Financial Incentives for Stationary Fuel Cells: A Report on State-Level Policy in the United States

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1. Introduction

The United States is more *energy-dependent* than any other country. With only 4.6 percent of the world's population, the United States consumes 24.0 percent of the world's energy. The United States ranks first in annual petroleum consumption (25.4 percent) and natural gas consumption (25.0 percent), and ranks second only to China in coal consumption.[1]

Critical problems associated with fossil fuel dependency and energy inefficiency are increasingly evident to governments at all levels, both domestic and abroad. Many governments are taking aggressive actions to address and counteract these problems, which include short-term and long-term environmental degradation, air pollution and public health deterioration, global warming, and a variety of political and economic consequences and risks associated with the procurement and combustion of fossil fuels. National security concerns also have been a prime motivator for energy policy re-examination.

Furthermore, several countries unaccustomed to massive blackouts—notably Italy, Sweden, Denmark, the United Kingdom, the Untied States and Canada—discovered in 2003 that old-fashioned, centralized electric generation systems are extremely vulnerable to malfunction—or worse. The resulting power outages, which collectively affected over 100 million people, contributed to a surge of new interest and investment in energy surety and distributed generation technologies.

Fuel cells are a promising source of clean, reliable, locally-generated energy. The U.S. federal government is providing substantial support to address the challenges confronting the fuel cell industry, including high production costs, the paucity of fuel and repair infrastructures, lingering technological impediments and a low level of public awareness.

At a broader level, international alliances that seek to accelerate the development and commercialization of fuel cells are taking form. In November 2003, the International Partnership for the Hydrogen Economy (IPHE) was created by the European Commission, the United States, Japan and 13 other countries. In January 2004, the United States and Japan signed a joint statement of intent to pursue pre-competitive research and the development of fuel cell and hydrogen technologies. The European Commission also is expanding its efforts to facilitate Europe's anticipated transition to a hydrogen-based economy.

Often underreported is the fact that state governments in the United States collectively offer scores of financial incentives and favorable regulatory policies that promote fuel cell deployment. This paper will discuss state-level incentives and policies encouraging the development and adoption of stationary fuel cells. The primary source of information for this paper is the *Database of State Incentives for Renewable Energy* (DSIRE),[2] a public resource funded by the U.S. Department of Energy and managed by the N.C. Solar Center at N.C. State University.

2. Background – The DSIRE Project

Established in 1995, DSIRE (www.dsireusa.org) is an ongoing project of the Interstate Renewable Energy Council (IREC) and the N.C. Solar Center. DSIRE tracks

(1) financial incentives; (2) outreach and voluntary programs; and (3) rules, regulations and policies administered by state governments, local governments, utilities, nonprofit organizations and private corporations to promote the use of renewable energy technologies. DSIRE also includes selected federal incentives for renewable energy. As of March 2004, DSIRE contained information on approximately 875 programs.

DSIRE provides the following information for each program:

- Incentive type
- Incentive administrator
- Eligible sector or sectors
- Eligible technology or technologies
- Incentive summary
- Link to authorizing statutes, orders, or regulations (when relevant)
- Link to program web site

The DSIRE home page features a clickable map of the United States to maximize facility, and includes a search function that allows users to explore the entire database of incentives by technology, eligible sector, incentive type and various other criteria. In addition, DSIRE offers U.S. maps that are color-coded by state in order to provide users with a better sense of regional trends regarding specific incentive types. The DSIRE project is a constantly evolving and increasingly comprehensive resource for policymakers, consumers, businesses, investors and renewable energy advocates alike.

3. Overview of State Policies and Trends

Federal funding for fuel cells largely supports research and development efforts for both stationary and automotive fuel cell applications, as well hydrogen infrastructure issues. State-level funding, on the other hand, tends to support the adoption of stationary fuel cells by end-users. A thorough knowledge and understanding of available state-level incentives may prove beneficial to those with an interest in the development and deployment of stationary fuel cells. Furthermore, stakeholders should be aware that there is a "long-standing tradition in American governance whereby states serve as laboratories for subsequent federal policy."[3]

U.S. states offer a creative array of financial incentives to encourage the deployment of stationary fuel cells. These programs include industry recruitment incentives, corporate tax credits, net metering policies, grants, loan programs, rebate programs, personal tax credits, sales tax exemptions, property tax exemptions, and one production incentive.

It is important to recognize that most state-level financial incentive programs for which stationary fuel cells are eligible were not designed exclusively to support fuel cells. Rather, these programs typically are designed to promote the development and adoption of multiple renewable energy technologies. Many of these incentive programs also support wind, photovoltaics (PV), biomass, small-scale hydro, and/or other renewable energy systems.

Three state-level incentive programs for fuel cells vanished in 2003: (1) California's Public Leadership Solutions for Energy (PULSE), a low-interest loan

program for schools and government agencies; (2) Massachusetts' Green School Initiative, a grant program; and (3) Arkansas' Emerging Technology Development Credit, an industrial recruitment incentive for technology manufacturers. In addition, a handful of programs were restructured, including grant programs in Illinois and Minnesota.

However, 10 new incentive programs were created during 2003 and early 2004:

1. Massachusetts - Fuel Cell Grants
2. New Jersey - Renewable Energy Advanced Power Program (a grant program)
3. New Jersey - Renewable Energy Economic Development (REED) Program (a grant program)
4. New Jersey - Reduced Energy Demand Options (REDO) for Local Governments and Schools (a loan program)
5. New Mexico – Clean Energy Grants Program
6. Pennsylvania - Energy Harvest Grant Program
7. New York - Solar and Fuel Cell Electric Generating Equipment Tax Credit
8. Louisiana - Net Metering policy
9. Maine - Renewable Resources Matching Fund Program (a grant program)
10. Wyoming - Renewable Energy Tax Exemption

The net gain of state-level incentive programs is encouraging, especially considering the current dreary condition of dozens of state budgets. Stakeholders should be aware that a February 2004 report issued by the National Conference of State Legislatures warned that 31 states will have budget gaps totaling $35.6 billion for fiscal year 2005.[4]

Another significant development in 2003 was the creation and evolution of the Public Fuel Cell Alliance (PFCA), a coalition of state, federal and international stationary fuel cell programs collaborating "to accelerate the widespread adoption and commercialization of stationary fuel cell technologies, fuel cell deployment and hydrogen infrastructure development in North America."[5] The PFCA, which was still in the development process at the time of this writing, is supported by agencies in 21 states.[*] Among other intentions, the PFCA proposes to facilitate joint projects among partners and serve as an information clearinghouse that will collect, standardize and publicize information pertaining to state, federal, and other fuel cell incentives and programs. The PFCA may be organized as a project of the Clean Energy States Alliance (CESA), a new nonprofit organization comprised of 17 state energy funds from 12 states.[†] The CESA, managed by the Clean Energy Group, was established in January 2004.

3.1 Industry Recruitment Incentives and Corporate Tax Credits

[*] The PFCA is supported by Alaska, California, Connecticut, Delaware, Florida, Hawaii, Illinois, Indiana, Massachusetts, Michigan, Minnesota, Mississippi, New Jersey, New Mexico, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island and Texas.

[†] The CESA is supported by California, Connecticut, Illinois, Massachusetts, Minnesota, New Jersey, New York, Ohio, Oregon, Pennsylvania, Rhode Island and Wisconsin.

Five states—California, Hawaii, Michigan, Montana and Ohio—offer generous corporate tax credits or exemptions in an effort to recruit fuel cell manufacturers. Michigan and Ohio are the most aggressive states in this category. Under the NextEnergy economic development plan, Michigan offers multiple tax benefits to companies engaged in the research, development or production of fuel cells. Eligible companies receive a full property tax exemption on alternative energy equipment, a full exemption from the state's personal and real property tax, an exemption from the state's education tax, and a personal income tax credit equal to the sum of the state income taxes paid by company employees.

Ohio's three-year, $103 million fuel cell initiative, which took effect in May 2002, includes $75 million to fund a direct loan program specifically for fuel cell businesses locating or expanding in the state. The California Consumer Power and Conservation Financing Authority offers low-interest loans ranging from $2 million to $10 million per applicant (with maximum awards of $40 million per company) to manufacturers of renewable energy systems or components that establish or expand facilities in California.

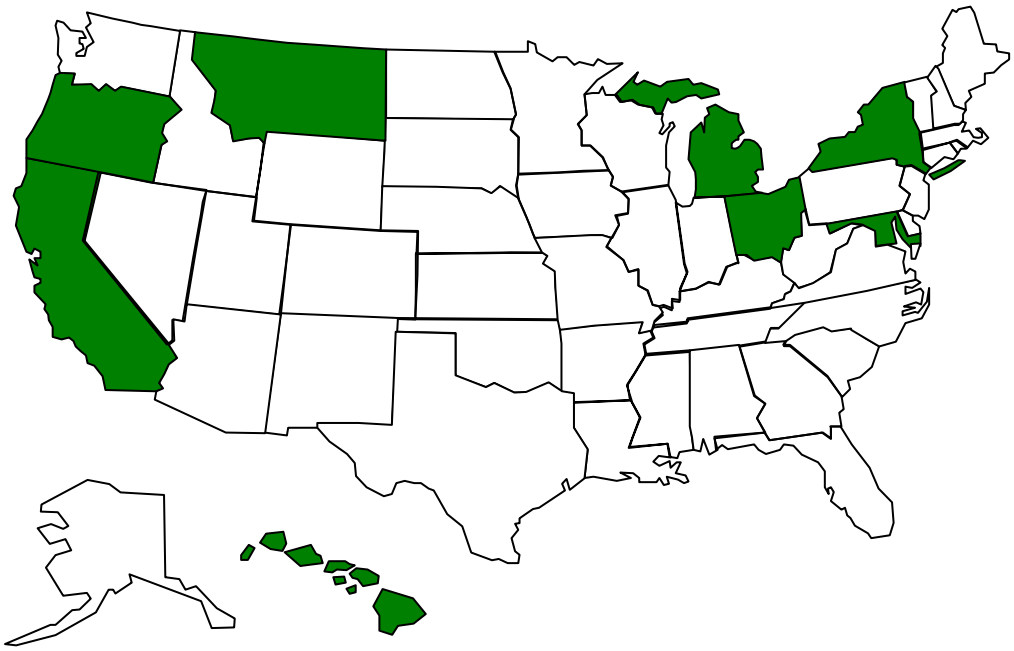

Figure 1. *States with industrial recruitment incentives or corporate tax credits for stationary fuel cell deployment.*

Hawaii offers a 100 percent tax credit on equity investments in businesses primarily engaged in manufacturing high technologies, including fuel cells. In Montana, commercial investments in alternative energy systems—including fuel cells—totaling or exceeding $5,000 are eligible for a tax credit of up to 35 percent on income generated by these investments. Associated facilities, including manufacturers of alternative energy equipment and industries using the energy generated, are also eligible for this credit. In

addition, Oregon offers a 35 percent credit on the incremental cost of fuel cell installations in commercial or industrial facilities.

Maryland and New York offer corporate tax credits for the inclusion of fuel cells in the construction of green buildings. In Maryland, qualifying green buildings that incorporate fuel cells receive a tax credit equal to 30 percent of a fuel cell's installed cost. In addition, New York offers a credit equal to 30 percent of the capitalized cost of a fuel cell used in green building construction.

3.2 Net Metering

Net metering, a crucial regulatory policy and financial incentive to encourage the adoption of renewable, distributed energy technologies, exists at various levels in 38 states. Net metering allows generators to receive full retail credit for excess electricity produced by eligible facilities.

Thirteen states and the District of Columbia have statewide net metering policies that apply to all utilities and include fuel cells as an eligible technology: Arkansas, Connecticut, Georgia, Idaho, Louisiana,[*] Massachusetts, New Mexico, Ohio, Oregon, Rhode Island, Utah, Vermont and Washington. Net metering policies and conditions vary widely, although all 14 of these statewide policies include residential fuel cell applications. Most of these policies are also available to the commercial and industrial sectors. Moreover, Idaho, Louisiana and Vermont include agricultural facilities.

3.3 Grant Programs

Of the 10 new incentives created by states in 2003 and early 2004, six of these were grant programs. A new Massachusetts grant program covers up to 25 percent of the total capital costs for the purchase and installation of fuel cells. A maximum award of $2,000,000 is available to businesses, nonprofits, and state and local government agencies under this program, which is supported by the state's public benefits fund. In addition, Massachusetts' Green Buildings Initiative provides awards of up to $500,000 to encourage the incorporation of fuel cells and other renewable energy technologies into new building construction.

New Jersey's Renewable Energy Advanced Power Program, created in 2003, encourages the development of distributive renewable electricity generation projects, including fuel cells. Awards cover up to 20 percent of total construction and other qualifying costs in non-residential facilities. This program is funded by the state's societal benefits charge. Another new program created by New Jersey in 2003, the Renewable Energy Economic Development (REED) Program, provides funding in the form of a recoverable grant for the development of renewable energy businesses, renewable technologies and market infrastructure. Businesses and nonprofit organizations are eligible for grants of up to $500,000 under the REED program.

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[*] Louisiana's net metering vaguely-worded net metering legislation, enacted in June 2003, allows commercial, industrial, residential and agricultural facilities to net meter electricity generated by fuel cells. At the time of this writing, the Louisiana Public Service Commission was still developing guidelines for Louisiana's net metering policy and interconnection standards.

New Mexico's new Clean Energy Grants Program, created in March 2004, provides funding for renewable energy projects, including fuel cells. Grants are available to state and local government agencies, schools and tribal governments. (The legislation that created New Mexico's Clean Energy Grants Program also established a statewide hydrogen and fuel cell technologies development program, which includes an outreach and education component.)

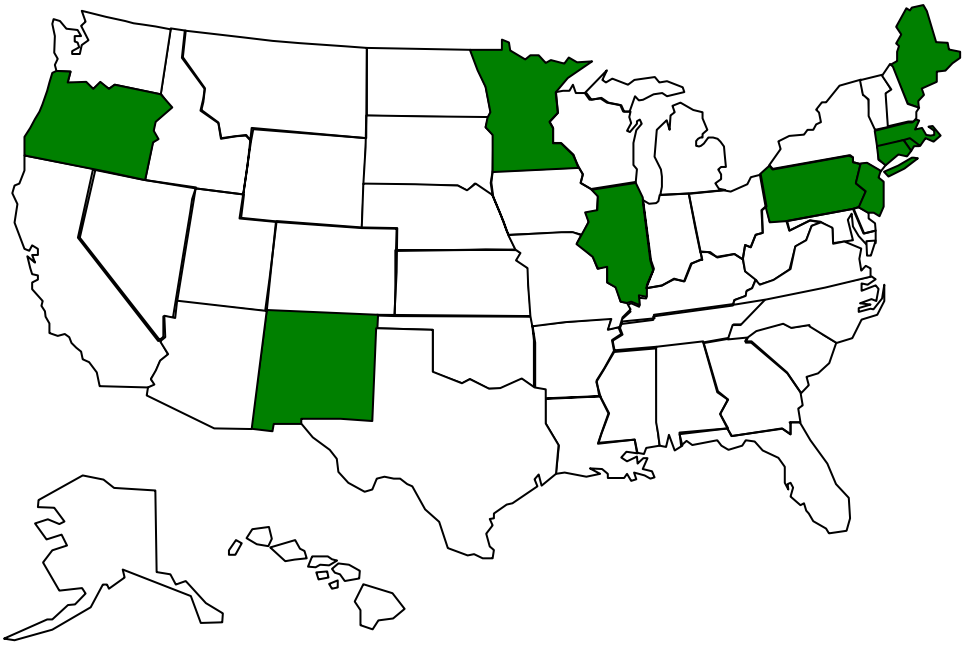

Figure 2. *States offering grants supporting stationary fuel cell deployment.*[*]

Pennsylvania's Energy Harvest Grant Program, created in 2003, provides grants to encourage businesses, nonprofits, schools, agricultural facilities and local government agencies to improve air quality, preserve land and protect local watersheds while providing economic opportunities for the state's agricultural community. There is no maximum award for this program, for which fuel cell projects are eligible. Total funding for the Energy Harvest Grant Program is $5 million. Other grant opportunities exist in Pennsylvania through the state's four major distribution utilities; these programs were created in cooperation with the state government following Pennsylvania's restructuring process.

Illinois offers two grant programs for which fuel cells are eligible. Illinois' Renewable Energy Resources Program, which is supported by the state's public benefits fund, was restructured in 2003 and now involves an annual solicitation process. One of two solicitations issued by this program in 2003 offered grants of up to $225,000 for fuel cell projects. In addition, the Illinois Clean Energy Community Foundation (ICECF)

[*] This map does not include several states that operate grant programs specifically supporting research and development efforts for renewable energy technologies, including fuel cells.

offers grants for which fuel cells are sometimes eligible. ICECF solicitations are issued twice per year and vary.

Oregon's New Renewable Energy Resources Grants fund a variety of projects in residential, commercial, nonprofit, school and local government facilities. This program, which awards approximately $1.5 million annually, is supported by the state's public benefits fund. Maine's Renewable Resources Matching Fund Program, created in 2003, offers matching grants to nonprofit organizations for community-oriented demonstration projects using renewable energy technologies. This program, supported by Maine's public benefits fund, provides a maximum award is $50,000.

In January 2003, Connecticut issued a solicitation for the installation and demonstration of fuel cells at businesses, schools, nonprofit organizations or local government agencies. A total of $4 million was made available under this solicitation, which specifically targets fuel cells. In December 2003, Minnesota issued solicitations for renewable energy projects totaling $25 million. Fuel cells projects are eligible under some Minnesota solicitations, which are funded by the state's public benefits fund.

In 2003, Rhode Island issued a solicitation intended to encourage large-scale energy consumers to purchase electricity generated by renewable resources. This solicitation offered a total of $500,000 to support proposals by large-scale consumers and utilities for the purchase or sale of green power to large-scale consumers in Rhode Island. These awards are supported by the state's public benefits fund.

Several additional state-level grant programs exist, but these are not incorporated into various maps and state tallies present in this report due to their peripheral nature. Michigan offers grants for energy efficiency projects, potentially including fuel cells with heat recovery applications, with funding from the state's public benefits fund. Michigan's grant awards vary by solicitation. Furthermore, several states—including California, Connecticut, Indiana, Massachusetts, Minnesota, New York, Ohio and Texas—operate grant programs that support research and development efforts for renewable energy technologies, including fuel cells. Of these states, Connecticut and Ohio have programs specific to fuel cells.

3.4 Rebate Programs

Although only two states offer rebate programs for fuel cells, these incentives are among the most generous of all state-level incentives. California's Self-Generation (SELFGEN) Program pays large-scale generators the lesser of $4.50 per watt or 50 percent of the cost of grid-tied fuel cells using a renewable fuel, and the lesser of $2.50 per watt or 40% of the cost of grid-tied fuel cells using non-renewable fuels and incorporating heat recovery technologies. Fuel cells with a capacity of 30 kilowatts to one megawatt are eligible for this rebate program.[*]

California's Emerging Renewables Program offers rebates for the purchase and installation of fuel cells with a maximum capacity of 30 kilowatts. This program—available to the businesses, residents and agricultural facilities—makes awards to eligible applicants based on system capacity. The Emerging Renewables Program, which is funded by California's public benefits fund, was restructured over the past year. Rebate

[*] Although the maximum system size eligible for California's SELFGEN Program is 1.5 megawatts, incentive payments do not extend beyond one megawatt.

amounts have decreased recently due to California's budget crisis, and it is possible the program could be scaled back further.

New Jersey's Clean Energy Program, funded by the state's societal benefits charge, provides enticing rebates of up to $5 per watt for fuel cells, depending on capacity. This incentive is available to businesses and residents.

3.5 Loan Programs

Five states operate loan programs for which fuel cells are eligible. The California Consumer Power and Conservation Financing Authority offers low-interest loans ranging from $2 million to $10 million per applicant (with maximum awards of $40 million per company) for the purchase and installation of renewable energy systems. Loans may also be used by manufacturers of renewable energy systems or components that establish or expand facilities in California. (This program is also listed as an industrial recruitment incentive in Section 3.1)

Ohio's Renewable Energy Financial Assistance Program offers low-interest loans of up to $50,000 to residents and $500,000 to businesses for the implementation of energy efficiency or renewable energy projects. This program is funded by the state's public benefits fund. (Ohio's fuel cell loan program is listed as an industrial recruitment incentive in Section 3.1.)

Montana's Alternative Energy Revolving Loan Program provides loans to residents and small businesses to purchase renewable energy technologies, including fuel cells. New Jersey implemented a new loan program in early 2004, offering low-interest loans to schools and local government agencies to cover the incremental cost of energy efficiency and renewable energy projects. Pennsylvania does not offer a statewide loan program, but the state's four major distribution utilities offer separate loan programs for which fuel cells are eligible. These programs were created in cooperation with the state government following Pennsylvania's restructuring process.

Although Indiana and Mississippi offer low-interest loan programs for which fuel cells are potentially eligible, it is unlikely fuel cell projects will be chosen in the near future, according to the program managers. (Furthermore, Mississippi's program was suspended in early 2004.)

3.6 Production Incentives

Production incentives can have a major impact on emerging renewable energy technologies. The federal Renewable Energy Production Incentive (REPI)—which, at the time of this writing, was suspended for new projects as of December 31, 2003—has been crucial to the development of the U.S. wind industry. This incentive is directed at utilities and also applies to electricity generated by fuel cells.

Over the past two years, Rhode Island's State Energy Office has issued solicitations geared toward commercial generators and utilities to encourage the generation of electricity by renewable energy systems, including fuel cells. This production incentive, funded by Rhode Island's public benefits fund, has paid up to $0.03 per kilowatt-hour for electricity produced during a five-year period.

3.7 Personal Tax Credits

Four states offer personal tax credits as a means of enticing residents to purchase stationary fuel cells. In 2003, New York implemented a tax credit of 20 percent for fuel cells installed a taxpayer's principal residence, with a maximum credit of $1,500. Maryland's personal tax credit is essentially identical to its corporate tax credit; both provide a credit of 30 percent for fuel cells used in new green buildings. Residents of Oregon and Montana are eligible for tax credits of up to $1,500 and $500, respectively, for the purchase and installation of fuel cells.

3.8 Tax Exemptions

Four states have implemented a sales tax exemption or reduction for the purchase of stationary fuel cells, and several others offer other tax exemptions. Maryland offers a full sales tax exemption specifically for fuel cells. Nevada exempts fuel cells from local sales tax. Vermont exempts fuel cells of 15 kilowatts or less from the state sales tax, and Washington exempts fuel cells of at least 200 watts from the state sales tax.

Residents and businesses in Oregon are exempt from paying property tax on the added value to a property resulting from the installation of fuel cells and certain other renewable energy technologies. Montana offers a property tax exemption on the assessed value of fuel cells used in buildings. Also, renewable energy systems in Montana with a minimum capacity of one megawatt are eligible for a 50 percent reduction of the state's corporate property tax for five years, and a diminished reduction for the subsequent five years. Furthermore, renewable energy systems with a capacity of less than one megawatt are exempt from property taxes for five years after start of operation.

In 2003, Wyoming enacted legislation exempting the sale of certain renewable energy equipment, including fuel cells, from the state excise tax. (Michigan's tax exemptions, which are classified as industrial recruitment incentives in this report, were discussed in Section 3.1.)

4. Other State-Level Policies

Some states have adopted comprehensive regulatory policies to ensure the creation of an in-state renewable energy industry. Public benefits funds (PBFs) and renewable portfolio standards (RPSs) are two such policies.

Most existing PBFs—also known as system benefits charges (SBCs)—were created by states as part of the electricity market restructuring process. PBFs are typically supported by a small surcharge on all electric bills. These funds vary widely in size and scope, and generally finance energy efficiency improvements, renewable energy projects, and low-income housing projects and improvements.

Fifteen states currently have PBFs that support renewable energy projects, and 12 of these support fuel cells: California, Connecticut, Illinois, Maine, Massachusetts,

Minnesota, New Jersey, New York, Ohio, Oregon, Pennsylvania and Rhode Island.[*] Several of the more generous fuel cell incentive programs already discussed in this report are financed by PBFs, including California's Emerging Renewables Program, Massachusetts' fuel cell grant program, Minnesota's grant program, New Jersey's Clean Energy Rebate Program, New Jersey's Renewable Energy Advanced Power Program, Ohio's Renewable Energy Loan program and Rhode Island's production incentive.

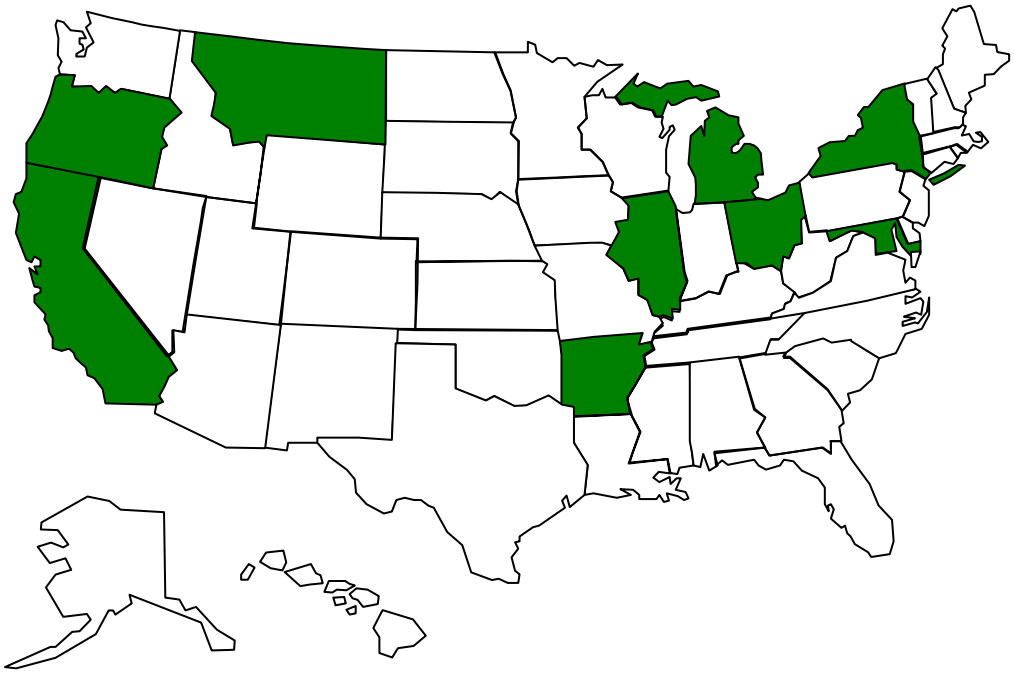

Figure 3. *States with public benefit funds supporting the deployment of stationary fuel cells.*

Thirteen states have imposed a renewable portfolio standard (RPS) on large-scale electricity generators, requiring these generators to use specified renewable energy resources to supply a certain percentage of their electricity by a specified year. Like PBFs, these policies have a tremendous potential to create a renewable energy industry within state boundaries. These standards also vary greatly among states, particularly in terms of eligible renewable energy resources, the percentage of renewable energy required from these resources, and mandated deadline. Fuel cells are an eligible technology to achieve standards in eight states: California, Connecticut, Hawaii,[†] Maine, Massachusetts, New Jersey, New Mexico and Wisconsin.

[*] Maine's public benefits fund is supported by voluntary contributions. Michigan has a public benefits fund that supports energy efficiency projects. Although fuel cell projects with heat recovery applications are potentially eligible for funding in Michigan, solicitations vary.

[†] Hawaii has a renewable portfolio *goal*; there are no penalties for non-compliance.

Furthermore, at least five states fund and actively participate in organizations that engage in statewide outreach and/or public education programs promoting the deployment of fuel cells. These organizations include the California Fuel Cell Partnership, the California Stationary Fuel Cell Collaborative, NextEnergy (Michigan), a recently established hydrogen and fuel cell technologies development program in New Mexico, the Ohio Fuel Cell Coalition, and the Infinite Power of Texas.

5. Recommendations for Further Research

As the conventional system of electricity generation poses increasingly significant challenges to economies, the environment, public health, energy surety and national security, policymakers likely will continue to expand incentives and policies that promote a shift toward renewable energy. Indeed, this report has found that state governments have continued to invest in renewable energy despite serious and prolonged budget constraints. With this in mind, more research is needed to determine and analyze the success of state-level incentives and other programs promoting stationary fuel cells and other renewable energy resources. This need may be fulfilled in part by the Public Fuel Cell Alliance (PFCA), depending on the direction and scope this organization assumes in 2004. It is anticipated that much of the information and data the PFCA intends to collect will become public. Future research on state-level policy regarding fuel cells should consider cooperating with the PFCA when feasible.

6. Acknowledgements

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[1] *International Energy Outlook 2003*. Energy Information Administration, U.S. Department of Energy. (Viewed on 2/24/04 at www.eia.doe.gov/oiaf/ieo/world.html.)

[2] *Database of State Incentives for Renewable Energy.* N.C. Solar Center, N.C. State University. (Viewed 3/04 at http://www.dsireusa.org.)

[3] Rabe, Barry G. *Greenhouse and Statehouse: The Evolving State Government Role in Climate Change*. Pew Center on Global Climate Change: November 2002. (iv)

[4] *State Budget Update: February 2004.* Fiscal Affairs Program, National Conference of State Legislatures. February 2004. (3)

[5] *Public Fuel Cell Alliance: Business Plan for Federal, State and International Collaboration on Fuel Cell Deployment and Hydrogen Infrastructure.* Clean Energy Group, October 2003. (v)