



Synapse
Energy Economics, Inc.

The Vermont Yankee Deal Context and Ratepayer Impacts

Briefing for Vermont Legislators

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Legislative Responsibility under §248

*No **nuclear energy generating plant** within this state **may be operated beyond the date permitted in any certificate of public good** granted pursuant to this title, including any certificate in force as of January 1, 2006, unless the **general assembly approves and determines that the operation will promote the general welfare**, and until the public service board issues a certificate of public good under this section.*

Title 30, Chapter 5, §248(e)(2)

Ratepayer impacts in context

- **Power purchase price**
- **Revenue sharing**
- **Taxes and employment**
- **Clean energy fund contributions**
- **Decommissioning funding, plans, and ultimate responsibility**
- **Site restoration**
- **Spent fuel disposition**
- **Cost of catastrophic failure**

Reliability and ratepayer impacts (from Issues Summary)

Issue	Summary
Power Purchase Agreements (PPAs)	<p>Today utilities buy some power from VYNPS for \$41/MWh under PPAs, expiring no later than March 21, 2012. New PPAs are being negotiated for post-relicensing period.</p> <ul style="list-style-type: none"> • What will be the price, risk, and other terms of replacement PPAs? • What risk will ratepayers have for VYNPS outages? • What are the costs and benefits to Vermonters of VYNPS power sold out of state and/or at market rates? • <i>How should these issues affect the legislature's decision?</i>
Revenue Sharing Agreement	<p>A "revenue sharing agreement" for the first ten years of the relicensing period provides for a 50/50 split between ENVY and VYNPC owners of revenues exceeding \$61/MWh (annual average), escalated annually.</p> <ul style="list-style-type: none"> • What are the likely benefits to ratepayers of this agreement? • What are the tax and credit implications of this agreement? • <i>How should these issues affect the legislature's decision?</i>
Vermont Electricity Market	<ul style="list-style-type: none"> • What is the capability of in-state and regional generation and energy efficiency to meet Vermont's needs, and at what cost? • Are there transmission constraints that affect the ability to replace VYNPS power with power from other sources? • What are the vulnerabilities in the Vermont electric system with and without VYNPS? • <i>How should these issues affect the legislature's decision?</i>
New England Market	<ul style="list-style-type: none"> • What is the role/significance of VYNPS in the regional electricity market? • How would regional prices and reliability be affected by a shutdown? • <i>How should these issues affect the legislature's decision?</i>
Disposition of DOE Settlement Funds	<p>A payment of settlement funds is likely for the Department of Energy's failure to collect and dispose of spent fuel, as promised, starting in 1998.</p> <ul style="list-style-type: none"> • Would these funds accrue to ratepayers, or to ENVY shareholders? • How is this disposition of funds to be accomplished? • <i>How will this issue affect the legislature's decision?</i>

Why not just cost-based?

- In the old days, utilities owned generation (including VYNPS) and charged ratepayers based on cost
- Today most New England generation (including VYNPS) is *merchant* in an unregulated market
- Wholesale contract prices are negotiated and these costs are passed through to ratepayers.

Future briefing topics (tentative)

- Dispatch modeling results (price and reliability)
- Broader economic analysis (jobs, taxes, multipliers...)
- Nuclear-specific issues and risks
- Long-term waste and site remediation
- Update on DPS dockets and studies

- Much more...

- ❑ Legislature-sponsored / DPS reports
 - Act 160 studies
 - Chapter 11 – Economics Report (GDS Associates)
 - Chapter 12 – Alternatives Report (GDS Associates)
 - Vermont Comprehensive Electric Plan 2009
- ❑ Utility studies of alternative sources
 - CEA phase I and II reports
- ❑ Advocates
 - VTEP report
 - Greenberg-Daley
 - Jay Thayer (Entergy) letter to PSB

Power Purchase Agreements

- PPA Basics
 - PPA Benefits
 - Fixed price vs. market-indexed
 - Unit contingent contracts
 - Current ENVY PPAs
- What determines PPA Price?
 - Expected market price
 - Risk management
 - Regulatory requirements
- Future options for stably-priced PPAs

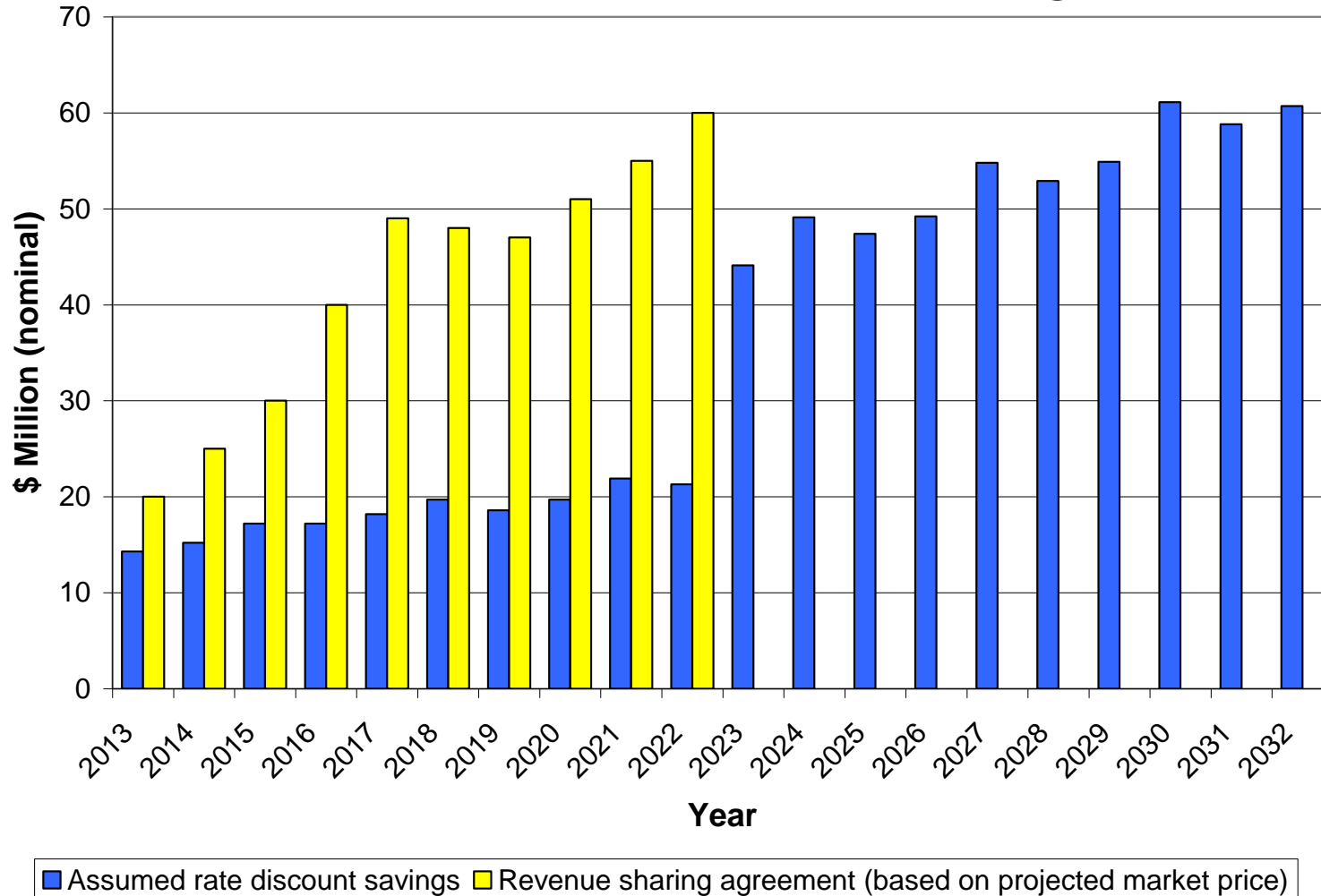
GDS Cost-benefit analysis

- ❑ Quantifies benefits of VY operation to 2032
- ❑ Does not compare to non-renewal scenario
- ❑ Does not include environmental costs & benefits

Conclusions

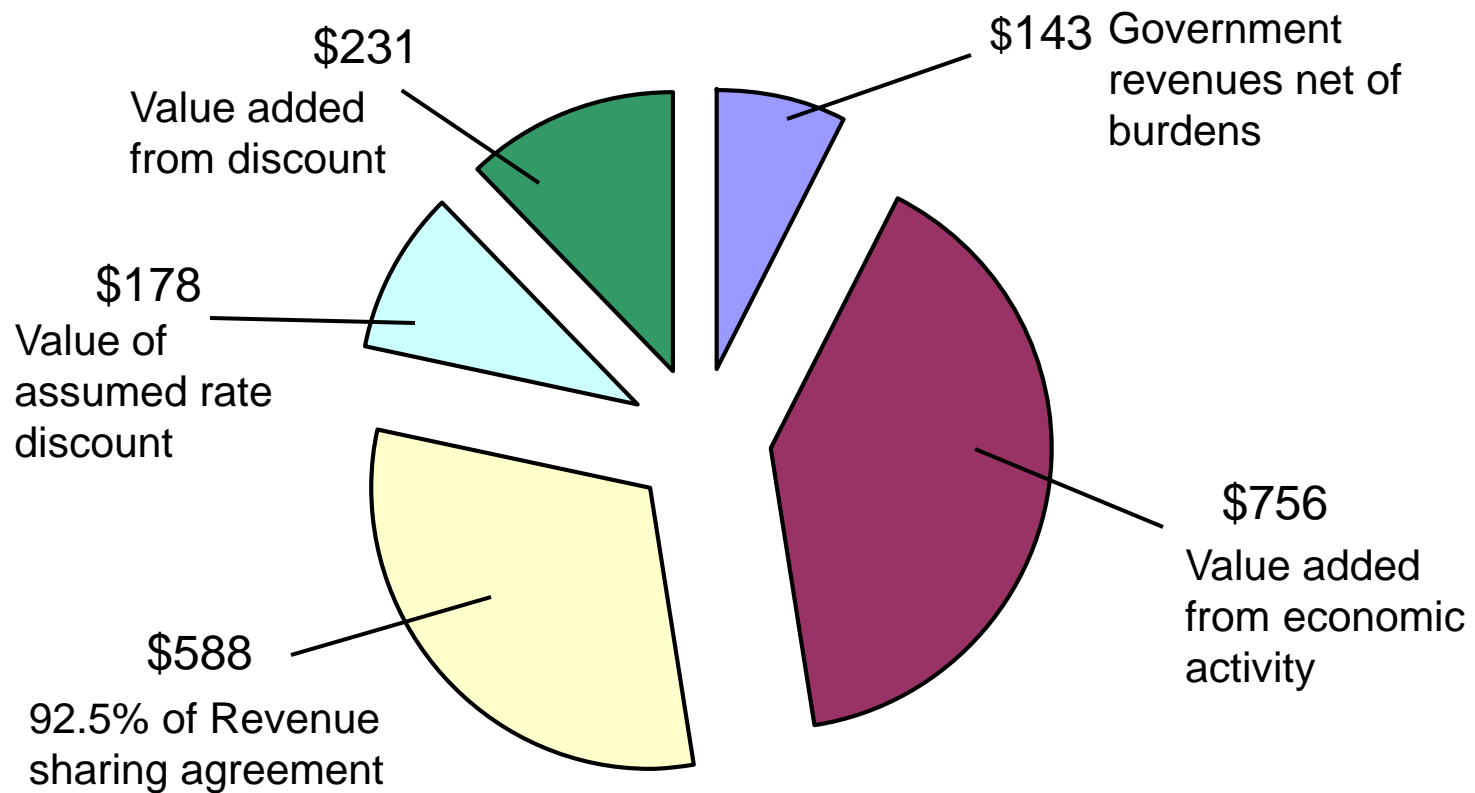
- ❑ 20-year value of VY operation is positive to
 - Vermont state and local governments
 - Overall Vermont economy
 - Ratepayers
- ❑ 20-year value of revenue sharing agreement is positive
 - Results in electric rate discount
 - Assumes 92.5% to utilities in base & high cases, 55% in low case
 - Benefits subject to market price assumptions

Rate Discount and Revenue Sharing Benefits



20-Year net present value of Vermont Yankee (\$M)

Total 20-year projected base case value: \$1.9 Billion



...all subject to numerous assumptions

(Bold) base case assumptions

- VY plant output remains at current levels
- VT utilities pay 15% below market in new PPA for 20 years
- VT utilities buy 45% of VY energy in new PPA for 20 years
- 92.5% revenue sharing to VT utilities
- Continued 3% load growth
- Decommission value the same in 2012 and 2032 – not included
- Broader economics impacts of closing plant not included

Chapter 11 conclusions

Low, base, and high cases

<i>20-Year Net Present Value**</i>			
Component	Extreme Low Case	Base Case	Extreme High Case
Govt Revenues Net of Burdens	\$105.1	\$143.3	\$169.6
Value Added – Econ. Activity	\$642.1	\$755.5	\$868.8
Revenue Sharing Agreement	\$159.0	\$587.8	\$908.0
Potential Electric Rate Discount	\$0.0	\$178.2	\$296.9
Value Added – Rate Discount	\$0.0	\$231.0	\$385.0
Total	\$906.2	\$1,895.8	\$2,628.3
Jobs Supported by Value Added*	21,298.0	30,079.4	36,884.2

GDS Study: Impacts of not relicensing VY

Transmission and distribution

- VT transmission not affected
- MA and NH Monadnock region affected

Environmental

- Short term replacement power higher emissions than VY
- Reduces reliability and safety concerns of nuclear

Regional power markets and pricing

- Power from VY would have to be replaced in regional grid
 - Fossil fuel sources
- “Barely noticeable” wholesale price increase

Vermont energy and demand

- Replacement power in the short term from imports
 - Most likely natural gas sources
- Replacement power in the long term from new VT gen + imports
 - In-state wind, wood-fired, and small hydro

Four portfolio options for Vermont

□ A combination of these portfolios is also an option

New VT Fossil Fuel	New VT Renewable Portfolio	Market Purchase Imports	Continued Operation of VY
<ul style="list-style-type: none"> ▪ 285 MW CTCC ▪ 85% capacity factor 	<ul style="list-style-type: none"> ▪ 565 MW resource mix ▪ 43% capacity factor 	<ul style="list-style-type: none"> ▪ 3 x 92 MW from NEPOOL, NY, Quebec ▪ 87% capacity factor 	<ul style="list-style-type: none"> ▪ 277 MW ▪ 87% capacity factor
<ul style="list-style-type: none"> ▪ \$54/MWh annual cost ▪ Rate increase < renewables ▪ Reliability concerns like VY ▪ 850,000 tons CO₂/yr ▪ 160 tons NO_x/yr ▪ Flexible siting 	<ul style="list-style-type: none"> ▪ \$73/MWh annual cost ▪ Rate increase ▪ Intermittent ▪ No reliability or SNF concerns ▪ Minimal emissions ▪ Location constraints ▪ Other land use issues 	<ul style="list-style-type: none"> ▪ Cost per MWh = market price ▪ 30% less CO₂ than new CTCC option ▪ NO_x, SO₂, & Hg emissions > CTCC 	<ul style="list-style-type: none"> ▪ Cost per MWh = market price – revenue share ▪ Reliability concerns ▪ Additional on-site SNF storage needed ▪ No direct emissions

- ❑ Not really an economic analysis
- ❑ Purpose is to help utilities plan for either contingency

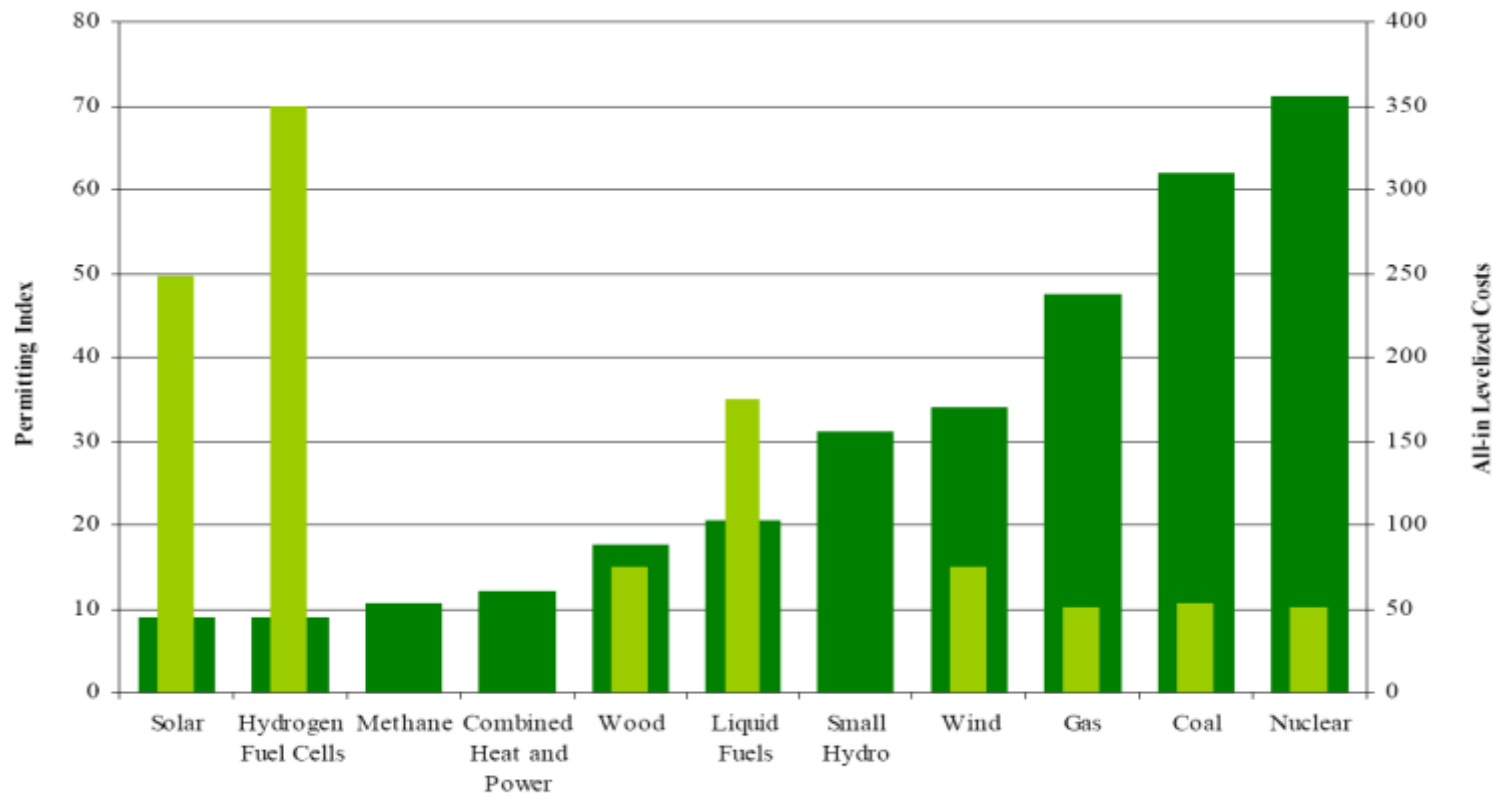
Recommendations to utilities

- ❑ Continue negotiations with VY
 - Entergy burden to show benefits = favorable to utilities, ratepayers
 - Revenue sharing plan can benefit ratepayers
- ❑ Diversify portfolio and manage risk from outages
 - Unit-contingency exposes ratepayers to market prices
- ❑ Plan alternatives
 - Generation, system power contracts, merchant power
- ❑ Diversify mix to renewables & other low-carbon base load
 - Uncertainty of VY future
 - Renew contract with Hydro Quebec

CEA Phase I and II conclusions

- ❑ Least-cost resources are difficult to build and garner public support
 - Pulverized coal, CTCC
 - Scale and financing issues
 - Environmental concerns, regulatory issues
- ❑ Greater reliability comes at greater cost
 - One large plant increases portfolio risk
 - Series of smaller plants diversifies portfolio
- ❑ Renewables are high-cost with few sites available.
 - Low capacity factors, high tech costs, etc.
 - Wind location constraints require new transmission
 - Land use, aesthetics, wildlife concerns complicate siting

CEA comparison of generation technologies: construction, operation & maintenance costs vs. regulatory risk



Source: Vermont Comprehensive Energy Plan 2009, adapted from CEA Phase II Report.

■ Regulatory Index ■ All-in Levelized Cost (\$/MWh)

Vermont Energy Partnership

- ❑ Rise in prices and GHG emissions if VY is not renewed
- ❑ Results based on debated assumptions, e.g. high load increases

Greenberg-Daley Report and Chapter 11 Critique

- ❑ DPS cost-benefit analysis lacks comparison to alternative energy sources
- ❑ Investments in efficiency cheapest way to meet needs
- ❑ Replacement energy sources could provide additional economic benefits to the state

Letter from Jay Thayer, Vice President of Entergy VY

- ❑ MOU provides enough value to Vermont to grant Certificate of Public Good
- ❑ Estimated value at \$938.8 million over 10 years (range \$259M-\$1.4B)
- ❑ Fixed price of energy itself is of great value in uncertain price environment