incentives, TA	I, C	$54,849,805
New York	Flex Tech	Audits	I, C, P	$29,500,000
North Carolina	Energy Efficiency for Commercial, Industrial and Large Nonprofit Sector	Grants	I, C	$9,147,000
Pennsylvania	Alternative and Clean Energy Program	Financing, Grants	I, C	$165,000,000
Pennsylvania	Green Development Loan Program	Financing	I, C, P	$48,000,000
South Carolina	Clean Green Investment Incentives	Audits, Grants	I, C	$2,113,910
South Carolina	Energy Technical Assistance Program	Audits	I, C, Ag, P	$1,700,000
South Carolina	Training	Training	I, C	$976,610
West Virginia	Clean Energy Standard Offer Program	Education	I, C	$50,000
West Virginia	EECBG - IOF	Audits, TA	I, P	$200,000
TOTAL				**$537,701,758**

States Provide Crucial Education, Training, and Technical Assistance

A common element of a majority of SEO programs for the industrial sector is providing technical assistance and training. Overall, SEOs operate over 25 programs providing free or subsidized energy assessments and audits, sometimes cost-shared with utilities, ongoing technical assistance, and/or training for manufacturers and industrial facilities in their state. These programs generally support other related programs in their state. For instance, several SEO energy assessment and audit programs include utility cost-share, and training workshops organized or supported by SEOs are often offered in conjunction with universities, IACs, and state MEPs. These programs cover topics such as DOE Best Practices training and energy management.

Due to lower funding levels in the past, SEOs have relied heavily on partnerships with other program administrators and technical assistance providers to broaden their impact. Core

technical assistance and training activities, organized or supported by SEOs drew on their in-house expertise, utilized existing connections with industry, and reinforced working relationships with other stakeholders, such as utilities, IACs and MEPs. Through years of engagement with these key state and regional partners, SEOs proved to be capable facilitators and coordinators even as they further developed deeper understandings of the unique economic development needs in their states and reinforced relationships with the private sector.

As a result of this experience, SEOs were well-positioned to launch new and expanded programs, which served the distinctive needs of the industrial sector in their state, when the large influx of funding into the State Energy Program and SEN in 2009 was made available. Looking ahead in the future, SEOs can continue to build on these strengthened relationships with private industry, utilities, other government agencies, and other partners to continue improving the competitiveness of the manufacturing sector in their states.

State Successes in Industry

The following sections highlight a few successful programs and partnerships from the states of Idaho, Arizona, South Carolina, New York, Alabama, and Ohio. These programs illustrate the many ways that State Energy Offices can empower the manufacturing sector through technology deployment, financing, technical assistance, and education.

Idaho Bridges the Space between Industry and Policymakers

In Idaho, the SEO, the Idaho Office of Energy Resources (OER), secured the funding for all industrial energy efficiency activities in the past from DOE ITP, working in partnership with other stakeholders. Prior to 2008, all of the grants Idaho received were parts of a larger regional collaborative, facilitated by Washington State University's Energy Extension Program, a leading industrial energy efficiency program implementer and technical assistance provider in the Northwest. In 2009, OER received its first individual SEN grant, which allowed the office to scale efforts that were already under development over the course of several years and increase their program from pre-2008 funding levels of around $90,000 to $350,000 in 2010 and 2011.

As an expansion of providing energy assessments and audits in accordance to ITP program guidelines, OER used program money to fund 50% of two full-time energy engineers spread across a 16-facility portfolio to provide personalized and continuous technical assistance, conduct in-depth training, and champion and manage project implementation in those facilities. Participating facilities provided the remaining 50% of the engineers' salary, ensuring the private companies had a stake in the process while leveraging public dollars. In addition to the direct energy savings of implemented projects and the lasting benefits of fostering a company culture around energy management, OER intends to use this pilot project as a way to demonstrate to companies the value of retaining energy engineers and begin creating sustained market demand.

Another natural extension of previous work is OER's current partnership with The Amalgamated Sugar Company (TASCO) to explore the feasibility of constructing a proposed large (100MW) combined heat and power (CHP) plant at TASCO's Nampa, Idaho site. Leveraging up to $60,000 of private and utility cost-share for $40,000 of OER funding through ITP,[v] the project is

currently in the process of completing a second, highly-detailed feasibility study following onto a successful first study. As testament to the singular role that SEOs can play in providing a feedback loop from program work back to policy, the results of this partnership with TASCO have seeded efforts by the SEO to inform state policymakers of regulatory hurdles in constructing CHP plants on the scale that TASCO proposes, and ultimately, intends to alleviate these barriers to allow for the integration of more CHP in Idaho's energy mix.

Arizona Spurs Development in Nascent Clean Energy Technology Sector

Historically, the Arizona Commerce Authority Energy Office has used a small portion of their State Energy Program funding to support staff time to provide businesses in Arizona with access to technical expertise and assistance. Both manufacturers and agricultural companies could call on the SEO to provide technical review of proposals for grants and loans to other programs such as USDA's Rural Energy for America Program (REAP) Guaranteed Loan Program. Many businesses are referred to the SEO for technical assistance through the Arizona Manufacturing Extension Partnership.

With the infusion of additional State Energy Program funds from ARRA, Arizona's State Energy Program budget expanded to $55.4 million.[vi] Of that amount, the Arizona SEO allocated 11% to two programs specifically for manufacturers of energy efficiency or renewable energy technologies in their state. Housed within the state's economic development agency,[10] the Arizona Commerce Authority, the Arizona SEO designed their programs specifically for energy efficiency and renewable energy companies as part of the state's driving priority to develop and support a growing clean energy sector in the state.

Based on the assumption that improved energy efficiency will increase productivity and competitiveness, the Manufacturers' Energy-Efficiency Grant Assistance (MEGA) Program was funded with $2.735 million available in competitive grants, which targeted energy efficiency improvements only in renewable energy technology manufacturing facilities to bolster that emerging sector. The program eligibility requirements, demonstrate the program's strong job creation and economic development focus by specifying that projects should create or retain at least 2 full-time employees for every $100,000 requested, provide at least 50% of matching or in-kind cost-share, and be expanding or relocating within Arizona.

Presently, over $2.7 million have been awarded to seven renewable energy companies, and the Arizona Commerce Authority Energy Office estimates these projects will create almost 180 new jobs in the state. Awardees include manufacturers of energy storage batteries, systems that use solar thermal energy to power Stirling engines, power distribution systems, wind turbines, and photovoltaic system components and modules.[vii]

A second program, designed for the purpose of supporting nascent energy efficiency and renewable energy manufacturing in Arizona, the 21st Century Energy Demonstration Projects Grant Program, provided about $3.4 million in grants and leveraged at least $1.2 million in cost-

[10] Thirty SEOs are a part of their state's economic development or commerce agency.

share for four demonstration projects.[11] These innovative projects include a demonstration of using solar powered systems for water pumping and aeration in two municipal wastewater treatment facilities and support for a manufacturer of high-efficiency, lightweight motors for electric bicycles.

Ultimately, the popularity and success of these programs in Arizona's industrial community rested on the strong working relationship between the SEO and the rest of the Arizona Commerce Authority. By coupling existing networks with the business community that Commerce had built in the past with the technical expertise of the SEO, Arizona was able to effectively mobilize millions of dollars to achieve the state's desired outcomes in clean energy development and job creation.

Solar powered water aerator in a wastewater facility in the Town of Thatcher, Arizona as part of SunPumps of Safford's 21st Century Energy Demonstration Project.

Source: Jim Westberg, Arizona Commerce Authority, Energy Division

To sum up Arizona's strategy in the words of Governor Brewer, "When I unveiled a new Arizona job creation and economic development plan in June [2010], it was projects such as these that are focused on creating quality jobs and advancing energy innovation that I envisioned…Each of these projects demonstrates how successful collaboration between the business community and the State of Arizona benefit the citizens of this great state."[viii]

South Carolina Partners With Other State Stakeholders

South Carolina's recent experience provides another example of a state employing existing networks and partnerships. In South Carolina, the Energy Office partnered with the South Carolina Coordinating Council for Economic Development and the South Carolina Department of Commerce to launch a $2.1 million Clean Green Investment Incentive program under the State Energy Program. The program aims to encourage manufacturers to locate, stay, and/or expand in South Carolina by providing funding for energy efficiency and renewable energy projects.[12]

[11] Because this was not strictly and industrial energy efficiency program, this program was not included in the total sums for Table 1.0 or Table 2.0.

[12] The SC Energy Office pays 100% of energy efficiency projects and 50% of renewable energy projects. Companies could also seek equal funding from the SC Department of Commerce for renewable energy projects. (Jerman 2011).

Similar to Arizona's MEGA program, the Clean Green Investment Incentive program targeted funding to energy efficiency and renewable energy companies, and granted several demonstration projects as part of the larger portfolio. For instance, one successful applicant will combine energy efficiency and demonstration by retrofitting their facilities with their own highly efficient aerated concrete. Another demonstration project seeks to convert landfill waste gas to power fuel cells for floor and warehouse equipment in a BMW facility. Yet another uses a project site as a training ground as the facility implements energy efficiency retrofit measures and plant retooling for solar technology production.[13]

As in Arizona and most of the states NASEO interviewed, the SEO's working relationship with the state commerce department or economic development agency, which was then able to tap into existing networks with state businesses to identify projects and conduct outreach, was a key to success. Additionally, in South Carolina, the SEO's established partnership with the state's MEP provided a ready conduit for increased funding from DOE ITP and allowed an effective ramp-up of SEN and Superior Energy Performance technical assistance and training efforts.

Lastly, in collaboration with the state's Technical College System and Office of Economic Opportunity, the SEO is channeling nearly $1 million to the state's seven energy efficiency training centers to provide training and certification in the residential, commercial, and industrial sectors. Though industrial participation in these programs has been relatively low thus far, these training centers support the overall growth of South Carolina's energy efficiency market and will continue to provide opportunity to the state's workforce as the economy recovers.

New York Makes Commitment to Industrial Customers

New York's long history energy efficiency program implementation has focused on transforming the marketplace, encouraging adoption of sound energy decisions, and providing energy efficiency and renewable energy as a resource option. The state's energy office, the New York State Energy Research and Development Authority (NYSERDA), has offered the FlexTech program to industrial and commercial businesses in their state for many years. The longstanding program provides various types of technical assistance and support for assessments, feasibility studies, and planning analysis. The program targets increased productivity and competitiveness through identifying and implementing energy efficiency, carbon reduction, peak-load reduction, combined heat and power, and renewable generation projects. The program is open to industrial, commercial and institutional facilities, state and local governments, and non-profits.[ix] Program participants work with FlexTech consultants to conduct assessments and receive technical support in planning and project development. Primarily a technical assistance program, FlexTech is well integrated with NYSERDA's other grant and incentive programs, and often provides an entry point to other resources.

For industrial customers, the FlexTech program often connects projects with NYSERDA's Industrial Process Efficiency grant program. This program provides performance-based incentives to industrial customers to make capital investments to increase productivity and

[13] There are at least ten manufacturing retooling programs in the U.S. These programs were not part of this initial report but will be a subject of a future NASEO study.

energy efficiency. In recognition of the potential for industrial energy efficiency, in 2008, New York allocated $122 million to the sector out of the state's Energy Efficiency Portfolio Standard (EEPS) funds.[x] The Industrial Process Efficiency program began in mid-2009 and runs to the end of 2011.

Papermachine at Irving facility; Fort Edward, NY

Source: Irving, Tissue Case Study, NYSERDA.

A recent success story from the program comes from Irving Tissue, one of North America's leading tissue, paper towel and napkin product providers. Located in Fort Edward, New York, the company was considering a major plant expansion at one of their New York facilities to improve productivity and competitiveness. To ensure that the new operation was cost competitive, Irving Tissue worked with manufacturers, suppliers, and NYSERDA to build energy efficiency into the new paper making systems.

One part of the proposal recommended moving to a more efficient vacuum system. This proposed upgrade would create significant energy and cost savings while delivering a higher quality product. However, the cost of the system was too great for the company to self-finance. At this point, Irving reached out to NYSERDA to explore options, and through the Industrial Process Efficiency program, NYSERDA was able to provide grant funding to help with the incremental cost of the system.

In the end, with support from the Industrial Process Efficiency program, Irving was able to implement not just a vacuum system upgrade, but also install premium efficiency motors and variable speed drives. The incremental cost for these three energy savings measures was $4.3 million dollars, and, of that, NYSERDA was able to finance $1.8 million. As a result, the new papermaking machine is now saving 14,800,000 kWh over a standard paper machine.
Without that support, Irving Tissue may not have been able to capture all of those energy and cost savings.

Alabama Leverages Private Sector Funding For New Loan Program

In December 2010, the Alabama State Energy Office, which is the Energy Division within the state Department of Economic and Community Affairs, launched a new loan program AlabamaSAVES targeted specifically for the state's industrial businesses and manufacturers. Since its establishment, the program has expanded eligibility to also include commercial and institutional facilities.

AlabamaSAVES Loan Program

Eligible Entities: Alabama industrial, commercial, or institutional facilities

Interest rate: 2.00%

Loan Size: $50,000 - $4,000,000

Application Fee: $500 projects < $250,000; $1,000 for larger projects

Project financing available to cover up to 100% of project costs.

With State Energy Program funds from stimulus, the Alabama SEO allocated $12.5 million in direct loans and another $12.5 million in credit enhancements.[xi] Those credit enhancements, comprised of a combination of loan loss reserves and interest rate buy-downs, are projected to leverage an additional $35 million in private sector funds, for a total loan fund of $60 million. As

a revolving fund, this initial $60 million will continue to cycle through and has the potential to finance up to $121 million in projects over the next 20 years.[xii]

Furthermore, partnerships such as those with Bank of America, Philips Lighting, Metrus Energy, and Efficiency Finance not only provide private sector leveraging, they also bring valuable marketing and outreach capabilities to the program. Using their companies' existing sales and marketing channels and expertise and active networks with Alabama industries, businesses, and contractors, these private partners are driving demand and uptake in the market.[xiii]

Complementing these activities, the state's *Save Energy Now* and E3 program supports outreach for AlabamaSAVES by presenting it as a key project financing option during and after the assessment process. Launched in 2009, the Alabama E3 initiative is one of the first E3 programs in the country. Supported by DOE, the U.S. Department of Labor, and U.S. Department of Commerce, the Alabama E3 program combines workforce training and education programs, direct energy and lean assessments,[xiv] and project development assistance to systematically increase capacity for sustained energy efficiency and productivity improvements in Alabama's industrial sector.

The Alabama SEO brought together key state partners including the Alabama Industrial Assessment Center, University of Alabama in Huntsville, and the Alabama Technology Network, to implement this program, and as a lead implementer in both E3 and AlabamaSAVES, the SEO ensures ongoing coordination and synergy between the two programs. Over time, the Alabama SEO intends for the programs to grow together and that companies who take advantage of E3 assessments can finance recommended energy efficiency upgrades through AlabamaSAVES, ensuring a steady stream of energy saving projects.[xv]

By the end of July 2011, the AlabamaSAVES program had recently closed its first loan of $2.3 million for energy efficiency upgrades for the carpet manufacturer Dixie Group's facility in Roanoke, Alabama. The new equipment financed through the program is expected to save the facility 15% of its utility costs while increasing its production capacity and creating 20 new jobs at the plant.[xvi] An additional $40 million in projects are in the pipeline at various stages of assessment, review, and approval.

Ohio Invests in State's Economic Engine

Industry comprises a major portion of Ohio's economy—the manufacturing sector in the state employs 626,000 people and accounts for 14% of gross state product.[xvii] As home to many energy-intensive industries including chemicals, glass, and steel, Ohio's industrial energy consumption ranks as one of the highest in the nation.[xviii] In order to support productivity and growth in this critical part of the state economy, the Ohio state energy office, which is the Ohio Department of Development, Office of Energy (ODOD), implements programs in two broad areas: (1) Providing support and training in industrial energy management and energy efficiency project development to improve efficiency, productivity, and competitiveness, and (2) Investing in the development and commercialization of advanced energy technologies to foster new manufacturing capabilities in the state.

Currently, two main programs, the Energy Efficiency Program for Manufacturers and the Ohio Center for Industrial Energy Efficiency, provide assistance to the state's manufacturers in

identifying energy efficiency opportunities at their facilities. The Energy Efficiency Program for Manufacturers is implemented primarily by the ODOD and is comprised of four phases. In the first phase, a company works with a project facilitator to review the company's current energy management practices and explore ways to improve them. The second phase involves a technical assessment and developing a comprehensive energy management plan. The Ohio SEO provides a grant for up to 50% of phase II costs, up to $15,000. The third phase is implementation of measures identified during the phase II planning process, and additional grant money may be available for project costs. The final phase of the program is the measurement and verification, evaluation and review.[xix] Expenditures for the program to date have been $21 million in grants for the 264 Phase I, 135 Phase II and 103 Phase III program participants. ODOD estimates energy savings of 28,331,432 kwh/year (electric) and 876,349 MMBTU/year (gas, oil, other) will be accomplished as a result of this funding.[xx]

A second major resource available to Ohio industries is the Ohio Center for Industrial Energy Efficiency (the Center), a program sponsored by DOE ITP's *Save Energy Now* program and jointly administered by ODOD and Energy Industries of Ohio. This multi-year effort, funded in 2009, aims to integrate state and federal programs into a seamless program.[xxi] The Center informs state industries about the suite of resources and tools available through *Save Energy Now,* provides energy assessments and project implementation assistance, and conducts energy management training. The Center is partnering with the Ohio Industrial Assessment Center and ODOD via the Energy Efficiency Program for Manufacturers to conduct at least 12 assessments each year for three years.[xxii] Technical and financial assistance in project implementation as well as direct follow-up are aimed to increase the number of conversions from assessments to projects. Lastly, the Center is developing a recognition program to award high achievement among participating companies. Together, the Energy Efficiency Program for Manufacturers and the Center are serving the many manufacturers in the state of Ohio.

With increased State Energy Program resources, the Ohio SEO was able to provide more grant support to the industrial sector than they could under the more limited resources of their existing programs. Through a grant program targeting energy efficiency in the industrial sector, Ohio provided $20.2 million to 66 state manufacturers to improve operations in their facilities.[xxiii] Some projects funded by this grant program include the installation of regenerative burners in a high-heat zone to preheat combustion air, desiccant-based dehumidification equipment, higher-efficiency injection molding machines, variable frequency drives and waste-heat recovery equipment[xxiv] This is another case where a state used an influx of funds to complement existing programs and helps finance the implementation of energy efficiency projects developed in part with support from ongoing activities and partnerships with businesses in the state.

In addition to programs that assist companies develop and implement energy efficiency programs, Ohio is aggressively investing in the state's growing advanced energy manufacturing sector. Specifically, the state's Advanced Energy Fund recently awarded $1.7 million in grants to five Ohio companies in support of advanced high energy batteries, upgrading landfill gas to commercial quality natural gas, advanced coating material technology, electric vehicle technology, and cellulosic ethanol.[xxv]

The Ohio Third Frontier

Created in 2002, the Ohio Third Frontier a $2.3 billion initiative to create new technology-based products, companies, industries and jobs in the state. The Ohio Third Frontier's vision is to create an "innovation ecosystem," and the program supports applied research and commercialization, entrepreneurial assistance, early-stage capital formation, and expansion of a skilled workforce.

To date, the initiative has already dramatically increased the availability of early-stage equity investment capital, The Ohio State University Center for Entrepreneurship found that total seed and early-stage venture capital investment in Ohio expanded by 18.5% between 2004 and 2008. The Third Frontier has also improved R&D collaborations between research universities and other partners; attracted new companies to the state; and impacted the diversity and competitiveness of existing state industries.

Part of Ohio's larger Third Frontier program, the Advanced Energy Fund aims to "accelerate the development and growth of the advanced energy industry in Ohio through direct financial support to organizations that seek to: investigate near-term specific commercial objectives with respect to products, processes, or services; commercialize new products, commercialize manufacturing processes or technologies, or adapt or modify existing components or systems that can reduce the cost of advanced energy systems or address technical and commercialization barriers; or demonstrate market readiness."[xxvi] Currently, the fund gives preference to wind, biomass, and energy storage projects.[14] In 2011, the fund received $94.5 million of requests for funding,[15] indicating strong demand.[xxvii]

Already, these investments have demonstrated results in enabling Ohio manufacturers to adapt to changing economic conditions, enter new markets, and maintain competitiveness. American Trim, a metal forming and coating, is using an R&D award to develop an advanced coating for vehicle bumpers as well as explore a new metal forming technology for use in manufacturing fuel cell plates.[xxviii] Overall, the Ohio Third Frontier program has contributed to attracting new companies to the state. In 2006, 2007, and 2008, Ohio received an industry award from *Site Selection* magazine for the most new facility locations and expansions.[xxix] Between 2003 and 2008, $681 million of state investments across the entire initiative has achieved $6.6 billion of economic activity; 41,300 total jobs; and $2.4 billion in employee wages and benefits—or about a $10 return for every dollar of state investment.[xxx]

Conclusion

With over $336 million of state programs exclusively allocated to the industrial sector and another $537.7 million available to them in programs that include multiple end-use sectors, there is significant opportunity to make a large impact in the energy performance, productivity, and competitiveness of manufacturers. Largely capitalized with increased State Energy Program and ITP funding from ARRA, many results still remain to be seen. Even so, this early look at all state and territory energy offices, has already drawn several useful conclusions that may inform program development and delivery in the future.

[14] Other funds within the Third Frontier Program provide support for Fuel cells and photovoltaics.
[15] The program received $94.5 million of requests in letters of intent and $48.6 million in full proposals.

The ability of almost all of the state programs surveyed to draw on existing relationships built over decades of collaboration with industry, utilities, sister state agencies, and other state, regional, and national partners provided the necessary infrastructure to identify and implement projects quickly. The demonstrated capability and convening power of SEOs to serve as facilitators among these diverse partners to realize dramatic results proves the value of ongoing industrial sector programs at the state level. Looking ahead, future research could assess the results of these state programs and identify ways to continue building on the progress achieved, while building a historical set of data to improve understanding of the changing trends in state industrial programs.

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[xi] Kathy Hornsby, "Overview of AlabamaSAVES Loan Program," (presentation to NASEO Financing Task Force, conference call, 5 Aug, 2011).

[xii] Lori Collins, "AlabamaSAVES Overview by Abundant Power," (presentation to NASEO Financing Task Force, conference call, 5 Aug, 2011).

[xiii] Collins, "AlabamaSAVES."

[xiv] Sandy Glatt, Jamey Evans, and Garrett Shields, "Alabama Leverages Funding for Industrial Energy Efficiency" (paper presented at the 2011 ACEEE Summer Study on Energy Efficiency in Industry, Niagara Falls, New York, 26-29 Jul. 2011), 5.

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Table 1.0: State Programs Targeting Only Industrial Sector

State	Program Name	Description	Total Funding
Alabama	E3: Reducing Industrial Energy Intensity in Alabama	Audits, TA, Training	$900,000
Arizona	Manufacturers' Energy-Efficiency Grant Assistance (MEGA) Program	Grants	$2,735,000
Arkansas	Arkansas Industrial Energy Technology Loan Program	Financing	$9,757,658
Arkansas	Arkansas Green Technology Grant Program	Grants	$3,049,653
California	California Partnership for Improving Industrial Plant Productivity	Audits, TA	$1,332,634
Colorado	Colorado Industrial Energy Challenge	Audits, TA	$1,650,000
Georgia	Regional Save Energy Now - ARRA	Audits, TA, Training	$533,000
Georgia	Southeast Industrial Energy Alliance	Audits, TA	$900,000
Georgia	Certified Energy Manager Training Program	Training	$400,000
Georgia	Industrial Energy Efficiency Grant Program	Grants, TA	$2,000,000
Idaho	Idaho Save Energy Now - Industries of the Future	Audits, TA	$900,000
Illinois	Midwest States Save Energy Now (SEN) Partnership Program	Audits, TA	$1,398,537
Illinois	Large Energy User Grant Program	Grants	$14,000,000
Indiana	Purdue Technical Assistance Program-Industrial Energy Efficiency Assessment Initiative	Audits, TA	$1,042,900
Kentucky	Kentucky Program for Industrial Energy Efficiency	Audits, TA	$899,861
Kentucky	Industrial Facility Retrofit Showcase	Grants, Incentives	$4,400,000
Louisiana	Louisiana Save Energy Now	Audits, TA	$890,774
Maine	Large Project Grants	Grants	$14,501,044
Maryland	Save Energy Now for Maryland Industries	Audits, TA	$733,765
Massachusetts	Massachusetts Save Energy Now	Audits, TA	$1,400,000
Michigan	State of Michigan Regional Delivery of the DOE Save Energy Now Program to Meet the Goals of EPACT	Audits, TA	$830,550

State	Program Name	Description	Total Funding
	(2005) and EISA (2007)		
Michigan	Clean Energy Advanced Manufacturing Program	Grants, Loans	$49,380,000
Minnesota	Implementing an Industrial Energy Efficiency Program in Minnesota	Audits, TA	$922,252
Minnesota	Emerging Renewable Energy Industries Grant		$4,000,000
Mississippi	Reducing Industrial Intensity in the Southeast	Audits, TA	$1,141,393
Missouri	Best Price Energy Efficiency Program	Grants	$3,000,000
Missouri	Industrial Pilot Projects	Incentives	$1,800,000
Montana	Industrial Energy Assessment Program	Audits, TA	$100,000
Montana	Industrial Energy Audits	Audits	$150,000
New Jersey	New Jersey Industrial Energy Program	Audits, TA	$900,000
New York	New York Industrial Partnership Network	Education, Audits, TA	$900,000
New York	Industrial and Process Efficiency Incentive Program	Grants, Incentives	$122,000,000
Ohio	Energy Efficiency Program for Manufacturers[1]	Audits, TA, Grants	$ 26,256,391
Pennsylvania	Comprehensive Statewide Pro-Active Industrial Energy Efficiency Program	Audits, TA	$847,257
South Carolina	Save Energy Now - South Carolina	Audits, TA	$1,040,291
Texas	Supporting Texas Manufacturing to "Save Energy Now"	Audits, TA	$1,080,595
Utah	Utah Industrial Efficiency Program	Education	$300,000
Virginia	Southeastern Industrial Efficiency Alliance	Audits, TA, Training	$211,050
Washington	Save Energy Now: State, Regional and Local Delivery	Audits, TA	$1,340,652
West Virginia	Industries of the Future- WV Assessment	Audits, TA	$150,000
West Virginia	Projects with Industry	Training, Workforce Development, Audits, TA	$120,000
West Virginia	E3	Training, TA, Audits	$94,375
West Virginia	Regional Assessment/Implementation SEN Delivery System Partnership	Audits, TA	$1,288,050
Wisconsin	Clean Energy Business Loan Program	Financing, Grants	$53,700,000
Wisconsin	Recovery Act: Expanding the WisconSEN Program	Audits, TA	$1,179,000
TOTAL			**$336,156,682**

Table 2.0: State-Level Programs Targeting Multiple Sectors

State	Program	Description	Sectors Served[1]	Total Funding
Alabama	Alabama Saves Revolving Loan Program	Financing	I, C, P	$60,000,000
Arizona	State Energy Program Technical	Audits, TA	I, Ag	$15,000

State	Program	Description	Sectors Served[1]	Total Funding
	Assistance			
Colorado	Direct Lending Revolving Loan Program	Financing	I, C, P, N	$11,000,000
Florida	Florida Energy Opportunity Fund	Financing	I, C	$36,089,000
Idaho	Low Interest Energy Loans	Financing	I, C, Ag, P, Res	$750,000
Iowa	Agricultural/Industrial/Commercial Loan Program	Financing	I, C, Ag	$1,500,000
Maine	Cash Incentives (No Name Given)	Incentives	I, C, Ag	$4,900,000
Maryland	Jane E. Lawton Conservation Loan Program	Financing	I, C, P	$2,500,000
Massachusetts	Alternative Portfolio Standard (for CHP)	Incentives	I, C, P	$9,000,000
Michigan	Retired Engineer Technical Assistance Program	Audits, TA	I, C, P	$1,000,000
Michigan	Energy Efficiency Technology Demonstration	Grants	I, P	$1,750,000
Minnesota	Energy Efficiency Revolving Loan Fund		I, C	$10,000,000
Minnesota	Energy Programs in Commercial and Industrial Buildings	Grants	I, C, P	$4,100,000
Mississippi	Commercial and Industrial	Audits, TA	I, C	$90,000
Nebraska	Dollar and Energy Saving Loan Program	Financing	I, C, Ag, P, Res	$11,307,475
New Hampshire	Expanded Business Energy Efficiency Program	Audits, Incentives	I, C	$922,000
New Jersey	New Jersey New Construction	Incentives, TA	I, C	$9,275,463
New Jersey	New Jersey Retrofit	Incentives, TA	I, C	$36,478,000
New Jersey	New Jersey Pay for Performance New Construction	Audits, Incentives	I, C	$7,487,495
New Jersey	Combined Heat and Power	Incentives	I, C, P	$18,000,000

State	Program	Description	Sectors Served[1]	Total Funding
New Jersey	New Jersey Pay for Performance	Audits, Incentives, TA	I, C	$54,849,805
New York	Flex Tech	Audits	I, C, P	$29,500,000
North Carolina	Energy Efficiency for Commercial, Industrial and Large Nonprofit Sector	Grants	I, C	$9,147,000
Pennsylvania	Alternative and Clean Energy Program	Financing, Grants	I, C	$165,000,000
Pennsylvania	Green Development Loan Program	Financing	I, C, P	$48,000,000
South Carolina	Clean Green Investment Incentives	Audits, Grants	I, C	$2,113,910
South Carolina	Energy Technical Assistance Program	Audits	I, C, Ag, P	$1,700,000
South Carolina	Training	Training	I, C	$976,610
West Virginia	Clean Energy Standard Offer Program	Education	I, C	$50,000
West Virginia	EECBG - IOF	Audits, TA	I, P	$200,000
TOTAL				**$537,701,758**