MASSACHUSETTS TECHNOLOGY COLLABORATIVE
RENEWABLE ENERGY TRUST

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF
TELECOMMUNICATIONS AND ENERGY

Investigation by the Department of Telecommunications and Energy on its own Motion into Distributed Generation	)	D.T.E. 02-38-C

MASSACHUSETTS DISTRIBUTED GENERATION COLLABORATIVE 2006 REPORT

June 30, 2006

Submittal Letter

The Massachusetts Distributed Generation DG Collaborative herewith submits its 2006 Report, including a set of proposed revisions to improve the Interconnection Tariff. This Report also summarizes what the DG Collaborative has learned to date about several other topics, including the role of DG in distribution company planning. The signatories of this 2006 Report are:

Utility Cluster

Fitchburg Gas & Electric Light Company (Unitil)
National Grid
NSTAR Electric and Gas Corporation
Western Massachusetts Electric Company (Northeast Utilities)

Distributed Generation Cluster

AmericanDG Energy Inc.
Beacon Power Corporation
Boreal Renewable Energy Development
Climate Energy, LLC
CommonWealth Resource Management Corp.
Conservation Services Group
ConsumerPowerLine
CoEnergy America, Inc.
The E Cubed Company, LLC
Energy Program Consulting
Ingersoll Rand Company
Neighborhood Power
Plug Power, Inc.
Solar Energy Business Association of New England
SourceOne, Inc.
UTC Power

Other Stakeholders

Associated Industries of Massachusetts
Cape Light Compact
City of Boston
Conservation Law Foundation
Electric Power Research Institute
International Brotherhood of Electrical Workers, Local 103
Massachusetts Department of Correction
Massachusetts Division of Capital Asset Management
Massachusetts Division of Energy Resources
Massachusetts Public Interest Research Group
Massachusetts Energy Consumers Alliance
The Energy Consortium

Electronic versions of this Report and its Attachments can be found at:
www.masstech.org/dg/collab-reports.htm
and detailed information regarding all the work of the DG Collaborative is available at:
www.masstech.org/policy/dgcollab

Questions regarding the DG Collaborative in general and this Report in particular may be directed to Francis Cummings at 508-870-0312, Extension 1-270, or via email at cummings@masstech.org.

Sincerely, on behalf of the Massachusetts DG Collaborative,

Francis Cummings
Director of Policy, Renewable Energy Trust
Massachusetts Technology Collaborative
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The authors of this Report are the Massachusetts DG Collaborative participants themselves. We have spent many hours together in meetings and conference calls over the last two years, sharing and analyzing detailed information and developing new ideas. The materials for each of these meetings, along with all of the information assembled by the DG Collaborative, are available at the DG Collaborative website: www.masstech.org/policy/dgcollab. We have also offered each other drafts and redrafts of report sections and contract language, and have spent more time together jointly revising the language to reach consensus. The Massachusetts Technology Collaborative (MTC) would like to particularly acknowledge the contributions of the following individuals and organizations to this 2006 Report, to the 2005 Report and to all the work of the DG Collaborative:

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DG Projects Pictured on the Report Cover

The line chart on the cover is from this Report's Figure 1, in Section 3.4, showing the potential of nearly 60 MW of DG capacity represented by the 332 Massachusetts projects that submitted applications for interconnection from the second quarter of 2004 through the first quarter of 2006. A few of those projects are pictured on the front and back covers of this report and introduced below. Additional information about new DG projects in Massachusetts is available at:
http://www.masstech.org/dg/ma-data.htm.

IBEW, Boston. The wind turbine in the upper right corner of the cover is owned by International Brotherhood of Electrical Workers, Local 103, which installed Boston's first commercial scale wind turbine in May 2005. The 149-foot turbine is a 100 kilowatt machine that will provide power to Local 103's training center. In addition to reducing electricity costs, Local 103 uses the turbine, along with its photovoltaic array, to train its workforce to install renewable energy technologies. The turbine was made by Fuhrlander AG in Germany. The rotor diameter is 70 feet and the unit will produce its rated output of 100 kW when wind speeds reach 27mph. The 115-foot tower on which the turbine rests was fabricated by Morrison Berkshire, Inc., a heavy steel fabricator in North Adams. The turbine is located next to the Southeast Expressway, I-93, and the MBTA Red line. Additional information is available at:
http://www.ibew103.com/node/605.

Climate Energy, Acton. The project pictured in the upper left corner was installed in an Empyrean International, LLC model home in January 2006. It is a Climate Energy 1 kW Micro-CHP System powered by a specially-designed Honda engine installed. Climate Energy is based in Medfield. This combined heat and power (CHP) project is a central warm air heating system. It is connected to the NSTAR electric system and supplied with natural gas by KeySpan Energy Delivery. Installation was by KeySpan Home Energy Services. Information about additional Climate Energy installations in Massachusetts is available at:
http://www.climate-energy.com/

Cape Cod Academy, Osterville. The CHP system pictured in the center of the page was installed in March 2006 at Cape Cod Academy (CCA) in Osterville. This cogeneration unit is a Coast Intelligen 60 kW reciprocating engine with plate heat exchangers. It supports the domestic hot water and boiler preheat, and is net metered on the NSTAR electric system. Co-Energy America, Inc., based in Southborough, is responsible for the installation and all service for this cogeneration unit, and Keyspan is the gas supplier. Information on this technology is available at:
http://www.coenergyamerica.com/

Pepperell Hydro Company LLC, East Pepperell. Pictured on the bottom of the cover is a hydroelectric power plant that is being rehabilitated at the former Pepperell Paper Mill on the Nashua River in East Pepperell. The project includes one operating turbine/generator set rated at 0.6 MW and rehabilitation of two additional turbine/generator sets to expand facility output by 1.3 MW, plus upgrades to control systems and safety equipment. During the first 10 years of operation of the rehabilitated facility, MTC will purchase 100% of the incremental Renewable Energy Certificates (RECs) generated by the new capacity (which will average 52% of the total output), through the Massachusetts Green Power Partnership (MGPP). Pepperell Hydro is currently engaged in the final stages of facility rehabilitation and expects to begin commercial operation in Summer 2006. Information on this project is available at:
http://www.swiftriverhydro.com/pepperell_hydro.htm

Bixby International Corporation, Newburyport. The 50 kW solar PV system pictured on the top of the back cover is located at a custom thermoplastic sheet extruder and laminator offering one of the broadest material selections in the industry. In an effort to hedge rising electricity costs in an environmentally sustainable manner, Bixby decided to invest in a 50kW photovoltaic system. The installation of this PV system incorporates the products and services of a number of Massachusetts firms including: Evergreen Solar of Marlborough, which provided the photovoltaic panels and the company's new Flat Roof Mounting System, Solectria Corporation of Woburn, which provided the four inverters for the system, Kleeberg Sheet Metal of Ludlow, which manufactured the flat roof mounting system for Evergreen Solar, and Conservation Services Group of Westborough, which installed the PV system at Bixby. This project provides real-world installation, testing, and operation of two newly developed Massachusetts products at a Massachusetts manufacturing site and it has the potential to improve the competitive position of all the participating Massachusetts-based businesses.

Massachusetts Maritime Academy, Bourne. The 248-foot-tall, 660-kilowatt, commercial-scale wind turbine pictured on the back cover of the Report was installed on the Bourne campus of the Massachusetts Maritime Academy on April 25, 2006. The Renewable Energy Trust and the Department of Capital Asset Management (DCAM) contributed toward funding of the $1.34 million project. It is estimated that the turbine will produce about a third of the academy's annual power needs and save some $300,000 each year. This first state-owned wind turbine in Massachusetts was designed, developed and installed by Solar Design Associates of Harvard, Massachusetts, Jim Gordon of Cape Wind and Energy Management, Massachusetts general contractor Jay Cashman and electricians from IBEW. Information is available at:
http://www.masstech.org/renewableenergy/mma.html.

1. Introduction

When the Department of Telecommunications and Energy ("Department" or "DTE") opened its inquiry into distributed generation ("DG") in Massachusetts in June of 2002, it noted a set of "benefits and concerns," including that DG:

- "can meet customers' energy needs,"
- "has potential for load response,"
- "may relieve transmission and distribution constraints and protect against outages,"
- "may raise safety and reliability issues about distribution systems," and
- "may affect distribution revenue streams and cause cost shifting among customers."

In subsequent Orders, the Department has asked the distribution companies and the DG Collaborative to address some of these concerns. The Collaborative first submitted a Model Interconnection Tariff ("Model Tariff" or "Tariff") to the Department in 2003, which went into effect in April of 2004. The distribution companies received 328 DG applications under this new process and approved 276 of them through March of 2006. The DG Collaborative has now completed a two-year review of the experience with this new uniform Model Tariff, and has conducted significant research into the potential role of DG in distribution company planning.

The DG Collaborative has held over 40 formal meetings over the last two years, with approximately 125 individuals participating in multiple meetings. As shown in **Table 1**, participants represented over 55 organizations, not including MTC and its contractors. Of the participants, 35 were from the state's four distribution companies, 35 represented public agencies, public interest organizations and energy users, and 45 were from the DG industry cluster. The materials and minutes for each of these meetings are available at the DG Collaborative website: http://www.masstech.org/policy/dgcollab.

Table 1: Meetings Attended – June 2004 through June 2006

	Massachusetts Distribution Companies	
1	Fitchburg Gas and Electric Light Company (Unitil)	**38**
2	National Grid	**42**
3	NSTAR Electric & Gas Corporation	**41**
4	Western Massachusetts Electric Company (Northeast Utilities)	**40**
	Customer Representatives	
5	Associated Industries of Massachusetts	**8**
6	City of Boston	**8**
7	City of Newton	**2**
8	Fenway CDC	**3**
9	General Services Administration	**4**
10	The Energy Consortium	**10**
11	Wyeth BioPharma	**12**
	Public Interest Groups	
12	Cape and Islands Self Reliance	**4**
13	Conservation Law Foundation (CLF)	**5**
14	International Brotherhood of Electrical Workers, Local 103	**2**
15	Low-income Energy Affordability Network (LEAN)	**1**

16	Massachusetts Energy Consumers Alliance (MassEnergy)	**6**
17	Mass PIRG	**1**
18	Union of Concerned Scientists (UCS)	**3**
	DG Industry Representatives	
19	Aegis Energy Services, Inc.	**12**
20	Ameresco	**3**
21	AmericanDG Energy Inc.	**11**
22	Beacon Power Corporation	**11**
23	Boreal Renewable Energy Development	**8**
24	Climate Energy	**9**
25	Co-Energy America, Inc.	**13**
26	CommonWealth Resource Management Corp. (CRMC)	**3**
27	The E Cubed Company	**7**
28	Energy Program Consulting	**5**
29	Gas Technology Institute	**12**
30	Ingersoll Rand Company	**21**
31	Jay Gardner	**8**
32	KeySpan Energy Delivery New England	**7**
33	Northeast Combined Heat and Power Initiative (NECHPI)	**8**
34	Neighborhood Power	**16**
35	Northeast Energy & Commerce Association (NECA)	**7**
36	Northern Power Systems	**6**
37	PJA Energy Systems Design	**11**
38	Plug Power, Inc.	**7**
39	Solar Energy Business Association of NE (SEBANE)	**23**
40	SourceOne, Inc.	**6**
41	Siemens Building Technologies, Inc.	**2**
42	Sustainable Energy Solutions	**2**
43	Synapse Energy Economics	**7**
44	Tecogen Inc.	**11**
45	Trigen-Boston Energy Corporation	**6**
46	United Technologies Corporation	**14**
	Government and Quasi-Government	
47	Cape Light Compact	**14**
48	ISO New England, Inc.	**8**
49	Massachusetts Department of Correction	**8**
50	Massachusetts Department of Housing & Community Development	**2**
51	Massachusetts Department of Telecommunications & Energy	**20**
52	Massachusetts Division of Capital Asset Management (DCAM)	**7**
53	Massachusetts Division of Energy Resources (DOER)	**43**
54	Massachusetts Office of the Attorney General	**7**
55	Massachusetts Technology Collaborative (Renewable Energy Trust)	**43**
56	US Environmental Protection Agency	**9**
	Resources and Other	
57	California Energy Commission (represented by BEW Engineering)	**13**
58	Cape Power Systems Consulting, LLC	**8**
59	Center for Energy Efficiency and Renewable Energy, Univ. of MA	**14**
60	Electric Power Research Institute	**11**
61	Honeywell	**5**
62	ICF	**5**
63	MIT	**3**

64	Navigant Consulting	**37**
65	Pacific Gas and Electric	**5**
66	Resolve, Inc.	**7**
67	W.E. Feero, PE	**13**

Section 2 of this 2006 Report lists all the changes that the DG Collaborative recommends be made in the Model Tariff. These changes are incorporated into a complete proposed redlined version of the Tariff, which can be found in **Attachment A**, and a clean copy of the proposed Tariff in **Attachment B**. Each of the individual changes is also described in greater detail in a Change Request form in **Attachment C**.

Section 3 summarizes a number of challenges related to the interconnection process that have been discussed but not fully resolved by the DG Collaborative, including:

3.1 insurance and indemnification,

3.2 interconnection to spot and area networks,

3.3 relationship between the Tariff and the other interconnection processes,

3.4 future "tracking" of the interconnection process, and

3.5 improvement in DG education and outreach.

Section 3 goes beyond the particular tariff changes recommended in Section 2 to summarize what we have learned about these challenges and to provide a number of specific recommendations for future action by the Department and/or other public and private entities.

Section 4 summarizes the studies and debates undertaken during the last few months on the potential role of DG in distribution company planning, and recommends a course of action on this issue that includes:

- a workshop process during the fall of 2006 to design solutions to the technical and business challenges identified by the Distribution Planning Work Group,
- expansion of the MTC Congestion Relief Pilots, in order to better understand the use of DG and other demand resources in achieving distribution system efficiencies,
- opening of a docket to investigate if utilities can install and own DG (this is not intended to affect existing emergency procedures) as part of a targeted distribution constraint relief project, or as part of distribution improvement, consistent with the existing restructuring statute, and
- using other initiatives, e.g. the STAC/EPRI project, development of a policy framework for appropriately allocating the costs, impacts and benefits of DG in such a way as to equitably capture the identifiable, tangible and quantifiable net benefits of DG.

Finally, Section 5 summarizes the possible activities on which many participants in the DG Collaborative plan to work together in the future, each of which is also addressed in one of the sections 2 though 4 of this Report. However, Section 5 also discusses a number of important modifications in the structure of such future collaborative activities.

2. DG Collaborative Recommendations to DTE: Tariff Changes

This section lists all the changes that the DG Collaborative recommends be made in the Model Tariff. These changes are incorporated into a complete proposed redlined version of the Tariff, which can be found in **Attachment A**, and a clean copy of the proposed Tariff in **Attachment B**. Each of the individual changes is also described in greater detail in a Change Request form in **Attachment C**.

Each Change Request suggested by DG Collaborative participants is listed in **Table 2** below, along with a summary of the resolution of each Request. This Table includes all Requests that were proposed, some of which were not adopted.

This table also indicates the portions of the Tariff which are affected by each Change. However, the Model Tariff (in **Attachments A and B**) is the authoritative location of the actual changes that were eventually adopted by the DG Collaborative as recommendations to the Department.

Table 2: Change Requests

Change Requests	Resolution	Attachment A Redline Tariff	Date Submitted	Date into Tariff
1: Eliminate Tariff as Attachment to Interconnection Agreement	**Agreed** (3/15) in principle to refer to Tariff by reference (not as Attachment 1); language accepted (4/11)	Pages 73, 75, 81-82 (Exhibit F), Pages 83-84, 86 (Exhibit G)	2/16/06	7-Apr
2: Add meter number to Simplified Process Application	**Agreed** (3/15); language accepted (4/11)	Pages 10, 52, 54, 59-60	3/2/06	7-Apr
3: Establish expiration time frame for Interconnection Agreement	**Agreed** (3/15), subject to need to draft language based on trigger concept; language slightly revised and accepted (4/11)	Page 14 (Section 3.4)	3/2/06	19-Apr
4: Option to submit multiple equipment specs or worst-case data for utility review	**Agreed** (3/15 and 5/31), with understanding that if applicant requests the utility to study multiple options, the utility may estimate increased costs and time	Page 9 (Section 3.0)	3/3/06	7-Apr

Change Requests	Resolution	Attachment A Redline Tariff	Date Submitted	Date into Tariff
5: Add question on exporting power to the Simplified application	Not approved (3/15); NSTAR announced (4/11) that its practice will nevertheless continue to be to send all net metering applicants a "QF Power Purchase Agreement" for their exported power	(Page 54)	3/6/06	n/a
5-b: Add application date to all application forms (so date on 1st page of form)	**Agreed** (3/15) to have date on all pages of form; corresponding language incorporated	Pages 52 - 64	3/6/06	7-Apr
6: Correct references to "certification" of equipment for screen #4	**Agreed** (4/11) in principle to make the changes proposed by the sub-group, subject to (a) check of need to replace some instances of "Qualified" with "listed", and (b) discussion on points raised by Herb Healy	Page 2-4, 8, Pages 15-16 (Figures 1 & 2), P. 17 (Note 3), Pages 29-30, other pages	3/7/06	15-May
7: Re-name Exhibit to "Customer Agreement Concerning Third Party Owner" and correct references to "Customer"	**Agreed** and red-line accepted (3/15)	Pages 2, 5, 6, 76-77, 82 (Exhibit F), 83-86 (Exhibit G)	3/7/06	7-Apr and 15-May
7-b: When a vendor has ongoing ownership or operational responsibilities for the DG, (under what conditions) should the ISA be executed by (a) the end-use Customer or (b) the vendor (as the "Interconnection Customer")?	**Agreed** (4/11) in principle to change title and make other edits, including a footnote that "An entity which owns the Facility interconnected to the Company EPS solely as part of a financing arrangement, which could include the acquisition of the tax credits related to the Facility, but is neither the Customer nor the operator of that Facility, shall not be considered the Interconnecting Customer hereunder."	See Change Request #7	3/7/06	7-Apr and 15-May

Change Requests	Resolution	Attachment A Redline Tariff	Date Submitted	Date into Tariff
8: Process for selection of multiple interconnection procedures (DTE Tariff, ISO-NE Smalll Gen, ISO-NE Wind, QF rules)	**Agreed** (5/31) to add the following at the end of the first sentence of Section 1.1 (Applicability): "except as provided under the applicable ISO-NE tariff and/or under the QF regulations...."	Page 1	3/8/06	1-Jun
9: Change the size for the Simplified process from 10 kW to 25 kW or 60 kW [*see revised terms*]	**Agreed** (5/1); originally proposed as increase to 60 kW -- no agreement reached (3/15). On 4/11, utilities proposed a new approach to move one screen (single-phase vs. 3-phase service) into box with screens 3-4 and increase to 25 kW only for 3-phase. Agreed 5/1	Pages 4, 8-9 (Sec. 3), 15 (Fig. 1), 17 (Note 2), 51 (Exhibit A)	3/7/06	15-May
10: Remove requirement of an external disconnect switch for Simplified	Withdrawn (4/11), with request to address in Report (see Change Request #10)		3/1/06	n/a
11: Clarify UL 1741 qualification may be demonstrated by independent lab testing which verifies performance to UL 1741 criteria	Withdrawn (4/11)		3/1/06	n/a
12: Require Company to complete System Modifications on a timely basis and to inform Customer of progress	**Agreed**; language drafted between meetings was accepted on 4/11, with two changes in section 5.5 wording approved during the meeting	Page 36, 67, 70, 74	3/13/06	21-Apr
13: Reduce burden on Customer to pay Company the "gross-up" for the Company's potential tax liability	**Agreed** (4/11); language drafted between meetings was accepted on 4/11	Page 35	3/13/06	21-Apr
14: Clarify exemption of net metering (up to 60 KW) from insurance requirements	**Agreed** (3/15); wording challenged (4/11); new language agreed (5/1)	Pages 48, 77 (Section 11)	3/14/06	15-May

Change Requests	Resolution	Attachment A Redline Tariff	Date Submitted	Date into Tariff
15: Change the order of the exhibits to align better with the interconnection process	**Agreed** (4/11)	Throughout	3/20/06	21-Apr
16: Eliminate the 10 kW limit for Simplified Network Interconnection, but retain limit of 1/15 of the customer's minimum load, with change to daytime load in the case of solar	**Agreed** (5/31) to increase from 10 kW to 15kW	Page 8, Page 16 (Fig. 2)	4/3/06	1-Jun
17: Indemnification for public facilities	**Agreed** (5/31) to accept language recommended in the April 19 letter from Assistant Attorney General Quinan	Pages 56, 68, 71, 79, 86	4/7/06	1-Jun
18: Insurance & indemnification for public facilities	Withdrawn (6/14); Dept. of Correction preferred Change Request #18 but agreed to defer to a policy for the Commonwealth consistent with Change Request #20 as revised	(Pages 51, 79) (Section 11)	4/10/06	n/a
19: Eliminate the restriction of self-insurance to "companies."	**Agreed** (6/14)	Pages 50, 78 (Section 11)	4/26/06	7-Jun
20: Package of edits on tariff insurance issues	**Agreed** (6/14), as a consensus settlement package	Pages 48-50, 77-78 (Section 11)	5/26/06	7-Jun

3. Interconnection Process

This section summarizes a number of challenges related to the interconnection process that have been discussed but not fully resolved by the DG Collaborative, including:

3.1 Insurance and indemnification,

3.2 Interconnection to spot networks,

3.3 Relationship between the Tariff and the other interconnection processes,

3.4 Tracking of data on the interconnection process, and

3.5 Improvement in DG education and outreach.

This section goes beyond the particular tariff changes recommended in Section 2 to (a) summarize what we have learned about these challenges and (b) provide a number of specific recommendations for future action by the Department and/or other public and private entities.

3.1 Insurance and Indemnification

The Department noted in its December 27, 2005 Order that "negotiations between DCAM, DOER, and distribution companies are taking place in order to develop mutually acceptable language that may resolve [the indemnification] matter for all Commonwealth DG interconnection proposals." The Department also noted the importance of the issue "in terms of the Commonwealth's ability to implement DG as an economic development resource at all sites owned by the Commonwealth."

The DG Collaborative took this issue up in its February 15 Plenary meeting that kicked off the "Phase 4" of its work, which began the Collaborative's new work on the Model Tariff. The Working Group on Insurance and Indemnification (the "I/I Work Group"), which DOER had convened during the fall of 2005, and which had included primarily utility and state agency representatives, continued to hold open meetings and calls after the February 15 Plenary meeting to discuss legal hurdles, insurance requirements, public policy issues and potential changes to the Model Tariff. The issue was framed to include both the insurance and indemnification sections of the Tariff.

As to indemnification, the parties acknowledge that the Commonwealth is precluded from pledging credit by Section 1 of Article 62 of the Amendments to the constitution of the Commonwealth of Massachusetts. Accordingly, the DG Collaborative proposes to amend Section 12 of the Interconnection Service Agreement and other sections on indemnification to begin as follows:

> "Except as the Commonwealth is precluded from pledging credit by Section 1 of Article 62 of the Amendments to the Constitution of the Commonwealth of Massachusetts, and except as the Commonwealth's cities and towns are precluded by Section 7 of Article 2

of the Amendments to the Massachusetts Constitution from pledging their credit without prior legislative authority...." [1]

As to insurance, the distribution companies issued a memorandum on January 10, 2006, which analyzed the ability of state entities to purchase insurance to meet the requirements under the Model Tariff under Massachusetts law. In this memo, the distribution companies concluded that there was no legal impediment to the purchase of insurance by state entities. A copy of the January 10, 2006 memorandum is attached in **Attachment J**, "Memoranda Regarding Insurance and Indemnification," along with the other memoranda and other materials cited in this section.

Further debate continued on the legal issues involved, and DOER requested an informal opinion from the Attorney General's Office. On April 5, the utilities issued a second memorandum, entitled "Legal Issues Regarding Insurance for State DG Facilities," to further clarify the issue for the Attorney General's Office. In this memo, the distribution companies more specifically set forth their proposal for how the purchase of insurance by state entities should be pursued to comply with the Model Tariff. A copy of this memorandum is included in **Attachment J**. This proposal was described as follows in "Exhibit A" to the April 5 memorandum:

1. "The Commonwealth entities owning or sponsoring a DG project would be required to comply with the insurance requirements of the standard interconnection tariff. Specifically, the Commonwealth entities would obtain (and pay for) commercial liability insurance with limits equal to the full amount of coverage required under the tariff for the applicable project size.
2. "Such insurance would designate the applicable Distribution Company as an "additional insured". Such designation would create privity of contract between the insurer and the Distribution Company. In the event of a covered claim, the Distribution Company would have direct recourse to the insurance, without the requirement to assert a claim against the Commonwealth entity, apart from any deductible amount.
3. "As part of the insurance policy, the insurer, by specific endorsement, would agree to waive any right of the insurer to assert the limit of liability under the Mass. Tort Claims Act, as a defense or bar to a claim. In essence, the insurer would agree not to use the sovereign status of the named insured as a defense to limit the size of a potential claim against the insurer to less than the stated policy limits. Thereby, the insurer would agree to be liable for any covered loss, to the full amount of policy limits.
4. "Nothing in this arrangement is intended to constitute a waiver, abrogation or derogation of sovereign immunity of the Commonwealth entities, or to expose the

[1] This language is that recommended in the April 19 a letter from Robert Quinan, Assistant Attorney General, referred to below, regarding "Informal Inquiry Concerning Purchase of Liability Insurance for State DG Facilities." See **Attachment J** and http://www.masstech.org/renewableenergy/public_policy/DG/2006-04-19_AG_Advice_DG_Insurance.PDF.

Commonwealth entities to any liability in excess of the limits otherwise imposed by the Massachusetts Tort Claims Act.

5. "This type of arrangement, including the specific endorsement, has been utilized in Connecticut. The endorsement language is shown on page 6 of the [April 5] memorandum."

On April 19, a letter was received from Robert Quinan, Assistant Attorney General, regarding "Informal Inquiry Concerning Purchase of Liability Insurance for State DG Facilities." This letter is in **Attachment J**. In brief, Mr. Quinan recommended changing the indemnification language in the Model Tariff to that quoted earlier in this section, and concluded that state entities could purchase insurance to meet the requirements of the Model Tariff, as laid out in Exhibit A to the distribution companies' April 5, 2006 memorandum (i.e., the five points cited above).

Subsequently, the I/I Working Group has met several times to discuss the implementation of this approach. The sub-group convened a call on May 4 with Jason Lerman, an underwriter with Chubb and Dave Nermoe of Aon RI, an insurance broker working with NSTAR, to better understand the costs and processes for purchasing the required insurance. The results of this call were summarized in a May 8 draft memo (in **Attachment J**) from the sub-group regarding "Liability Insurance Availability for DG Owned by Government Entities."

On May 16, a set of changes to Section 11 of the Model Tariff were recommended by the distribution companies to allow the pooling of multiple units under one policy, to allow the reduction of the aggregate insurance limit required when pooling multiple limits in line with the table provided, and to allow the purchase of a policy which will cover only the utility company. [2] These proposed changes also included edits to other insurance requirements for DG in the both the public and private sectors.

During subsequent meetings it became evident that the Working Group would not have sufficient time to adequately analyze and negotiate the distribution companies' May 16 proposal, but there was a belief among participants that there remained an opportunity to move forward with some changes that represented areas of mutual agreement. At a meeting on May 26, the distribution companies presented a reworked proposed set of changes to Section 11 of the Model Tariff. With some modifications, that proposal became Change Request 20, which was discussed at the DG Collaborative's May 31 Plenary meeting.

During the May 31 Plenary meeting, representatives of the Division of Capital Asset Management (DCAM) and the Department of Correction (DOC) reiterated their view that state

[2] This set of proposed changes, which were not adopted, are available at http://www.masstech.org/renewableenergy/public_policy/DG/2006-05-16_Insurance-Provision-redlined.pdf

agencies should be exempt from the insurance requirements in the Tariff in view of the fact that the Commonwealth traditionally self-insures and that, in the view of DCAM and DOC, the Commonwealth has adequate procedures and ample financial resources for paying third party claims and the Commonwealth should be strongly encouraged to undertake DG projects that may ultimately result in savings to Commonwealth taxpayers.

Following the May 31 Plenary, and in the interest of providing a more certain framework for the planning and implementation of public DG projects, DCAM agreed to support Change Request 20 with the understanding that, as described briefly below, certain issues of importance to the Commonwealth will be the subject of continuing good faith discussions. Highlights of Change Request 20, which now has consensus support within the DG Collaborative, include the following:

- Implementation of formatting changes to promote clarity,
- Clarification that insurance requirements do not apply to facilities eligible for net metering,
- Clarification that insurance limits can be met by any combination of insurance policies,
- Addition of option for interconnecting customer to purchase insurance solely for the benefit of the Distribution Company (this may allow public entities that self-insure their own liability risks to purchase insurance that covers only the Distribution Company),
- Clarification that the required insurance is intended to cover third party liability risks faced by the distribution companies arising from private and government owned DG interconnections,
- Recognition of the mechanism approved by the Attorney General by which the Commonwealth or a political subdivision can purchase liability insurance from an insurer that agrees to pay claims regardless of damages caps imposed by the Massachusetts Tort Claims Act, and acknowledgement that it is not meant to be a waiver of the Massachusetts Tort Claims Act. [3]
- Imposition of requirement that Interconnecting Customer provide annual certification of insurance coverage,
- Recognition of distribution companies' existing practice of refusing to approve policies written on a "claims-made" basis without three-year extended reporting period,
- Clarification that any interconnecting customer can self-insure (but a public entity could not use self-insurance where the Massachusetts Tort Claims Act or similar law has a damages cap that could limit recovery).

[3] Change Request 20 now includes the following insert in Section 11.1(f) of the Tariff: "Nothing herein is intended to constitute a waiver or indication of an intent to waive the protections of G.L. c. 258 by the Governmental Entity."

There are a number of ongoing concerns and opportunities for further improvement about which the Work Group plans to continue discussions, and on which the parties have varied views. These topics include the opportunity for a further examination of what constitutes an adequate level of insurance and the cost of that insurance, blanket or pooled insurance coverage for customers with multiple facilities, additional options for self-insurance by public entities, payment of fees by interconnecting customers sufficient to fund an extension of the distribution companies' traditional risk management practices, and further clarifications to the technical terms of the insurance provisions.

3.2 Network Interconnection

3.2.1 General Discussion of Accomplishments and Technical Issues

The DG Collaborative, with support from the MTC, continued to investigate all major aspects of the DG and network interconnection issue. This work built upon the extensive efforts of the Collaborative documented in The 2005 Annual Report, which devoted a full chapter to the subject. In addition, comprehensive studies of a pioneering trial installation with two types of DG (inverter and induction generator) on a spot network in Boston at the GSA Williams building were carried out in 2005; this report was cited in the 2005 Annual Report and posted on the web page for the 2005 Report. In December of 2005, the Collaborative organized a one-day meeting for presentation and discussion of additional research on the Williams building project. More than 75 people from across the country attended the meeting to learn about this landmark monitoring and data analysis project.

Simultaneously, other states (California and New York, primarily) have been conducting their own investigations of how DG may be installed on network distribution systems. California in particular has maintained a close liaison with the Massachusetts efforts, providing speakers and consultants (with MTC support) for several Collaborative meetings. This year the activities of the Collaborative's Plenary meetings on network DG interconnection have included (a) presentations from guest speakers on their DG experiences, (b) periodic updates on progress regarding IEEE P1547.6, the proposed national standard for DG on networks, and (c) discussions and guidance for an effort by MTC consultant William E. Feero (WEF) to develop a technical plan for advancement of network DG installations via protection and DG control interfaces.

Also of significance, in early 2006 a number of Collaborative members interested in exploring and advancing the options for interconnection of DG on network distribution systems formed a Network DG Interconnection (NDI) Subcommittee. This group included members from Massachusetts and NY utilities, DG suppliers, DG proponents, the MTC, Collaborative consultant WEF and other interested parties. The group met on April 5 for the following purposes.

- Present an overview of the technical issues unique to network distribution service (both spot and area) for non-utility members (this presentation is included in **Attachment F**)
- Discuss several potential methods of reducing the technical difficulties inherent in DG interconnection on networks (see **Attachment F**)
- Provide a more extensive update on IEEE Standards work regarding P1547.6, the proposed standard (in development) for interconnection of DG on networks
- Discuss spot and area network characteristics, noting the problem of uncertainties in load flow on area networks and other challenges.

3.2.2 Differences Between Spot and Area Network Issues

During the discussions it became clear that there are real technical problems and issues to be addressed, not just "barriers", in considering interconnection of DG on networks.

Interconnection to area networks, for example, has additional issues which need consideration. The typical area network layout includes multiple network transformer vaults tied together through multiple sets of low-voltage (120/208 v) conductors, known as network secondary sets, serving many customers. In the case of National Grid, customers with projected loads of 300 kVA or less do not have to provide space within their building for a network transformer vault, and instead rely on the area network for service. These multiple sets provide back-up in the event of neighboring network transformers being out for maintenance or failure. There can be as many as 5 to 25 different area network vaults spread over many city blocks tied together in this way. This system of area network vaults can serve many hundreds of customers in the area.

As discussed in the May 2005 report, one of the possible strategies for interconnection of DG on spot networks involves monitoring the load in real-time served by spot network transformers in conjunction with the output of a customer-owned DG system. This monitoring would automatically reduce the DG output to below the point where the network protectors would open up due to reverse power flow conditions. With a spot network arrangement, this monitoring is relatively simple since the transformers (2 to 4) are inside the DG customer's transformer vault within their building, and the DG unit is within the customer's building. This would involve only 3 to 5 monitoring locations tied into an intelligent controller.

The challenge for this type of real-time load monitoring and DG control on an area network is the fact that the transformers which need load monitoring are spread over many city blocks. In addition, due to the sheer number of customers served from an area network system, monitoring would need to be done on many of the customer main service entrances to properly monitor the resulting load flows, making for an extremely complicated and expensive load monitoring system. The existing meters used for these smaller customers in most cases do not have interval data recording capabilities (15 minute load/kWh measurements), so even the initial review for interconnection to an area network is complicated by the fact that the

customer's internal usage over time can not be determined; only gross kWh consumption over a meter reading or billing period can be determined.

Area network transformers also display other differing characteristics than spot network transformers in their actual operation. Balancing the impedance from the utility source to the transformer is more difficult in an area system than in a spot system. This balancing is required to make sure multiple transformers share the loads equally. If the impedances are unbalanced even slightly, one transformer would 'hog' the load, in other words, one transformer would serve more load than a neighboring transformer. In this case, the transformer serving less of the load is much closer to a reverse power possibility.

3.2.3 Alternatives to Network Interconnection

Recognizing the technical barriers to connecting DG to secondary networks, the utilities have noted that system modifications can be made, at the customer's cost, to allow connection of their DG unit. For example, if a radial distribution line is nearby, rather than connect to the network, the customer may be able to connect to a radial feeder. Examples of this type of modification were provided in the 2005 Annual Report.

An update of the status of locations in Massachusetts where DG is being considered for customers on secondary network distribution systems is provided below:

LOCATION	GENERATOR TYPE	CAPACITY	STATUS
Quincy Elementary School, Boston	Induction	One – 250 kW	No further action from customer
5 Post Office Sq., Boston	Inverter	10 to 12 kW	Initial discussions held with customer. No application ever received.
22 Pearl St., Cambridge	Inverter	2.5 kW	Applied for Interconnection via Simplified Process. Informed connection would require Standard Process. No further action from customer.
114 The Fenway, Boston	Inverter	1 to 2 kW	Applied prior to Interconnection Tariff. Informed of network connection. Much correspondence exchanged. No further action from customer.
First Fenway Coop, Boston	Inverter	1 to 2 kW	Same as above

3.2.4 Market Perspective on Placement of DG in Network Areas

In discussions to further understand and appreciate the technical problems with connecting DG to networks and the difficulties in developing solutions, members felt that it would be helpful to better understand the size of the issue, i.e. know more about how many and what type of customers are connected to networks in Massachusetts.

Need for Complete and Accurate Information

The Collaborative discussed making available a description of the network systems in an effort to provide a better understanding of the impact of the technical barriers to connecting DG to networks. However, this information is not available at this time and will be an effort of the ongoing Network DG Interconnection Work Group.

Regarding network interconnections, the Collaborative believes that comprehensible facts and more accurate technical information would benefit both DG proponents and utilities. Pertinent facts regarding networks should be readily accessible. There are a number of circumstances where a DG project may advance if the facts can be addressed. In other cases, addressing the facts may lead to abandonment or deferral of a course of action until network interconnection, if it is still sought, is more feasible.

The proposed RFP discussed below, for example, is a direct endorsement by the Collaborative of efforts to move beyond past perceptions that "nothing can be done" and toward advancements in technology which may make network interconnection more feasible on a broader basis. Toward that end, the Collaborative advocates consideration of the continued use of the MTC website(s) to convey information developed pursuant to the recommendations which follow.

Overview of DG in Network Areas

Placement of DG on the electric system, within areas where the distribution company provides network service, has been identified as a technical challenge to the Distributed Generation industry. NSTAR, National Grid and other distribution companies operate these network distribution systems in areas of high power density such as downtown Boston, Cambridge, Worcester and New Bedford.

Much work has been done by the Collaborative to evaluate the technical requirements of placing DG units in network areas; however, continued evaluation is warranted. This section presents the potential opportunities for certain types of DG in network areas, without consideration of technical feasibility or cost.

When reviewing Boston as a typical network area, and considering the decision metrics utilized to decide to actively pursue Distributed Generation, there appear to be discrete opportunities

where DG (before consideration of interconnection costs) will pass the customer's decision-making assessment . Contributing factors are as follows;

- Typically the types of facilities within the older urban areas are retail, office and other administrative type facilities with limited thermal load which will drive toward small combined heat power units, but not financially support a large combined heat and power system.
- Older downtown facilities will have limited space within for large wind, solar or combined heat and power facilities to be installed. These projects will typically be small with regard to the service capacity of the facility.
- There will be limited opportunities to install small wind and solar installations for environmental stewardship.
- The network areas have a limited number of customers with year round thermal need who are presently located on district steam and have leveraged the steam system for laboratory, process, or cooling as well as the traditional heating who are candidates for large scale combined heat power plants.
- There may be a very small number of customers who have reliability needs that dictate back up generation, and
    - Will require closed transition recovery to minimize internal transients during the return to normal utility service following the rare power outages to the network.
    - May also want to take advantage of demand response or peak shaving opportunities when the ISO market or demand charges provide economic incentives to interrupt or curtail power through the use of the on-site generation.

Market Perspective Summary

There appear to be significant discrete potential opportunities for large size combined heat and power distributed generation in network area, aside from interconnection issues. There is a higher level of probability that small combined heat and power units which can support domestic hot water needs and some space heating and thermally activated measures, such as chilling or dessication of moisture, will support the customer selection criteria. In addition, there is also interest for installation of wind and solar energy systems. This market perspective is challenging, but the DG Collaborative supports continued efforts toward development of cost-effective solutions to connect DG units to networks.

3.2.5 Approach to Advance Opportunities for DG on Networks

The major issues and problems of interconnecting DG on network distribution systems are also defined and summarized in the first part of **Attachment F**, Relaying and Control Technology Development for Spot Networks (the full title is "Spot Network Interconnection Issues and

Opportunities for Relaying and Control Developments to Advance DG on Network Interconnections"). Subsequent parts of **Attachment F** describe a proposed request for proposals (RFP) to advance network DG options.

More specifically, the RFP has been created to advance the acceptability of DG on networks by developing advanced network protector relays and establishing high-speed communication between network protectors and DG units. This combination should enable DG units to react essentially instantaneously to any adverse situations (e.g., faults, reverse power flow, etc.). whereas today the DG units do not react appropriately until voltage, current or frequency range outside of normal values. It is expected that work carried out under this RFP will be of value to the IEEE P1547.6 Working Group as it develops the national standard for interconnection of DG on networks.

The approach proposed in the RFP has three components:

- Form a development team of a protector relay manufacturer(s), DG interface equipment manufacturers, and utilities to determine the specific requirements the new product(s) developed must meet for general acceptability,
- Produce one or more prototype systems, and
- Devise a test plan to verify the functional performance of the product(s) in one or more laboratory environments and a utility-based trial/demonstration project.

The NDI Subcommittee reviewed and approved this program plan; it also recommended that the full DG Collaborative support this approach. Funding for the program is to be sought from several state agencies active in DG interconnection work and the U.S. Department of Energy. The entity that would actually seek and receive the funding from DOE and state agencies will be mutually agreed on between the state and federal agencies involved in the project.

Regarding progress in IEEE P1547.6, it must be noted such standards development work is done on a purely voluntary basis by Working Group members – that is, in addition to the demands of normal employment. Members meet every six months or so, but develop draft material between meetings which is distributed and discussed for consideration at the formal meetings. The Collaborative is appreciative of the efforts of the volunteers in the IEEE Working Group.

There are over 30 members in the IEEE P1547.6 group at present, including DG suppliers, network equipment manufacturers, independent consultants, federal government laboratories and of course utilities. Members of the Collaborative are well-represented in P1547.6, including William Feero, Ingersoll-Rand, UTC Power, and representatives from NSTAR, Northeast Utilities and National Grid.

3.2.6 Conclusion

The Massachusetts DG Collaborative therefore recommends that the RFP in **Attachment F** be implemented as soon as possible, with the support of MTC and funding agencies such as DOE, NYSERDA and CEC, and with the cooperation of Massachusetts utilities and other signatories to this DG Collaborative Report. A final report will be developed as a result of the effort outlined in the RFP, and it will be distributed to the DTE and the members of the Collaborative and posted on the MTC website.

3.3 Relationship Between the Tariff and the Other Processes

At least three distinct interconnection processes now exist for DG projects in Massachusetts:

- The Massachusetts Model Interconnection Tariff ("Model Tariff") that first became effective April 1, 2004, as amended,
- The newly-introduced Independent System Operator-New England (ISO-NE) interconnection process for FERC jurisdictional "small generators." [4]
- The legacy Qualified Facilities (QF) interconnection policies used by the four Distribution Companies to interconnect QFs.

As discussed and recommended in the report [5] accompanying the Model Tariff from 2003, it was suggested to the DTE that any project deemed a QF be interconnected under the Massachusetts Model Interconnection Tariff to further minimize the confusion for all parties. This would have eliminated the multiple legacy QF interconnection policies and result in having only two processes for interconnecting DG in Massachusetts. The DTE at the time did not agree with the recommendation.

With this it left two different policies for interconnecting customer-owned generators. With the recent FERC order on Small Generators as administered by the ISO-NE, there are now three different policies in place in Massachusetts. It is recommended that the QFs be directed to interconnect under the new Massachusetts Model Tariff. The DG Collaborative acknowledges that this may require DTE action to implement, and recommends that the DTE take such action.

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[4] See FERC Order of April 14, 2006 on ISO-NE Small Generator Interconnection Compliance Filing at http://masstech.org/renewableenergy/public_policy/DG/tariff/2006-04-14_iso-ne_FERC_SGIP-LGIP_Order.doc.

[5] The 2003 Report is available at www.masstech.org/renewableenergy/public_policy/DG/resources/Collab_2002Collab03_05_15_ProposedStandardsFinal.doc

QF customers, non-QF customers and DG developers seeking interconnection may not know which of the three above processes they should follow. Therefore, the DG Collaborative recommends that procedures be developed to assist DG developers to navigate the interaction between these multiple interconnection processes and to determine which is applicable to each particular project.

These procedures should at a minimum clarify the eligibility for these multiple processes, and indicate which kinds of DG projects should submit an application to their Massachusetts Distribution Company, and which kinds of projects should instead submit an application to ISO-NE. They should also provide, to the extent possible and applicable, a uniform or consistent package of information that a DG developer will receive from any utility, ISO or state agency that is contacted for such information. This material should also be posted on the MTC website as part of the on-line "DG Interconnection Guide." [6]

The ISO-NE has indicated the desire to begin the process to develop these hand-off procedures for FERC jurisdictional customers for the New England utilities.

The Massachusetts Model Tariff that is the subject of this report applies under the following circumstances:

- The Interconnecting Customer is a net-metered customer, or
- The Interconnecting Customer is not exporting any kWh to the utility distribution system, or
- The Interconnecting Customer is exporting to a third party but is connecting to a non-FERC jurisdictional distribution feeder. This would be the case, for example, when DG project is the first wholesale customer on the distribution feeder, but the next DG project to export to a third party on that feeder would instead be subject to the ISO-NE rules

As a practical matter, even when the interconnecting customer may be exporting small quantities of power to the utility system, the Massachusetts Model Tariff will apply unless the export is metered and sold to a non-utility buyer AND the interconnection is made to an existing FERC jurisdictional distribution feeder.

This may result in Model Tariff jurisdiction for projects that may be eligible for IRS private-letter ruling(s) confirming exemption from tax gross-up. This refers to an IRS ruling some time ago which exempts wholesale power generators from paying the tax-effect mark-up utilities impose on construction advances. This tax-effect mark-up is to pay the utilities tax liability since the IRS treats a construction advance as revenue to the utility. If the customer involved in wholesale power generation requests, the utility will request this private letter ruling at customer cost. In the event the utility infrastructure built as paid for by a construction advance is someday deemed taxable (the landfill gas runs out and the landfill gas project shuts down)

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[6] See http://www.masstech.org/cleanenergy/howto/interconnection/index.htm.

the utility may require some level of security from the customer as a condition of interconnection to pay the now due tax liability on the original construction advance.

With respect to the new ISO-NE process, eligibility works as follows: when a generator is interconnecting to local utility distribution system, FERC jurisdiction is triggered when there will be a wholesale transaction and the distribution feeder to which the connection will be made is FERC jurisdictional by virtue of a previous wholesale transaction. A wholesale transaction is one in which the sale of excess power is to a third party, not the Distribution Company (under the PURPA (QF) regulations or otherwise). When FERC jurisdiction applies, the DG proponent will be directed to submit an application to ISO-NE – not to the applicable Massachusetts Distribution Company – and will be subject to the ISO-NE's rules for interconnection of small generators, not to the Model Tariff addressed by this Report.

The current net metering regulations (allowing units up to 60 kW to be eligible for reverse metering) do not trigger FERC jurisdiction because the sale of excess generation exported to the grid by definition only would be to the Distribution Company.

With respect to the QF interconnection policies, eligibility works as follows: Non-net-metered customers who are deemed a Qualifying Facility (QF), by virtue of getting a QF certificate from FERC, and who have agreed to have their electricity purchased by the Distribution Company are by definition only selling excess to the Distribution Company. These applicants would apply to the Distribution Company and interconnect under the Distribution Company's applicable QF policy. However, it is important to note that the Energy Policy Act of 2005 amends PURPA and provides for "waiver of QF purchase requirements if FERC finds the service territory of the utility seeking exemption to be competitive. The waiver is based on the reasoning that when QFs have access to other potential buyers, local utilities need not be forced to purchase the QFs' output." If ISO-NE is deemed a competitive market for this purpose by FERC, New England Distribution Company s could be granted an exemption from QF purchase requirements, if they request such an exemption. This exemption would only take effect in Massachusetts if the DTE also agreed to waive the purchase obligation. Under these conditions, a generator that is not net-metered that exports even a single kWh for wholesale sales to a third party on a FERC jurisdictional distribution feeder would trigger FERC jurisdiction.

In summary:

- For a customer that desires to be net-metered (under 60 kW DG), or that is all behind the meter with no export of power, or is interconnecting to a non-FERC jurisdictional distribution feeder, the interconnection application would be submitted to the Distribution Company under the Model Tariff. See: http://www.mtpc.org/cleanenergy/howto/interconnection/index.htm

- For a customer planning sell to a third party on a FERC-jurisdictional feeder, the interconnection application would be submitted to ISO-NE. See:

http://www.iso-ne.com/genrtion_resrcs/nwgen_inter/smgen_20/index.html

- For a customer that is selling excess to the Distribution Company with a valid FERC issued QF certificate, the interconnection application would be submitted to the Distribution Company under the Massachusetts QF interconnection policies.

It is possible that a DG developer could find that its DG project would initially be subject to one of these two processes but could subsequently become subject to another process. This could be occasioned, for example, by a change in plans to sell power (either to the Distribution Company or to a retail or wholesale power marketer), or by a change in QF status. A set of clear guidelines should be developed to handle any transfer of responsibility (and files) that might occur between the ISO and the Distribution Company. Periodic meetings may be needed to maximize the consistency and uniformity of procedures to address the above issues, and other issues as they arise.

If there is a change in status as described above during the interconnection process, the customer, in writing, should notify the affected party (ISO-NE or the Distribution Company) of the proposed change. There may be additional costs and/or delays as the necessary paperwork is transferred between the parties. If the ISO-NE or Distribution Company already has completed any of the studies required (feasibility, impact, or facility), to the extent possible, the completed study will be utilized to minimize any additional study costs.

The DTE, ISO-NE and interested parties should work together to clarify the process that will apply to a customer under state or FERC interconnection jurisdiction, including what will happen if a customer changes plans or actions (e.g., what happens if a customer who has been selling excess generation only to the Distribution Company subsequently decides to sell excess generation to a wholesale trader). These parties should continue to work together to clarify ongoing issues. A set of clear guidelines should be developed to handle any transfer of responsibility (and files) that might occur between the ISO and the Distribution Company. Periodic meetings may be needed to maximize the consistency and uniformity of procedures to address the above issues, and other issues as they arise.

In addition, the DG Collaborative recommends that further activity be initiated to maximize uniformity between the three processes discussed herein, and to continue to streamline the overall Massachusetts Interconnection process on a state and region-wide basis.

3.4 Data Tracking

This section summarizes the two years of data tracking since the Model Tariff became effective on April 1, 2004, and recommends to the Department an approach to future tracking efforts. Additional information on this topic is included in the following Attachments, which are an integral part of this Report:

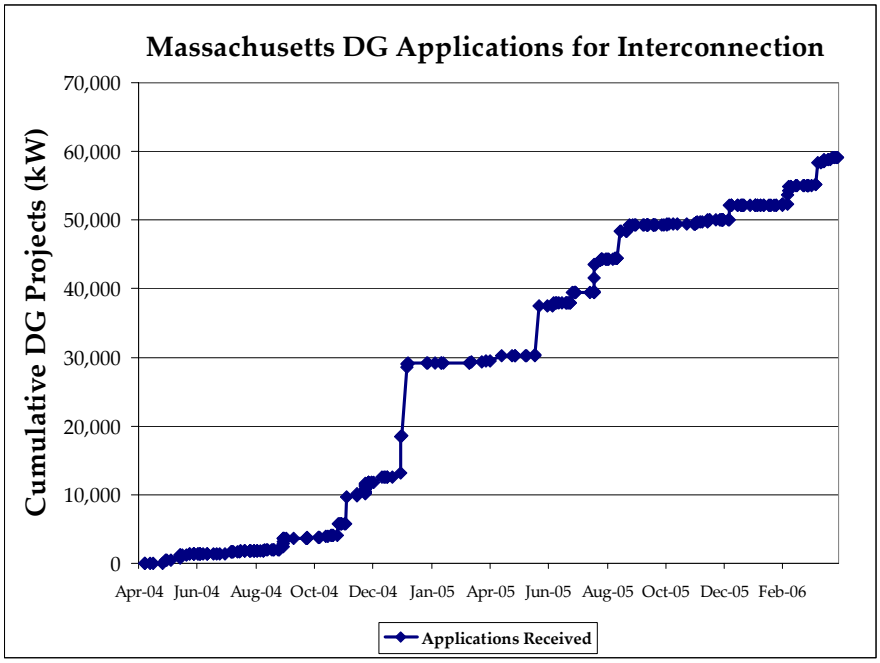
- **Attachment D**: Two-Years of Tracking Data through March 2006
- **Attachment E**: Responses to Eight Questions about Data Tracking.

3.4.1 Review of Two Years of Data Tracking

The Distribution Companies in April 2006 submitted updated data tracking spreadsheets with project information from April 1, 2004 through March 31, 2006. The spreadsheets that contain project by project information are posted on the DG Collaborative website. [7] The summary statistics and analysis in this report are based on all data collected from April 1, 2004 through March 31, 2006 and include those projects removed from the spreadsheets posted online. This information, which is summarized in **Attachment D**, Two Years of Tracking Data through March 2006, completes the two year data tracking process agreed upon by the DG Collaborative in March 2003 and ordered by the Department of Telecommunications and Energy in February 2004 (D.T.E. 02-38-B).

From the second quarter of 2004 through the first quarter of 2006, 332 projects submitted applications for interconnection and have been assigned a statewide tracking number. These projects represent a total of just over 58 MW of potential DG capacity, as illustrated in the following chart.

Figure 1



The Data Tracking census for all Massachusetts Distribution Companies is reported in Table 1, and Table 2 presents the applications sorted by review process for each Distribution Company.

[7] The spreadsheets are available at http://www.masstech.org/dg/ma-data.htm. These spreadsheets do not include projects that applicants requested not be included in the database.

This and other tabulations are repeated for each Distribution Company in **Attachment D**, Two Years of Tracking Data through March 2006, which also includes a more detailed explanation of the data tracking process and results. All this information was calculated from the data tracking spreadsheets completed by each Distribution Company.

Table 1. Aggregate DG Data Tracking Census for the period Q2 2004 through Q1 2006 for all DG applications submitted to the Distribution Companies.

Type of Review	All Applications		Approved Appl.	
	Count	kW	Count	kW
SIM	238	687	234	676
EXP	43	4,685	30	4,120
STD	47	52,885	12	15,406
Total	328	58,257	276	20,202

Fuel Source	All Applications		Approved Appl.	
	Count	kW	Count	kW
SOLAR	248	1,746	233	925
WIND	12	11,102	5	681
HYDRO	3	910	0	0
DIESEL	2	2,460	0	0
NG	58	29,554	36	13,735
OIL	0	0	0	0
COAL	1	4,000	1	4,000
BIODIESEL	2	80	0	0
BIOMASS	1	40	0	0
LANDFILL G	4	8,890	0	0
DIGEST G	0	0	0	0
ETHANOL	0	0	0	0
OTHER	1	861	1	861

Generator Type	All Applications		Approved Appl.	
	Count	kW	Count	kW
INV	259	1,770	243	949
IND	56	15,781	27	4,852
SYN	17	42,091	6	14,401

Prime Mover	All Applications		Approved Appl.	
	Count	kW	Count	kW
PV	248	1,746	233	925
IC ENG	61	20,080	32	4,791
MICRO TUR	0	0	0	0
GAS TUR	4	15,690	2	3,690
FUEL CELL	1	4	1	4
WIND TUR	12	11,102	5	681
STEAM TUR	3	10,111	3	10,111
OTHER	3	910	0	0

Service Type	All Applications		Approved Appl.	
	Count	kW	Count	kW
RADL	331	59,640	276	20,202
SPOT	0	0	0	0
AREA	1	3	0	0

Application Initially Complete?	Yes	No
SIM	219	19
EXP / STD	47	43

Review Fees and Costs*	Customer	Utility
SIM	N/A	$ 16,650
EXP	$ 17,745	$ 7,050
STD	$ 30,465	$ 4,450

* Review Fees and Costs are only for the review of screens in the SIM and EXP Processes or the

Total Fees and Costs	Customer	Utility
SIM	N/A	$ 30,300
EXP	$ 7,230	$ 17,391
STD	$ 25,352	$ 26,725

Table 2. DG Data Tracking for the period Q2 2004 through Q1 2006 for all DG applications submitted to the Distribution Companies.

		FG&E		NGRID		NSTAR		WMECO		Aggregated	
		Count	kW	Count	kW	Count	kW	Count	kW	Count	kW
Simplified Process	Applications	4	11	64	211	127	345	43	120	238	687
	Approved	4	11	64	211	126	343	40	112	234	677
	Rejected	0	0	0	0	1	3	0	0	1	3
	Withdrawn	0	0	0	0	0	0	0	0	0	0
Expedited Process	Applications	1	60	16	635	22	3,824	4	166	43	4,685
	Approved	0	0	13	568	15	3,432	2	120	30	4,120
	Rejected	0	0	0	0	0	0	0	0	0	0
	Withdrawn	0	0	0	0	0	0	0	0	0	0
Standard Process	Applications	0	0	13	19,804	30	17,520	4	15,561	47	52,885
	Approved	0	0	3	4,290	7	6,255	2	4,861	12	15,406
	Rejected	0	0	0	0	0	0	0	0	0	0
	Withdrawn	0	0	0	0	1	460	0	0	1	460
All Processes	Applications	5	71	93	20,649	179	21,689	51	15,847	328	58,256
	Approved	4	11	80	5,069	148	10,030	44	5,093	276	20,203
	Rejected	0	0	0	0	1	3	0	0	1	3
	Withdrawn	0	0	0	0	1	460	0	0	1	460

The average sizes for the Simplified, Expedited and Standard Process applications submitted are 2.9, 109 and 1,125 kW, respectively. The majority of the DG applications (179 applications or 54%) are located in NSTAR Electric and Gas Corporation's ("NSTAR") service area, followed by 97 applications or 29% in National Grid's ("NGRID") service area. Western Massachusetts Electric Company ("WMECo") has received 51 applications and Fitchburg Gas and Electric Light Company ("FG&E") has received five.

Solar projects account for 75% of all applications with a median size of 2.5 kW and an average size of 7.0 kW. Because nearly all solar facilities are less than 10 kW, 229 of the 248 solar-powered applications are reviewed in the Simplified Process. Facilities that employ natural gas were the next largest fuel source class. These applications span a large size range, from 1.0 kW for micro-combined heat and power systems to 10,000 kW for a synchronous gas turbine.

3.4.2 Future Data Tracking

During the March 15 Plenary meeting, eight questions were posed about patterns in the tracking data. Some of these questions were originally submitted to MTC by DOER and some additional questions were posed during the March 15 Plenary meeting by CSG and CRMC. The 8 questions were forwarded to Navigant Consulting, which provided answers to some of them on March 21. The questions were further discussed at the April 11 meeting in Boston, and the utilities submitted drafts of answers between April 18 and May 18. In **Attachment E**, the questions and the utility answers are presented first, followed by the NCI answers.

Further tracking of the timeline for units is not necessary. No complaints about the timelines for the studies have been received by the utilities. The one complaint heard had to do with how long it took to construct the facilities necessary to interconnect a landfill gas project, not the time for the study. As the end of section 3.4 of the Model Tariff states, "Notwithstanding these maximum time frames, the Company shall endeavor to meet the customer needs." The tracking was initially agreed to in order to determine if either, there was sufficient time for the utility to complete the study, or short enough so as not to economically burden the customer. Except for a few larger projects as per the response to question 2, most projects are studied within the specified timelines. Without any customer complaints, future tracking to the degree previously undertaken will only be an undue burden for the utilities, and not serve any useful purpose in getting more DG installed in the state.

In the event that it can be shown customers have not been properly served (possibly through independent surveys of customers who have been through the interconnection process), additional tracking as directed by the Massachusetts DTE would be conducted.

There is an understanding that various entities need information on the amount of DG being installed. In order to track installed DG in Massachusetts in the future, the distribution utilities

would like to modify the current QF report due every April 1 to the Massachusetts DTE. This current report includes the following: [8]

1. name and address of the QF,
2. the fuel type,
3. prime mover,
4. estimated on-line date,
5. the amount of lost transition revenue expected as a result of the QF being installed.

The modified report would continue the previous items and add the following:

6. ZIP Code of all new DG (QFs and non-QFs) interconnected,
7. date interconnection application received,
8. date interconnection application deemed complete, only for the Expedited and Standard process,
9. date interconnection agreement sent,
10. amount of un-collected distribution revenue expected as a result of the DG being installed.

The above information will be filed electronically with DTE in a uniform way as an excel spreadsheet. [9] (Name and address information will be redacted in the public version of this filing.) Interpretation of this data should reflect understanding of the shared responsibility for effective communication and complete information in the application and review process.

3.5 Improvement in DG Education and Outreach

DG technology continues to develop and impact many areas of regulation and the energy markets. Corresponding improvements in education and outreach covering DG technologies across the State should be considered to further promote sustainability of DG technologies in the market place. The goal would be to have a process of communicating consistent information while identifying possible ways to improve the processes to prepare for the potentially larger volume of DG inquires and installations. [10]

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[8] See examples at http://www.masstech.org/dg/ma-QF-data.htm.

[9] If this reporting is approved, MTC will post such data as it becomes available at http://www.masstech.org/dg/ma-data.htm, "Data on DG Installations" in Massachusetts.

[10] See http://masstech.org/cleanenergy/howto/interconnection/index.htm for the on-line "Interconnection Guide for Distributed Generation" and http://www.mass.gov/doer/pub_info/guidebook.pdf for DOER's "Renewable Energy and Distributed Generation Guidebook," and http://masstech.org/cleanenergy/cando/howto.htm for four other "How-To Guides" on solar, wind and other projects.

The DG Collaborative plans, as a part of its future activities, to assess the need for such education and outreach activities, and alternative approaches to implement them. The DG Collaborative recommends that the following elements be considered in this process:

- The audience could be those involved with DG installation, including contractors and end-use energy users, to assist in growing the implementation of DG technology among the participants.
- Information provided could include descriptions of different DG technologies, general guidelines to aid the owner in their decision of which DG technology is applicable for a certain site, funding opportunities, required forms and brief case studies.
- DG system install and design workshops could be provided through local education institutions, for example; and certification programs, such as the North American Board of Certified Energy Practitioners (NABCEP) offers for solar, and expanding to solar thermal and wind.
- Information could be exchanged to review and coordinate interconnection, grantmaking and other processes to eliminate inadequate applications and promote proper installations that would save time, costs and reduce negative experiences among stakeholders. For example, the outreach program could assist with resolving issues of improperly completed applications to increase processing cost savings to the utility, MTC, contractor and owner while not being an encumbrance to completing the project.
- Approval of funding, amount to be determined, in support of MTC for implementation and effective outreach program.

Communicating and processing DG information consistently with improvements from lessons learned, and data tracking, will assist in continuing a beneficial DG program for Massachusetts. The education outreach program enables the DG users to operate effectively and aids in building positive results and collecting data to manage continuous improvements as the program grows.

4. Distribution Planning and Other Potential Next Steps

4.1 Report on DG and Distribution Deferral by the Distribution Planning Work Group

The 2005 Annual Report submitted to the Massachusetts DTE by the Massachusetts Distributed Generation Collaborative on May 31, 2005 specified the following objectives that were developed by the consensus of the DG Collaborative and its Distribution Planning Work Group ("DPWG" or "Work Group"):

- Identify and quantify costs and benefits of DG to test the general hypothesis that DG contributes value to distribution planning and meets customer needs by further analyzing the eight distribution planning opportunities and collecting data from existing, pilot, or other DG installations.
- If the above hypothesis appears to be valid, develop and propose a framework for business and regulatory models that would be needed in order to provide distribution value, meet customer needs, and achieve a societal win/win/win outcome with net benefits greater than costs for all stakeholders.

The Work Group has made sufficient progress toward the first of these objectives, and the DG Collaborative is pleased to submit to the Department the DPWG's Report on DG and Distribution Planning (**Attachment H**), summarizing what the Work Group has learned to date.

The cost-benefit worksheets developed for the DG Collaborative by Navigant Consulting, Inc. (also available for download on the MTC website[11]) included as many of the costs and benefits associated with DG as it has been feasible to include to date, and various economic estimates were developed for all of the eight opportunity areas.[12] While not every significant benefit or cost has yet been analyzed, the Work Group participants have learned to appreciate the substantial complexity of the underlying economic issues, and the degree to which the potential economic values being tested are highly dependent on the way in which a series of engineering and business condition and challenges would be addressed. The three major conditions are:

- There must be enough DER capacity to meet distribution planning needs. The process of marketing, enrolling, assessing customer suitability and viability for deploying DER is a complex and time consuming process, and needs substantial further study.
- The DER reliability must meet distribution planning needs. A DER solution must result in the same level of reliability that a distribution system upgrade provides. The DPWG found that the impact of DG installations on distribution utility reliability has not been adequately considered in previous analyses when being applied to the utility system as

[11] See http://masstech.org/dg/DistributionPlanning.htm

[12] See http://www.masstech.org/dg/Benefits.htm for additional research on benefits and costs of DG.

alternatives to distribution system investments. A more comprehensive evaluation of the design requirements of DG installations necessary to support distribution system reliability will be needed to fully address these concerns.

- The economics of the DER solution for utilities must be favorable. In addition to the need for the DER customer to see favorable economics, a number of other parties are also impacted economically and additional work will be needed to fully assess the impact to other parties, not the least of which is the electric utility involved.

Some of the technical challenges include:

- DER Monitoring and Control. The first challenge relates to how DG units would be operated as integral components of a utility distribution system, in addition to elements of customer energy management solutions.
- DG Behavior on Distribution Systems. The Collaborative did not research what, if any, studies have been conducted on how widespread applications of DG on distribution systems will behave. The need to assess how resilient these DG units will be to remain in operation during disturbances on other portions of the distribution system not necessarily involving a fault on the circuit they are connected to also needs further review.
- Utility System Design Changes. The third challenge recognizes that existing utility primary-voltage distribution circuits and their protection systems are largely designed to be operated radially out from a single electrical source. They are not typically designed to function with multiple electrical sources out beyond the substation supply. Their layout and protection devices are configured to optimize their performance for power flow from only one direction. The fundamental requirement would be to integrate DG units into the designed reliability of the system, which could require additional system upgrades and modifications.

Further discussion of these conditions and challenges are in **Attachment H**, the Report of DPWG on DG and Distribution Deferral. The Navigant Economic Analysis is presented in **Attachment G**, "DG and Distribution Planning: An Economic Analysis for the Massachusetts DG Collaborative."

Based on the conclusions in the Navigant Economic Analysis, DG appears to provide some positive benefits in deferral of distribution investment, but only within narrow windows of opportunity, based on specific timeframes, need dates and specific feeder lines, and only when DG is combined in a package of resources that includes energy efficiency and demand response measures. Thus, the deferral value results, on their own, summarized in the Navigant Report,

do not provide support for widespread deployment of DG. [13] The DPWG report in **Attachment H** describes this work done to date.

In other words, the Work Group has not at this point concluded its test of the hypothesis, but has recognized that the real challenges are to identify the conditions under which DG can create value, and to develop ways to optimize and leverage that value for DG owners, distribution companies and other stakeholders. The Work Group has therefore agreed to initiate a series of additional technical analyses and other steps to tackle those challenges. One of these steps, further discussed in Section 4.4, will be the technical sessions to design an integrated set of technical and business solutions for one of the eight distribution opportunity areas, and/or for another location as identified by the utilities.

4.2 Policy Statement for Future Work

During the fall and winter of 2005, the Collaborative has pursued the objectives set out in the June 2005 report to the DTE, primarily, to assess and validate the hypothesis that DG provides benefits to utility distribution system planning by avoiding or reducing the need for investments in distribution system upgrades to meet growing load demand on feeder lines, and to provide the DTE with feedback and recommendations on ways in which DG can be better incorporated in utility planning. A major focus of the Collaborative's effort was the analysis of specific distribution planning scenarios performed by Navigant Consulting, described in **Attachment G**: DG and Distribution Planning: An Economic Analysis for the Massachusetts DG Collaborative. Some conclusions of that analysis are summarized in section 4.1 above.

The Collaborative believes that it would be inappropriate to draw broad conclusions about the potential of DG based solely on the limited perspective of distribution deferral as one potential source of value. As part of its overall cost/benefit analysis of DG, the Navigant Economic Analysis (**Attachment G**) identified other areas of positive customer and societal benefit. These benefits and other logical suppositions about the value of DG should be analyzed and tested. If supported by further analysis, such conclusions could form the basis for policy decisions to create and implement a system of incentives or other types of support to various stakeholders that would promote implementation of DG on broader scale, thus capturing the full potential benefit of DG to society as a whole.

The following are areas of potential value that the Collaborative recommends should be explored in future work (in addition to further work on potential deferral benefits):

[13] See also Section 4, "Benefit/Cost of DG Beyond Distribution Deferral," pages 98–148 and 203-219 of **Attachment H**.

1. Impact of DG on constrained areas.

   DG may provide relief capacity to constrained transmission load pockets (SW Connecticut, NEMA/Boston in particular), by reducing transmission and distribution (T&D) losses and potentially reducing reserve capacity needs.

2. Impact of DG on market prices.

   End-use customers who install DG reduce their dependence on the regional market for their energy needs, which may contribute to a decrease in energy price volatility. Reductions in regional energy demand should result in lower market clearing prices that benefit all customers.

3. Impact of DG on the environment.

   Many types of DG, particularly highly efficient and/or renewable DG, may be more efficient and cleaner than central station generation. While the relative environmental benefit depends on efficiency, fuel and time of operation, it is a logical supposition that DG in general is positive for the environment, where the DG in question involves clean renewable sources of energy or Combined Heat & Power solutions with high net annualized efficiencies (63% or greater), that reduce on-site fuel use for thermal generation, and avoid less-efficient diesel fired units that are disfavored under the environmental regulations of the Commonwealth. Renewable DG is directly supportive of the Commonwealth's policy to promote renewable energy.

4. Economic Benefit.

   Appropriate DG can yield economic benefits to the customer and to the larger economy. This is supported by the Navigant Economic Analysis in **Attachment G**.

In sum, the potential of DG should continue to be investigated in a broader sense than it has been in this collaborative if the DTE wants to fully explore the potential role of DG in Massachusetts. The region will ultimately need additional capacity and DG is poised to provide at least a portion of this need. The environmental benefits of DG, if demonstrated through factual analysis, must also be a consideration.

As described in the attached report under Section 3 "Next Steps", the DG Collaborative therefore recommends the following course of action, either as part of a continued collaborative effort, or as part of a different initiative under the auspices of the DTE:

1. Continue and expand the MTC Congestion Relief Pilots ("CRPs") in order to better understand the use of DG and other demand resources in achieving distribution system efficiencies, in conjunction with the Technical Design Workshops (described in section 4.4 below) that are slated for later in 2006.

2. Encourage opening of a docket to investigate if utilities can install and own DG (this is not intended to affect existing emergency procedures) as part of a targeted distribution constraint relief project, or as part of distribution improvement, consistent with the existing restructuring statute.

3. Using other initiatives (e.g. the EPRI STAC project that is described in section 4.5, MTC Congestion Relief Pilots), begin discussion among stakeholders on the necessary elements of a comprehensive, broad-based policy-legislative-and-regulatory framework (which could include consideration of mechanisms such as PBR, decoupling and/or standby rates, but could also consider other mechanisms that go beyond the distribution company regulatory framework) for equitably allocating the costs, impacts and benefits of DG in such a way as to appropriately capture the identifiable, tangible and quantifiable net benefits of DG. This discussion should recognize (a) that non-DG customers may be asked to pay for the costs of DG programs only if they produce lower costs or other net economic benefits for non-participating ratepayers as a whole, and (b) that any implementation by regulated distribution companies is subject to, and governed by, adjudicated proceedings (or settlements), consistent with D.T.E. 02-38 and other precedent.

This Collaborative has focused on the questions asked by the DTE, which were primarily a set of technical issues, and important policy issues remain.

4.3 Congestion Relief Pilots

The Renewable Energy Trust of the MTC is in the process of working with interested Distribution Companies and others to develop two to four Utility Congestion Relief Pilots, each of which would include prototype installations of renewable DG and other distributed energy resources in a specific location on the Distribution Company's T&D system.

The goal of these pilots is to test realistic, representative cases of customer-sited renewable energy generation combined with demand-response controls, load shedding, energy efficiency, storage and other distributed resources that provide benefits to the distribution system as well as to host customers and other entities. More specifically, one objective is to develop an integrated "smart DER" approach that would enhance the DER technology installed at the customer's site through a combination of additional controls, communications, and monitoring equipment that would in turn enable the asset to respond to distribution company requirements while still providing benefits to the customer. The DER asset would become a tool that would ultimately benefit the customer and the utility, as well as additional stakeholders.

National Grid is working with MTC on a Pilot in Everett, Massachusetts, and included the following summary its May 26 filing with the DTE on its "Summer Load Relief Program for Everett, E. Longmeadow, and Brockton:"

> "The Everett area served by the Thorndike substation is new to the list of eligible areas. As load continues to grow in this area, an outage of one of the 23 kV cables in the area may require an additional 23 kV cable to be installed to back up the load. The Company wishes to determine whether there are sufficient customer side resources which can mitigate this future potential situation. In addition, the Massachusetts Renewable Trust recently awarded the Company funding to encourage Everett area customers to install renewable energy distributed generation in conjunction with the demand response efforts typically employed in the Company's load relief programs. The grant will pay for the additional studies needed for siting the distributed generation as well as incentives for customers to install proposed systems. It will also help the Company in its efforts to automate parts of the Program, including some level of control over certain aspects of the customer's internal processes." [14]

This initiative also seeks to find new "win/win" opportunities for clean distributed energy resources (DER) and to collect meaningful data on all the net benefits and costs from such DER, and all the revenues on which a business model for DER could be built. [15] MTC has proposed to incorporate one or more of these Congestion Relief Pilots directly into the "EPRI/STAC" project, which is described in greater detail in section 4.5 below.

Further information is available at: http://www.masstech.org/dg/winwin.htm.

4.4 Workshops to Address the Challenges for Distributed Energy Planning

The Work Group agreed to conduct a workshop process to address the challenges listed in the Section of the DPWG Report (in **Attachment H**). These workshops will be held beginning in the fall of 2006. Some members of the Work Group expressed a preference to focus primarily on a detailed technical assessment of either one or more of the "paper pilots" offered by Massachusetts utilities in support of the DG Collaborative distribution planning evaluation, or other projects the utilities brought forward from other work (i.e. Congestion Relief Projects, possible micro-grid evaluations, etc.). Other Work Group participants were interested in extending the workshop process to also include economic and policy issues and to include a full range of stakeholders. Therefore, a process has been developed with a "Technical Design Workshop" of technical experts at its core, followed by a Policy Workshop open to all interested DG Collaborative participants. These Workshops would focus primarily at the site-specific or pilot level.

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[14] See http://www.masstech.org/dg/2006-05-26_NationalGrid_Congestion-Relief-Pilot_DTE-filing.pdf, page 2.

[15] See "Framework for Developing Win-Win Strategies for Distributed Energy Resources in Massachusetts," Attachment C to the DG Collaborative's 2005 Report, at http://www.masstech.org/dg/collab-reports.htm.

The primary deliverable of the core Technical Design Workshop will be an engineering review of a small number of case study scenarios employing various DER solutions put forward in the Navigant Economic Analysis (**Attachment G**). The purpose is to optimize and evaluate the technical feasibility of these DER options as alternatives to the traditional utility approach, affirm or modify the economic analyses performed by Navigant, and consider the applicability of these analyses on the broader question of the role of DG in distribution planning. The group will review the technical details of the identified problem area and proposed DER options, and work to further quantify and possibly resolve any operational and engineering level challenges. The group will also identify the extent to which the results would indicate different results from those estimated in the January 2006 Navigant economic Analysis. Finally, the group will assess if/how the findings may be applied in the context of the utility distribution planning process going forward.

The context for the discussions should not be limited to the next few years, but should be based on a planning horizon that extends over a sufficiently long term period so that it will include assessment of potentially high levels of DG penetration, and high levels of penetration of power electronics and other "smart grid" features on both sides of the meter. [16] This will require participation and additional funding in the pilot exercise by experts in future technologies for the grid as well as for distributed energy applications, from DOE, EPRI, national labs, universities, utilities from other states or countries, or other sources.

The technical design workshop will initially consist of two (2) technical sessions, and one (1) policy session to review the output of the technical sessions. Additional sessions could be scheduled depending on the availability of outside funding as described above. The proposed dates are September 27th and November 8th, 2006 for the technical sessions, and December 13th, 2006, as the policy session. A report will be submitted to the Massachusetts DTE by December 31, 2006.

The outline below provides a potential agenda for the Workshop process that could include the following nine steps:

A. Preparatory Activities by Distribution Planning Work Group

1.) Review of paper pilots and/or any other instructive opportunities, and discussion of appropriate candidates to be contemplated for the technical assessment with the intent to identify one or two specific project locations.

[16] See http://www.themoderngrid.org/ for technologies to "accommodate renewables and other new ways of generating power" that are being addressed by the DOE and several other organizations. MTC co-sponsored the June 26-27 Northeast Regional Summit in Lenox, MA and will coordinate the Distributed Energy Planning Workshops and the Congestion Relief Pilots with this Initiative.

2.) Develop a matrix of issues to be tested (see example Technical Issues Matrix) and the approach to be taken (i.e. Process Flow Chart) for the technical evaluation exercise

3.) Select particular scenario(s) for technical and valid capacity assessment -- Upon completion of matrix and flow chart and a review of customer data, select those scenario(s) to be studied that suggest the best opportunities to assess the technical issues and provides a viable customer base and mix of customer sizes and types for development of a DER (DG, EE, DR) options

4.) Select DER technologies to include and optimize application of resources -- Identify the DG, EE, DR, and Renewable Energy technologies to be evaluated (i.e., identify any changes to technologies in Navigant's Economic Analysis): [17]

- Analytical methodology and technology review (conceptual)
- Resource size, location and mix
- DER Project modeling
- Interconnection design
- Monitoring and control approaches
- Market participation evaluation
- Define operational requirements to assure reliability of utility distribution system (i.e. define parameters to attain consistent load relief during peak loading hours and the necessary procedures, etc.)

B. Core Technical Workshop Process

The Technical Design Workshop will include technical and cost analyses and preparation and summary of Workshop results:

5.) Detail project engineering design and analysis

- Conduct system analysis of design options for DER and Utility system modifications (if needed)
- Quantify extent of control and monitoring equipment and its operation
- Quantify desired operating and communication procedures
- Develop the first steps of an overall package of actions that the Workshop participants would recommend to a Distribution Company under the set of conditions that have been specified for the pilot exercise

6.) Design cost analysis

- Assess equipment and operating costs at the customer, utility and operations centers
- Assess potential utility savings with respect to avoided T&D costs if consistent load relief or reliability parameters are met.

[17] See **Attachment I**: "Symposium on Technical and Business Challenges for DG to Play a Role in T&D Planning" for information on some technologies to assess.

- Assess system savings associated with loss reduction, congestion benefits, and other market based benefits thru the ISO-NE

7.) Economic and market calculations (based on methodologies developed to date as part of the DG Collaborative study effort)

- Review proposed costs and benefits above versus Navigant
- Review proposed marketing and enrollment approaches and costs
- Review Navigant's economic analysis with the revised inputs (including peak load availability/reliability calculations)
- Begin the process of estimating the various costs and benefits for each stakeholder type.
- Provide input to other entities (i.e. EPRI STAC project) to look at potential changes in business models, regulatory frameworks or other institutional arrangements to move toward win/win outcomes.

C. Policy Workshop by the Distribution Planning Work Group

8.) Overview and conclusions (open to the public)

- Summarize outstanding issues and concerns
- Summarize potential benefits
- Assess potential applicability of the projects for which proposed solutions have been found for similar distribution planning situations
- Assess implications of this exercise for appropriate role(s) of DG in distribution company planning
- Summarize overall viability of DG use in distribution system planning

D. Development of Recommendations by DG Collaborative

9.) Recommendations for State Agencies and/or Other Entities

- Assess implications of this exercise and other work to date (in Massachusetts and elsewhere) for appropriate role(s) of DG in distribution company planning
- Develop arrangements for future involvement of interested stakeholders in ongoing projects (e.g., EPRI DER Partnership/STAC Project, MTC Congestion Relief Pilots, ISO-NE committees, MADRI Working Group)
- Develop recommendations to DTE for other future work in this area

Energy users will play an important role in the process of workshops and pilot projects to assure that their needs are addressed as well as those of the utilities and vendors. Participants with DG or CHP experience will need to be included in the process in order to achieve the most effective assessment. Other market participants and representatives of ISO-NE will likely be invited to contribute their expertise with respect to the interaction between distributed energy resources and the present and potential future wholesale power markets. Equally important, a

successful technical design workshop will either encompass or lead into additional activities to address the full range of significant challenges identified in this report.

4.5 Win/Win Business and Policy Frameworks

One of the activities recommended in section 4.2 above was to "begin discussion among stakeholders on a comprehensive, broad-based framework for equitably allocating the costs, impacts and benefits of DG in such a way as to appropriately capture the net benefits of DG, ... using other existing initiatives (e.g. EPRI STAC project, MTC Congestion Relief Pilots)." The EPRI STAC project is entitled "Creating and Demonstrating Incentives for Electricity Providers to Integrate Distributed Energy Resources (DER)," and was described in detail in a proposal submitted to the State Technologies Advancement Collaborative (STAC) on July 11, 2005. [18] Federal funding was awarded in November 2005 to supplement funding from state agencies and other sources. This project is co-sponsored by DOER, EPRI and multiple state agencies, electricity providers, and DER suppliers and developers, including:

- Massachusetts Division of Energy Resources
- Massachusetts Technology Collaborative
- Massachusetts Department of Telecommunications and Energy
- National Grid
- EPRI DER Public/Private Partnership
- California Energy Commission
- New Jersey Board of Public Utilities
- New York Energy Research and Development Authority
- Pacific Gas & Electric
- RealEnergy
- San Diego Gas & Electric
- Solar Turbines
- Southern California Edison
- TVA
- UTC Power.

According to the proposal, this project addresses regulatory barriers to Distributed Energy Resources (DER) integration with the objective of creating, through stakeholder collaboration, business models and regulatory frameworks that reward electricity providers for integrating DER where there are societal benefits. Business models and regulatory templates will be created, and then applied to each participating state's regulatory and market environment to develop state-specific business and regulatory strategies. These strategies will be demonstrated by testing them through pilot projects, including one or more of the MTC's Congestion Relief Pilots (described in section 4.3 above). Results will be shared widely through outreach in public and private forums.

[18] The proposal document can be downloaded from http://www.masstech.org/dg/winwin.htm.

This multi-state project will advance the market integration of DER systems by creating rewards and incentives to integrate DER where there is value to society. Developing such rewards for utilities will solve the market dilemma that keeps hardware projects from moving forward. As regulatory initiatives ease the way for utilities to share in the benefits from DER deployment, utility customers and society will realize benefits in the form of more optimal resource use, increased efficiency and diversity, energy security, environmental protection and more stable energy costs. Key features of the proposed project include:

- Many solutions have been proposed to address the barriers to DER, but few of the proposed solutions have been built by consensus and many face significant barriers to adoption. By facilitating collaboration among stakeholders, issues that could prevent adoption of particular approaches will be worked out in the stakeholder collaboration process. Furthermore, the outcomes will be tested in demonstration projects to ascertain real world acceptance before they become regulatory orders.

- EPRI's recent work in bringing stakeholders together in public private partnerships has proved unique and valuable. In the EPRI DER Partnership California pilot project, end results were far different from starting positions due to stakeholders coming together and working toward common goals. For example, after stakeholder input identified potential solicitation showstoppers, Southern California Edison reshaped its RFP process to focus on innovative 'demand limitation' arrangements rather than on guaranteeing distributed generator performance, giving potential host customers more flexibility in proposing solutions to defer distribution investment. Furthermore, since EPRI is the only collaborative R&D organization representing the entire electric utility industry, EPRI can bring together electricity providers as well as state agencies, regulators, and suppliers, and customers to resolve important DER issues.

- This program will take an important step toward overcoming a major business and regulatory barrier to DER market penetration: resistance from electricity providers to supporting or implementing sensible DER as part of their energy portfolios. The work will creatively address the underlying business reasons why many providers resist DER in favor of conventional utility approaches, and will test new regulatory paradigms that enable utilities to prosper by advancing the public good.

5. Potential Future Activities

This section outlines some possible activities on which many participants in the DG Collaborative plan to work together in the future.

5.1 Summary of Next Steps

The participants in the DG Collaborative plan to undertake the following activities, which have been introduced or described in other sections of this Report:

1. Continue voluntary Work Group discussions about ongoing concerns and opportunities for further improvement in insurance arrangements, on which the parties have varied views. (See section 3.1.)
2. Implement an RFP for Relaying and Control Technology Development (in **Attachment F**) with available state and federal support of MTC and with the cooperation of Massachusetts utilities and other signatories to this Report. (See section 3.2.)
3. Work with DTE, ISO-NE and interested parties to clarify the process that will apply to a customer under state or FERC interconnection jurisdiction (see section 3.3.), and participate in, or coordinate with, relevant stakeholder activities at the regional level (New England and, where appropriate, the Northeast), including the development of ways for renewable and demand resources to participate in the ISO-NE Forward Capacity Market (see section 5.3 below).
4. Continue utility reporting on DG installations in a reduced and modified manner, as proposed in section 3.4 above.
5. Assess the need to improve education and outreach to DG contractors and owners, and consider potential implementation approaches. (See section 3.5.)
6. Undertake further work on potential deferral benefits (see section 4.2). This will include holding Technical Design Workshops slated for later in 2006 (see section 4.4).
7. Explore the following areas of potential DG value: impact of DG on constrained areas, impact of DG on market prices, and impact of DG on the environment. (See section 4.2.)
8. Continue and expand the Congestion Relief Pilots funded by the MTC. (See section 4.2 and section 4.3.)
9. Encourage opening of a docket to investigate if utilities can install and own DG as a distribution resource. (See section 4.2.)
10. Using other initiatives, e.g. the EPRI/STAC project, begin discussion among stakeholders on a framework for equitably allocating the costs, impacts and benefits of DG in such a way as to appropriately capture the net benefits of DG. (See section 4.2 and section 4.5.)
11. Initiate a northeast regional-level effort to address opportunities and mechanisms for deployment of distributed energy resources. (See section 5.3.)

Additional next steps may include activities such as the following:

- periodic conferences for information exchange and coordination among professionals with an interest in grid integration of distributed energy, and
- continued monitoring of activities around the country to address interconnection on spot and area networks.

5.2 Modifications in Structure of DG Collaborative

A number of important modifications have been identified in the structure and function of future collaborative activities, and are addressed in this section.

The DG Collaborative has worked rigorously since November of 2002 to provide the DTE with consensus recommendations for a tariff that addresses the concerns noted in prior sections of this report. The DG Collaborative has achieved significant progress to date toward the goals set forth by the Department in D.T.E. 02-38. Many of the participants are looking forward to working together on a voluntary basis to achieve further progress through the activities listed above.

Over the course of the four years the structure and function of the collaborative has been modified to meet the needs of particular phases. While the Members of the Collaborative agree that the activities listed in Section 5.1 above are important, they do not believe the current formal structure of the collaborative will be necessary or appropriate to complete the proposed activities.

The Members see value in continuing informal exchange and problem solving on specific issues, and sharing of what is learned through the various activities listed in Section 5.1, including convening interested individuals on a project or activity specific basis. To achieve this, the Members recommend an approach that is less formal and that drops the past focus on decision-making about recommendations and replaces it with a new focus on information exchange and problem solving.

The new approach would continue to involve voluntary Work Groups or other committees to address topics such as network interconnection and distribution planning. In addition, distinct projects may be organized such as the MTC Congestion Relief Pilots (section 4.3) and the EPRI STAC project (section 4.5). However, instead of convening Plenary meetings of all parties to govern the Work Groups' deliberations, these groups would operate primarily on an independent basis. To the extent that interaction between these various activities may be desirable from time to time, a coordinating committee could meet as needed, perhaps two or three times in a year.

A new name would be used for this umbrella group, such as the "Distributed Energy Coordinating Committee." Such a name would recognize a shift from a consensus-based

decision-making process to a voluntary process of information exchange and problem-solving. Use of the term "Distributed Energy" or "Distributed Resources" would acknowledge that the scope has naturally evolved beyond generation. The name "Massachusetts DG Collaborative" would no longer be used, unless the Department were to order a formal collaborative process to develop recommendations for the Department on a particular topic.

The Massachusetts Electronic Business Transaction (EBT) Working Group could provide an example for how to organize such Work Groups or such a Coordinating Committee. Each Work Group could be co-Chaired by volunteers, perhaps representing different sections, for example a member from the utility caucus and a member from the distributed generation, or state, or environmental sector(s). Each Group could meet every two or three months as needed, and could be hosted by a state agency (e.g., MTC, DOER, DTE) or other participant. Agendas could be created based on input from those who attend meetings.

The purpose of this future Work Group process would be to provide a forum for identifying future implementation challenges associated with integrating DG into the grid and addressing those challenges, as appropriate. With this proposed structure, many members and interested parties would invest significant time, voluntarily, on the projects or activities in which they are most interested. Additionally, if the MTC Board approves, MTC could provide significant funding to support the activities listed in Section 5.1. However, it is not expected that participation will be sufficiently widespread to warrant the development of consensus policy recommendations to the Department.

This future direction is consistent with the recent experience of the DG Collaborative. Despite the significant participation of many stakeholders over the last two years, it has been difficult for many private-sector and public-interest entities to participate in as many meetings as the distribution companies and some of the state agencies. For example, for the DG customer and public interest clusters, fewer than 25% of the organizations attended more than 25% of the meetings.

The DG Collaborative has achieved significant progress to date toward the goals set forth by the Department in D.T.E. 02-38. Going forward, many of the participants are looking forward to working together on a voluntary basis to achieve further progress through the activities listed above.

5.3 Opportunities for Regional Coordination

To date, the Massachusetts DG Collaborative has undertaken a stakeholder process to initially address standardization of DG interconnection procedures to facilitate deployment of DG in the Commonwealth. Subsequently, the DG Collaborative has sought to further streamline that process, address deficiencies in that process, and additionally address an expanded scope of issues and opportunities for DG deployment, including for example, interconnection to networks, and the role of DG in distribution planning. As evidenced in this report, the DG

Collaborative is faced more and more with policy type issues as compared to the primarily technical based issues faced to date. Such policy issues will need more involvement from the Massachusetts DTE and will likely need additional stakeholder resources to address.

The DG Collaborative agrees that DG development in Massachusetts will be facilitated by standardized interconnection procedures that have evolved from the effort to date. However, the Collaborative feels that the potential for expanded DG development in Massachusetts, and in the broader New England/ northeast region, will depend not just on standardized technical procedures, but on the availability of open, competitive markets, including the proposed new Forward Capacity Market (FCM) [19] at the ISO-NE, wherein considerations for the attributes of DG -- such as efficiency, environmental stewardship, power security, and deployment flexibility to address system constraints and/or system stability -- can be appropriately evaluated and valued.

While the above can be addressed at the individual state level, it is important to understand that variation in handling of DG in different states with respect to both interconnect procedures as well as other tariff structures does provide significant barriers for DG, in that the stakeholders are required to address many of the same issues in different venues, requiring significant resources. The DG Collaborative recognizes that the northeast region is an important region of opportunity for DG due to, inter alia, energy prices and future capacity concerns and system constraints, and that within this region, the relative size of the states implies that a significant DG market must look regionally for volume.

For the above reasons, the DG Collaborative recommends initiation of a northeast regional-level effort to address opportunities and mechanisms for deployment of distributed energy resources (DER) that provide benefits to the ratepayers of the region, including addressing existing issues and deriving solutions to such issues. [20] A regional effort would be able to include

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[19] See http://www.masstech.org/renewableenergy/public_policy/capacity/NE-Renewable-Capacity-Payments.htm.

[20] An example is the Mid Atlantic Distributed Resource Initiative (MADRI), which is described below (taken from the MADRI website, file titled "Mid-Atlantic Distributed Resource Initiative"): "The Mid-Atlantic Distributed Resources Initiative (MADRI) seeks to identify and remedy retail barriers to the deployment of distributed generation, demand response and energy efficiency in the Mid-Atlantic region. MADRI was established in 2004 by the public utility commissions of Delaware, District of Columbia, Maryland, New Jersey and Pennsylvania, along with the U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA), Federal Energy Regulatory Commission (FERC) and PJM Interconnection. The guiding principle for MADRI is a belief that distributed resources should compete with generation and transmission to ensure grid reliability and a fully functioning wholesale electric market. However, institutional barriers and lack of market incentives appear to be slowing deployment of cost-effective distributed resources in the Mid-Atlantic. MADRI has three goals: 1) Educate stakeholders, especially state officials, on distributed resource opportunities, barriers, and solutions; 2) Develop alternative distributed resource solutions for states and others to implement; 3) Pursue regional

consideration of the ISO-NE Forward Capacity Market (FCM), now being designed, in its deliberations. Such an initiative could also address, but not be limited to, the following:

- Standardization of interconnection and dispatching of DER on a regional basis, including state and ISO-NE,
- Benefits of DG in mitigating market and system constraints,
- Role of DG in distribution system planning,
- Potential utility ownership of DER,
- Qualification and Bidding of DER in regional markets,
- Other infrastructure for DER (e.g., monitoring and verification (M&V), accounting, marketing, financing, contractual and regulatory enabling),
- Review of existing economic incentives and the appropriate application of economic incentives for customers to install or expand on-site DG.

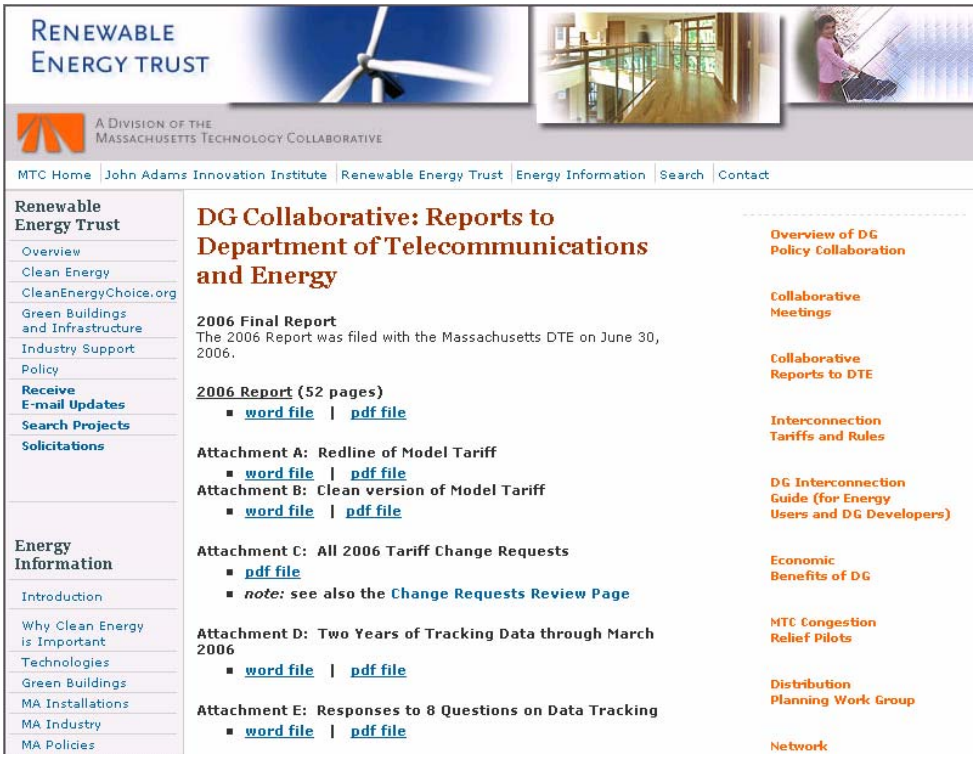
We further recommend that the Massachusetts DTE take an active role in establishing such a regional initiative.

consensus on preferred solutions." Information on MADRI was presented during the January 25 Symposium (see Attachment I, pages 52 – 64), and is available at http://www.masstech.org/dg/winwin.htm.

Web Link to Report

Note: this Report and all Attachments are available at the DG Collaborative website illustrated below, through the following web address:

www.masstech.org/dg/collab-reports.htm



Detailed information regarding all the work of the DG Collaborative is at:

www.masstech.org/policy/dgcollab

List of Attachments

Attachment A: Redline of Model Tariff

Attachment B: Clean Version of Model Tariff

Attachment C: All 2006 Tariff Change Requests

Attachment D: Two Years of Tracking Data through March 2006

Attachment E: Responses to Eight Questions about Interconnection Data Tracking

Attachment F: Relaying and Control Technology Development for Spot Networks

Attachment G: DG and Distribution Planning: An Economic Analysis for the Massachusetts DG Collaborative

Attachment H: Report of DPWG on DG and Distribution Deferral

Attachment I: Symposium on Technical and Business Challenges for DG to Play a Role in T&D Planning

Attachment J: Memoranda Regarding Insurance and Indemnification