

**Disconnect In Connecticut:
The Unfulfilled Promise of Demand-Side
Transmission Resources**

**ACEEE CONFERENCE ON EFFICIENCY AS A
RESOURCE**

Berkeley, CA

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OVERVIEW

- Background
 - Least-cost transmission planning: what's load got to do with it?
 - Harnessing Connecticut's demand-side transmission resources
- IV. Prospects for efficient reliability in Connecticut

I. BACKGROUND

Optimal Energy:

- Six-person consultancy founded 1996
- Planning, design, and management support for efficiency investments
- Our specialties:
 - Economics of distributed resources
 - Commercial/industrial efficiency
 - Business development
- Led studies of efficiency potential in Vermont, New York, and Maine.
- Played key roles on two projects integrating efficiency into transmission and distribution planning in Vermont.

I. BACKGROUND (con't)

For Connecticut Office of Consumer Counsel:

- Testimony before Siting Council on ability of Conservation and Load Management (C&LM) to contribute transmission capacity in southwestern Connecticut (March 2002; January 2003)
- Analysis and report to Department of Public Utility Control on performance incentive mechanism for C&LM program administrators (in progress)

II. Transmission Capacity: What's Load Got to Do with It?

A lot, according to...

- Connecticut's regulators
- ISO New England
- Connecticut utilities

II. LOAD AND TRANSMISSION CAPACITY NEED

Peak demand growth affects both ...,

- Magnitude
- Timing

...of future transmission capacity need

More rapid demand growth

- Increases the amount of total capacity needed at any given time in the future
- Accelerates need to expand capacity

II. LOAD AND TRANSMISSION CAPACITY NEED

Lower demand growth postpones

- Critical need date = time by which higher load on existing capacity pushes reliability below minimum acceptable threshold
- Capacity additions otherwise needed to avert reliability problems

II. LOAD AND TRANSMISSION CAPACITY NEED

Connecticut's regulators know this, or at least knew this once upon a time....

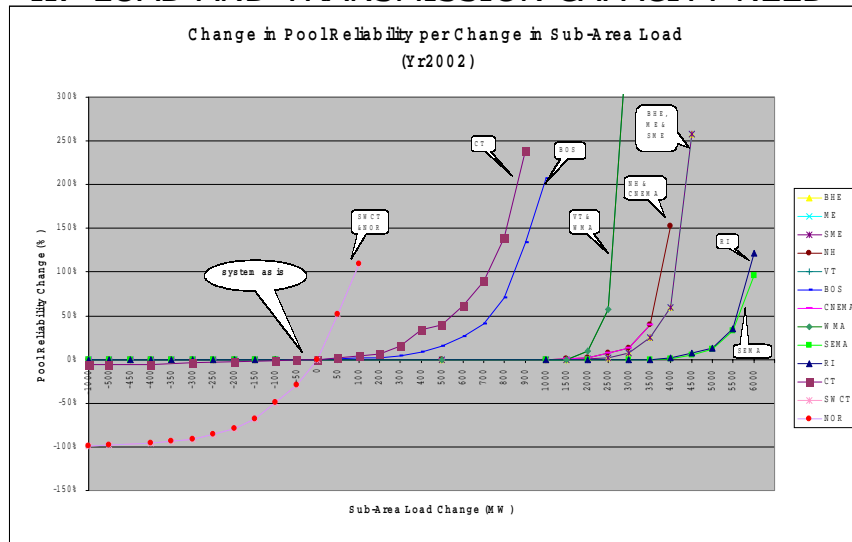
In 1975, the Siting Council's predecessor found that slower load growth due to the energy crisis of 1973-4 and its aftermath postponed the need for adding transmission capacity to serve southwestern Connecticut.

In 1982, the Siting Council found that "recent decreases in load growth ...will result in considerable delay in the requirement for a 345 kV loop into the southwestern area...." (Siting Council Findings, October 8, 1982)

II. LOAD AND TRANSMISSION CAPACITY NEED

ISO New England sure LOOKS LIKE it knows this.....

II. LOAD AND TRANSMISSION CAPACITY NEED



II. LOAD AND TRANSMISSION CAPACITY NEED

- This graph was presented by ISO NE as part of its regional transmission expansion plan (RTEP) process
- It plots
 - change in loss of load probability, against
 - Change in MW peak load
- For SW CT, it shows:
 - A 100 MW load reduction would provide
 - A 50% drop in LOLP

II. LOAD AND TRANSMISSION CAPACITY NEED

- SO.... You'd think that
- this is a made-to-order opportunity for C&LM to make a difference in transmission planning,
- And that C&LM would get serious consideration in the process...

II. LOAD AND TRANSMISSION CAPACITY NEED

- WELL.... Guess again.
- Here's the full extent of C&LM's treatment in CL&P's filing with the Siting Council:
- "Based on current peak load projections, demand-side management and distributed generation cannot meet the large scale reinforcement need in southwestern Connecticut. It would be difficult to compensate for the magnitudes of load growth coupled with potential generation requirements, and would pose substantial implementation difficulties."

II. LOAD AND TRANSMISSION CAPACITY NEED

SO.....The answer is?

- the proposed Bethel-Norwalk transmission line, followed by
- the anticipated Middletown-Norwalk line
- Between them, "the total project is estimated to be in excess of \$600 million." (ISO-NE Board of Directors, November 7, 2002)

In other words.....

- spend over half a billion dollars on a 345 kV transmission line
- running through the most expensive real estate on the planet (aka "substantial implementation difficulties")

II. LOAD AND TRANSMISSION CAPACITY NEED

Deferring this investment by one year would

- avoid the annual carrying charges associated with return **ON** and **OF** capital associated with the project .
- Reduce the present value of transmission revenue requirements by approximately \$60 million

III. HARNESSING CONNECTICUT'S DEMAND-SIDE TRANSMISSION RESOURCES

- **Transmission Capacity From C&LM in Connecticut**
- **Economics of Connecticut's Demand-Side Transmission Resources**

III. HARNESSING CONNECTICUT'S DEMAND-SIDE TRANSMISSION RESOURCES

- **Transmission Capacity From Connecticut's C&LM**

Connecticut has been among the nation's leaders in energy efficiency programs in terms of

- Scope
- Design
- Scale

III. HARNESSING CONNECTICUT'S DEMAND-SIDE TRANSMISSION RESOURCES

SCOPE: Programs target all

- major lost-opportunity markets
- discretionary retrofit markets.

DESIGN: Program designs are aggressive,

- Paying most if not all incremental costs of efficiency in new construction or replacement
- Buying down customer retrofit costs so that they yield paybacks of 2 years or less, depending on customer type

III. HARNESSING CONNECTICUT'S DEMAND-SIDE TRANSMISSION RESOURCES

SCALE:

- Total C&LM spending in 2001 was \$77 million
- Savings from all program operations in 2002 are projected to be 67 MW
- Cumulative savings from 1990 through 2002 = 500 MW
 - Without this prior investment, the RTEP graph shows that CT LOLP would increase by 40%
 - SW CT LOLP would be drastically higher without its share of past C&LM

III. HARNESSING CONNECTICUT'S DEMAND-SIDE TRANSMISSION RESOURCES

Connecticut could increase savings still further by

- Increasing budget to relieve over-subscription of current programs at current funding levels
- Expanding program eligibility to more customers and efficiency technologies
- Intensifying marketing to achieve near-universal participation
- Increasing incentives for targeted efficiency measures and/or customers
- Strengthening delivery services to make it easier for customers to choose and install efficiency technologies
- Targeting investments in places where they have the most value

III. HARNESSING CONNECTICUT'S DEMAND-SIDE TRANSMISSION RESOURCES

- Over the next 5 years, I estimate that enhancing and expanding current programs could achieve
 - 112 MW in cumulative annual peak load reductions in southwestern Connecticut
 - 40 MW of which would be realized in the Norwalk-Stamford area.
- These figures correspond roughly to a 75% increase in the current pace of C&LM acquisitions in Connecticut

III. HARNESSING CONNECTICUT'S DEMAND-SIDE TRANSMISSION RESOURCES

B. Economics of Demand-Side Transmission Resources

Costs = Efficiency technology costs, plus
Program administration costs

Benefits = Avoided electricity costs, plus
Avoided non-electric resource costs

Electricity benefits consist of avoided costs for

- Energy generation (including congestion costs)
- Generating capacity
- Distribution capacity
- Transmission capacity

III. HARNESSING CONNECTICUT'S DEMAND-SIDE TRANSMISSION RESOURCES

C&LM should be treated analogously to generation alternatives to transmission capacity

The net cost of transmission capacity from generation alternatives (\$/kW or \$/kW-yr) =

- Generator capacity payments or capital costs,
- MINUS
- Value of energy output sold into the market (net of fuel costs),
- DIVIDED BY
- Peak capacity contribution from generating source

III. HARNESSING CONNECTICUT'S DEMAND-SIDE TRANSMISSION RESOURCES

LIKEWISE:

- Net cost of C&LM transmission capacity =
- Total resource costs
- MINUS
- Present value of all non-transmission resource benefits (avoided energy and generation and distribution capacity)
- DIVIDED BY
- Peak capacity provided by peak demand reduction

III. HARNESSING CONNECTICUT'S DEMAND-SIDE TRANSMISSION RESOURCES

From CL&P's 2002 C&LM plans:

- Residential programs average a net cost of ***negative*** \$19/kW-yr. of peak demand reduction
- Commercial and industrial programs average ***minus*** \$37/kW-yr

As Amory Lovins once put it, C&LM offers demand-side transmission capacity that is

- Not just a free lunch, but
- A lunch you're paid to eat

IV. PROSPECTS FOR EFFICIENT RELIABILITY IN CONNECTICUT

LEAST-COST PLANNING OBJECTIVE:

Choose the portfolio of transmission and non-transmission resources that minimizes the total costs of providing reliable service to Connecticut electricity consumers

IV. PROSPECTS FOR EFFICIENT RELIABILITY IN CONNECTICUT

Connecticut can find the least-cost solution by developing and comparing competing scenarios,

- Each constructed to furnish the same target reliability performance
- Each involving different amounts of
 - Transmission
 - Generation
 - C&LM, including demand-response initiatives

It is doubtful that the least-cost solution consists entirely of one type of new capacity

IV. PROSPECTS FOR EFFICIENT RELIABILITY IN CONNECTICUT

The gains to Connecticut's economy from pursuing the least-cost portfolio equal the difference between the total resource costs of

- The all-transmission scenario
- The least-cost combination of transmission and non-transmission alternatives

IV. PROSPECTS FOR EFFICIENT RELIABILITY IN CONNECTICUT

Today the transmission planning system has a built-in bias

- Towards transmission
- Against non-transmission alternatives
- Even those such as expanded C&LM with zero or negative resource costs

IV. PROSPECTS FOR EFFICIENT RELIABILITY IN CONNECTICUT

Connecticut's C&LM budget has been decimated in 2003, as funds have been re-allocated to address the state's fiscal crisis

Unless this development is reversed soon,

- Reliability will decline as load growth accelerates
- Total costs will increase as costly and risky transmission and other supply investments fill the gap
- Both outcomes could harm Connecticut's economy
- State regulators appear to have the authority to order utilities to invest in C&LM to avoid more costly T&D