

**STATE OF VERMONT
PUBLIC SERVICE BOARD**

Petition of Vermont Electric Power Company, Inc.)
("VELCO") for a Certificate of Public Good authorizing)
VELCO to construct the so-called Northwest Vermont)
Reliability Project)

Docket No. _____

**DIRECT TESTIMONY OF
JOHN PLUNKETT
OPTIMAL ENERGY, INC.**

**PHILLIP MOSENTHAL
OPTIMAL ENERGY, INC.**

**CHRISTOPHER NEME
VERMONT ENERGY INVESTMENT CORP.**

**ON BEHALF OF
VERMONT ELECTRIC POWER COMPANY, INC.**

The purpose of this testimony is to present, and briefly summarize Optimal Energy, Inc.'s report entitled "Assessment of Economically Deliverable Transmission Capacity from Targeted Energy-Efficiency Investments in the Inner and Metro-Area and Northwest and Northwest/Central Load Zones, April 2003."

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1 Q1. Please identify yourselves.

2 A1. We are John Plunkett, President, and Philip Mosenthal, Vice President, of Optimal Energy,
3 Inc., ("Optimal" or "OEF") and Chris Neme, Planning and Evaluation Director of Vermont
4 Energy Investment Corporation ("VEIC"). Optimal is a six-person energy consultancy with
5 offices at 14 School Street, Bristol, Vermont 05443. VEIC is a non-profit corporation
6 headquartered at 255 South Champlain Street, Burlington, Vermont 05401.

7

8 Q2. What is the purpose of your testimony?

9 A2. Our purpose is twofold: First we introduce our estimates of how much demand-side
10 transmission capacity VELCO could count on from a sustained investment in efficiency
11 targeted in northwestern Vermont. We provide these estimates in our report, attached here
12 as VELCO Exhibit OEI-1, entitled *Assessment of Economically Deliverable Transmission
13 Capacity from Targeted Energy-Efficiency Investments in the Inner and Metro-Area and
14 Northwest and Northwest/Central Load Zones, April 2003*. Our projections extrapolate from

1 the experience of the most aggressive efficiency programs fielded in the region, dating back
2 fifteen years or more. The second purpose of our testimony is to provide the qualifications
3 behind the professional judgment we used to project future efficiency savings and the costs
4 of achieving them. Between us we have 58 years of experience in the energy business,
5 almost all of which has been devoted to the design, planning, management, and assessment
6 of large-scale energy-efficiency investment.

7
8 Q3. On whose behalf are you testifying?

9 A3. We prepared this testimony and the underlying report for the Vermont Electric Power
10 Company, Inc. (“VELCO”).

11
12 Q4. Mr. Plunkett, please summarize your qualifications.

13 A4. I am an economist and have worked in a variety of challenging settings for a diverse array
14 of clients throughout my 24-year career. On behalf of utilities, government agencies, and
15 citizen groups I have led inter-disciplinary teams in all aspects of developing, analyzing and
16 negotiating comprehensive, state-of-the-art energy-efficiency investment portfolios
17 throughout North America. I served as project leader and integration team leader for the
18 NYSERDA efficiency and renewables potential study and I led program planning and
19 evaluation work by Efficiency Vermont (“EVT”) between 2000 and 2002. This work, done
20 in close consultation with EVT program managers, included developing and negotiating
21 performance indicators and targets in 2000 and again in 2002 for resource and economic
22 savings, program results, market effects, and other outcomes over EVT’s three-year contract
23 terms. Currently I am EVT Senior Policy Advisor and am a member of the EVT senior
24 management team. I also led the consulting team providing program planning, management,
25 and evaluation support for LIPA’s Clean Energy Initiative from 1999 to 2002, on which I
26 now serve as a senior advisor. I have been involved as an advisor to the non-utility parties
27 to the Massachusetts efficiency collaborative on cost-effectiveness analysis and performance

1 incentives for utility program administrators since 1999. From 1990-1997 I led negotiations
2 with the Potomac Electric Power Company on the design, planning, and evaluation of its
3 comprehensive energy-efficiency portfolio for its Maryland service territory. VELCO
4 Exhibit OEI-2 provides other details of my professional background.
5

6 Q5. Mr. Mosenthal, what are your qualifications?

7 A5. I have 20 years of experience in all aspects of energy efficiency, including facility energy
8 management, policy development and research, planning, and program design,
9 implementation and evaluation. My particular expertise is in the business and institutional
10 sectors. I have developed numerous utility DSM plans, and designed and evaluated utility
11 residential, commercial and industrial energy efficiency programs throughout North America
12 and in Europe. I led development of the program theory and logic models for the Long
13 Island Power Authority's C&I Portfolio of programs. Recent projects include Commercial
14 Efficiency Team Leader for NYSERDA's Efficiency and Renewable Potential Study, C&I
15 Planning and Program Design for Efficiency Vermont, Commercial Team Leader for the
16 NSTAR Collaborative, technical consultant on C&I programs for the MECO and WMECO
17 Collaboratives, and for the Cape Light Compact. VELCO Exhibit OEI-3 contains more
18 information about my experience and education.
19

20 Q6. Mr. Neme, please state your qualifications.

21 A6. I have worked on market assessment, program planning, cost-effectiveness screening, and
22 evaluation of efficiency policies and programs in more than fifteen different states and
23 provinces since joining VEIC in 1993. This has included extensive work on new
24 construction, central air conditioner, lighting, appliance, windows, low income and high use
25 retrofit programs. I have also testified on DSM program designs, evaluation plans, and other
26 topics before several regulatory agencies in both the United States and Canada. Recent
27 projects include: lead residential programs consultant for the New Jersey and Massachusetts

1 Collaboratives, manager of residential planning and program design for Efficiency Vermont,
2 residential sector lead for NYSERDA's current efficiency and renewable energy potential
3 study, program manager for the NEEP regional residential HVAC program, and member of
4 four-person committee overseeing audits of Enbridge Consumers Gas' evaluation reports
5 and savings claims. VELCO Exhibit OEI-4 provides my resume.
6

7 Q7. Have any of you ever testified before this Board?

8 A7. Yes. Mr. Plunkett and Mr. Mosenthal have both testified before the Public Service Board
9 in previous cases. Mr. Plunkett testified in Docket Nos. 5980, 5720, and 5270-CVPS 1&3,
10 and Mr. Mosenthal also testified in Docket 5980.
11

12 Q8. What were your respective responsibilities for the study you have submitted in this docket?

13 A8. Mr. Plunkett framed the analysis and was lead author of the report. Mr. Neme was
14 responsible for the analysis of efficiency costs and savings in the residential sector and
15 related sections of the report. Mr. Mosenthal was responsible for the commercial and
16 industrial analysis. In all, a team of seven staff from Optimal and VEIC contributed to the
17 analysis and supporting report.
18

19 Q9. In your opinion, how much peak demand could Vermont secure in the northwestern part of
20 the State and how much would it cost?

21 A9. We estimate the economically deliverable summer peak demand savings from energy-
22 efficiency programs targeted in the northwestern part of the state to be 213 MW by 2012 (see
23 VELCO DSM Output Table 1), at a cost of \$618 million (Table 13A). (All dollar values are
24 stated at their present worth in 2003 dollars, discounted at a 4.0% discount rate). By
25 economically deliverable, we mean peak demand savings that can be acquired for less than
26 the supply costs they avoid. These peak demand savings and their associated costs include
27 our estimates of continued statewide efficiency investment through Efficiency Vermont.

1 Q10. What are the main advantages of the economically deliverable efficiency savings you
2 estimate for northwestern Vermont?

3 A10. Their primary advantage is their cost-effectiveness relative to other transmission capacity
4 alternatives. The net economic benefit from pursuing all the peak demand potential would
5 be \$589 million (Table 14A), the difference between total societal benefits of \$1,207 million
6 (Table 13A) and the total societal costs of \$618 million (Table 13A). In fact, the net cost
7 of demand-side transmission capacity available from targeted energy-efficiency resources
8 is negative.

9 The targeted efficiency resources we found for northwestern Vermont also have the
10 unique advantage of varying directly with underlying load, so that output increases as
11 demand does, both in the short and long run. This is a unique risk-mitigating advantage
12 whose value is not reflected in our benefit/cost calculations.

13
14 Q11. How can the net cost of transmission capacity alternatives be negative?

15 A11. This somewhat startling result can occur when the non-transmission benefits of a resource
16 exceed its costs.

17 Consider generation alternatives to transmission capacity. The net cost of
18 transmission capacity from generation alternatives (\$/kW or \$/kW-yr) is equal to the
19 generator capacity payments or capital costs less the value of energy output sold into the
20 market (net of fuel costs), divided by peak capacity contribution from the generating source.
21 If the value of energy output exceeds the capacity payments or capital costs, then the net cost
22 of capacity would be negative.

23 This is precisely the result we found from our analysis of targeted energy-efficiency
24 resources. The net cost per kW of transmission capacity from targeted efficiency investment
25 is negative because generation and distribution benefits together exceed the total resource
26 costs of the efficiency resources. Thus, we found the net cost of transmission savings from
27 targeted efficiency to be \$-3,047/kW or \$-107/kW-yr (Table 14A).

1 Q12. What are the main disadvantages of the economically deliverable peak demand reductions
2 you project?

3 A12. Their primary disadvantage is that they are highly capital intensive. In 2012, efficiency
4 investments in the Inner and Metro-Area and Northwest/Northwest Central Area load zones
5 would require total capital outlays of \$64 million (Table 16A), roughly three and a half times
6 the \$19 million Vermont spent statewide on efficiency at the peak of utility DSM investment
7 a decade ago.

8 A second disadvantage of the economically deliverable demand-side transmission
9 capacity is that its benefits are so diffuse. These benefits originate from multiple sources,
10 which (in decreasing order) are distribution (\$298 million), non-electric - fossil fuel and
11 water (\$258 million), and avoided generation (\$207 million), (Table 13A). No one source
12 of benefits is large enough to cover the total costs of the efficiency resources, almost all of
13 which consist of capital required in large amounts. Concerted effort on the part of many
14 parties would be required to mobilize this unprecedented level of sustained capital
15 investment. VELCO's share of these benefits is relatively small and by no means sufficient
16 to support the acquisition of a major share of the economically deliverable transmission
17 capacity in the load zones studied.

18
19 Q13. What level of confidence do you attach to your estimates?

20 A13. If the necessary capital can be mobilized, then we conclude that there is a 90% probability
21 that the savings we predict would materialize at or more than the magnitudes we project, at
22 or below the costs we estimate.

23
24 Q14. Why are you so confident in your estimates?

25 A14. To achieve these aggressive load reduction goals, the study contemplates a large ambitious
26 investment campaign over a decade, utilizing the most aggressive proven market
27 implementation strategies proven to acquire widespread participation by all market sectors:

- 1 • Sustained marketing to consumers and equipment suppliers;
- 2 • Generous financial incentives covering the full cost of retrofit measures and the full
- 3 incremental cost for new construction/renovation measures;
- 4 • Comprehensive technical and information services for market participants; and
- 5 • Complete customer service delivery.

6 All the technologies and market intervention strategies contemplated in the analysis
7 have proved effective in New England and elsewhere at achieving the levels of market
8 penetration we project here. Likewise, we attach a high degree of confidence to our
9 technology cost projections because they are all relatively well known.

10 On the other hand, no utility has ever sustained such large efficiency investment
11 commitments for so long in so many markets simultaneously and actually achieved the
12 relative magnitudes of peak demand savings projected over the next decade in this report.
13 In this sense, we are forecasting well beyond the pooled, time-series sample data we are
14 estimating from.

15
16 Q15. Summarize the approach you used to develop your estimates of economically deliverable
17 transmission capacity from energy-efficiency resources in northwestern Vermont.

18 A15. The study estimates potential savings in three residential markets – retail products and
19 appliances, retrofit applications and new construction – and two commercial/industrial
20 (“C&I”) markets – existing and new construction. For the three residential markets, the
21 study further provides separate estimates for measures that alternately contribute
22 comparatively high and low peak load kW savings. The C&I existing market is further
23 broken down into three segments – retrofit, renovation and remodel/replacement.

24 Drawing on a statewide potential study completed by Optimal Energy in 2003 for the
25 Department of Public Service (“DPS”), this analysis considers dozens of efficiency

1 technologies applied to all major end-uses across the full range of building types.¹ The
2 residential market analyzed measures for two building types: single- and multi-family
3 buildings. The C&I market included eleven building types: agriculture, education, grocery,
4 health, industrial, lodging, office, restaurant, retail, warehouse and other. The savings
5 estimates consider both the energy savings each efficiency technology offers and the time
6 required getting the technology in place (i.e., market penetration rates) using very aggressive
7 DSM program efforts in the two VELCO planning zones (the Inner and Metro-Area zones,
8 and the Northwest and Northwest/Central zones.)

9 The analysis specifically sought to ensure that the estimates of potential peak demand
10 savings are realistic, considering how difficult it may be to get consumers to replace
11 inefficient existing equipment or choose high efficiency options in new construction. This
12 aggressive campaign would pursue comparatively high levels of peak load reductions,
13 considering the history of energy efficiency programs in Vermont and other places in the
14 nation. The analysis recognized this by lowering projected penetration rates to reflect what
15 VELCO could really expect to count on for transmission planning purposes with a high
16 degree of confidence. The statewide potential estimates were developed as expected values
17 (with a 50-50 chance the actual value will fall above or below the prediction). Given the
18 objective of a more conservative assessment for a specific resource-planning problem, this
19 study used lower achievable market penetration rates for some measures and markets than
20 those used in the DPS statewide analysis. Consequently, we attach a higher degree of
21 confidence to the likelihood of achieving these lower market penetration rates in the future.

22
23 Q16. Does this complete your prefiled direct testimony?

24 A16. Yes.

¹ "Electric and Economic Impacts of Maximum Achievable Statewide Efficiency Savings," Public Review Draft, prepared by Optimal Energy for the Vermont Department of Public Service, January 2003.

EXHIBITS

- Exhibit OEI-1 *Assessment of Economically Deliverable Transmission Capacity from Targeted Energy-Efficiency Investments in the Inner and Metro-Area and Northwest and Northwest/Central Load Zones, April 2003*
- Exhibit OEI-2 Resume of John Plunkett
- Exhibit OEI-3 Resume of Phillip Mosenthal
- Exhibit OEI-4 Resume of Christopher Neme