

STATE OF VERMONT
PUBLIC SERVICE BOARD

Docket No. 7440

Petition of Entergy Nuclear Vermont Yankee, LLC,
And Entergy Nuclear Operation, Inc., for
Amendment of their Certificates of Public Good
And other approvals required under 10 V.S.A. §§
6501-6504 and 30 V.S.A. §§ 231(a), 248 & 254,
For authority to continue after March 21, 2012,
Operation of the Vermont Yankee Nuclear Power
Station, including the storage of spent-nuclear fuel.

PREFILED TESTIMONY OF
SCOTT M. ALBERT

ON BEHALF OF THE
VERMONT DEPARTMENT OF PUBLIC SERVICE

November 14, 2008

Summary: Mr. Albert analyzes the potential impacts of not relicensing the Vermont Yankee Nuclear Power Plant. He looks at the impacts on the transmission and distribution system, power markets and pricing, energy and demand, and environmental concerns. He also explains the differences between several potential power replacement portfolios.

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EXHIBITS:

DPS-SMA-1: Resume of Scott M. Albert

DPS-SMA-2: Act 160 Report Chapter on Alternatives to Vermont Yankee

DPS-SMA-3: Concentric Energy Advisors (CEA). *Vermont Utilities Technical and Cost Issues of Generation Alternatives, Phase One of a Two Phase Report.*

Filed January 18, 2008.

DPS-SMA-4: Generation, Cost, and Emissions data for Future Energy Portfolios.

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I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Scott M. Albert. I am a Principal of GDS Associates and the Region Manager of the firm's Northeast Office, located in Manchester, New Hampshire. My business address at GDS Associates is 1181 Elm St. Suite 205, Manchester, NH 03101.

Q. Mr. Albert, please summarize your educational background and experience.

A. I received a Bachelor of Science in Civil Engineering from Northeastern University in 1981, and a Masters Degree in Business Administration from New Hampshire College in 1984. I have over twenty-five years of experience in the energy industry, and am a board member of the New England Energy and Commerce Association, and a member of the Association of Energy Service Professionals, Association of Energy Engineers and the New England Sustainable Energy Association.

Since joining GDS in 1999, I have worked on numerous electric and gas energy efficiency and renewable resource/distributed generation projects for clients throughout the Northeast and across the country. In addition, I have previously held supply and demand-side resource planning management positions with Boston Edison Company and Public Service Company of New Hampshire, and have worked extensively with renewable resource projects and technologies.

1 I have been involved in overseeing the development, technical, contractual,
2 operational and regulatory activities associated with over 100 renewably-fueled,
3 non-utility owned hydroelectric, biomass, municipal solid waste, landfill gas,
4 wind, solar and animal waste-fueled facilities. Activities in this area included:
5 design support and coordination of standard grid interconnection policies and
6 procedures; short and long-term power purchase contract policy development,
7 negotiations and implementation; net metering and retail wheeling issues
8 identification and resolution; project development tracking; dependable capacity
9 and annual energy determinations; operations monitoring; and regulatory filings
10 and reporting. Please see Exhibit DPS-SMA-1 for my résumé.

11

12 Q. What is the nature of your business?

13 A. GDS Associates, Inc. (“GDS”) is an engineering and consulting firm with offices
14 in Marietta, Georgia; Austin, Texas; Corpus Christi, Texas; Manchester, New
15 Hampshire; Madison, Wisconsin; Augusta, Maine; Washington, DC; and
16 Auburn, Alabama. GDS provides a variety of services to the electric utility
17 industry including power supply planning, generation support services, rates and
18 regulatory consulting, financial analysis, load forecasting and statistical services.
19 Generation support services provided by GDS include fossil and nuclear plant
20 monitoring, plant ownership feasibility studies, plant management audits,
21 production cost modeling and expert testimony on matters relating to plant
22 management, construction, licensing and performance issues in technical
23 litigation and regulatory proceedings.

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II. ASSIGNMENT

Q. What was your assignment in this proceeding?

A. My firm, GDS Associates, Inc. was retained to assist the DPS in development of an analysis of many issues relating to the license renewal at Vermont Yankee. We refer to this as the Act 160 report. DPS also requested GDS personnel to develop testimony to be filed in Docket 7440 based on the results presented in several of the Act 160 report chapters. I drafted the Act 160 report chapter on alternatives to the continued operation of Vermont Yankee. This testimony presents the results of my analysis of alternatives to Vermont Yankee and includes the Act 160 report chapter on alternatives to Vermont Yankee as Exhibit DPS-SMA-2.

III. CONCLUSIONS

Q. How is your testimony organized?

A. I will summarize the contents and structure of our research and report as submitted to the Vermont Department of Public Service, and then touch on the key conclusions of this chapter of the report.

Q. Please describe your methodology for completing the Alternatives to Vermont Yankee chapter of the Act 160 report.

A. This section provides information regarding potential alternatives to the relicensing of Vermont Yankee for continued operation past 2012.

The Vermont Yankee plant is currently rated at 620 MW and produces approximately 4.9 million MWh annually which are sold into the New England power market, about half to Vermont utilities. In 2003, Vermont utilities

1 purchased 35% of Vermont’s total electric generation needs and satisfied 28% of
2 its peak load requirements through the Purchase Power Agreement (“PPA”) with
3 Vermont Yankee. These purchases from Vermont Yankee are on a unit
4 contingent basis – that is, when the plant operates Vermont utilities receive 48%
5 of that output. This is in contrast to the Hydro Quebec contract under which the
6 capacity and energy are guaranteed, independent of the performance of any
7 particular resource in Canada.

8 Additionally, there are miles of high voltage transmission lines devoted to
9 transporting the electricity produced at Vermont Yankee both in Vermont and to
10 neighboring states. Through these interconnections, Vermont Yankee also has a
11 role in physically supporting the electric grid in Vermont and neighboring states.

12 When assessing alternatives, it is important to recognize that the Vermont
13 Yankee plant provides numerous benefits to the state, its utility ratepayers, and
14 the region including: (1) rights to receive 48% of the energy and capacity (after
15 the power up-rate) produced by the plant for each hour in which it operates that
16 are provided to Vermont’s utilities under a purchase power arrangement (“PPA”)
17 signed at the time the plant was sold to Entergy; (2) certain reliability benefits to
18 Vermont and the region associated with the physical location of the output of the
19 plant; (3) millions of dollars in taxes paid annually; and (4) jobs for over 500
20 people. The Economic Benefits chapter discusses these impacts more fully. It is
21 therefore crucial to understand the impact of not relicensing the plant and to
22 discuss the alternatives to continued operation of Vermont Yankee.

23

1 Q. In making your assessment, what topics did you consider?

2 A. To address this topic, the following items were considered:

3 1) Physical Impacts of closing the plant, including the transmission and
4 distribution system implications (local/regional), and the associated system
5 stability and reliability implications, 2) Economic Impacts, including power
6 markets/potential pricing implications (local/regional), and utility energy supply
7 and capacity implications (local/regional) and potential replacement power
8 sources (fossil, imports, renewable, energy efficiency, etc.), and 3) Environmental
9 Implications, including the regional emissions impacts and the Vermont electric
10 sector environmental footprint.

11 This assessment relied on secondary research and a review of numerous
12 relevant documents and reports, including (but not limited to): 1) Vermont
13 Department of Public Service, *Vermont Electric Plan 2005*, January 19, 2005; 2)
14 Vermont Electric Power Company (VELCO), *2006 Vermont Transmission System
15 10 Year Long Range Plan Analysis: A Reliability-Based Electric System Upgrade
16 Schedule for the Vermont Bulk Power Supply System*, June 30, 2006; 3) ISO New
17 England, Inc., *2007 Regional System Plan*, October 18, 2007; 4) Energy
18 Information Administration, *Renewable Energy Trends, 2005 Edition*; 5)
19 Concentric Energy Advisors (CEA), *Vermont Utilities Technical and Cost Issues
20 of Generation Alternatives, Phase One of a Two Phase Report, Draft*, September
21 14, 2007; 6) Vermont Public Interest Research and Education Fund, *A Decade of
22 Change: A Vision for Vermont's Renewable Energy Future*, Summer 2006; and 7)
23 Howland, Robert E., *Memo to Dave Lamont, Assessment of Hydropower*

1 *Expansion*, July 16, 2007. Source 5, the report by Concentric Energy Advisors
2 was extensively used, and is available in full in Exhibit DPS-SMA-3.

3 The first part of the chapter gives an overview of this methodology. The
4 second section summarizes key findings in each of the above mentioned areas.
5 The third section provides area-specific impact assessments and analysis to
6 support our conclusions and recommendations. The fourth and final section
7 describes several potential replacement generation portfolios, and discusses the
8 pros and cons of each.

9
10 Q. Please summarize your findings and conclusions regarding alternatives to
11 Vermont Yankee, starting with the impacts on the transmission and distribution
12 system.

13 A. Below are our key findings and conclusions in each of the previously mentioned
14 impact assessment areas.

15 **Transmission and Distribution System Implications** – Vermont lies in a fairly
16 robust transmission area, which will not be severely adversely affected by the loss
17 of Vermont Yankee. As long as the Hydro Quebec-Vermont Joint Owners
18 contract is extended beyond its current 2016 expiration date and power continues
19 to flow over the Highgate converter, the minor transmission problems apparent if
20 Vermont Yankee is retired also exist in the case where the facility remains in
21 service. VELCO already has plans to address these concerns. However, there are
22 several more serious implications that could result from non-renewal of the

1 Vermont Yankee license for the regional transmission system, especially in the
2 Monadnock regions of New Hampshire and Massachusetts.

3 VELCO submitted a thorough analysis of Vermont's transmission network
4 in June 2006 as part of a 10-year plan for scheduled upgrades and maintenance.

5 The report specifically addressed the possibility that Vermont Yankee does not
6 receive a license renewal past 2012. Removing the Vermont Yankee facility from
7 service will add a certain degree of stress to the local and regional transmission
8 network as Vermont will have to import more power from the regional mix.

9 However, the implications for the local and regional networks will differ only in a
10 few notable ways. Some key findings of this report are:

11 Removing Vermont Yankee from service poses no significant reliability or
12 distribution problems to Vermont's transmission network. While there are some
13 minor negative consequences, all of these are addressed by upgrades and
14 maintenance already under consideration by VELCO even if Vermont Yankee
15 remains in service. While the local implications are fairly minor, the retirement of
16 Vermont Yankee could cause some problems in the regional transmission system.
17 The Monadnock region of Massachusetts and New Hampshire would see
18 heightened reliability concerns in certain outage scenarios. While the Vermont
19 utilities are responsible for local distribution upgrades, they also must pay for 4%
20 of upgrades to the regional transmission system and attention should therefore be
21 paid to regional impacts.

22

1 Q. Please describe your conclusions regarding the physical impacts to the regional
2 electric system and the associated regional pricing implications.

3 A. Energy and Demand, and Associated Power Markets and Pricing Implications
4 (including Potential Replacement Power Sources) – The closure of Vermont
5 Yankee would mean that the New England region will have to replace the
6 capacity and energy supplied into the regional grid in some way. Secondly,
7 Vermont utilities will have to replace the contract or price hedge value that is
8 represented by the current contract with Vermont Yankee.

9 Vermont Yankee is a base load facility, and because of its low variable
10 costs it operates at full output whenever it is available to do so. This is generally
11 24/7 operation except for scheduled refueling outages lasting about three weeks
12 and occasional unplanned outages and deratings. Should Vermont Yankee be
13 retired, the bid stack of units in New England will shift down by 620 MW (out of
14 a fleet of 35,000MW). This will result in a slight increase in regional prices
15 throughout the region.

16 Absent a specific directive to the Vermont utilities mandating a specific
17 power portfolio to replace Vermont Yankee, the regional marketplace will decide
18 what type of power replaces the Vermont portion of the energy which was
19 formerly generated by Vermont Yankee. The other 50%, not currently sold to
20 Vermont utilities, will be replaced by sources developed within the New England
21 market or imports. The nature of these sources will be determined by the market
22 participants and the policies existing in each state.

1 In the short term, it is likely that replacement energy would be supplied
2 from existing fossil fueled plants – most likely existing natural gas combined
3 cycle units which could increase their operating hours to fill the need. In the long
4 run, it is difficult to predict what the marketplace will put forward. Many states
5 have renewable portfolio requirements for power retailers doing business in their
6 states. However, these units cannot be considered as replacements for Vermont
7 Yankee since they are “mandated” already.

8

9 Q. Please describe your conclusions regarding the impact on the power portfolio of
10 the Vermont utilities and potential price impacts of closure.

11 A. Vermont Yankee currently provides energy at a relatively low and stable cost
12 when compared against its practicable alternatives. Vermont distribution utilities
13 have commitments from Entergy under a 2002 agreement, for electricity at
14 between 3.9 and 4.5 cents/kWh. This agreement (PPA) will expire in 2012. If the
15 Vermont Yankee facility license is renewed, new power supply agreements with
16 the Vermont utilities will need to be negotiated. Entergy will have no obligation,
17 post-2012, to provide power at costs below market price. The only obligation it
18 will have with respect to new power purchase agreements is to negotiate with the
19 Vermont utilities in good faith for 30 days.

20 Since the current PPA price for Vermont Yankee is substantially below
21 the current and projected market price for power, any new PPA will likely contain
22 higher prices than the current agreement. Because of the permitting requirements
23 to obtain a Certificate of Public Good “CPG”), Vermont utilities retain significant

1 leverage to negotiate favorable contract terms. However, the amount and nature
2 of any discount included in a new contract is at present uncertain and depends, in
3 some part, on the amount of power Vermont utilities choose to buy from Vermont
4 Yankee.

5 The current transmission grid could effectively accommodate the import of
6 replacement power into Vermont through the existing network to replace Vermont
7 Yankee's generation. However, it is also possible in the long term for Vermont to
8 develop enough generating capacity in-state to support its electrical energy
9 consumption and peak demand needs. With consideration to cost, generating
10 capacity, and Vermont's commitment to renewable and environmentally friendly
11 resources, the most likely sources are some combination of new wind, wood-fired,
12 and additional small hydroelectric generation. In the foreseeable future, however,
13 these sources will not be available in sufficient quantity as is currently provided
14 through operation of the Vermont Yankee facility. Additional imports, secured
15 under a market based contract, will be required to help fill the gap. These imports
16 could come from Hydro Quebec, from the remaining regional system mix, which
17 is currently powered by a combination of fuels (primarily natural gas, oil, coal
18 and other nuclear), or from contracts with specific facilities located in the region,
19 some of which could be renewables. The most likely replacement source for the
20 short term is a negotiated contract or series of market based contracts with
21 suppliers operating within the region.

22

1 Q. Please discuss your conclusions regarding environmental impacts of the closure of
2 Vermont Yankee.

3 A. Environmental Implications – Although emissions (NO_x, SO₂, CO₂, etc.)
4 associated with the operation of nuclear power plants are negligible, there
5 remain concerns over reliability and the federal government’s continuing
6 struggle regarding storage of the nation’s nuclear waste. Replacing power from
7 the Vermont Yankee plant through increased output at other existing power
8 plants in the region, or through construction of new fossil-fueled or renewable
9 facilities, will result in increased air emissions or complicated siting and land use
10 commitments. However, these alternatives to continued operation of the
11 Vermont Yankee plant could reduce concerns over reliability and the expanded
12 need for storage of nuclear waste. It is also important to note, as discussed
13 above, that the closure of the plant does not necessarily result in the construction
14 of additional renewable sources of power as some might suggest, nor does
15 continued operation preclude increased utility reliance on renewables. The
16 plant’s closure similarly would not remove the spent fuel currently stored onsite.

17
18 Q. Please describe the potential replacement portfolios you developed in the last
19 section of your report.

20 A. In the event that Vermont Yankee is retired in 2012, Vermont will have to decide
21 how to best replace the lost generation. This can be accomplished through
22 building new fossil fuel generation capabilities, building a portfolio of new
23 renewable generators, increasing power imports from neighboring states and/or

1 Canada through market purchases, increasing DSM expenditures, or creating a
2 portfolio combining some elements of all of these. Costs associated with
3 additional power imports would depend on market prices. See Exhibit DPS-
4 SMA-4 for electricity price forecasts, as well as predicted emissions from the
5 regional mix. In order to help inform these decisions, GDS has utilized the CEA
6 report and other secondary data sources to develop and summarize pricing and
7 emissions data for four potential portfolios: New Fossil Fuel Generation; New and
8 Expanded Renewable Generation; Continued Operation of Vermont Yankee; and
9 New Imports (see Exhibit DPS-SMA-4). One caution regarding price estimates is
10 appropriate. Energy is a worldwide commodity and the world economic structure
11 is changing rapidly. Demand, and therefore price, for fuel to power generators
12 and steel, copper and other commodities necessary to build them is dependent on
13 the level of growth seen worldwide. Forecasting is always difficult, but it is
14 especially so in the current environment. A qualitative discussion and assessment
15 of the pros and cons for each portfolio is presented below.

16 **Portfolio 1- New Fossil Fuel Generation**

17 Building a new 285 MW natural gas fired combustion turbine combined
18 cycle (CTCC) generator could meet the capacity and energy gap for Vermont's
19 share of Vermont Yankee's retired production. This kind of plant would not pose
20 the types of spent fuel concerns associated with a nuclear plant, but would pose
21 similar reliability concerns. Construction of a single natural gas plant would be
22 cheaper and simpler than building a portfolio of various smaller renewable
23 generators.

1 A plant this size running with an 85% capacity factor would provide over
2 2,100 GWh of energy, and would cost approximately \$230 million to build. The
3 expected lifetime levelized cost per MWh, adjusted for inflation to indicate the
4 annual payments that would need to be made over the plant's estimated lifespan
5 to cover all capital and operating costs, including direct emission costs, would be
6 \$54 per MWh. This represents the estimated operating cost for whoever builds,
7 owns and operates the plant. As such, it would need to be escalated somewhat to
8 reflect required rates of return before comparing alongside market prices. The
9 investment to build and operate this plant could pose a slight rate increase to
10 Vermont ratepayers, but would not be as great an impact as what would occur
11 with the renewable portfolio.

12 While a natural gas plant would be among the cheaper new power plant
13 construction options available to Vermont, it is still a fossil fuel source (with its
14 associated fuel price volatility), and would emit an estimated 850,000 tons of
15 carbon dioxide per year, as well as 106 tons per year of nitrous oxides. One
16 benefit of a CTCC fossil fuel plant is its somewhat flexible siting capability.
17 Unlike wind and hydro plants requiring development only at specific sites
18 (existing dams or remote ridgelines where viable wind resources exist). A CTCC
19 plant can be located closer to available transmission and pipeline facilities and
20 could likely be more easily integrated into the existing transmission infrastructure,
21 cutting down on costly line extensions and interconnection issues. As mentioned
22 above, the costs of a natural gas facility flowing through to ratepayers would vary
23 relative to the market price of natural gas.

1 **Portfolio 2- New and Expanded Renewable Generation**

2 GDS reviewed a published report that identified a portfolio of local,
3 renewable generation resources that Vermont could develop by 2015. This
4 portfolio was used along with information from the CEA report and other publicly
5 available information on renewable facilities being proposed or constructed in the
6 region to come up with a portfolio of renewable resources that could potentially
7 replace the power Vermont currently purchases from Vermont Yankee.

8 This portfolio is composed of 100% local renewable resources, making it a
9 sustainable source of power produced in Vermont. The emissions from this
10 portfolio would be minimal when compared with the fossil fuel portfolio, and are
11 similar to the nuclear portfolio while not posing any of the associated concerns
12 over reliability and spent fuel storage, although siting and land use concerns will
13 remain. Additionally, the generation from these resources would be insulated
14 from the volatility of gas and oil prices. Future increases in the market prices of
15 fossil fuels and uranium could make a renewable portfolio an even more attractive
16 option. Conversely, falling fuel prices would have the opposite effect.

17 This portfolio includes 80 MW of new wood biomass production, 25 MW
18 of improvements to existing small hydro facilities, 444 MW of new wind
19 generation, a combination of improvements to existing landfill gas facilities and
20 new plants totaling 7.5 MW, 5 MW of generation from anaerobic digesters (aka
21 “Cow Power”), and 3 MW of customer sited solar/PV systems.

22 As shown in Exhibit DPS-SMA-4, this portfolio of renewable resources
23 would cost approximately \$73 per MWh to develop and operate and would be

1 more expensive than the New Fossil Fuel Generation Plant (Portfolio 1). Since
2 building this portfolio of resources would represent additional expenses above the
3 anticipated market price, this portfolio would result in some form of increase in
4 the electricity rates seen by Vermont ratepayers. Additionally the capital
5 requirements of \$1.23 billion, required to build this portfolio would be a huge
6 challenge for Vermont's utilities. However, the resulting portfolio represents a
7 mix of all local and renewable resources, and is consistent with Vermont's stated
8 commitment to development and utilization of clean and renewable power
9 production when possible.

10 It should be noted that for wind in particular, it is possible that significant
11 upgrades to the transmission system may be necessary, since likely generation
12 sites include remote ridgelines not on the current power grid. Siting wind
13 generation along Vermont's ridgelines may also be problematic due to issues
14 associated with effects on the view shed and the local wildlife. However, a recent
15 state-wide poll found that 81% of Vermonters would find wind turbines along
16 Vermont's ridgelines acceptable.

17 The majority of air emissions resulting from this portfolio (while
18 extremely low) would come from the wood burning biomass facilities, with an
19 estimated 161 tons of nitrous oxide emissions per year. Over the entire life cycle
20 of all these generators, there will be some emissions associated with the
21 construction of the facilities, transportation of fuel for biomass, etc, but the
22 operations of these units produce no carbon dioxide, making them an extremely
23 attractive alternative. It should be noted that sustainable wood generation, as well

1 as landfill gas and aerobic digesters are considered carbon neutral because,
2 although the process does release some carbon into the atmosphere, it would have
3 been released anyway as part of the materials' natural life cycle, unlike carbon
4 releases from fossil fuel generation.

5 Exhibit DPS-SMA-4 provides a summary of the pricing and emissions
6 associated with each of these portfolios and of a comparative control portfolio
7 (continued operation of Vermont Yankee) discussed below. By utilizing a mix of
8 the most economical resources from the renewables, fossil and imports portfolios
9 the cost impacts associated with replacement power resulting from retirement of
10 the Vermont Yankee plant could be minimized. However, it should be noted that
11 the average capacity factor of the renewable portfolio is 43%, compared with
12 capacity factors of around 90% for nuclear and large combined cycle natural gas
13 plants. This is due to the intermittent operating nature of some of these
14 technologies associated with their reliance on the natural availability of wind, sun,
15 and river flows to generate electricity as compared to a baseload nuclear or
16 combined cycle plant which can be expected to supply full power over 90% of the
17 time. As a result, the total installed capacity of the renewable portfolio needs to
18 be roughly twice that of the other portfolios in order to generate the same amount
19 of energy.

20 **Portfolio 3- Continued Operation of VY**

21 As a comparative control, the continued operation of Vermont Yankee is
22 included as Portfolio 3. For this assessment, it is expected that actual rates would
23 likely be near market price, discounted to reflect the revenue sharing agreement

1 between Entergy and the two large Vermont utilities. Exhibit DPS-SMA-4
2 provides a comparative electricity price forecast and the testimony and exhibits of
3 Witness Jacob Thomas discuss several likely pricing schemes for a renegotiated
4 VY power purchase agreement.

5 There would be no direct emissions from the continued operation of
6 Vermont Yankee, excluding emissions associated with the mining and
7 transportation of the nuclear fuel. However, the continued operation of the
8 Vermont Yankee plant does create the need for additional on site storage of
9 spent fuel, and continued questions as to whether or not the plant can be reliably
10 operated for another 20 years.

11 **Portfolio 4- New Imports**

12 Vermont also could potentially fill the gap left by retirement of the
13 Vermont Yankee plant beyond 2012, through increased imports from Quebec,
14 New York, and from the New England System Mix. The price impacts associated
15 with this portfolio on Vermont ratepayers would depend on the market price of
16 electricity. See Exhibit DPS-SMA-4 for the forecast through 2032.

17 The environmental impact of this option would depend on the ultimate
18 sources of the power Vermont chose to import. For the purposes of this analysis,
19 it was assumed that the lost production from the retirement of Vermont Yankee
20 would be met by importing one-third of this power from Quebec, one-third from
21 New York, and one-third from the NEPOOL system mix. Power imported from
22 Quebec is by far the cleanest, as it is 94% hydropower. The major components of
23 the system mix from New York are 29% natural gas, 23% nuclear, 18% coal, and

1 17% hydropower. The NEPOOL system mix's primary components are 36%
2 natural gas, 27% nuclear, and 15% coal. This portfolio would result in
3 approximately 30% less carbon dioxide emissions than the New Fossil Fuel
4 portfolio, but greater sulfur, nitrous oxide, and mercury emissions. All source
5 emissions from this portfolio would be at much higher levels than the Renewable
6 portfolio or the continued operation of Vermont Yankee. The total emissions
7 from this portfolio can be found in Exhibit DPS-SMA-4.

8

9 Q. Have you provided the bases for your findings and conclusions?

10 A. Yes, the bases for my findings and conclusions are provided in the Act 160 report
11 chapter on Alternatives to Vermont Yankee which is attached to this testimony as
12 Exhibit DPS-SMA-2.

13

14 Q. Does that conclude your testimony at this time?

15 A. Yes it does.