

The Greater New Bedford LFG Utilization Project: The Electrical Interconnection Process



As Presented to the NECA Conference
on Successful Renewable Energy
Project Development Strategies in New
England on March 1, 2006
Update for presentation to NStar
on May 19, 2008

CommonWealth
Resource Management Corporation

Greater New Bedford LFG Utilization Project: Overview

The Project



Developer:	CommonWealth Resource Management Corporation
Location:	Crapo Hill Landfill, Dartmouth, Massachusetts
Fuel:	Landfill gas
Capacity:	3.30 MW gross nameplate generating capacity
Equipment:	Caterpillar 3516 internal combustion engines with Caterpillar SR4 generators (four x 825 kW)
LDC:	Commonwealth Electric Co. dba NStar Electric
Constructor:	Atlantis Equipment, Corp., Adams, MA
MTC programs:	Pre-development financing initiative, Mass. Green Power Partnership (REC put option)

Greater New Bedford LFG Utilization Project: Construction

The site



The building



Greater New Bedford LFG Utilization Project: Construction

The landfill gas supply



Greater New Bedford LFG Utilization Project: Construction

The engines



The installation

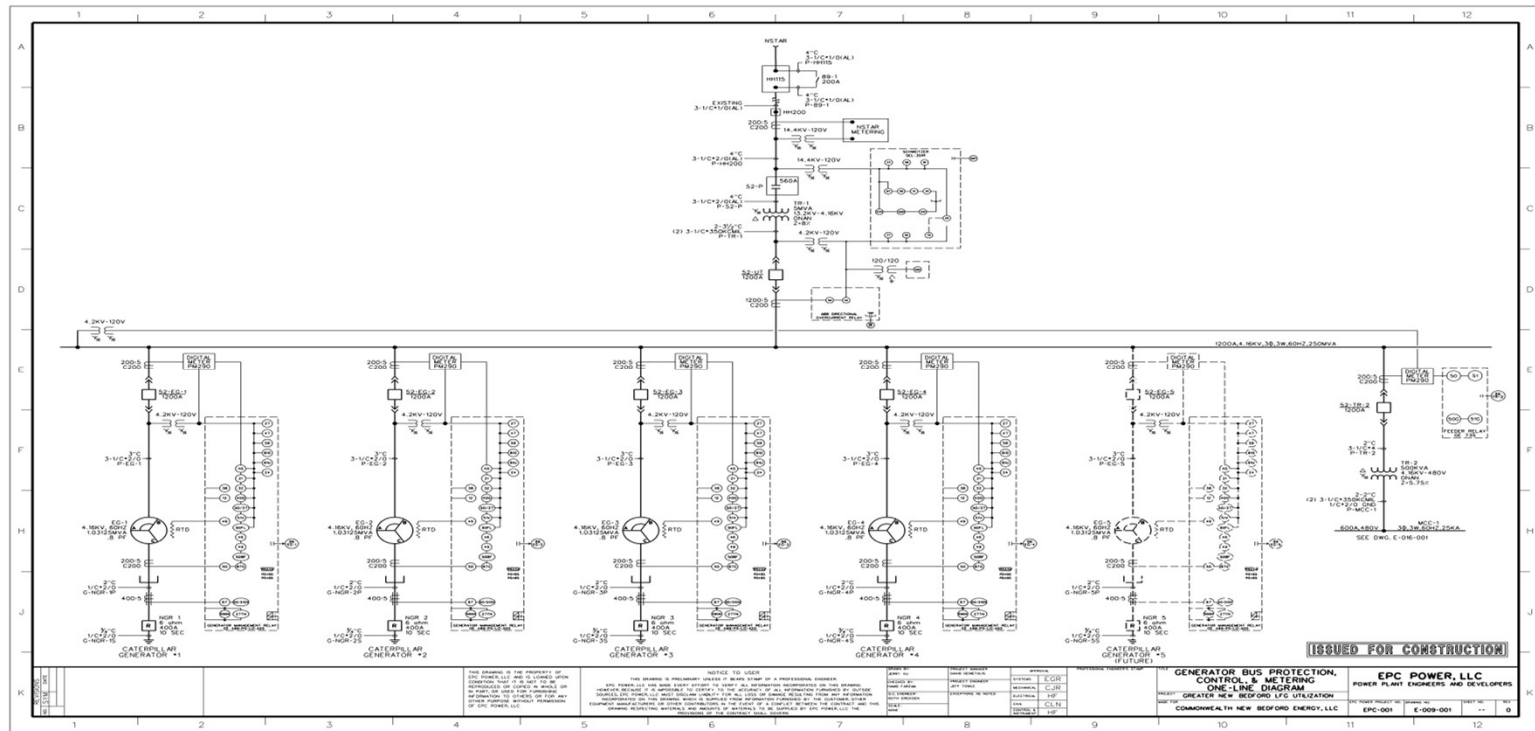


Greater New Bedford LFG Utilization Project: The Facility



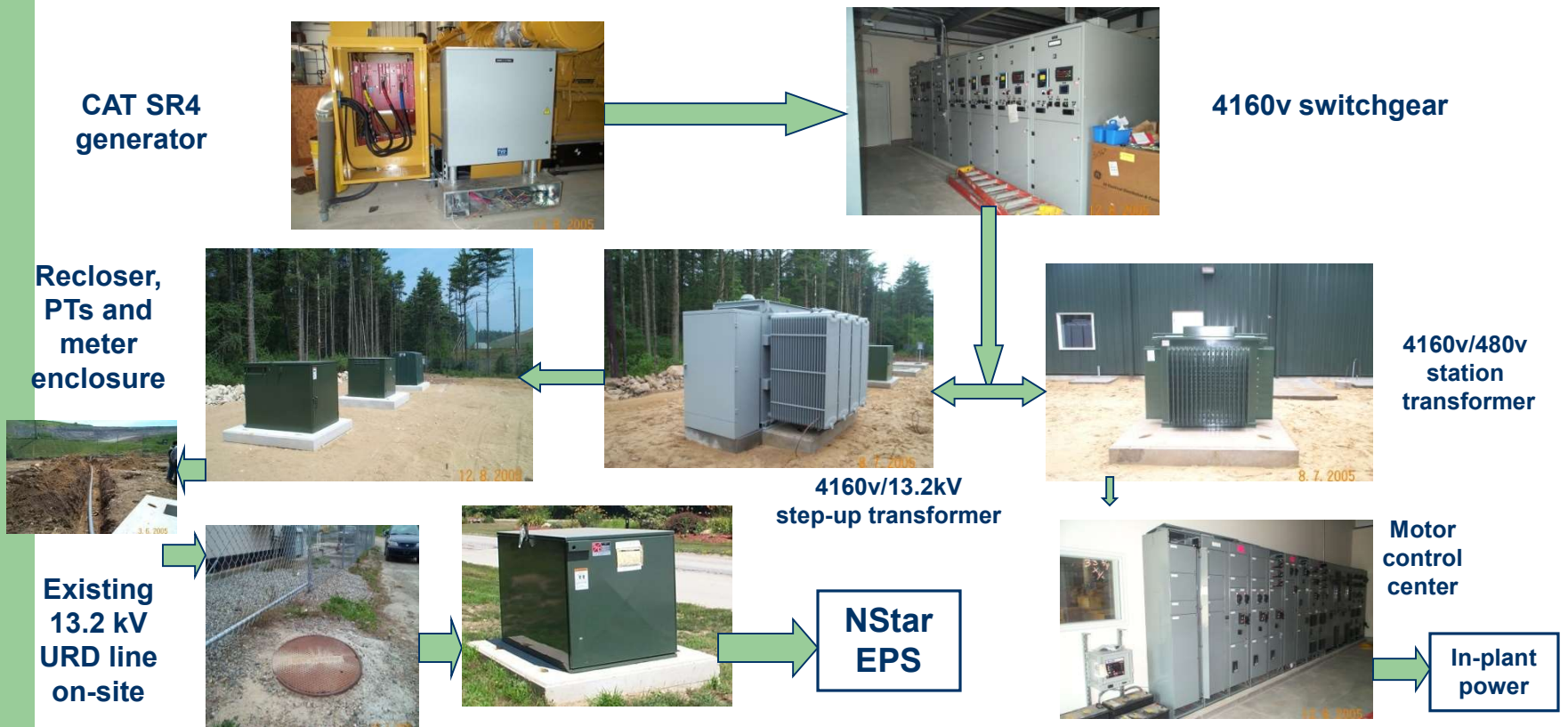
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The Interconnection: The One-Line Diagram



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The Illustrated One-Line Diagram



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<i>Process Stage</i>	<i>Duration per the tariff</i>	<i>Actual duration</i>	<i>Dates</i>
Acknowledge/review application	3 days/10 days	5 days	Jan 13 to 18, 2004
Complete Impact Study	55 days	127 days	May 24, 2004
Complete Detailed Study	30 days	92 days	August 24, 2004
Sign Agreement	15 days	153 days	January 24, 2005
Total days	125/150 days	377 days	
Construction	No limit specified	195 days	Notice to Proceed on March 11, 2005
Witness relay testing and authorize the interconnection	By mutual agreement	39 days	September 22, 2005 to October 31, 2005

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Study period: 219 days actual vs. 95 days per tariff

Hoped-for interconnection plan

- Interconnect with the 13.2 kV URD line adjacent to the site
- “15 minutes and \$50,000”



NStar plan

- Interconnect to substations via new dedicated cables or upgraded lines
- \$270,000 to \$298,000 distribution + protection cost + ???

Analysis of alternatives takes extra time

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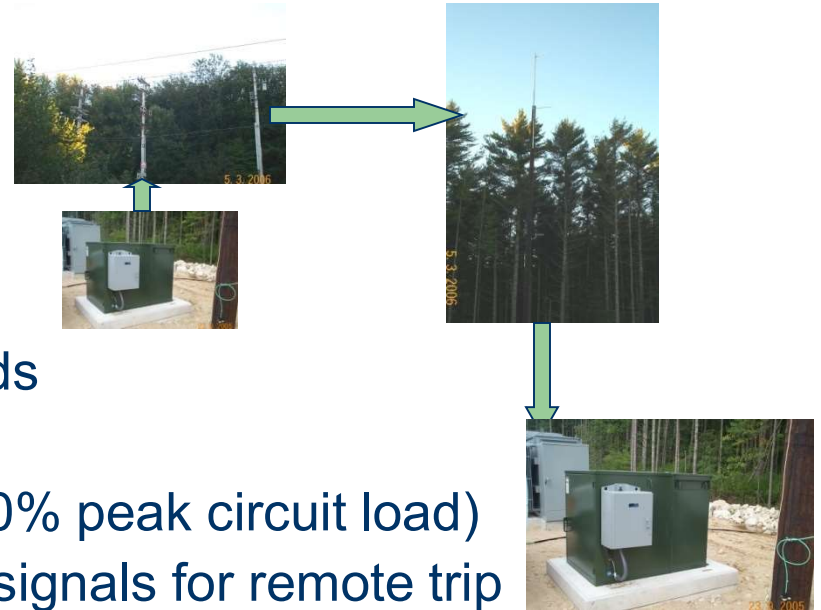
Challenges during the study

Challenges to use of the URD line

- Risk of circuit overvoltage
- Risk of islanding
- Risk of violating reliability standards

Responses to challenges

- Limits on capacity (3.3 MW for >40% peak circuit load)
- Reclosers with 900 MHz wireless signals for remote trip
- Power factor down to 90% lagging



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Agreement period: 153 days actual vs. 15 days per tariff

The CIAC gross-up: Generator required to pay utility's potential income tax liability, whether or not actually incurred. Negotiated for an indemnity clause to replace the gross-up.

The scope of work: NStar asked for \$100,000 more substation work after the detailed study was complete. Refined fault current modeling showed that the requested substation work was not needed

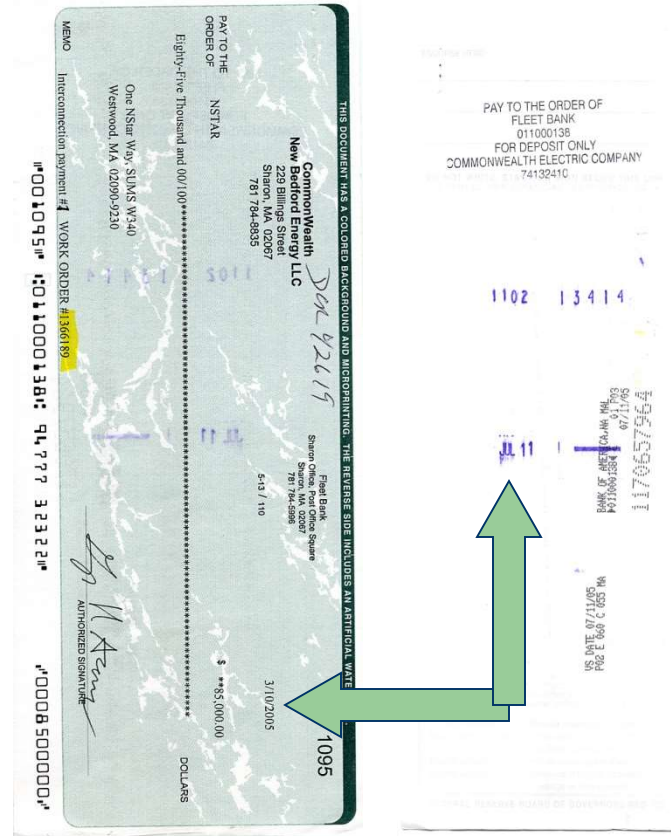
The schedule: MDTE has no requirements for construction time. Burden is on the generator to expedite the utility construction schedule

The deposit: Generator pays utility 100% of cost upfront, and leaves the utility no incentive to perform. Negotiated for a staged deposit to replace the 100% upfront payment.

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CNBE check no.1095

- Dated March 10
- Sent overnight by FedEx
- Cleared Jul 11
(121 days after receipt)



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NStar's Christmas Present (December 23 executable ISA)

PROMISED AND EXPECTED

Alternative #1-B

A second variation of Alternative #1 was analyzed. The results in *Appendix B* demonstrate that, with the Crapo Hill units operating at lagging power factor to regulate the local 13.2kV voltage at their point of interconnection, four (4) units may operate from 100% of Summer peak down to at least 40% of peak (a Spring light load condition), with no resulting voltage violations and with the 1/0 URD conductor within normal ratings.

Estimated Interconnection Cost: \$ 30,000
(excluding system protection costs)
[add \$40,000 to get total of \$70,000].

ACTUAL

System Modification Costs

The cost to implement Option 1B, as described in Attachment 2 is **\$221,480** and includes the following –

Why?

1. **NStar omitted the cost of its recloser from its cost estimate**
2. **NStar decided to charge the project \$100,000 in substation costs to address pre-existing fault current issue**

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Resolution of the issues

Contract issues

- Indemnity clause replaced the gross-up
- Staged deposit replaced 100% upfront payment

The Christmas present

- Refined fault current modeling, performed on an expedited basis, showed facility did not cause need for \$100,000 substation improvement costs
- CNBE agreed to pay for the “omitted” recloser

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Sunday, 15 May 2005

UWUA Local 369 strikes against NSTAR

BRAINTREE, MA, ISSUED MAY 16, 2005...The President of the Utility Workers Union of America Local 369 says that the strike against NSTAR, which began at 12:01 a.m. Monday, can end as soon as NSTAR agrees to negotiate seriously. Nearly 2000 Utility Workers walked off the job shortly after midnight, when

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Interconnection equipment technology is changing:

What happens when a
(good ol') Cooper Recloser
meets a
(hip new) Schweitzer 351R
Recloser Controller?



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Construction coordination/communication questions

- What does the generator install, and what does the utility install? Where is the point of Common Coupling? At the generator? The meter? The disconnect switch? The property line?
- Is an easement needed? Do the standard terms apply?
- How can the generator monitor the utility's progress? What about long-lead-time equipment (e.g., the recloser, with lead time of 16-20 weeks)?
- How can the generator coordinate construction with the way the utility schedules its crews?
- Is ISO-NE involved? LDC tariff (<2.0 MW) vs. ISO-NE small generator rules (2.0-5.0 MW) vs. ISO-NE large generator rules (>5.0 MW)?

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Relay setting, testing and witnessing: Sept 22 to Oct 31

Table 2. Interconnection System Response to Abnormal Frequencies

DR SIZE	Frequency Range (Hz)	Clearing Time ^a (s)
≤30 KW	> 60.5	0.16
	<59.3	0.16
>30 KW	>60.5	0.16
	< {59.8 - 57.0} <i>(adjustable setpoint)</i>	Adjustable 0.16 to 300
	<57.0	0.16

Note. (a) DR ≤30 KW, Maximum Clearing Times; DR > 30 KW, Default Clearing Times



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Recommendations to improve the process

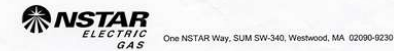
1. Make the study process open and collaborative
2. Develop a detailed step-by-step schedule and track progress against it
3. Improve the interconnection services agreement
 - Pay utilities on completion of milestones
 - End the gross-up
4. Facilitate internal communication among utility divisions

Survival strategies

1. Be persistent
2. Get top-notch technical help
3. Be persistent
4. Develop relationships with key individuals
5. Be persistent

Greater New Bedford LFG Utilization Project: The Electrical Interconnection Process

Success!



November 1, 2005

Mr. George H. Aronson, Principal
CommonWealth New Bedford Energy, LLC
229 Billings Street
Sharon, MA 02067

RE: ID# 114 – 4,300 kW Internal Combustion Engine, Synchronous Generators

Dear Mr. Aronson,

This letter is being provided to satisfy the requirements of Section 2 of the Interconnection Service Agreement between NSTAR Electric and Gas (the Company) and CommonWealth New Bedford Energy LLC (CNBE, or Interconnecting Customer) dated January 24, 2005, as amended on February 17, 2005.

With this letter, CNBE is hereby given notice that (1) NSTAR has received all requested documentation, (2) Witnessed successful protective relays testing at CNBE's facility fired by landfill gas at the Crapo Hill Landfill, 300 Samuel Barnett Boulevard, New Bedford, MA 02745 (the Facility); and (3) NSTAR hereby authorizes CNBE to interconnect with the Company EPS; and (3) NSTAR confirms that CNBE has the right to operate its Facility in parallel with the Company EPS as per the interconnection agreement as of the date of this authorization letter.

NSTAR wishes you well in your endeavor and hopes that you have many years of successful operation

Sincerely,

Joseph V. Feraci, Jr.
Interconnection Program Manager
Tel: 781-441-3196
Fax: 781-441-3191
E-mail: joseph_feraci@nstaronline.com

CC: Anton Finelli, Principal,
CommonWealth New Bedford Energy, LLC
199 Corey Street
Boston, MA 02132