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Vermont's Energy Forecasting Efforts

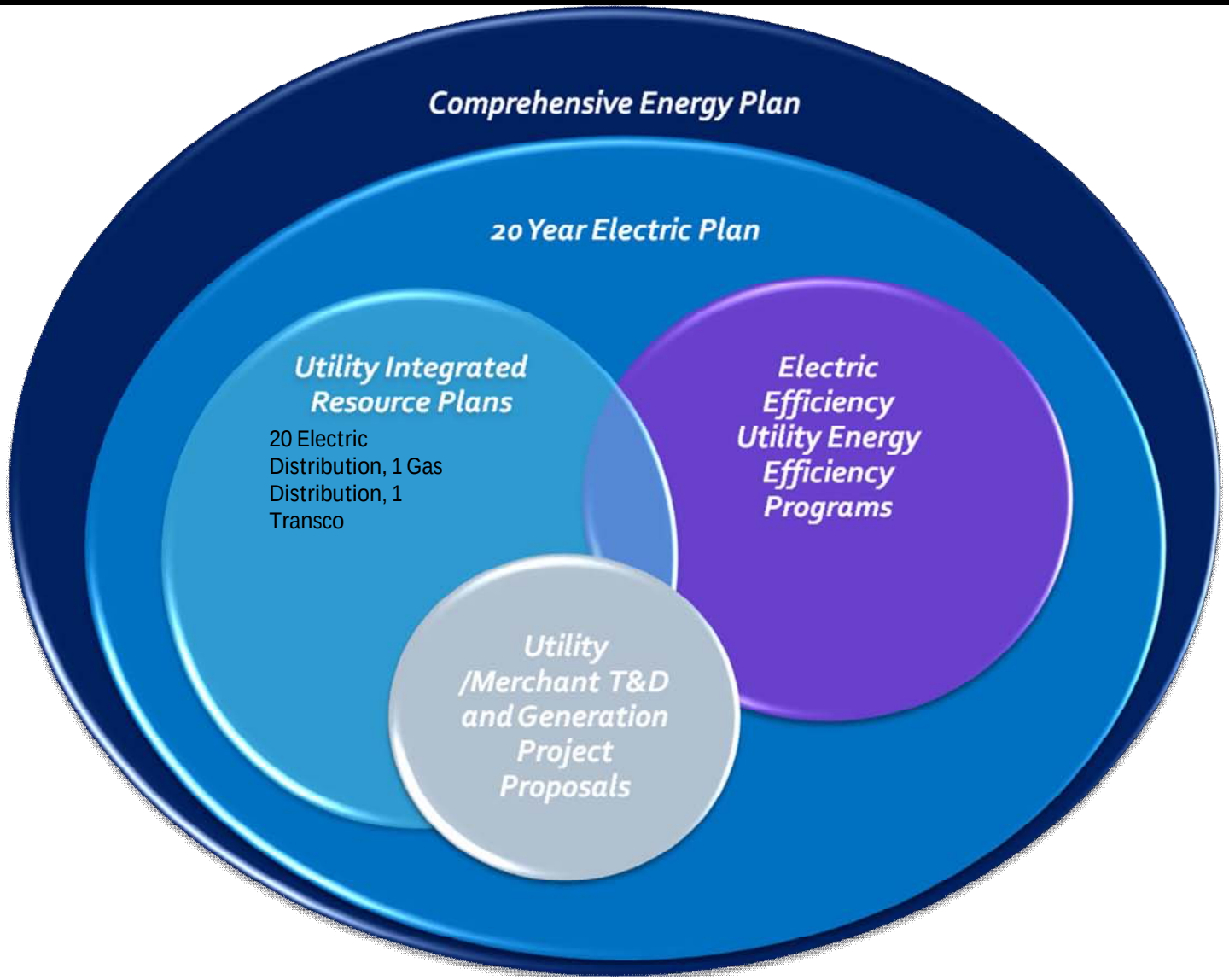
Who We Are?

- Vermont Department of Public Service
  -- Public Advocate
  -- Regulated Utility Planning / Technical Experts
  -- Oversee 21 Electric Utilities and 1 Gas Utility in a state with a population of roughly 610 thousand
  -- Responsible for all fuels planning
  -- Participate in regulatory proceedings before the PSB
  -- Roughly 40 staffers (4 in my Planning Division – typically 1 forecaster)

Major Forecasting and Policy Simulation Needs

- Comprehensive Energy Plan
  - Required under statute every 5 years
  - Draft Released in May 2008
- 20 Year Electric Plan
  - Required under statute at least every 5 years
  - Last Released January 2005, draft update in October 2006
- Governor's Commission on Climate Change
  - with DPS assisting on the energy policy analysis

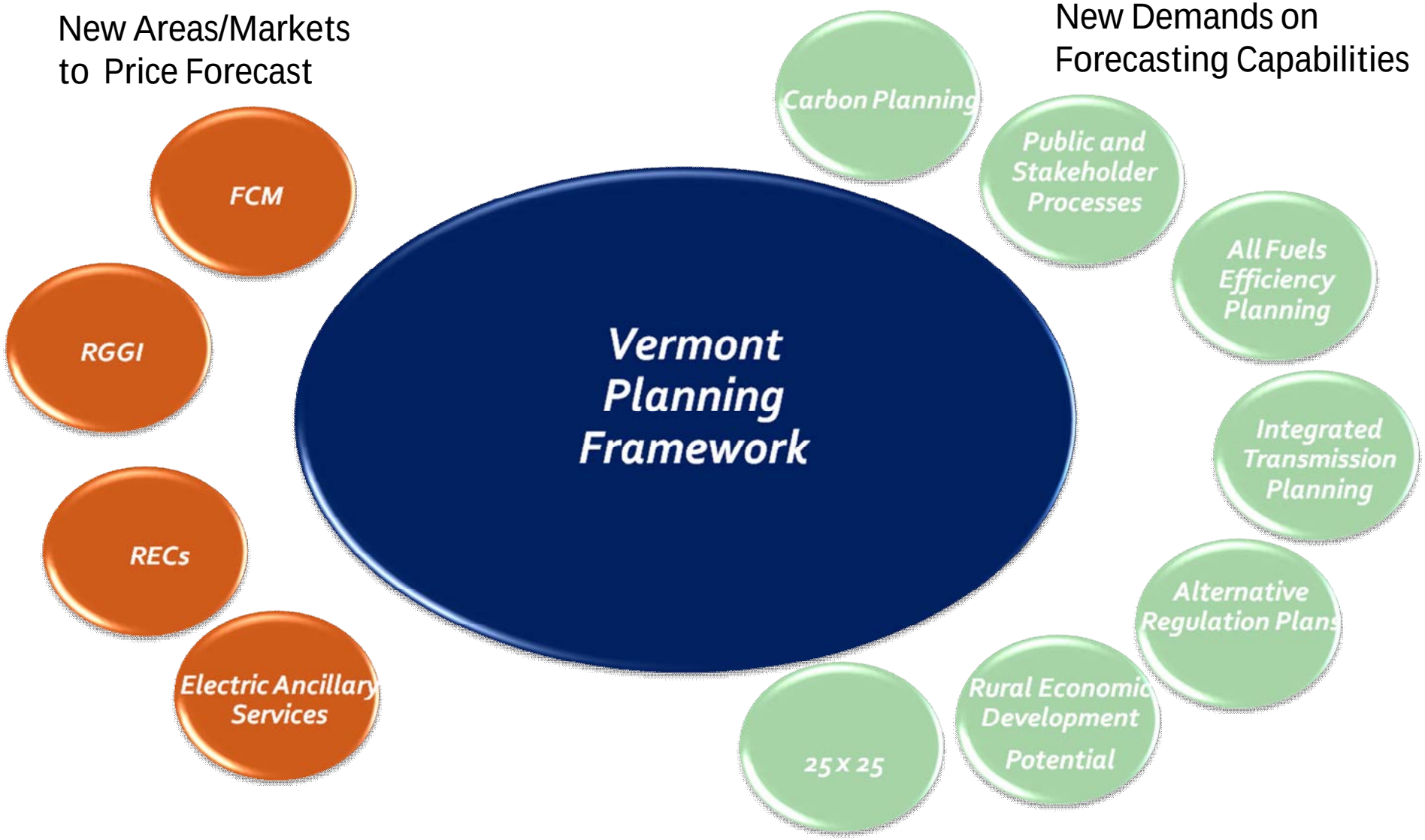
Vermont's Traditional Planning Framework



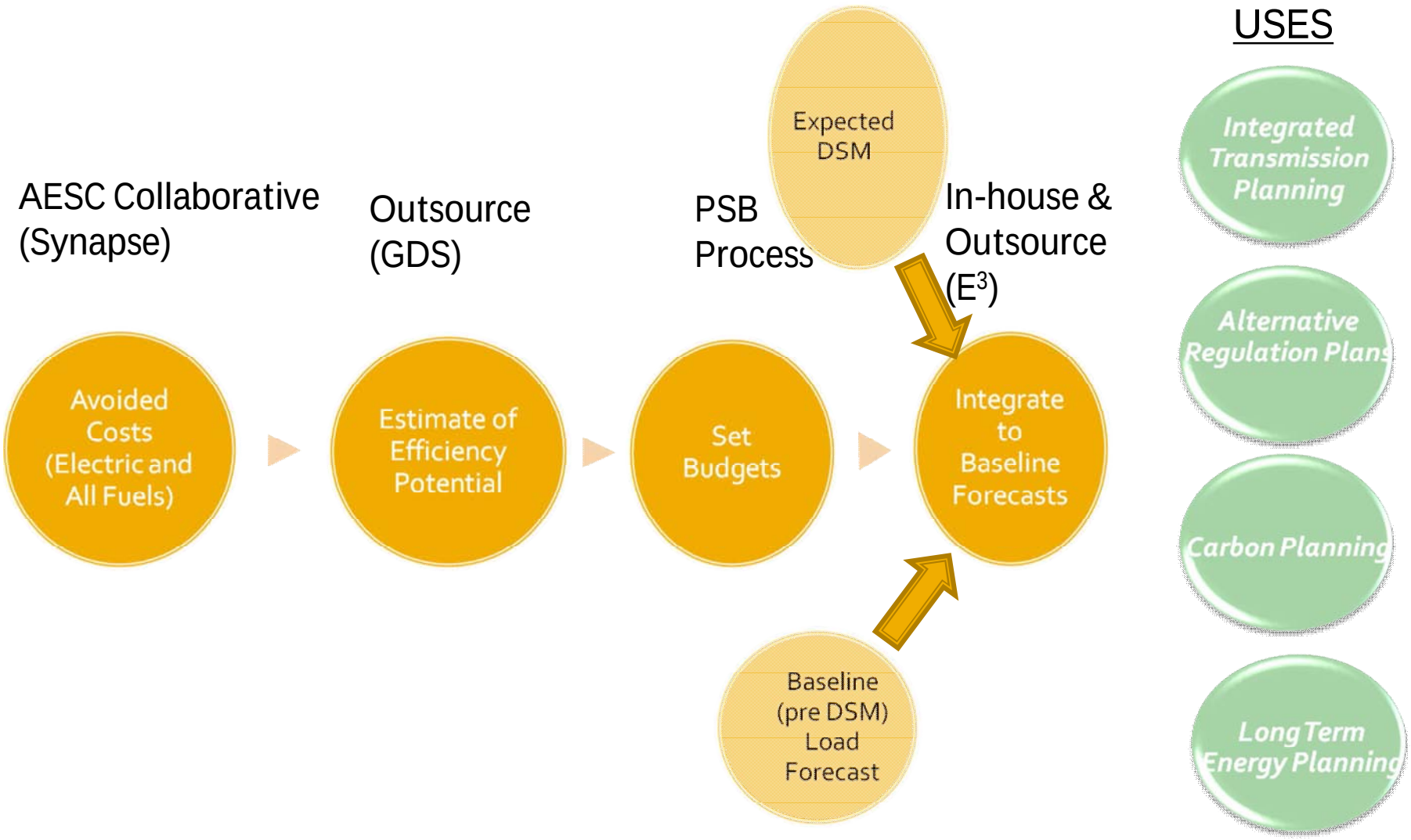
New Challenges for Forecasters

New Areas/Markets to Price Forecast

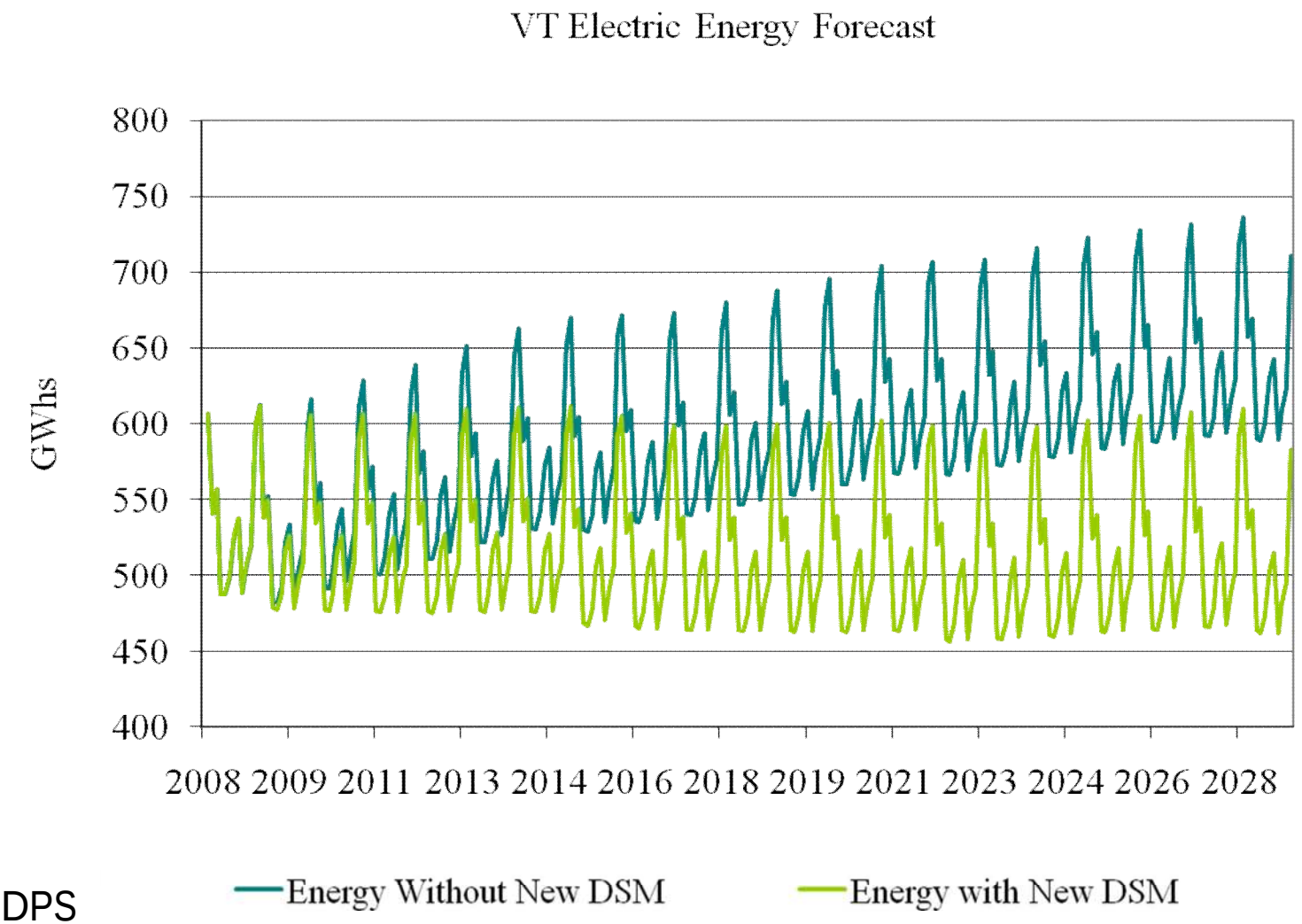
New Demands on Forecasting Capabilities



Forecasting Process

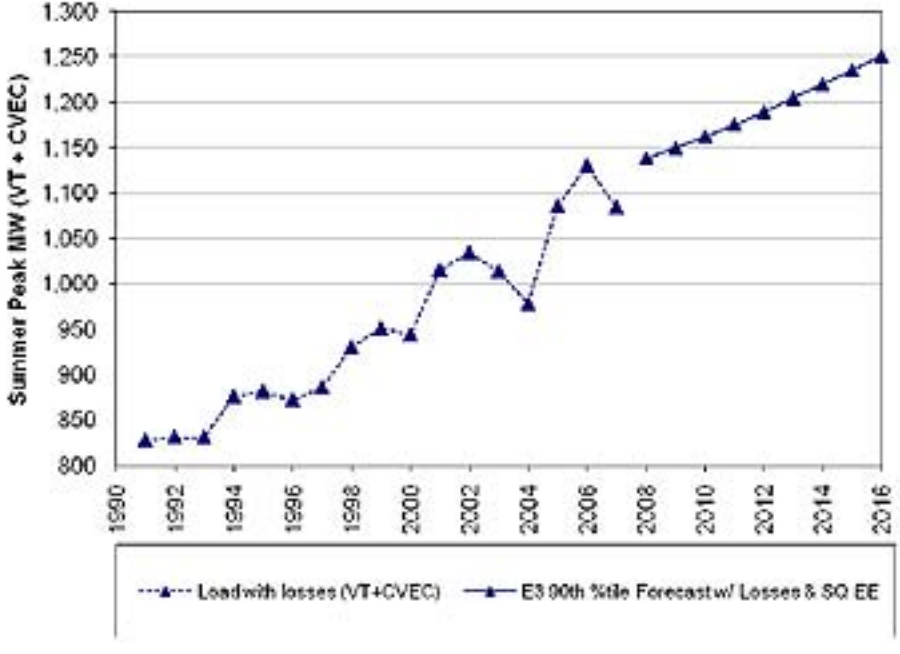


Vermont Electric Energy Forecast



Source: VT DPS

Vermont Electric Peak Forecast (Extreme Summer Weather)

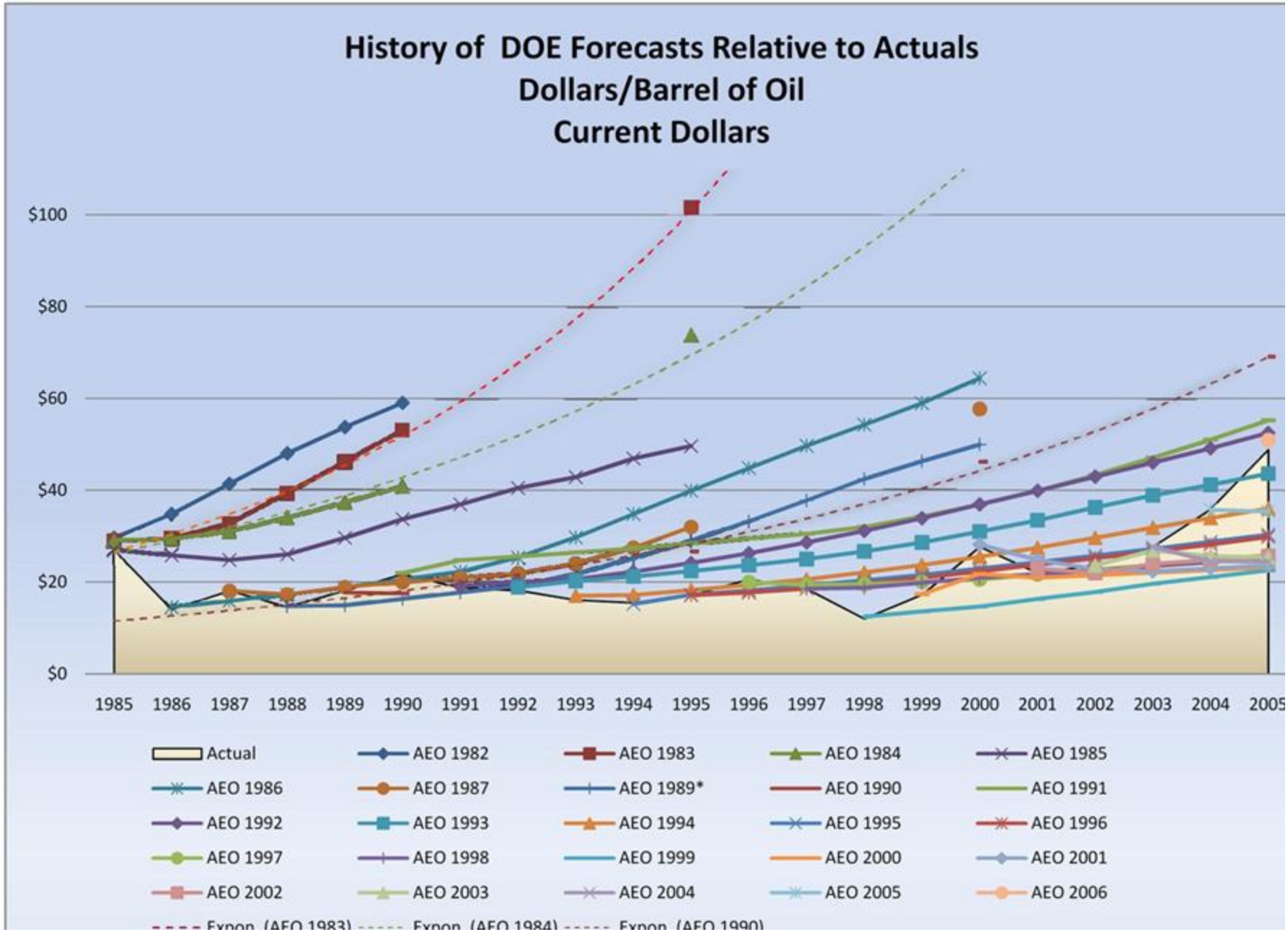


Variable	Coefficient estimate with standard errors in ( )	*p*-value
Intercept	351.0 (35.76)	<.0001
= 1 if June, 0 otherwise	-5.02 (2.67)	0.0607
= 1 if July, 0 otherwise	-2.99 (2.53)	0.2369
= 1 if August, 0 otherwise	13.90 (2.54)	<.0001
= 1 if Monday, 0 otherwise	7.78 (2.16)	0.0003
= 1 if Tuesday, 0 otherwise	5.96 (2.09)	0.0045
= 1 if Wednesday, 0 otherwise	2.46 (2.13)	0.2476
= 1 if Thursday, 0 otherwise	5.54 (2.15)	0.0101
EE size (MW)	-0.692 (0.08)	<.0001
Time trend t	-43.86 (3.40)	<.0001
Average WTHI	5.39 (0.52)	<.0001
Time trend * Average WTHI	0.847 (0.049)	<.0001
F-statistic with (11, 787) degrees of freedom	1164	<.0001
Adjusted R^2	0.9413	
Mean square error	347.2	

Source: E³ report for VT DPS, Docket 7373

Forecasts Approaches Used

Forecast	Sources	Leveraging	Advantages	Disadvantages
Fuel Prices and Avoided Energy Costs	DOE forecasts customized to Vermont and New England	Collaboration with neighboring states and utilities through AESC	• Affordable • Large Pool for Peer Review •Regular Schedule	• Timing
Economic and Demographic	•Moodies •REMI	Secondary contracts with sister agencies	•Affordable •Credibility	•REMI capabilities have been underutilized
Electricity Energy and Peak	•In-house •Outsource for larger project reviews	VSPC (relatively new instate planning process)	Some bill-back opportunities in formal cases	Inadequate peer review of in-house forecasts
Comprehensive And Integrated Modeling	•VENSIM/ System Dynamics •Old Energy	???	Comprehensive	Work-in-progress Initial build time


History of DOE Forecasts Relative to Actuals
Dollars/Barrel of Oil
Current Dollars
$100
$80
$60
$40
$20
$0
1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005
Actual
AEO 1982
AEO 1983
AEO 1984
AEO 1985
AEO 1986
AEO 1987
AEO 1989*
AEO 1990
AEO 1991
AEO 1992
AEO 1993
AEO 1994
AEO 1995
AEO 1996
AEO 1997
AEO 1998
AEO 1999
AEO 2000
AEO 2001
AEO 2002
AEO 2003
AEO 2004
AEO 2005
AEO 2006
Expon. (AEO 1983)
Expon. (AEO 1984)
Expon. (AEO 1990)

Comments and Conclusions

- Need for effective forecasts has increased substantially during a period of declining budgets and personnel (on an already small resource base)
- Successful Strategies so far …
  - Partnering with other jurisdictions
  - Outsourcing (where funds are available)
  - Fostering planning processes that clearly places burden of forecasting on others
  - Leverage forecasting efforts/license arrangements from sister agencies through secondary licenses
  - Keeping it relatively simple and leveraging work of others
- Where we have struggled …
  - Complex models (building system dynamics model)…, but plan to persevere
  - Single forecaster (staff turnover and inadequate peer review)
- Increasing demand for forecasts and independent analysis (Strategy going forward is to continue to build a comprehensive and – hopefully – transparent policy simulation and forecasting environment using system dynamics working first from Energy 2020 framework, at least in the early going)

Appendix – Web References to Plans, Studies, and Forecasts

- Comprehensive Energy Plan
  - Required under statute every 5 years
    http://www.leg.state.vt.us/statutes/fullsection.cfm?Title=30&Chapter=005&Section=00202b
  - Draft Released in May 2008
    http://www.publicservice.vt.gov/planning/CEP%20%20WEB%20DRAFT%20FINAL%206-4-08.pdf
- 20 Year Electric Plan
  - Required under statute at least every 5 years
    http://www.leg.state.vt.us/statutes/fullsection.cfm?Title=30&Chapter=005&Section=00202
  - Last Released January 2005, draft update in October 2006
    http://www.publicservice.vt.gov/pub/state-plans/state-plan-electric2005.pdf
    http://www.publicservice.vt.gov/pub/other/drafteplanupdate.pdf
- Governor's Commission on Climate Change
  - http://www.anr.state.vt.us/air/Planning/docs/GCCC%20Final%20Report_pages%201-10.pdf
    with DPS assisting on the energy policy analysis

Appendix

- Economic impacts analysis (job impacts) http://www.vtrural.org/files/Energy%20Report%209-18-20071.pdf by Vermont Rural Energy Council with DPS assisting the modeling
- Economic forecast drivers for energy forecasts http://www.economy.com
- Efficiency potential studies to inform efficiency program funding http://www.publicservice.vt.gov/pub/other/allfuelstudyexecsummary.pdf http://www.publicservice.vt.gov/energy/vteefinalreportjan07v3andappendices.pdf http://www.publicservice.vt.gov/pub/aescstudy.htAvoided cost estimates (fuel price projections) for energy efficiency programs screening ml
- Public/stakeholder engagement http://www.publicservice.vt.gov/planning/mediatedmodeling.html