

Energy Efficiency for Needy Buyers in a Sellers' Market:

How Efficiency Programs Helped Vermont Reduce the Burden of Electricity Costs Even As Market Prices Rose

Carnegie Mellon University: EPP and CEIC
Pittsburgh Pennsylvania
November 1, 2006

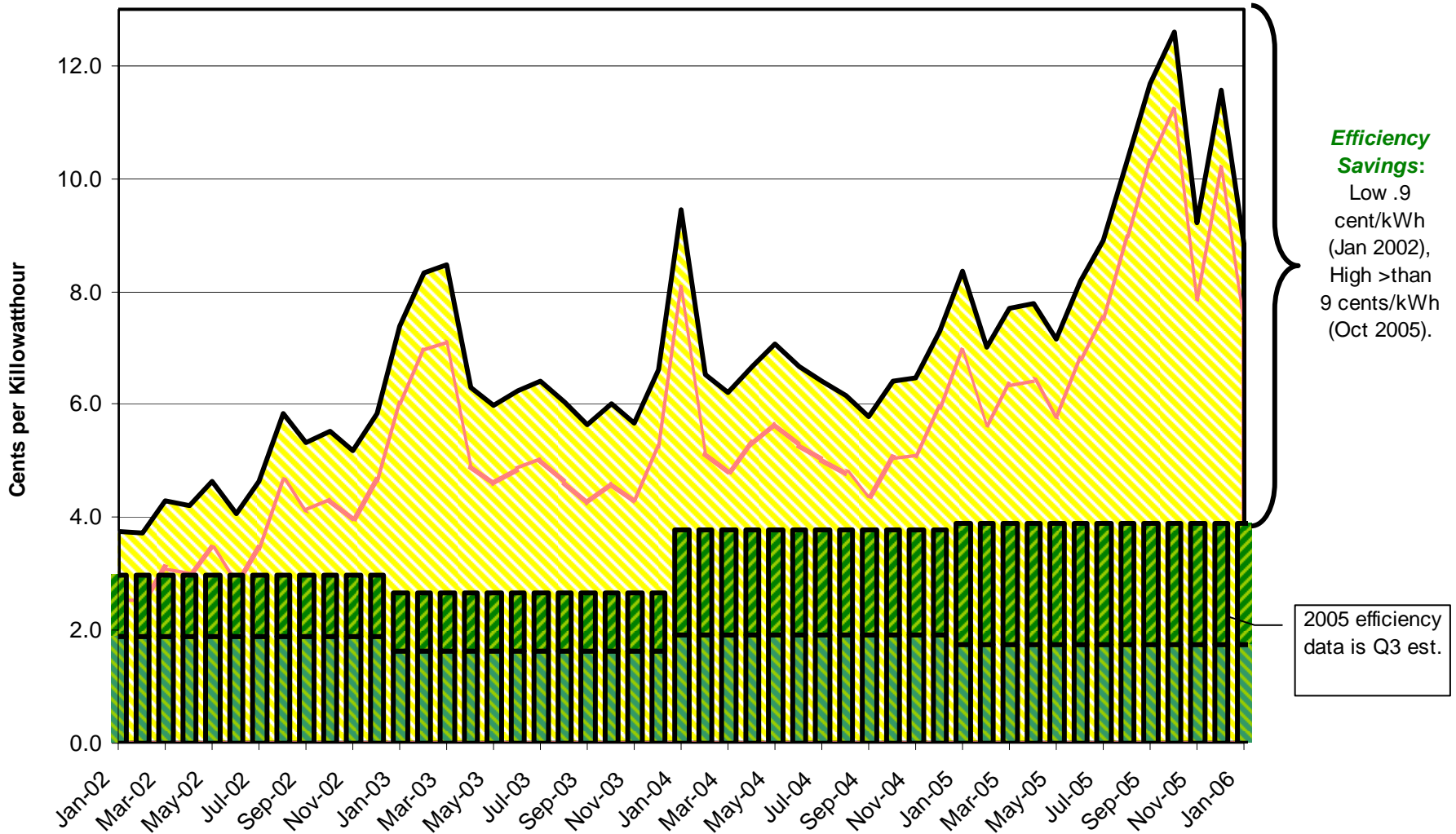
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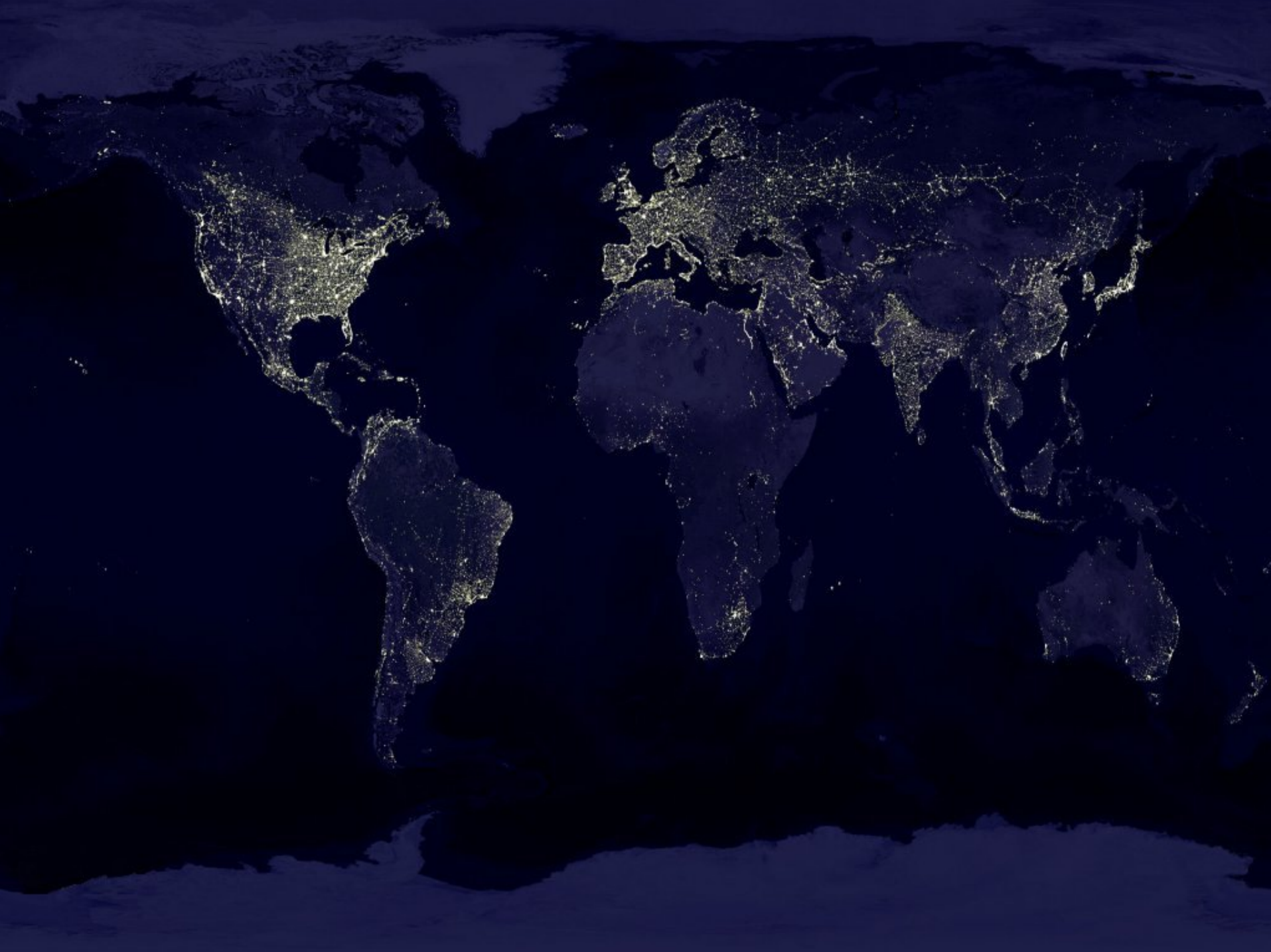
One Minute, Four Sentences, About Why I Am at the Vermont Law's Institute For Energy & the Environment:

- * Energy policy is our world's most important environmental issue.*
- * Environmental issues are the energy sector's most important challenge.*
- * America's legal system will critically affect how humanity deals with this*
- * Vermont Law teaches people how to work with -- and improve -- that system.*

Wholesale Power Costs vs. Efficiency Vermont Costs, 2002 - 2005



Cost of Wholesale Electric Energy including ancillary and bulk transmission costs
 ISO NE Monthly Average Wholesale Market Price
 Efficiency Vermont, Contract Price per levelized kWh, stacked below customer-cost



Why Will Energy Prices Stay High ?

World Fundamentals Will Drive Oil & Gas Prices

Oil & Gas Will Drive Coal and Uranium Pricing

6.1 Billion People in the world of 2000

0.6 Billion averaging 10,000 kWh/household (US level ca. 12,000)

2.0 Billion averaging 5,000 kWh/household (typical Latin/Eastern Eur)

2.0 Billion averaging 1,000 kWh/household (typical Asia, Africa)

1.5 Billion without electricity

What happens if 5.5 billion people want 5,000 kWh/ year in 2025 ?

Answer: about 200% of 1990s' electricity demand

What happens if 9 billion people want 5,000 kWh/year in 2030 ?

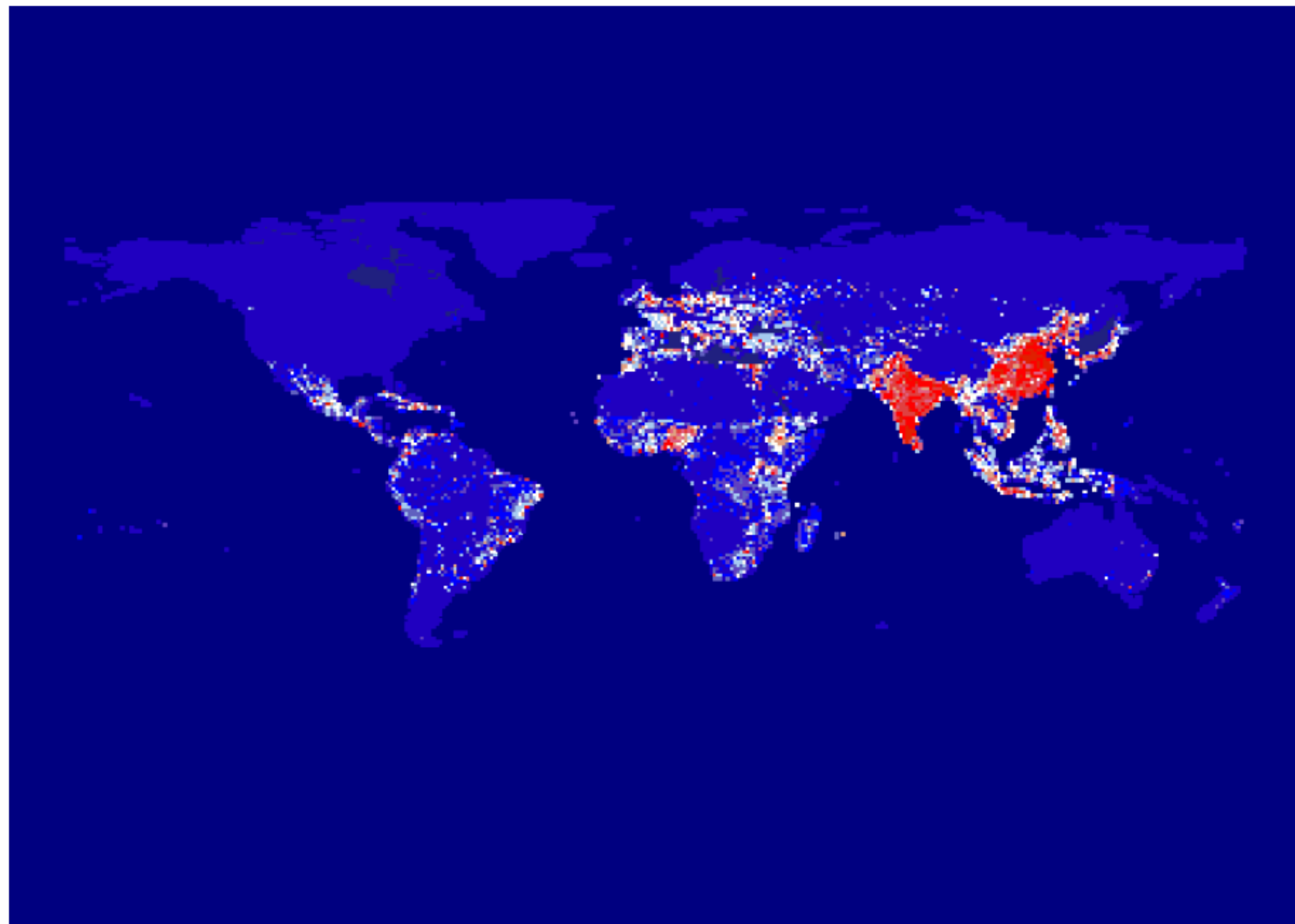
Answer: almost 300% of 1990s' electricity demand

What happens if 9 billion people want 10,000 kWh/year in 2030 ?

Answer: over 500% of 1990s' electrical demand.

Pareto assumption – new need met without reducing current usage levels of 600mm

Increases in light flux if everyone outside USA lit like USA (1996-7),
Or latent electricity demand, blue to white to red color ramp



Source: Nadja Makarova Victor & Jesse Ausubel, 2004

Between 1999 and 2005 Vermont doubled its commitment to strong energy efficiency programs. The result?

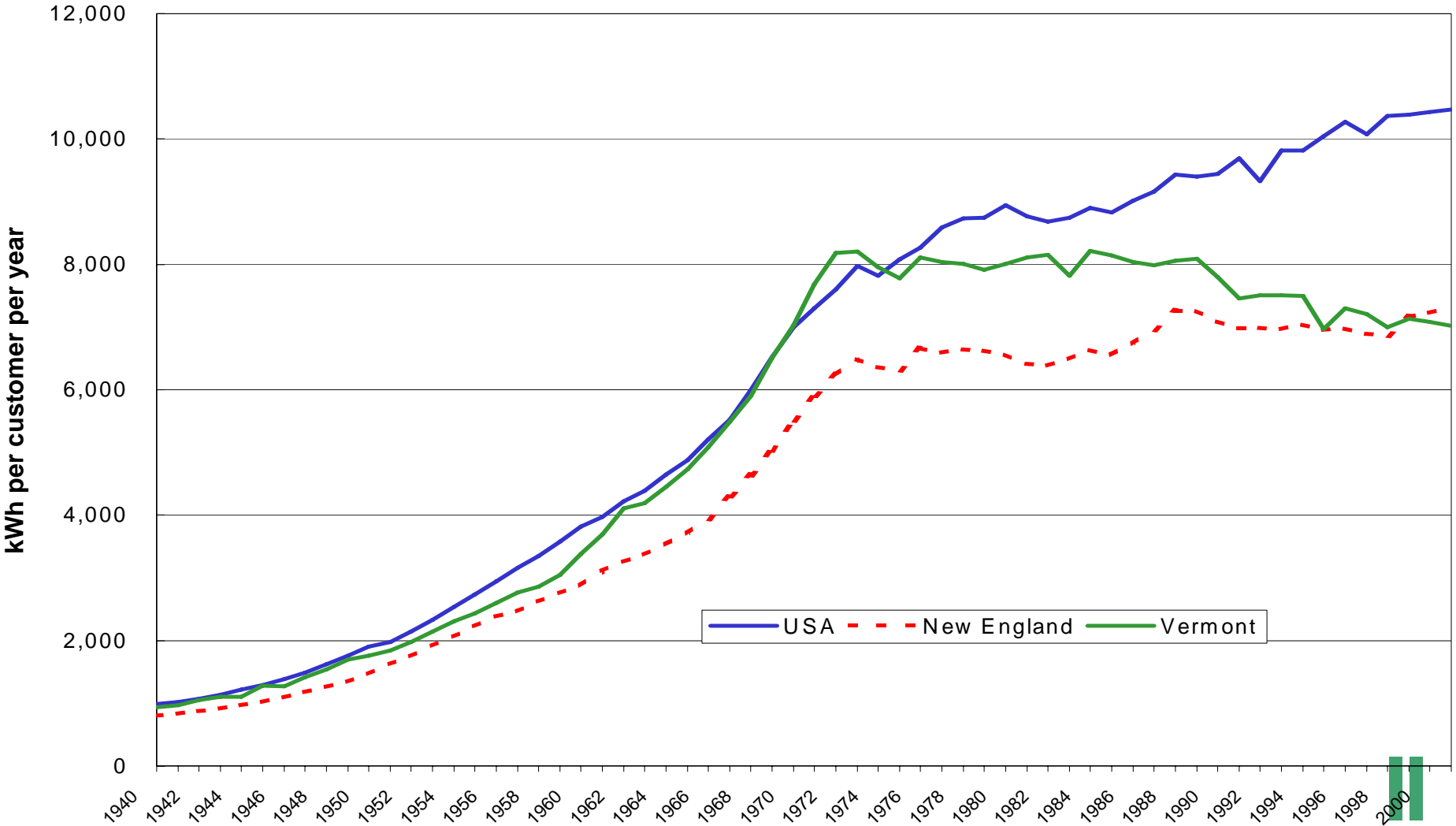
Lowering the burden of electric costs for Vermont residents and businesses:

In 1999, Vermont and NY had highest electric rates of seven north-eastern states; by 2005 we had the lowest such rates.

More importantly than rates, the burden went down.

- Commercial & Industrial electric costs dropped from 1.9% of Gross State Product to less than 1.6%.
- Residential electric bills dropped from 3.9% of disposable personal income to 3.3%.

Residential Electricity Use kWh per customer per year, 1940-2001



Efficiency Vermont has cut Vermont's annual rate of kWh growth by 50%.

I.e, one half of historic, one half of projected, one half of NY, MA, NH, Quebec kWh growth -- *despite* VT GDP \$ growth above NE average.

Efficiency Vermont is now meeting 7% of Vermont's 1999 projected kWh needs and is on path to meet well over 12% of our requirements by 2012

Current Program: eliminate kWh growth by 2011

Potential program: annual gWh reduction 2011-2015



What is:

Efficiency Vermont

The nation's first energy efficiency utility

Established by regulatory order and supporting legislation

Implements energy efficiency as a least-cost resource to meet Vermont's electric power needs



Key Design Features

Funded by a “System Benefits Charge” (2-3% surcharge on)

A single, statewide administrator, acting as: “Efficiency Vermont”

Selected through competitive performance bidding

Independent, non-utility contractor, under a multi-year, performance-based contract with the Vermont Public Service Board, with significant \$ holdback



The Performance Contract

Competitively bid (for most savings, not for lowest price)

Initial 3-year term with \$27 Million budget;
Extended 3 more years for \$45 Million more; now ramping up to \$34MM year.

Performance contract is based on a set of carefully chosen, measurable and verifiable indicators.

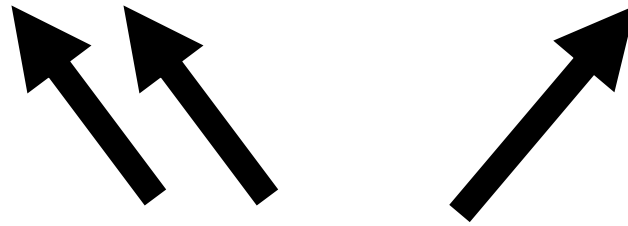
\$ 17 mm halved kWh growth, \$34mm levels kWh, \$45 mm could reduce kWh use



Objectives Deliberately Pull in Different Directions

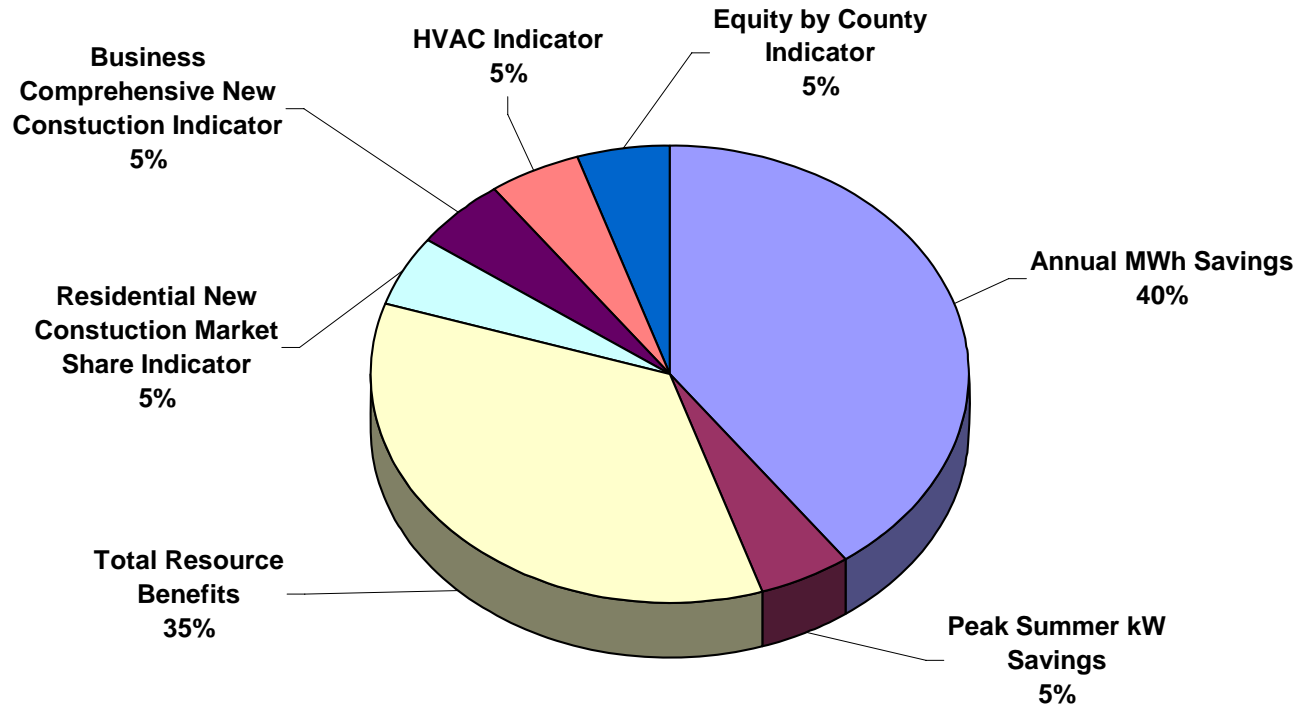
**More Resource
Acquisition**

**More Participation
& Equity**

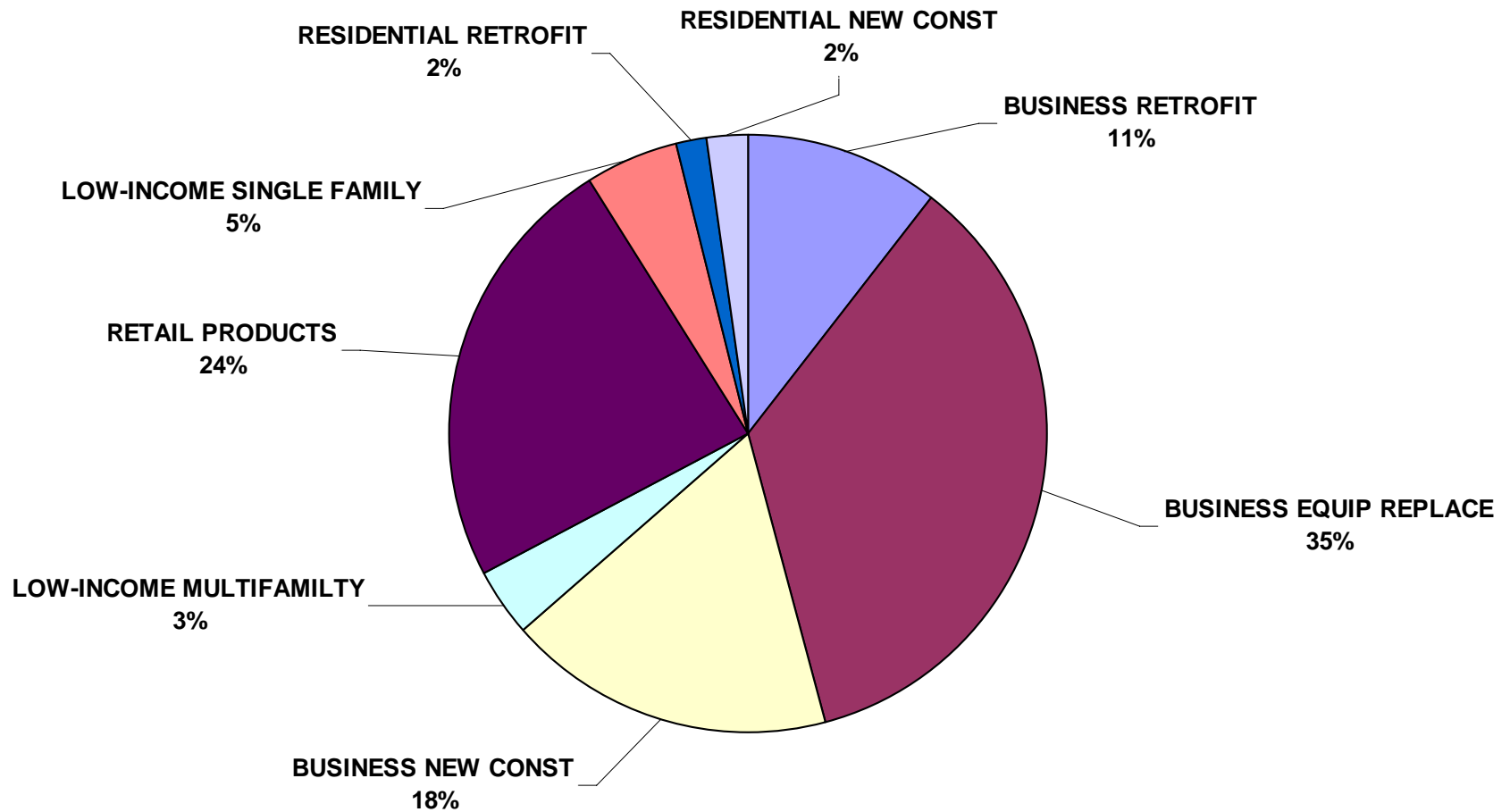


**More Market
Impacts**

Weighting of Performance Indicators



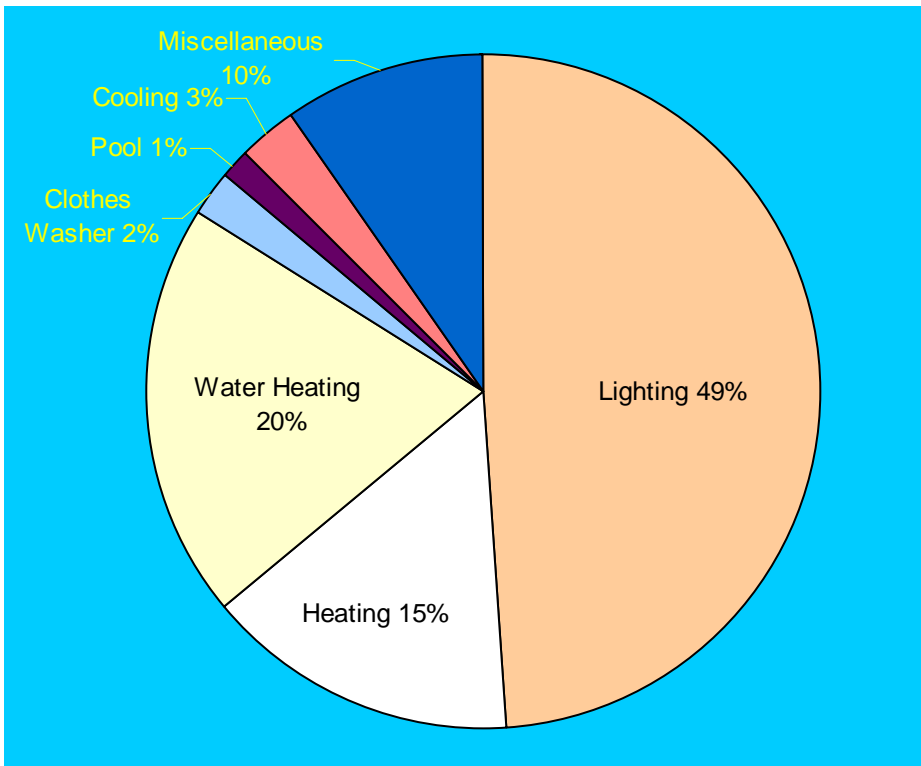
2004 Savings Distribution



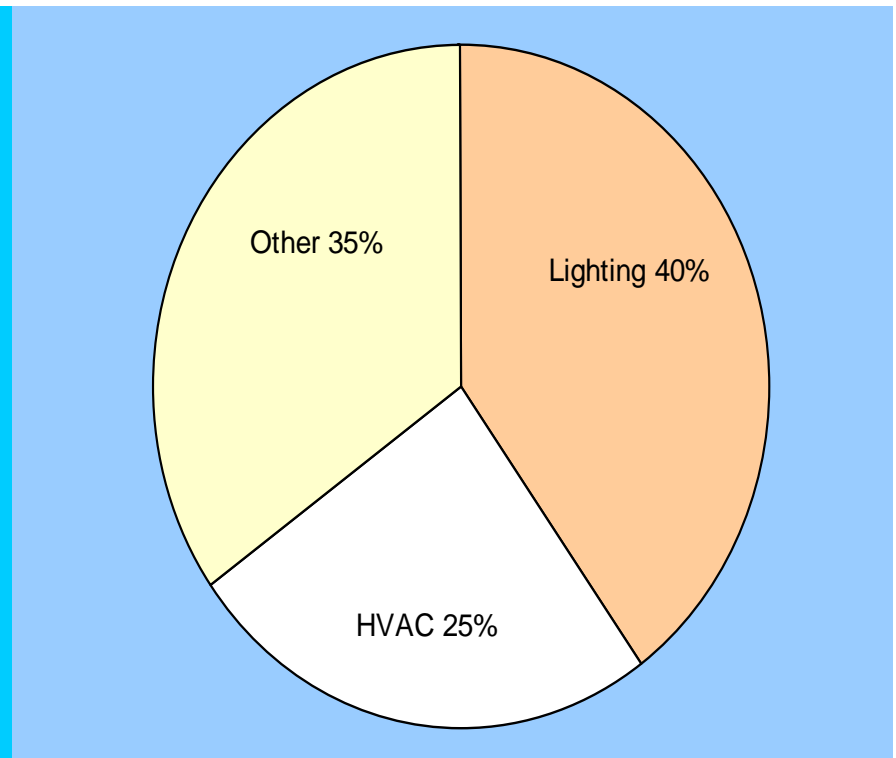
What are the Major “Reservoirs” of Achievable EE Potential in New England by 2013?

#2: By End Use (NEEP)

Residential Savings



C&I Savings



Statewide Participation and Results through 2005

- **124,000** Participants
 - **42%** of all electric customers
- **156** Million kWh/yr Being Saved (**7%**)
- **Peak Savings:** **24MW** Summer
 46MW Winter
- **\$163** Million Economic Value

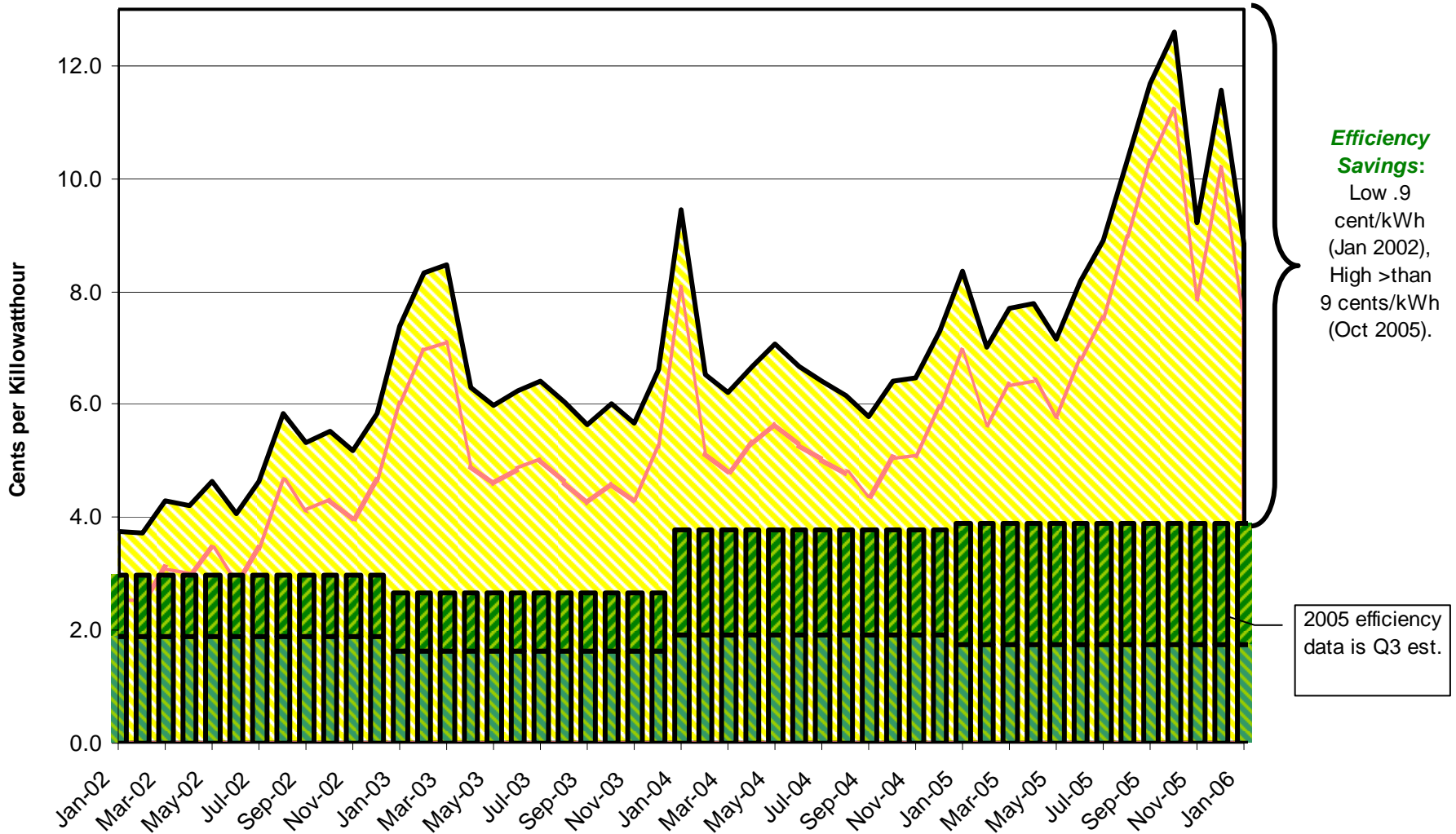


DISTRIBUTION OF PARTICIPATION AND BENEFITS BY COUNTY 2000 – 2003

LEGEND: GREEN: % DISTRIBUTION OF EFFICIENCY VERMONT PARTICIPATION | RED: LIFETIME ECONOMIC BENEFIT FROM EFFICIENCY INVESTMENTS



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Market Potentials– and Results

Nation-Leading Market Shares

- Highest 2002 Efficient Residential Air Conditioning Share (61%)
- Highest 2003 Efficient Washer Share (62% in 3rd Quarter)
- 2002 Share for Energy Star Homes: 25%

High Participation of Lighting and Appliance Dealers

High Participation in Key Markets

- Affordable Housing
- Commercial and Industrial New Construction



What might be worth consideration elsewhere?

Statewide labelling:

- Allows customer-based approach
- Widespread availability / equity really is important to address - for social/political acceptance (something for everyone)
- Can greatly reduce difficulties of coordinated parallel delivery
- Cost savings
- *Strong emotional appeal for many citizens !*
- **Alternative:** Statewide Label and Multi-Utility Advertising:
 - How Does Ark-Efficiency sound ?
 - What about Efficiency-Kansas ?



What might be worth consideration for replication in other states?

Performance-based \$ holdback

Focuses on performance results and improves performance relative to costs

- Establishes a high level of accountability
- Reduces regulatory costs; puts responsibility for achieving priorities at daily decision point
- Multi-year commitment provides some stability for planning and longer-term strategies
- Option for third-party or for utility ‘below the line’

What might be worth consideration for replication in other states?

Business Structure for efficiency efforts

- **A single administrator for statewide efforts ?**
- **Not part of State government**
- **Or:**
- **Utility Staff (Cost of Service or ‘Below Line’)**
- **Utility Affiliates / Subsidiaries**
- **Multi-Utility Joint Venture**



Do Business Structures Matter ?

Yes....but....not as much as commitment to success.

There are lots of ways to seek energy efficiency.

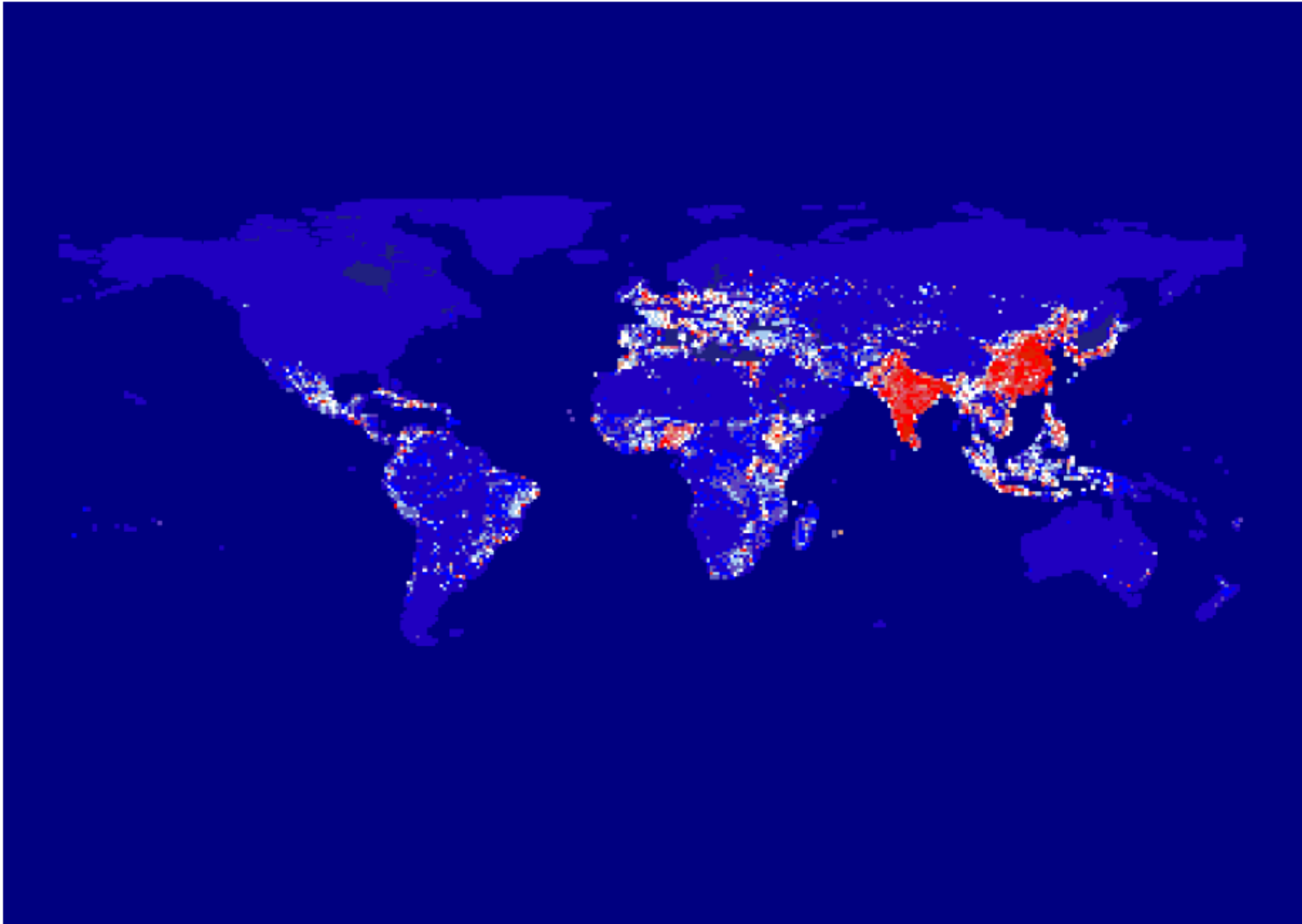
But the differences among the different ways of doing it aren't as big as the difference between doing it any reasonable way and not doing it at all.

So.... Its more important to get started with pretty good programs than to take a decade trying to find the perfect program through theoretical analysis.

We learned more by trying than by theorizing...and we saved energy and dollars as we learned.



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What “Resources” Does Efficiency Need ?

Situational Resources

Need

- Rising Power costs
- Rising Infrastructure costs and impacts
- Environmental Concerns (especially GHG)

Opportunity/Potential

- New Technologies
- Unused Expertise
- Social Willingness
- Regulatory Backbone

Decisions/Questions

- State wide vs utility/region
- Prime actor: utility, 3d party, governmental
- Goals/Targets....
- Commitment (term: 3+ 3? Ten years?)

Resource Tools

Legal

- Model Statute (or existing authority)
- Model Regulations
- Model Order

Business

- Model RFP or Notice of Proposed Order/Rule
- Model Performance-Contract or Acquisition Mandate
- Financing or Rate-Order

Implementation

- Skilled People !!!!!
- Software (do NOT underestimate this)
- Customer usage data
- Offices



What “Resources” Does Efficiency Need – Some Answers

Situational Resources

Need

Rising Power costs
Rising Infrastructure costs and impacts
Environmental Concerns (especially GHG)

Marginal cost, delivery charges and losses, reserves, etc
T & D stresses over \$ x billion
kWh Generation as key to fossil fuels

Opportunity/Potential

Under-Used Technologies
Unused Expertise
Social Willingness
Regulatory Backbone

Super T8/LED, variable motors, insulation
Design, Awareness, Assessment
Care, knowledge, aggregation
Expertise re avoided costs, risks in future, nodal point

Decisions/Questions

State wide vs utility/region
Prime actor: utility, 3d party, governmental
Goals/Targets....
Commitment (term: 3+ 3? Ten years?)

Symbolism, Marketing, Jurisdiction,
Incentives, expertise, acceptability
Technical, C/E, Achievable:: Flat or dropping kWh/kW
Effectiveness, financing, training, incentives/PBR

Resource Tools

Legal

Model Statute (or existing authority)
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Model Order

Public Benefits, Avoided Costs, Necessity & Convenience

Vt 1990, Calif stacking order 2005, BPA/NWPCC ?

Business

Model RFP or Notice of Proposed Order/Rule
Model Performance-Contract or Acquisition Mandate
Financing or Rate-Order

Nat En Effic Action Plan Draft NOPR
Vt PSB/EVt Contract, Calif PSC Order
ESCO/BizRep, ERAM/ACE, Lost Rev

Implementation

Skilled People !!!!!
Infrastructure
Software (do NOT underestimate this)
Customer data
Offices

Incentives to draw them: finance..education.. motive
Trade partners, skilled professionals, distribution chains
Referrals, financials, CSR support, payback, back office
Usage, contact, offers, achievement, Customer Service
Presence, Credibility, Example!