State Experiences with Financial Incentives to Promote Clean Distributed Energy: Greenhouse Gas Reductions with CHP

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ABSTRACT

Many states have promulgated energy incentive schemes to achieve a wide variety of policy goals. Considering the context of diverse incentives and policies that promote both renewable energy (RE) and combined heat and power (CHP), this paper examines direct capacity grant incentive programs in four states (CA, CT, NJ and NY) to determine broad differences regarding their cost effectiveness, both in achieving installed capacity, and in achieving reductions of greenhouse gas (GHG) emissions. Using two methodologies and assumptions to estimate the GHG reductions attributable to different RE and CHP technology types, the paper determines dollars of incentive per ton of CO_2 reduction. CHP incentives generally offer a better value per dollar of incentive distributed than RE incentives if GHG reduction is the primary goal.

Introduction and Problem Statement

There is a critical need to alter the trajectory of new clean energy technology capital accumulation rates (and new product development rates) in the United States. Environmentalists, politicians, national spokespersons on matters of economic competitiveness, greenhouse gas reduction advocates, technology leaders, and even those concerned with national security, are increasingly utilizing their public platforms for fashioning and bringing new energy policy perspectives into the marketplace of ideas. Energy efficiency (EE) Combined Heat and Power (CHP) and Renewable Energy (RE) technologies are widely acknowledged as critical components of a successful energy policy portfolio.

The intent of this paper is to survey the landscape of incentive categories, to note potential conflicts (or perhaps synergies) among the multiple objectives, and to offer some guidance when certain structures are best suited to particular purposes, paying particular attention to the cost effectiveness of programs intended to reduce GHG emissions. It will also review whether or not excluding CHP from incentive programs contradicts stated goals of certain State energy legislation.

This paper examines a wide range of incentives that attempt to promote new clean distributed energy (DE) technologies, with a focus on CHP. We consider the rationale for existing incentives and describe how some incentive structures may unwittingly undermine greenhouse gas reduction or other goals by excluding or providing less favorable treatment for CHP compared with other alternative energy sources or energy efficiency measures.

This paper places in context the myriad challenges facing development of effective incentives for CHP, and based on a survey and analysis of incentive programs in several states proposes actionable recommendations for the development of future CHP incentive portfolios.

Incentives Utilized to Promote Clean DG/CHP[1]

A wide variety of incentives have been utilized to promote clean distributed generation in the United States and abroad. CHP has benefited from a more modest range and scale of incentives. This section provides a rough inventory of incentives, both domestic and international, that have been used to promote CHP and EE, and attempts to organize them by type, intent and structure.

Overview of Incentive Schemes

The applicability and intended recipients of incentive schemes have been differentiated across many dimensions, including eligible technology types, eligible application sizes (e.g. less than 10 kW or 50kW), and eligible application sectors (farms, residential, etc.), as well as across types of incentive. The very large number of possible variations within these types illustrates the complexity of distributed energy promotion, and also the challenge of identifying which incentive structures work best for which purposes. In a later section we discuss reasons for the wide variety of schemes and some of their relative advantages. In order to frame the policy environment in which the grant structures we analyzed operate, it is useful to inventory the basic incentive types, which all can be targeted to promote particular investments:

- Installed Capacity Payments ($/kW) – fixed payments per nameplate capacity rating, sometimes including a performance component (i.e., a number of run hours during peak summer shortages). These payments are sometimes capped, for example available up to the first 1,000 KW of installed capacity.
- Project Grants (XX% of project costs, capped at $X Million) – an important variation of capacity payments, which may incorporate technology, application type, innovation, or efficiency goals
- Peer Reviewed Project Grants – grants, up to a percentage of total project cost, awarded following review by a technical committee and subject to certain goals and program standards
- Production Tax Credits (PTC) – provides an offset to taxable income of the project owner based upon the volume of kWh of energy produced
- Investment Tax Credits (ITC) – tax relief to project owner based on the initial capital cost of the installed DE project.
- Low-Interest Loan Programs – provides financing assistance to reduce the interest expense for funds borrowed to purchase and install the DE system.
- Net Metering Payments – ongoing payments to project owners for electricity produced in excess of on-site consumption (may use a variety of pricing models)
- Renewable Portfolio Standards (RPS) / Utility Purchase Obligations – obligations on utilities or energy service companies to procure a set percentage of delivered power from certain types of generators
- Special Gas Purchase Rates (Fuel Discount) – provide discounted natural gas “pipes” charges to CHP users meeting certain criteria

[1] Distributed Energy (DE) encompasses Distributed Generation (DG) and energy efficiency. CHP is a subset of clean Distributed Generation (DG). Many clean DG technologies are renewable power generation technologies. CHP may be based on renewable power sources (e.g. biomass based CHP).

- Locational Payments or Time Specific Payments – payments to relieve congestion, lower peak demands, etc.
- Carbon Cap and Trade (RGGI, CA) – provide a monetized value for offset carbon emissions
- Carbon Tax – a price on emitted carbon may differentially assist lower net emitters such as CHP
- Off Take Tariff – guarantees a price for produced electricity; similar to net metering (more experience in Europe than in the U.S.)

In many instances, DG incentive programs *exclude* some or all forms of CHP from participation. This is the case with most of the existing RPS or utility purchase obligation programs, and the production tax credit and net metering programs operated by the states. In other instances, incentive programs may permit CHP participation but at a lower incentive rate as compared with other types of DG (e.g. the California Small Generator Incentive Program, "CA SGIP").

All of these types of incentives, including their subcategories and combinations, offer particular advantages or disadvantages to society or to the project sponsors. Some incentive schemes provide greater control of project quality and characteristics but perhaps at the cost of timely disbursement of payments. On the other hand, loosening control over project quality and characteristics and reducing or eliminating the wait time for payments greatly increases risks to society that the level of public benefits expected will be achieved. We will examine these important characteristics in later chapters.

Intended Outcomes of Incentive Policies

Legislatures and executive government, as representatives of taxpayers and societal interests have articulated several objectives when Clean DG programs are put in place. Incentive programs have been justified on the basis of the following projected outcomes.

- Economic Benefits
  - Improved competitiveness, productivity, and economic growth
  - Create new jobs in a state or region
  - Promote/nurture the development of a new industry ("infant industry" argument)
- Environmental Benefits
  - Reduced emissions of criteria pollutants (NOx, SOx, Hg, PM, etc)
  - Reducing greenhouse gas emissions (primarily CO_2 and CH_4)
- System Benefits
  - Reduced reliance on imported fossil fuels (several studies have shown that increased CHP deployment significantly decreases net natural gas consumption in a region.[2])
  - Reducing grid congestion

[2] See, e.g., "Natural Gas Impacts of Increase CHP", Energy and Environmental Analysis, Inc. October 2003 (http://www.eea-inc.com/dgchp_reports/CHPA-Gas.pdf); and NYSERDA's Distributed Generation – Combined Heat and Power Demonstration Program M&V Report (2005), which reports that "the program has [allowed] a net decrease statewide of 120,586 MMBtu/year due to greater efficiency of the DG/CHP systems at sites where imported fuel is used."

    - Lowering peak demands and impacts on prices and/or stress on the T&D grid
    - Improving the diversity of energy supplies in a region
- Security
    - National security arguments
    - Reliability during outages/disasters ("safe havens")

Representative Statements of Public Purpose

One way to gauge the intended effect of various incentive schemes—which is necessary to evaluate them according to their effectiveness in achieving their stated goals—is by analyzing the Statements of Public Purpose in the enabling legislation or other foundation documents. Cataloguing these statements of purpose allows judgments regarding whether the resulting incentive programs deliver any of the benefits that were intended.

California. California recently passed legislation that set a target of generating 20 percent of total retail sales from eligible renewable resources by the year 2010. It is instructive to examine the stated public purposes that are enumerated in the bill language. The purposes include diversity, reliability, public health and environmental benefits:

> SEC. 13. Section 399.11 of the Public Utilities Code is amended to read: 399.11. The Legislature finds and declares all of the following: (a) In order to attain a target of generating 20 percent of total retail sales of electricity in California from eligible renewable energy resources by December 31, 2010, and for the purposes of increasing the diversity, reliability, public health and environmental benefits of the energy mix, it is the intent of the Legislature that the commission and the State EnergyResources Conservation and Development Commission implement the [3]

At the same time, California is removing fossil fuel based CHP from the flagship program, which has supported distributed generation in the past. The California Self Generation Incentive Program (SGIP) has been the primary incentive program for smaller scale renewable power generation (solar PV, wind less than 5 MW, renewable based fuel cells and renewable based CHP systems) and has included non-renewable power from fuel cells, microturbines, small combustion turbines and reciprocating engines.

AB 2778 (Sally Lieber, D-Mountain View), which removes fossil fuel combustion technologies from the Self-Generation Incentive program (SGIP) was also signed into law. Under the bill, starting Jan. 1, 2008, the SGIP is limited to fuel cell, wind and qualified waste gas applications. AB 2778 eliminates the most efficient technologies within SGIP – technologies that provide significant grid reliability and environmental benefits to California. One such technology is natural gas combined heat and power (CHP), also known as cogeneration, where heat that would otherwise be wasted is used to generate electricity.

CHP provides an important environmental benefit by reducing GHG emissions, as noted in the state's CEC "Integrated Energy Policy Report".[4] The Climate Action Team report targets CHP for 2.4 percent of 2020 GHG emissions goals. Furthermore, according to the 2005 CEC

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[3] California SB 107 (Simitian) Renewable energy: Public Interest Energy Research 08/31/2006.

[4] 2005 Integrated Energy Policy Report, Commission Final Report Adopted November 21, 2005; accessed at http://www.energy.ca.gov/2005_energypolicy/index.html

"Integrated Energy Policy Report", natural gas CHP is the most cost-effective form of distributed generation.

Connecticut. Connecticut stated an explicit interest in creating "several initiatives to reduce charges associated with congestion on the electric transmission system". In so doing, the legislature specifically identified customer sited distributed resources.[5] Furthermore, there was a directive to the existing incentive funds to consider transmission and distribution system congestion as an important criteria when making budget allocation decisions—contacts in the state emphasize that offsetting FERC transmission charges was the primary motivation for new incentives. The bill did not explicitly mention greenhouse gas issues.

New Jersey. The initial 1999 legislation that enabled the New Jersey Clean Energy Rebate Program, the Electric Discount and Energy Competition Act, did not mention greenhouse gases. Instead, the legislature seemed intent on economic restructuring, competition and cost issues. (It is worth noting that the CHP program was not added to NJ's suite of incentives until 2004 through a regulatory process, so no legislative statement directly relating to CHP is available.)[6]

New York. New York State Energy Research & Development Authority (NYSERDA) is responsible for overseeing the entire portfolio of programs that are supported by funds from New York State's System Benefit Charge (SBC).

The "Theory/Logic" of the program is stated to be Value/Cost as guided by a (Peer Review) Assessment

> 5.7.1 Program Description
> The goal of the DG-CHP Demonstration Program is to contribute to the growth of combined heat and power and other distributed generation applications in New York. The program provides funding for site specific feasibility studies and demonstrations and seeks to improve awareness by end-users and project developers of DG-CHP. The program also seeks to address DG-related issues such as DG permitting; SIR; utility standby service; tariffs; technology risk; and renewable fuel options such as anaerobic digester and landfill gas; and impact of fluctuating prices of natural gas.

The program uses financial incentives to encourage customer-sited DG using commercially available DG technologies such as reciprocating engines. The incentive approach will co-exist along with similar offerings from RPS Customer-Sited tier and Consolidated Edison's System Wide Demand Reduction programs.The total program budget is $67.1 million.

Incentive Program Structures, Levels and Results

One of the reasons for examining the four states discussed in this paper is that all offer both Renewable Energy (RE) incentive programs and similar or related programs that support

[5] OLR Bill Analysis HB 7501 AN ACT CONCERNING ENERGY INDEPENDENCE SUMMARY: http://www.cga.ct.gov/2005/ba/2005HB-07501-R00SS1-BA.htm.

[6] The CHP Program resulted from a collaborative effort involving the NJ BPU Office of Clean Energy (OCE), the OCE Bureau of Energy Efficiency, utilities, and others. The program received regulatory approval in 2005.

CHP. Because of the diversity and overlapping effects of the various energy incentives and policies identified above, we restrict our analysis here to explicit energy grant programs. This simplifies analysis and comparisons between states, but necessarily glosses over many important variables that also influence the rates of clean energy investment. For example, in states with RPSs that do not include CHP, RPS incentives for renewables may comparatively increase RE investments compared to CHP beyond the levels that can be attributed to the grant programs' RE outcomes alone.

California—SGIP Program

Since 2001 California's Self-Generation Incentive Program (SGIP) has supported both renewable and efficient fossil fired CHP, with success as noted below. However, as of January 1, 2008 the SGIP program in CA will no longer provide incentives for fossil fuel based CHP.

During PY05, SGIP projects delivered over 480,000 MWh of electricity. As SGIP projects are located at customer host sites of the Investor-Owned Utilities (IOUs) to help meet on-site demand, this represented electricity that did not have to be generated by central station power plants and delivered by the transmission and distribution system. Thermal cogeneration systems (Level 3/3-N/3-R engines and turbines) provided over 80 percent of the electricity delivered during 2005. Level 1 PV projects supplied the next largest amount at approximately 14 percent of the total.

The table below summarizes the costs of the SGIP incentives in terms of incentive $'s per MWh of energy production and in terms of Incentive $'s per kW of installed capacity.[7]

	Incentives ($Mil)	Capacity (MW)	Production (MWh)	Incentive $'s per MWh	Incentive $'s per kW
Renewables:					
PV	$ 204.0	53.00	65,915	$ 3,089	$ 3,842
Wind	$ 3.1	1.65	2,038	$ 1,521	$ 1,879
FC's: Renewable	$ 3.4	0.75	2,637	$ 1,289	$ 4,533
Fuel Cells: Non-Renew	$ 4.0	1.80	11,164	$ 358	$ 2,222
Engines/Microturbines: Renewable & Non-Renew	$ 58.0	106.72	399,495	$ 145	$ 543
TOTAL	**$ 272.5**	**219.32**	**481,250**		

Connecticut – Customer-Side Distributed Generation Incentives

Over the past two years Connecticut has initiated an array of incentives for CHP development that complements the state's existing renewables programs. The key feature of the Connecticut program is a $450 or $500 per kW grant that is available to CHP or other generation that will operate during peak periods. The higher value is available to generation sited in transmission-constrained Southwest CT. In addition to the capital grants, the program includes low interest loans, discounts for the cost of natural gas, an exemption from certain electric costs for backup service, and the ability for customers that use a 'clean' fuel, or install a combined

[7] See SGIP 2005 Impact Evaluation (http://www.socalgas.com/business/selfgen/docs2007/2007_SGIP_FifthYearImpactEvaluation_2005.pdf).

heat and power project, to earn renewable energy credits that can be sold in the wholesale electric market.

Since this program was initiated, 141 projects comprising 344 MW of capacity have either been approved to enter the development pipeline or are pending approval. Of these 141 projects, 45 of them, representing 231 MW of capacity, are CHP. It is too early to know with certainty how many of these will eventually be built, but given the large dollar incentives the authors believe that a majority will be completed. The average grant amount associated with the approved CHP projects approved so far is $75,515,763, or roughly $460 per kW.[8]

New Jersey – Clean Energy Program

New Jersey offers a tiered system of grant financing to renewable and CHP projects, with different incentive levels per Watt depending on the project size and technology type. These grants range in value from $150 to $5,000 per kW, with higher values directed at smaller and renewable projects.

Between 2004 and 2005 grant years, $11.4 Million was spent on CHP projects. In the initial 2004 allocation, the $7.4 Million expenditure resulted in 10 projects totaling 18 MW, at approximately $411 per kW.

By contrast, in New Jersey's RE programs from 2001 to 2006 spent roughly $600 to $4,400 per kW of capacity (wind took the least incentive, PV the greatest). Wind appears to be a good value; New Jersey's Clean Energy Program has provided $3.3 million in subsidy for 7.5 MW of wind capacity since its inception in 2001 ($441 per kW).[9] Note that wind is a Class I RE resource eligible for Class I RECs toward satisfying the NJ RPS.

New York – NYSERDA Programs

The NYSERDA DG/CHP Program is housed within the suite of SBC-funded R&D programs. On December 31, 2005 the New York State Public Service Commission (PSC) extended the SBC from July 1, 2006 to June 30, 2011 and increased the funding levels from approximately $150 million per year to $175 Million annually. The total program allocation for viable DG/CHP projects is $55 million. This allocation will support 100 projects and represent 130 MW of installed capacity.[10]

The Clean Energy Infrastructure program, formerly the End-Use Renewables program, funded 438 PV systems and 15 small wind systems as of 12/31/2006, under Program Opportunity Notice 716.[11] The dollar value of incentives paid for PV's in this program was $10 million, with an additional $333,712 paid for small wind systems. Cumulative energy generation through the end of the review period was 4,619 MWh. There were 2.1 MW of installed clean generation at the close of the period, which nets to a value of $4,870 per kW of installed renewables, for the combined total of wind and PV projects. Aggregating the wind and PV values masks the per kW cost of either. Also, similarly to the NYSERDA CHP project outcomes,

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[8] 32 of the pending CHP projects were approved at time of writing, with 13 projects totaling 53 MW listed as pending.
[9] Correspondence from Renewable Energy Program Administrator Scott Hunter.
[10] At time of writing 46 of these projects are operating, with the remainder in various stages of engineering, construction and commissioning.
[11] Table 5-8. DG-CHP Demonstration Program – Key Program Outputs, pg. 5-13 (http://www.nyserda.org/Energy_Information/SBC/sbcmar07section5.pdf)

it should be noted that NYSERDA's emphasis on high efficiency and technology demonstration projects may include some marginal costs that benefit society through technology transformation but appear to increase installed costs.

Energy Technology and Differential GHG Reduction

It is understood that different technology investments provide different types of benefits, including different levels of greenhouse gas reduction. Differences such as capacity factor, operational profile, size and others affect the amount of CO_2 or other pollutants that are emitted. As some renewable energy advocates are quick to point out, gas fired CHP does contribute emissions as a point source—despite the significant gains that CHP may offer compared to a base case, such as the boiler or other thermal system that it may offset. Thus, to fairly compare the cost per ton of CO_2 reduction, it is necessary to quantify the benefits from each type of investment. We used two different methodologies: one from the California SGIP program evaluation, and the other developed by Dr. Bruce Hedman of EEA / ICF.

SGIP Method

The ITRON Program Year 2005 (PY2005) Evaluation Report of California's SGIP program provides estimates of the GHG reduction potential of the various technologies receiving incentives. We have added our own calculations of the incentive dollars per MWh and dollars per ton of GHG reduction in two additional columns.

The GHG reduction potential of CHP installed under the SGIP program cost $145/MWh and reduced GHGs at a rate of 0.11 tons/MWh, at an incentive cost of $1,318 per ton of GHG reduction. Solar PV cost $3,089/MWh of incentive and reduced GHG at a rate of 0.60 tons/MWh. The reduction potential of PV is five times greater than CHP, but the costs of the PV incentives relative to the CHP incentives are 21 times greater.

	GHG Reduction Potential (tons of CO_2 per MWh)	**Incentive $'s per MWh**	**Incentive $'s per Ton Reduction**
Solar PV	0.60	$3,089	$5,148
Wind	0.61	$1,521	$2,493
Engines/Microturbines (Renewable & Non)	0.11	$ 145	$1,318

ICF Analysis

Other estimates of GHG reductions attributable from natural gas fired CHP systems show far better results. For example a report by Dr. Bruce Hedman of ICF International, using a 5 MW gas combustion turbine as the proxy CHP system, shows a potential value of 0.60 tons of CO_2 reductions per MWh. This is essentially the same factor determined for Solar PV in the 2005 SGIP Evaluation Report.

Dr. Hedman's estimates were by his own admission only a rough approximation. His assumptions included a 75% efficient, 5 MW combustion turbine that would displace the national average fossil fuel generation mix as reported by the US EPA in the E-GRID database.

Obviously different sizes, thermal applications and many other real world differences would affect the result.

Suppose that the true value of GHG reductions from CHP was 0.30 tons of GHG reduction per MWh, or about 50% of the estimate made by Dr. Hedman, but three times that of the ITRON study. In that case, CHP still is clearly an important GHG reduction measure, and one that is considerably less expensive than investments in solar PV and smaller scale wind systems.

Using the CA SGIP data and the 0.30 tons of GHG reduction per MWh figure we calculate an incentive cost per ton of $484. The same analysis in New York and New Jersey shows costs per ton of $383 and $372 respectively.

This would indicate that net metering for CHP could be worthwhile – "the capacity factor of engines and turbines is influenced by fundamentally different factors. PV system power output is primarily governed by weather, and PV systems in the program are eligible for net-metering tariffs that enable them to produce more power than is consumed by the facility during certain hours."[12] In California, the capacity factor reported for CHP (and which is used to calculate the $484 per ton figure above) is just 42%.

If Dr. Hedman's figures were accepted and reduced by 50%, we see a dramatic rise in the cost-effective GHG potential that could be available via a more aggressive program of incentives for CHP Projects.

Turning to other states, in New Jersey, the renewable energy programs operating during 2001 – 2006 spent $127 Million to produce roughly 37 MW of renewable energy investment. With calculations and assumptions based on California's SGIP report for consistency, the payouts translate into GHG reductions at slightly more than $1,000 per ton.

For CHP, the $440 per kW of capacity New Jersey spent on CHP incentives in 2004, again using the model of California's SGIP report for consistency, translates into an expenditure of just over $1,000 per ton. This is significantly higher than the $372 per ton estimate using the conservative version of Dr. Hedman's estimate, so clearly the methodological issues of this analysis merit further investigation.

Relative Benefits

Across the states examined and for which data were available, the average incentive cost per annual ton reduction of GHGs was computed as $3,058 with the SGIP methodology. For CHP this average was $735 per ton with the SGIP method, and $413 using the conservative version of Dr. Hedman's method. Many factors affect the validity of comparison calculations and specific conclusions about the efficacy of the subject incentive programs, including differences in reporting, annual run hours in various contexts, and the possibility of RPS and tax incentives, interconnection policy, standby rate treatment and other legal or regulatory differences. However, the magnitude of difference does indicate that from a GHG perspective the relative benefits of CHP incentives should not be overlooked.

[12] Pg 124 of ITRON report

Conclusions

CHP is a "tried and true" technology, relatively well understood and deployed in a wide variety of applications across a broad range of economic sectors. Renewable technologies, though very promising in the intermediate to longer-term are not nearly as far along the curve of technology development and commercialization.

Policy-makers interested in securing near-term success in criteria pollutant reductions, GHG emissions reductions, price and peak demand reductions ought to give greater consideration to bolstering incentives for demonstrably clean, high efficiency CHP even when such CHP is fueled by fossil fuels.

On a cost-effectiveness basis, well designed CHP incentive programs can play a much more immediate role in meeting many of the state goals of alternative and renewable energy programs that are now supported by the states. Further research should conduct similar comparative analysis for end use efficiency programs.

Based upon the limited amount of program information that we have analyzed here, and despite concerns about "comparing apples to oranges," we find CHP to be markedly superior to renewably based distributed generation technologies, at least in terms of the cost-effectiveness of direct incentives.

It may be that society has an interest in paying a premium for GHG reductions that occur due to Solar PV, rather than GHG reductions due to clean gas based CHP. However, we are not sure that the public has fully understood or debated that issue of how much of a premium to accord some renewable technologies, as contrasted with very clean fossil-fuel based CHP technologies.

Policy makers should consider whether it is reasonable to provide richer incentives to renewable energy than to efficiency and CHP, if new technology development is an overriding goal. Although not all of the programs we examined were explicitly founded on the goal of climate change mitigation, the current political climate increases the likelihood that GHG reduction will play a larger role in legislative intent in ensuing years. Considering the pressing issue of global warming, and the well-documented cost effectiveness of CHP, policy makers who intend to maximize public benefits and GHG reductions should pay closer attention to the CHP option. Particularly in light of the examples we studied, the GHG impact of CHP incentives appears to represent a great bargain to taxpayers.

Appendix A – Statements Of Public Purpose

Massachusetts

The Massachusetts Renewable Energy Trust: "public purpose of said trust fund shall be to generate the maximum economic and environmental benefits over time from renewable energy to the ratepayers of the commonwealth through a series of initiatives which exploits the advantages of renewable energy in a more competitive energy marketplace by promoting the increased availability, use, and affordability of renewable energy and by fostering the formation, growth, expansion, and retention within the commonwealth of preeminent clusters of renewable energy and related enterprises, institutions, and projects, which serve the citizens of the commonwealth."[13]

New Jersey

The statement declared that The Legislature finds and declares that it is the policy of [New Jersey] to:

1. Lower the current high cost of energy, and improve the quality and choices of service, for all of this State's residential, business and institutional consumers, and thereby improve the quality of life and place this State in an improved competitive position in regional, national and international markets;
2. Place greater reliance on competitive markets, where such markets exist, to deliver energy services to consumers in greater variety and at lower cost than traditional, bundled public utility service;
3. Maintain adequate regulatory oversight over competitive purveyors of retail power and natural gas supply and other energy services to assure that consumer protection safeguards inherent to traditional public utility regulation are maintained, without unduly impeding competitive markets;
4. Ensure universal access to affordable and reliable electric power and natural gas service;
5. Maintain traditional regulatory authority over non-competitive energy delivery or other energy services, subject to alternative forms of traditional regulation authorized by the Legislature;
6. Ensure that rates for non-competitive public utility services do not subsidize the provision of competitive services by public utilities;
7. Provide diversity in the supply of electric power throughout this State;
8. Authorize the Board of Public Utilities to approve alternative forms of regulation in order to address changes in technology and the structure of the electric power and gas industries; to modify the regulation of competitive services; and to promote economic development;
9. Prevent any adverse impacts on environmental quality in this State as a result of the introduction of competition in retail power markets in this State;
10. Ensure that improved energy efficiency and load management practices, implemented via marketplace mechanisms or State-sponsored programs, remain part of this State's strategy to meet the long-term energy needs of New Jersey consumers;
11. Preserve the reliability of power supply and delivery systems as the marketplace is transformed from a monopoly to a competitive environment; and
12. Provide for a smooth transition from a regulated to a competitive power supply marketplace, including provisions which afford fair treatment to all stakeholders during the transition.

[13] Source: http://www.mtpc.org/renewableenergy/legislation_1.htm#rtf

Appendix B – Incentive Spreadsheet

Incentive Comparisons

General Program Info						Offer		Response			Evaluation		Impact Calcu
State	**Program**	**Prog Note**	**Technology**	**Incentive ($Mil)**	**Prog Size? Fully Subscribed?**	**Incentive ($'s / kW)**	**Incentive ($'s / MWh)**	**Capacity (MW)**	**Production (MWh)**	**No. Projects**	**Capacity ($'s / kW)**	**Energy ($'s / kWh)**	**Cap. Factor (Annual %)**
CA	SGIP		RE PV	204.0				53.0	65,915		$3,842	$3,089	
CA	SGIP		RE Wind	3.1				1.7	2,038		$1,879	$1,521	
CA	SGIP	(h)	RE FC's-Renewable	3.4				0.8	2,637		$4,533	$1,289	
CA	SGIP	(h)	FC's-NonRenewable	4.0				1.8	11,164		$2,222	$358	
CA	SGIP		Engines/Microturbines (all)	58.0				106.7	399,495		$543	$145	
NJ	2004		All CHP types	7.4				18.0		10	$411		42%
NJ	2005		All CHP types	4.0						24			42%
NJ	NJCEP	(d)	CORE Solar	120.1		4,439		27.1		1868			16%
NJ	NJCEP	(d)	CORE Wind	3.3		441		7.5					15%
NJ	NJCEP	(d), (i)	CORE Biomass	3.1		1,431		2.2		5			40%
CT		(c)	CHP	99.8		450 - 500		231		45	$432		
CT		(g)	Renewables										
NY	DG-CHP	(e)	CHP	55.0	$67.1 Mil.			130.0		100			42%
NY	CEIP (PON 716)		PV	9.9						438			
NY	CEIP (PON 716)		Wind	0.3						15			
NY	Sum of PV a	(f)		10.2				2.1		453.0	$4,871		16%

Notes

- a New Jersey Clean Energy Program divides RE into Wind and Sustainable Biomass, and Solar Electric technologies.
- b Is this a typo on the web site? Should it be up to 1 kW?
- c Based on projects in CT pipeline; all may not be completed.
- d CORE - cumulative 2001-2006
- e Demonstration program; spans __ years
- f Because the reporting data combines wind and PV output, we summed the two technology costs for analysis
- g Appropriate information to asess CT renewables programs was not found at tiem of submission.
- h Factors for GHG reductions not found at time of submission.
- I Biomass not used in conclusions: need to verify capacity and GHG factors