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Governance of Public Benefit Funds to Promote Innovation in Energy by Addressing Early Adopter Risks

for World Energy Congress 2010 in Montreal, Quebec

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TOPIC AREA #4: Accountability – Policies, regulations and financing

WEC Target topic: "4.4 Investing in transition – risks and rewards"

Building a better energy future will be very expensive. Capital for new projects will be difficult to attract at a time when the financial resources of the planet are limited and required for many other pressing needs, such as education and health care. Attracting capital requires a viable balance between risk and return, and this depends on consistent energy prices. Building a better future has a price. Refusing to face this reality can be far more expensive.

Abstract

Building a better energy future will be very expensive, in part, because it will require modernizing decaying and inadequate energy infrastructure or bringing more innovative technologies to deliver energy more efficiently to consumers with less environmental impact. In the wake of the extended recession and turmoil in credit markets in 2008, some states have turned to public benefit funds to overcome barriers and critical risks in the commercial use of innovative energy technologies and systems. This paper seeks to update valuable observations in the governance and options for best utilizing these public benefit funds to promote wider adoption of innovative energy technologies enabling a better balance of risk and return, not only for investors, but consumers and communities affected by the use of more innovation. Of note, given limited fiscal resources, government agencies and communities can consider focusing more on using public benefit funds in concert with other policy tools to negotiate the transfer or reduction of risks, particularly early in the adoption cycle, rather than provide deeper (and more expensive) subsidies for innovative technologies.

Keywords: risk, benefit funds, project finance

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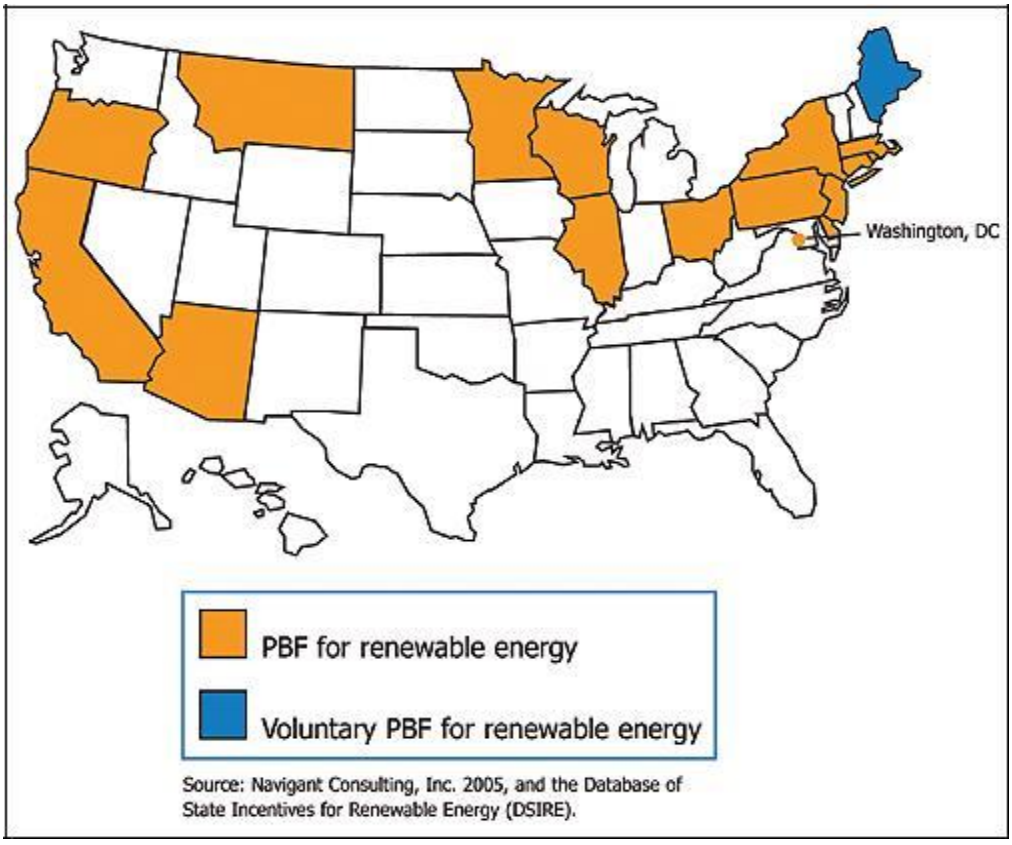
Introduction and Background

As of October 2008, in the USA 23 states and the District of Columbia had established clean energy funds: Arizona, California, Connecticut, Delaware, the District of Columbia, Hawaii, Illinois, Maine, Massachusetts, Minnesota, Michigan, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oregon, Pennsylvania, Rhode Island, Texas, Vermont and Wisconsin (see Figure 1). The size of these funds ranges from less than $1 million to more than $300 million a year.

Map of States with Public Benefit Funds for Energy (U.S. EPA, 2008)



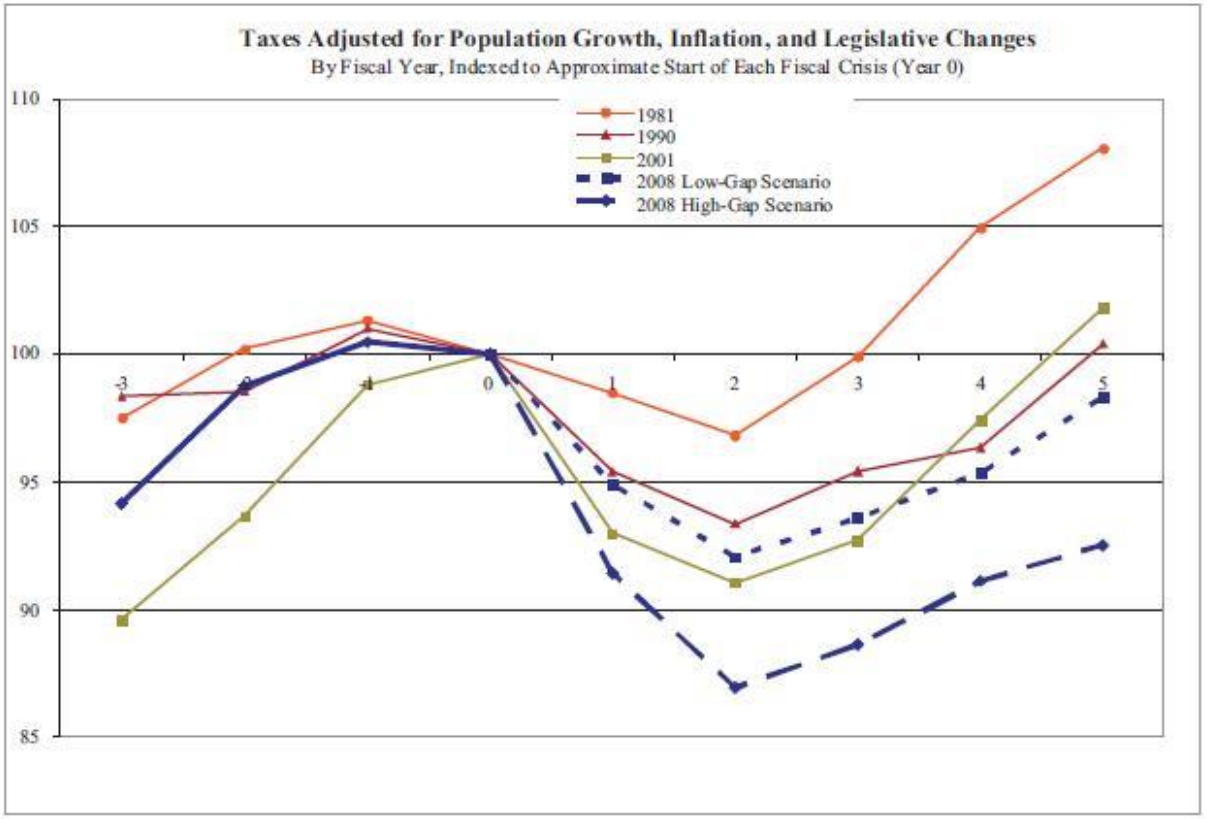
http://www.epa.gov/chp/state-policy/funds_fs.html

Mechanisms available to the PBFs and end market vary widely. Some states provide loans or loan guarantees, often through commercial lenders, for new energy efficiency and renewable equipment installations. Other states focus on training and building codes and appliance standards, which do not involve PBFs directly, but can be coordinated with their goals.

However, typically the state programs and PBF programs have been focused more on reducing electricity or energy cost and consumer acceptance, rather than a financing analysis emphasizing risk reduction or transfer in addition to cost evaluation. Bringing innovative technologies, as compared to conventional systems and devices, to commercial market applications offers the best long-term path to either reduced costs or better environmental performance and security. However, innovative technologies inherently entail "early adopter risks" and other market development friction, which consumers and investors are not eager to embrace. PBFs targeted on these early adopter risks with a variety of tools can play a vital catalytic role in accelerating wider commercial use, particularly by focusing on mitigating these early risks and addressing key barriers, rather than focusing narrowly on subsidies, which are expensive for states.

Nearly all states face declining and severely constrained budgets in the wake of depressed receipts and higher outlays for extended unemployment and other public needs. Below is a historical analysis showing the lag in state budget receipts in a recessionary environment, which constrains PBF resources:

Figure 1. State Tax Revenue Takes Several Years to Recover After a Recession



Nelson Rockefeller Institute of Government (State University of New York), 2008.

In the USA, state energy programs have become increasingly dependent on Federal Stimulus Package funding, namely the American Recovery and Reinvestment Act (ARRA, 2009) signed by President Obama in February 2009. ARRA provisions directly related to the energy sector, some of which will supplement funding to state PBFs or to projects eligible for PBF funding:

- Expanded DOE Loan Guarantee Program, with $6B in credit subsidy appropriations (leverages up to $60B in loans). Projects must start construction by Sep 2011.
- Municipal bond support for energy and power development
- Clean Renewable Energy Bonds (CREBs) and Energy Conservation bonds ($4B)
- Multiple tax credit options for energy projects
    - Wind production tax credit (PTC) extended to Dec. 2012; other RE to Dec. 2013
    - 30% investment tax credit (ITC) for solar, now available to utilities
    - ITC convertible to grants by Treasury in some circumstances
    - 30% ITC for "Advanced Energy Manufacturing Equipment" ($2.3B)
    - 50% expensing option allowed in 2009 (reduces depreciable basis)
- Energy efficiency funding through state programs (up to $11B)
- Grants via DOE for advanced battery technology ($2B)
- Grants via DOE for "SmartGrid" / electricity reliability, storage ($4.5B)
- A new ARPA-E initiative for earlier stage "breakthrough technologies" ($400M)

[Summary given by Andrew Paterson at finance briefing Environmental Business Council – New England, June 2009]

Even with this unprecedented level of federal stimulus funding in the energy sector, states will be faced with a daunting level of financing to modernize energy infrastructure and drive commercial adoption of innovative technologies with lower carbon emissions. Stretching PBF resources will involve governance or program execution elements more deeply rooted in credit analysis based on a project finance framework.

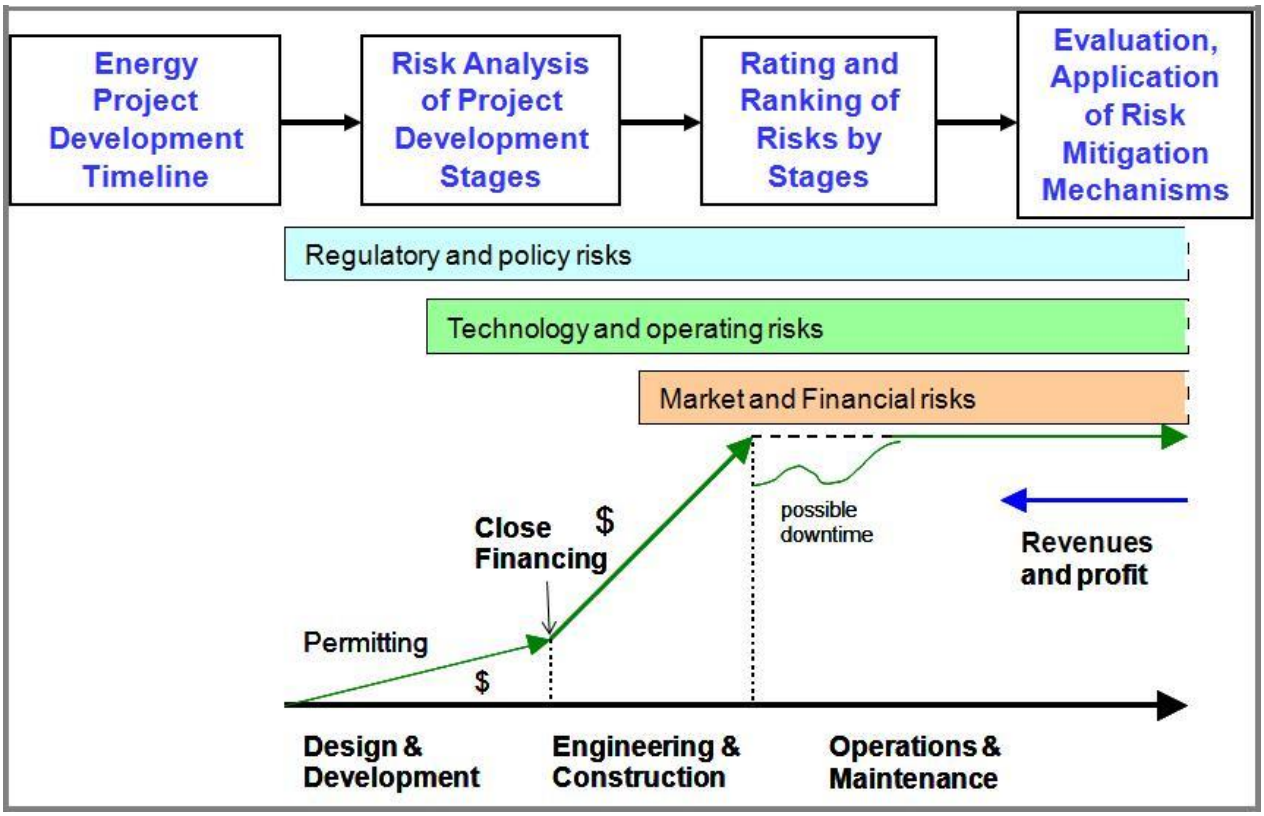
Project Finance Framework

IEA stated in their World Energy Outlook 2008 that $26 trillion of investment (public and private sector funding) would be needed to meet energy demand worldwide by 2030. This estimate was raised to $30 trillion in 2009, assuming an infrastructure that would also keep carbon dioxide emissions below a peak atmospheric threshold of 550ppm. This volume of financing cannot be financed by venture capital, or solely by the public sector (state or federal); it must be financed by lenders and the bond market, forcing risk evaluation and credit analysis on project selection.

A project risk framework is not another form of "R&D roadmap" (or wish list) or rating of technical priorities; it is not an environmental risk assessment. Nor is it a delineation of barriers, per se, though it can deepen an understanding of barriers to commercialization. Instead, it is

based on a straight-forward assessment of business risks in several dimensions based primarily on the investment group making the decision to buy and operate a plant. The risk-rating framework notes that business risks shift over the project timeline of development and design, construction, permitting and operation of a power plant. For analysis the risks over the power project timeline are separated into three basic categories: A) Regulatory and policy risks; B) system technology and operations, and C) Market and financial risks:

Project Risk Framework



From: Risk-based Energy Policy – A Framework for Financing Clean Energy, presented by co-author Dr. Maria Dubravka Pineda at World Energy Congress 2007 (Rome, Italy).

Regulatory and policy risks include federal legislation and agency rule-makings which affect the siting, life cycle, construction, and operation of energy or power projects and the emissions and effluent from such projects. Such policies may include mandates, "renewable energy standards", and incentives, such as those implemented through PBFs, which monetize GHG savings or energy savings to the benefit of the project.

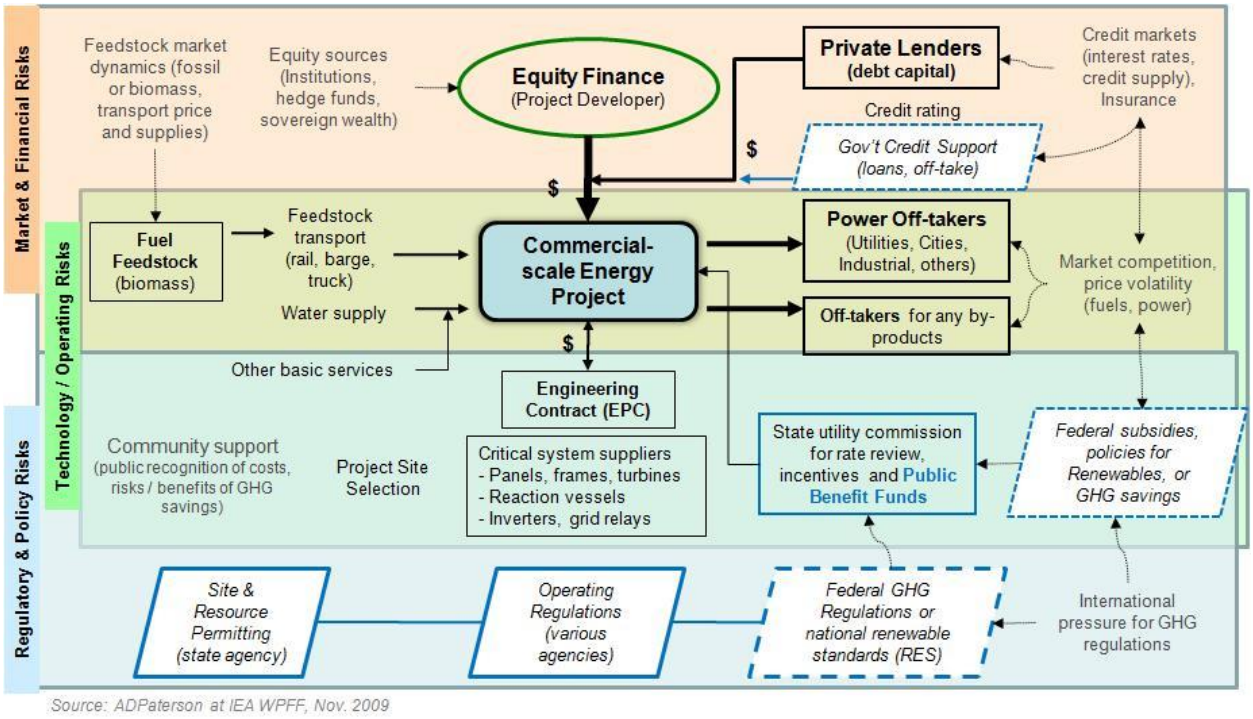
Technology and operating risks entail the design, capital and operating costs, and performance, including emissions, of innovative systems that generate energy or power, or enable energy savings. Advanced solar, wind, geothermal, hydropower, or biomass systems, as examples, entail capital costs based on innovative design, and energy savings or reduced carbon emissions.

The nature of certain renewable technologies make them more vulnerable to shifts in weather (storms, hail, dropoff in wind or sun, drought, or flooding), which poses clear operating risks.

Market and financial risks are derived from competing fossil sources, volatility of electricity or fuel or feedstock prices (e.g., biomass), and disruptions in supply or transmission difficulties. Financial risks could include rising interest rates, or credit market conditions that require tighter lending covenants and more equity financing for the project at the outset and later.

Debt or project financing requires a credit analysis rooted in an analysis of the risks mentioned above based on the interaction of key actors, project elements and factors bearing on a given project (below). The key elements and factors are arrayed in the critical risk areas, showing the relationships to the project. Actions or incentives provided by government agencies are highlighted in blue boxes, including PBFs:

Critical Project Elements and Factors (for risk analysis)



[Presented by ADPaterson at the IEA Working Party for Fossil Fuels; Nov. 2009, Paris, France]

Rather than looking at a certain sector, a project finance risk analysis entails evaluating critical elements that must be addressed in a financing "term sheet" for debt and equity. A term sheet is a contracting framework outlining the elements critical for project success, such as:

a) Project permitting initiated (air, water, land use, storage etc.) with a clear track for approvals.

b) Obvious GHG and pollutant savings with a clear methodology accepted by regulators
c) Strong customer profile for revenues, say, in the form of stable wholesale energy markets, or of creditworthy off-takers, possibly even with rate guarantees (power projects).
d) Long-term agreements for feedstock or vital supplies, preferably with multiple sources, or other sources of stability of supply commensurate with the state of the host energy market
e) Technology systems with demonstration and performance data at larger scale
f) An experienced EPC / engineering contractor identified, ideally engaged with incentives
g) Well-detailed construction and project baseline schedule and budget to contain overruns
h) Site control for both the commercial plant, the operations, and any waste streams
i) Competitive economics and good debt coverage for given debt with additional subsidies (feed-in tariffs, tax credits, repayment options, etc.)
j) Equity raised, with sources that can provide additional equity if needed.
k) Advantageous site features with evidence of local community support and government backing
l) Insurance for critical events and force majeure incidents and first losses on CCS activities
m) A capable management team with a track record in the industrial sector at scale for such projects.

[Presented by ADPaterson at the CSLF Financing Roundtable, Jan. 2010, London, UK]

The above "term sheet" elements, though not exhaustive, are fairly standard credit analysis factors that can be applied across a wide array of energy projects in various settings. Such an analysis can amplify the leverage for PBFs allowing states to stretch limited resources across a broader array of projects. By assessing these elements for a given project, PBFs can better apply or leverage scarce funding resources to the key weaknesses or risk areas in a given project, rather than looking primarily to just subsidy cost or defray the cost of research, development and demonstration (RD&D). For example, a loan guarantee cannot fund experimental R&D (where a grant is typically used), but can contribute considerably to overcoming a weaker off-take or revenue profile, and with flexible repayment terms can enable a project to overcome a longer shakedown or installation timeframe often encountered with first-of-a-kind or early systems. Such loans or loan guarantees (credit support) allow PBFs to stretch funding across more projects because the funding is paid back according to negotiated terms; whereas grants or tax credits or feed-in-tariffs are not replenished. By example, Germany and Spain recently found that their feed-in-tariff schemes for promoting wind and solar power were overly generous or too expensive fiscally, and opted to trim such subsidies markedly. Such sharp reversals in subsidy arrangements cause havoc among investors looking for stable cash flows. U.S. wind project developers experienced the same instability in tax credit policies during the last decade (2001 to

2007), and this led to wild gyrations in the amount of wind capacity brought on-line. However, loan guarantees offer little assistance for permitting or siting issues.

Observations for Governance of Public Benefit Funds to Promote Innovation in Energy

Resources for Public Benefit Funds can be raised in a number of ways. In examining the DSIRE database (www.dsireusa.org) of state energy incentives, PBFs and their coordinated programs are funded by a wide variety of mechanisms:

1. Taxes (various kinds): on fuel extraction or emissions
2. Rate tariffs, often very small on a per KWh basis in the monthly electric bill
3. Feedstock or fuel levies at the pump or along the value chain
4. Matching funds, equity, and fees from the private sector related to a given project
5. A share of royalties on future systems sold
6. A lump sum legal settlement associated with utility mergers or acquisitions or other events
7. Some proceeds from profit-sharing or equity share or warrant conversions
8. Revolving loan terms with successful projects returning funds for future projects

Any mix of these mechanisms can work, but tailoring them more mindful of critical project risks can be more effective, than merely providing subsidies.

Governing fund resources by a Board and staff involves balancing a number of factors with these lessons learned based on interviewing a number of state officials (notably Sandra Byrd, former Arkansas state commissioner, and other NARUC members) and investors:

- "Those that get taxed get a vote" --- consumers (utility customers as an example) and corporations (e.g., oil company profits, etc.).
- Strive for consensus, but have super-majority vote required for decision (e.g., two-thirds), rather than allowing a single vote to veto a project.
- Use collaborative workshops or open meeting process for input to the Governing Board; a possible Board structure could be: one-third consumers who pay consumption or usage tax; one-third capital market representatives (retired) and representatives from corporations subject to levies feeding the PBF; one-third regulators, NGOs, or government agency managers (including environmental)
    - Keep membership balanced between the 3 sectors
    - Consider 6-12 Board members (not too small, but not too unwieldy)
    - Board gets reasonable compensation (but have other full-time jobs)
- Board can utilize a budget to hire an Executive Director (who is ministerial, not substantive) and administrative staff
- Budget can also be used to hire consultants, experts to help them in review and evaluation of competing projects looking for funding
- Chair needs to be politically independent, rather than beholden to the governor or legislature and vulnerable to pressure on project selection.

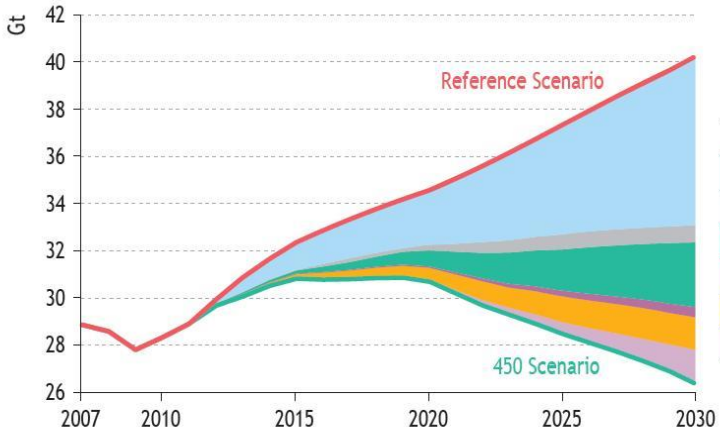
Observations for addressing Early Adopter Risks

Similarly, a transparent set of practices mindful of elevated early risks with innovative systems is important for best use of constrained resources for PBFs:

- Structure reasonably secure, multi-year funding prospects to engage lenders and investors. Predictable funding levels avoid a "roller coaster" effect in project development, as seen with wind power in the previous decade.
- Use multiple test beds, e.g., at state universities or incubator centers, for innovative ideas; perhaps not limited to a single state.
- Provide strong political support for innovation, or "tolerance for some failure", with specific incentives for innovation and some "risk-taking" with a longer term viewpoint.
- Analyze support of innovation all along the energy value chain: e.g., extraction, generation, distribution, end-use, back end processing.
- Put in place financial review criteria which do not heavily penalize innovation, and negotiate risk bearing mechanisms with private projects to better tailor risk assumption.
- Promote decentralized decision-making by well-qualified people, perhaps with a "probation" period to demonstrate sound risk evaluation and underwriting analysis, and to maintain quality control on credit analysis.
- Note geographic dispersion of projects, but avoid making it a "quota" regime.

Energy efficiency and renewable energy sources occupy a very large portion of projected savings by IEA sought by 2030 if the 450ppm goal is to be reached by global action.

Figure 5.8 • World energy-related CO_2 emission savings by policy measure in the 450 Scenario



	Abatement ($Mt CO_2$) 2020	2030
Efficiency	2 517	7 880
End-use	2 284	7 145
Power plants	233	735
Renewables	680	2 741
Biofuels	57	429
Nuclear	493	1 380
CCS	102	1 410

IEA World Energy Outlook, 2009

But, broader implementation of innovative renewable technologies and energy efficiency systems and practices will require smarter use of constrained public resources, such as PBFs.

In sum, PBF resources can be raised from multiple sources, but those resources are better deployed to promote innovation mindful of negotiating coverage of critical project risks and coordinating other public policies (such as siting and life cycle permitting), rather than merely providing subsidies. Governing those PBF resources can be structured based on "lessons learned" from a variety of state programs that were utilized over the last two decades, and innovation must be explicitly encouraged along the entire energy value chain to make progress in modernizing our energy infrastructure and expanding access where energy infrastructure is inadequate.

EXHIBITS: CASE STUDIES OF STATE PBFs

Features of several state clean energy fund programs are highlighted below:

New Jersey.

New Jersey's statewide clean energy initiative, the New Jersey Clean Energy Program™ (NJCEP), is administered by the New Jersey Board of Public Utilities. The NJCEP provides education, training, and financial incentives in three program areas:

- Residential Programs, which include heating equipment rebates, home energy analyses, residential solar rebates, and the Comfort Partners program for income-eligible households.

- Commercial & Industrial Programs, which offer incentives and technical assistance to commercial, industrial, and municipal customers. The program's goals include increasing energy efficiency, reducing overall system peak demand, and encouraging the use of emerging technologies throughout the state. A Combined Heat and Power (CHP) Program offers financial incentives for CHP installations.

- Renewable Energy Programs, which offer support to customers interested in implementing renewable energy generation technologies and systems. NJCEP offers rebates towards the installation of renewable generation systems such as solar electric, wind, or sustainable biomass; low-interest loans for businesses, schools, and municipalities that want to combine energy efficient and renewable energy technologies; and grants for utility-scale projects and startup businesses.

The NJCEP energy efficiency and renewable energy programs have been managed and implemented by the state's seven investor-owned utilities and gas public utilities, but in April 2007, management was turned over to Honeywell Utility Solutions and TRC Energy Solutions. The BPU will continue as the administrator of the NJCEP. Contracted program managers must manage and implement these programs.

To learn more about clean energy funding in New Jersey, visit the state's Clean Energy Program Web site http://www.epa.gov/epahome/exitepa.htm

New York.

The New York State Energy Research and Development Authority (NYSERDA) administers the New York Energy $mart program, which provides energy efficiency, research and development, and environmental protection activities. Among other things, the Energy $mart program administers the New York Energy $mart Loan Program, which provides an interest rate reduction of up to 4 percent (400 basis points) off of a participating lender's normal loan interest rate for a term of up to 10 years on loans for certain energy efficiency improvements and/or renewable technologies. Con Edison customers may be eligible to receive an interest rate reduction of up to 6.5 percent (650 basis points). Such programs may offer long debt tenors than found among commercial lenders or lower equity requirements, thereby aiding capital formation. In addition, NYSERDA administers other programs to facilitate the development of clean energy in New York State. These include the DG/CHP Program, which as of 2006 has approved more than 100 DG/CHP systems for funding, representing 100 megawatts (MW) of peak demand reduction.

For more information about the Energy $mart Loan Program, visit the program Web page. http://www.epa.gov/epahome/exitepa.htm

For more information about NYSERDA's current opportunities, visit the program Web page. http://www.epa.gov/epahome/exitepa.htm

Connecticut.

The Connecticut Clean Energy Fund is managed by Connecticut Innovations, Inc., a quasi-governmental investment organization. The program has three major components:

- *Installed Capacity Program*, which supports long-term contracts for clean energy projects and incentive programs for host supply or onsite installations of clean DG projects.

- *Technology Demonstration Program*, which supports the demonstration of new clean energy technologies and innovative applications, while also providing infrastructure support to the emerging clean energy industry.

- *Public Awareness and Education Programs*, which support local clean energy campaigns to influence the buying behavior of electricity customers so that they voluntarily support clean energy.

For more information, visit the Connecticut Clean Energy Fund Web page. http://www.epa.gov/epahome/exitepa.htm

Massachusetts.

The Massachusetts Renewable Energy Trust is managed by the Massachusetts Technology Collaborative (MTC), an independent economic development agency focused on expanding the renewable energy sector and Massachusetts's innovation economy. The State Division of Energy Resources provides oversight and planning assistance. MTC's approach is to first identify barriers to renewable energy growth in Massachusetts, then leverage additional funds from other sources, including private companies and nonprofits. MTC's goals include maximizing public benefit by creating new high-tech jobs and producing clean energy. As of June 30, 2007, 629 projects with 85.6 MW of clean energy capacity had been installed with funding from the MTC.

Massachusetts low-income

Low-income energy programs are usually thought as relatively low on any innovation scale – weather-stripping and insulation. But experience with two System Benefit Funds in Massachusetts – one directed to energy efficiency, the other to renewable – show a very different potential.

Utility-funded programs for low-income energy efficiency in Massachusetts go back to the mid-1980s. A dedicated low-income program, however, was not established until the 1997 Restructuring Act, effective in March 1998. A set-aside of about 12 percent of all electricity efficiency spending was established for low-income customers, supplemented by regulator-established funds for gas efficiency, totaling about $6 million at the time. Key features of this program, reenacted with much more funding ($50-80 million per year in 2010-2012) by the Green Communities Act of 2008, are:

- Reasonably permanent funding, so low-income agencies and their contractors can plan for more than one year at a time. Funding for electric programs is based on a fixed charge per kWh of sales plus proceeds of carbon credit sales, capacity market sales, and additional charges set by the regulator. Gas program budgets are set by the regulator. Budgets are currently set on a three-year cycle under a legislative mandate to secure all available cost-effective efficiency.

- Administration by public utilities,[1] which provide a source of business and technical expertise, as well as eased access to customer data. Also noteworthy is the fact that funding is accomplished by a mandate on utilities rather than by creation of a fund that can be reprogrammed.

[1] In one area of the state, efficiency is conducted in the electric service territory by a consortium of towns. Areas served by municipal utilities are not included in the program.

- Implementation by the Low-Income Energy Affordability Network (LEAN),[2] the consortium of community action programs that deliver the federal energy programs of low-income fuel assistance and low-income weatherization assistance. This made it possible to coordinate the programs, each leveraging the other for maximum funding and efficiency. Utility and federal programs use the same set of technical standards, and the same efficiency contractors, although some funding rules differ; most homes receive appliances, lights, heating systems, and building shell measures, using a blend of funding that maximizes the work than can be performed at each house.

- Cooperation between the utilities and the low-income agencies in a Best Practices Task Force, which brought together the skills and experience of utilities and low-income agencies to help to standardize the program across the state (where it made sense to do so). This mission explicitly includes reviewing potential new technologies, measures, and practices for statewide adoption. Utilities are explicitly rewarded with modest incentives for participating in and contributing to this process, which they have done with a high level of cooperation and expertise. This has resulted in the early investigation and adoption of such innovative efficiency measures as densepack insulation, high efficiency heating systems, indirect hot water systems, solar domestic hot water systems, horizontal axis clothes washers, major repairs that make efficiency possible (such as major roof repairs), and single-family-home-scale micro-combined-heat-and-power-systems (pending). Super-insulation and LED lighting are on the current agenda.

- Coordination with grant funding from the Renewables Energy Trust (RET). (The RET is also funded by a fixed legislated charge per kWh.) A program was established and funded by the RET that has evolved into the use of LEAN as a laboratory for innovative efficiency measures. Utility programs require cost-effectiveness (described below) but RET projects do not. So RET funding has been used to test the practicality and cost-effectiveness of, for example, backyard-scale windmills, photovoltaic installations, solar domestic hot water, large repairs to make efficiency possible, and micro-combined-heat-and-power-(MCHP) systems – the last three were proven sufficiently practical and cost-effective for adoption into the utility program (MCHP ispending).

- Oversight by the regulator, now the Department of Public Utilities (DPU), as well as (under the Green Communities Act) an Energy Efficiency Advisory Council (EEAC) led by the Commonwealth's Energy Office, the Department of Energy Resources (DOER).

  The low-income programs, and the innovation they have brought, have enjoyed the strong regulatory support of these agencies.

[2] One of the authors is counsel to LEAN.

- A utility program cost-effectiveness standard that is a variant of a Total Resource Cost (TRC) test. All costs from all sources are compared, to establish cost-effectiveness, with a wide set of benefits over the lifetime of each measure. These benefits include projections of avoided energy,[3] carbon, transmission, and distribution costs as well as other avoided utility costs (e.g., arrears reductions, reduced energy prices due to reductions in demand), and avoided participant costs and other benefits (e.g., reduced health costs, reduced risks of fire, reduced O&M from such activities as replacing light bulbs).[4] External environmental and economic development benefits are examined but not currently counted in the cost-effectiveness calculation. While this extended list of benefits is not without a certain level of controversy, the relatively broad scope leaves considerable room for innovation in energy-saving measures and practices.

This 20-year experience suggests a number of conditions that help promote innovation:

- Reasonably secure funding.
- A financial test that allows for testing of innovative ideas.
- A test bed for innovative ideas.
- Strong political support for innovation.
- Decentralized decision-making by well-qualified people.
- Specific incentives for innovation.

[3] Massachusetts electric and gas systems are both deregulated, but energy includes all sources of the commodities, whether provided by the distribution utilities or not.

[4] CITE to California list.

California

California adopted a similar efficiency program structure but has had less success in promoting innovation. A very high incentive for utilities to project kWh savings – the incentive is paid irrespective of actual performance – has led to an emphasis on such highly cost-effective cream-skimming measures as lighting.

A renewables SBF overseen by the California Energy Commission (CEC) was repealed. The legislature had limited the fund to solar rebates, customer credits for signing up for competitive power ("direct access"), and new development.

The renewable SBF was partially replaced in 2002 with a Renewables Portfolio Standard (RPS) that, in effect, established utility administered funding for renewables and mandated investment in immature technologies. This was accomplished by (a) ambitious mandatory goals for the fraction of power each electric utility must procure from renewable (20% by 2010, 33% by 2020), (b) strong shareholder penalties for failure to achieve the RPS (five cents per kWh, to $25M per utility), and (c) authority for utilities to purchase renewable via long-term contracts and include the cost in distribution rates. This has encouraged such investment innovation as large scale Stirling dishes (1500 MW), large PV plans (200-300 MW), solar thermal Power Towers (1500 MW), wave power, and tidal power.

The California experience suggests these additional conditions to promote innovation:

- Avoid disincentives to innovation.
- Strong incentives that specifically promote innovation, perhaps with penalties for failing to meet mandates.
- Socialize the risk of investing in innovation.

Connecticut

Like Massachusetts, Connecticut established both efficiency and renewable funds, funded by a per-kWh charge but overseen by a new Energy Conservation Management Board (ECMB). Although it left the utilities as administrators of the efficiency programs, the Legislature considered the per-kWh charge to be a fund, called the Connecticut Energy Efficiency Fund, and thus felt free to raid the fund to fill a budget gap. These missing funds were ultimately restored, but not without a lesson in the disadvantages of centralization.

The ECMB (as the Mass. EEAC) is convened by the regulator, the Department of Public Utility Control, (DPUC), which appoints its members subject to the requirement that they must include the Consumer Advocate, the Department of Environmental Protection, and the Attorney General and also represent utilities, various business interests (4 members), and residential customers.

While such a group would appear to have great potential for conflict, the project has in fact worked reasonably smoothly because members agreed on a set of highly skilled and professional

experts and also agreed to objectives of parity, fairness, a "whole house" approach, and cost-effectiveness. Innovation has not been an objective and little has been achieved.

The Renewable Energy Investments Board is similarly populated, albeit more politically, e.g., House Speaker appoints a RE expert, House Majority Leader appoints a business representative. Not surprisingly, decisions have a high political element, which in practice means a focus on economic development – which in turn means a strong emphasis on the local renewable industry, which happens to be fuel cells.

The Connecticut experience suggests these additional conditions to promote innovation:

- Political appointments tend to generate political decisions.
- A centralized fund is susceptible to reprogramming.
- Innovation is much less likely to occur where it is not a specific objective.