Presentation for
Residential Ratepayer Advisory Board
January 23, 2017

Patricia Martin
Chair, Rindge Energy Commission
Ratepayer

Background & Experience

- BSEE from UNH in 1978 (Retired in 2011)
- Engaged in Energy Management & Efficiency projects since the 1970s
- Named in 7 US Patents for low power circuit design, user interfaces and communications for portable computers
- Frequent attendee at legislative and PUC hearings on energy policy

Motivation & Purpose

- Veteran of US Air Force (1973-1975) and NH Air National Guard (1975-1979)
- Member of “Operation Free,” a veteran’s organization dedicated to combating Climate Change as a risk multiplier to National Security
- Present an alternative perspective to the Business Industry Association’s (BIA) claim that NH faces an “Energy Cost Crisis” requiring more natural gas

Agenda for today
Compare NH with US averages for:

- Total Energy = heat + transportation + electric
- Electricity Consumption and causes of high rates
- Home Heating

Energy Cost

- Whether it’s a gas, electric or oil bill, the amount you pay for your energy is based on the price per unit times the number of units you use.
- The BIA argues that we have an “Energy Cost Crisis” based solely on the price per unit. It is definitely an important factor, but the response to the problem can be dealt with by reducing the number of units consumed too.

The numbers the BIA uses to sell the "Energy Cost Crisis"

Table E15. Energy Price and Expenditure Estimates, Ranked by State, 2014

	Prices		Expenditures [a]		Energy Expenditures per Person		Energy Expenditures as Percent of Current-Dollar GDP [b]	
Rank	State	Dollars per Million Btu	State	Million Dollars	State	Dollars	State	Percent
1	Hawaii	37.38	Texas	162,556	North Dakota	11,094	Louisiana	18.0
2	New Hampshire	27.86	California	137,720	Wyoming	9,997	Mississippi	15.2
3	Connecticut	27.84	New York	68,056	Louisiana	9,765	North Dakota	14.7
4	Vermont	27.60	Florida	66,414	Alaska	9,349	Maine	13.9
5	Massachusetts	26.36	Pennsylvania	55,666	Texas	6,025	Wyoming	13.3
6	Rhode Island	26.34	Illinois	51,550	Iowa	5,796	Montana	12.5
7	Arizona	25.94	Ohio	51,386	Maine	5,681	Alaska	12.2
8	California	25.31	Louisiana	45,400	South Dakota	5,648	Alabama	12.0
9	Maryland	25.25	Michigan	40,740	Nebraska	5,486	Kentucky	12.0
10	District of Columbia	24.96	Georgia	39,728	Montana	5,402	West Virginia	11.8
11	Florida	24.91	New Jersey	39,117	Mississippi	5,328	Arkansas	11.6
12	New York	24.57	North Carolina	37,283	Oklahoma	5,283	South Carolina	11.6
13	Alaska	24.43	Indiana	34,152	Vermont	5,225	Oklahoma	11.2
14	Delaware	23.77	Virginia	33,980	Hawaii	5,195	Vermont	11.2
15	Nevada	23.52	Tennessee	29,615	Indiana	5,176	Idaho	11.0
16	New Mexico	23.37	Massachusetts	27,574	Kentucky	5,092	Indiana	10.7
17	North Carolina	23.02	Missouri	26,719	Kansas	5,046	Iowa	10.6
18	New Jersey	22.78	Wisconsin	26,448	Alabama	4,982	South Dakota	10.4

Since we don't all live in the same geographical/climatic region, other factors need to be considered

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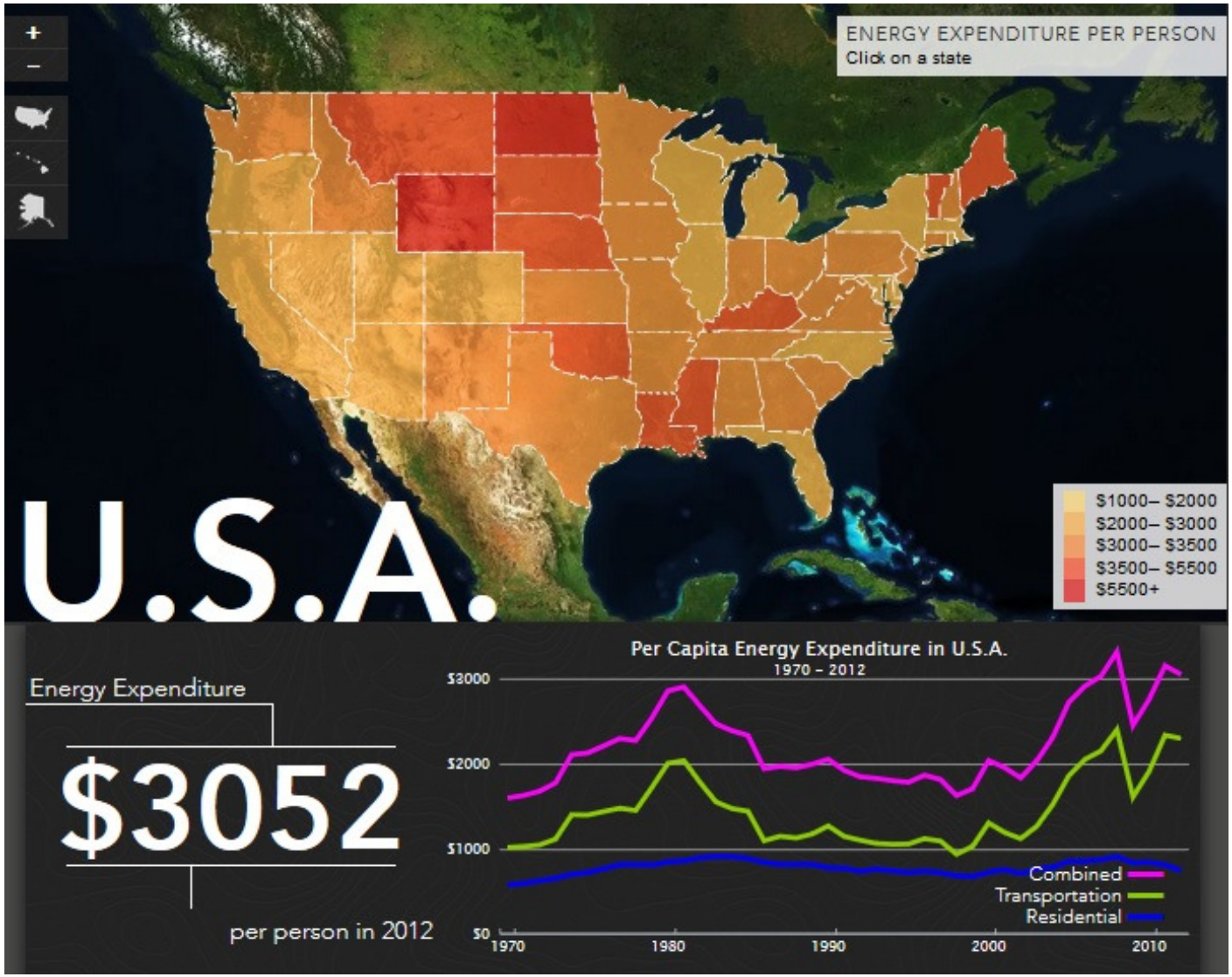
19	Maine	[illegible]	Washington	[illegible]			Kansas	[illegible]

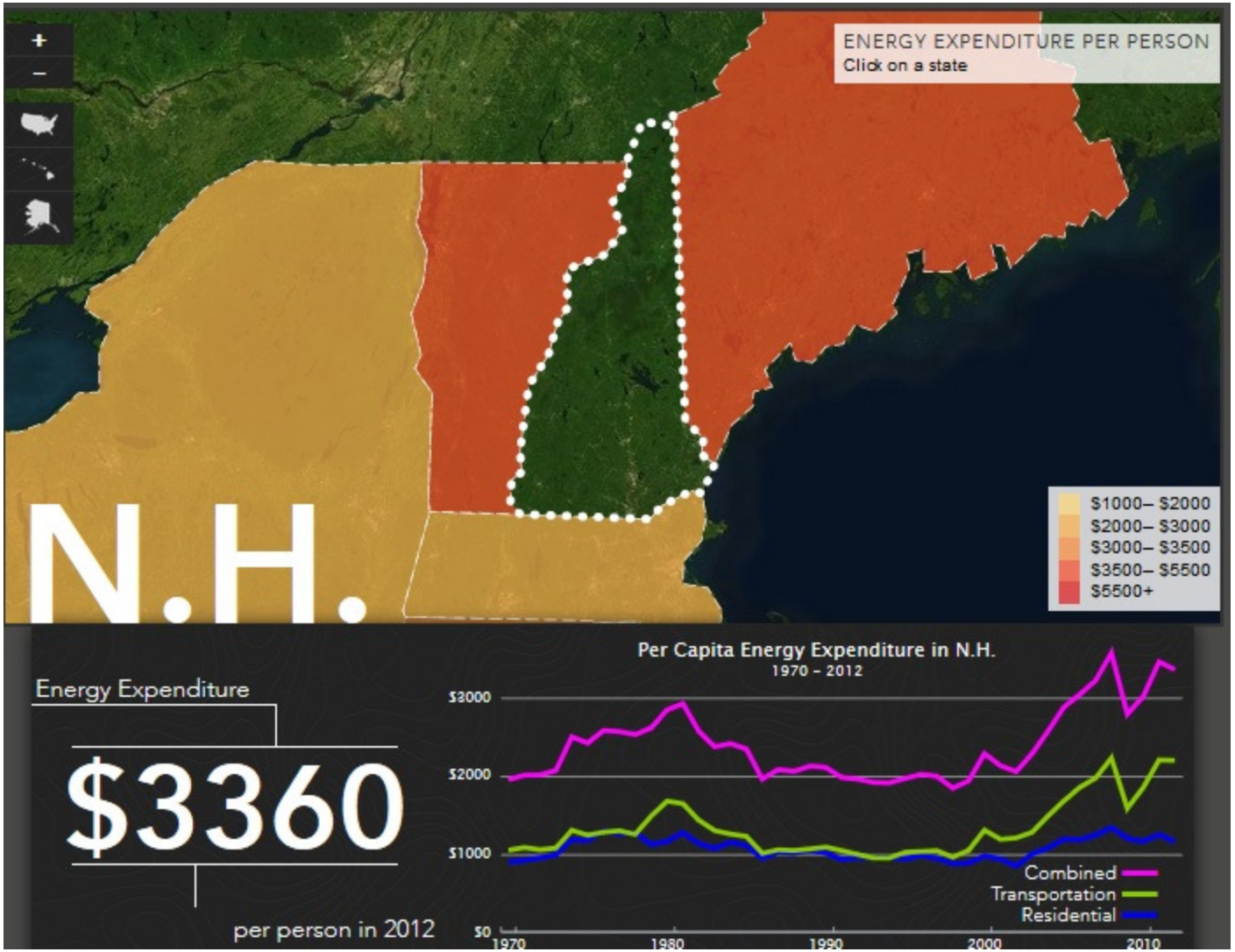
NH ranks #19 for total energy expenditure/person and #28 for % of GDP

22	South Carolina	21.74	Maryland	22,951	Minnesota	4,638	New Mexico	9.8
23	Montana	21.72	Arizona	22,610	Wisconsin	4,592	Hawaii	9.7
24	Virginia	21.66	Kentucky	22,467	South Carolina	4,530	Missouri	9.5
25	Tennessee	21.47	South Carolina	21,876	Tennessee	4,523	Nebraska	9.3
26	Kansas	21.46	Oklahoma	20,497	Ohio	4,431	Wisconsin	9.1
27	Pennsylvania	21.44	Colorado	19,994	Missouri	4,406	Michigan	9.1
28	Colorado	21.25	Iowa	18,022	New Jersey	4,376	New Hampshire	9.0
29	Washington	21.11	Mississippi	15,948	Pennsylvania	4,351	Ohio	8.9
30	Georgia	20.95	Connecticut	15,483	New Mexico	4,325	Pennsylvania	8.5
31	Mississippi	20.78	Oregon	14,866	Connecticut	4,30	Georgia	8.4
32	Kentucky	20.75	Kansas	14,646	Idaho	4,270	Minnesota	8.0
33	Wisconsin	20.74	Arkansas	13,885	Delaware	4,112	Florida	7.9
34	Utah	20.71	Utah	10,755	Michigan	4,108	Arizona	7.9
35	Idaho	20.43	Nevada	10,513	Massachusetts	4,082	Nevada	7.8
36	South Dakota	20.32	Nebraska	10,330	Virginia	4,080	North Carolina	7.7
37	Ohio	20.01	New Mexico	9,020	Illinois	4,002	Rhode Island	7.7
38	Michigan	20.01	West Virginia	8,756	Rhode Island	3,965	Utah	7.7
39	Oklahoma	19.97	North Dakota	8,210	Georgia	3,935	Virginia	7.3
40	West Virginia	19.97	Maine	7,558	Maryland	3,841	New Jersey	7.1
41	Minnesota	19.65	Hawaii	7,379	North Carolina	3,751	Illinois	7.0
42	Nebraska	19.26	Idaho	6,980	Oregon	3,744	Oregon	7.0
43	Texas	19.05	Alaska	6,891	Colorado	3,733	Maryland	6.6
44	Illinois	9.02	New Hampshire	6,361	Nevada	3,704	Colorado	6.5
45	Arkansas	18.87	Wyoming	5,841	Washington	3,653	Connecticut	6.2
46	Wyoming	18.70	Montana	5,527	Utah	3,653	Washington	6.1
47	Alabama	18.64	South Dakota	4,819	California	3,550	Delaware	6.1
48	North Dakota	8.51	Rhode Island	4,204	District of Columbia	3,516	Massachusetts	6.1
49	Iowa	18.24	Delaware	3,848	New York	3,446	California	6.0
50	Indiana	7.94	Vermont	3,275	Arizona	3,360	New York	4.9
51	Louisiana	15.49	District of Columbia	2,320	Florida	3,336	District of Columbia	2.0

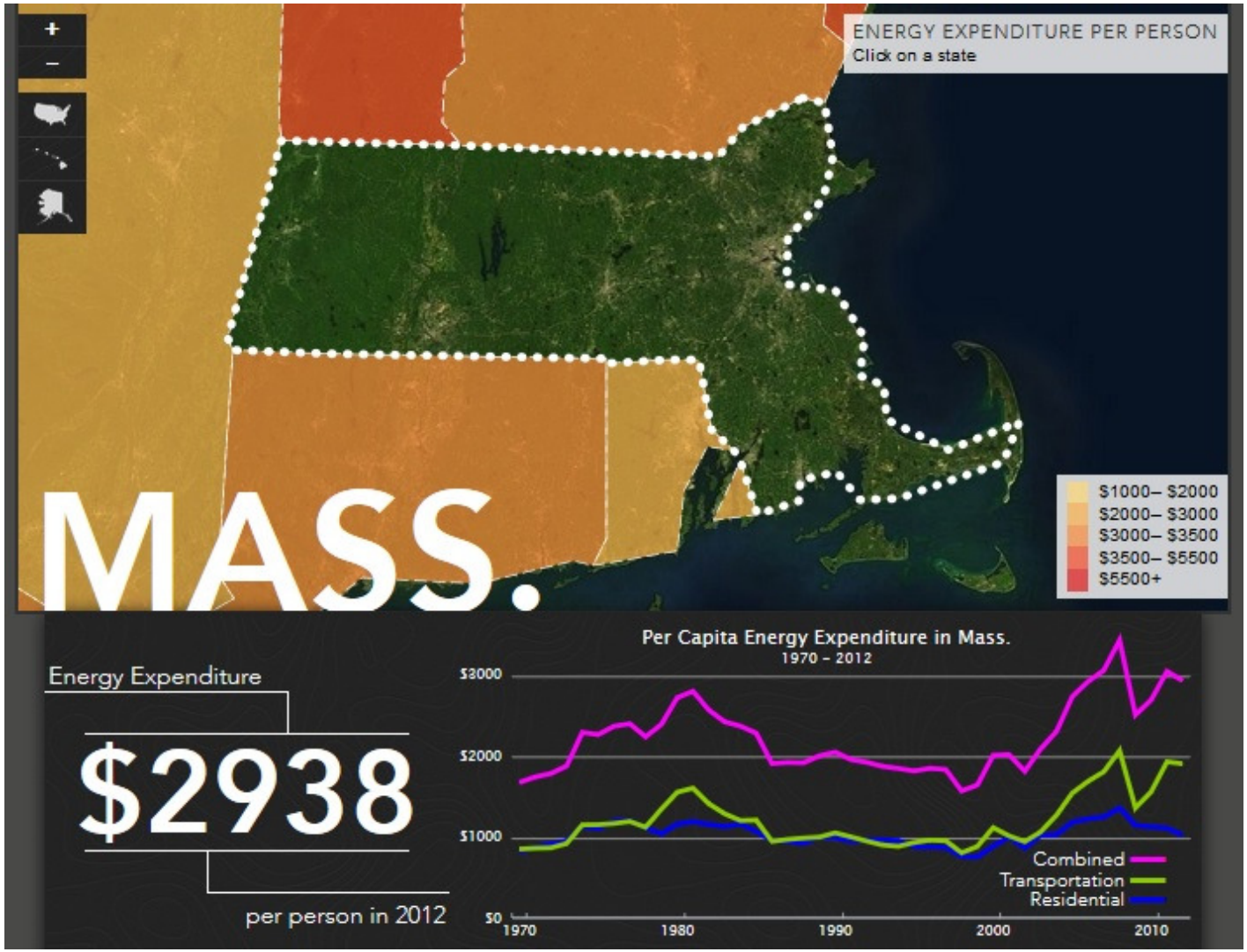
Energy.gov interactive map for 2012



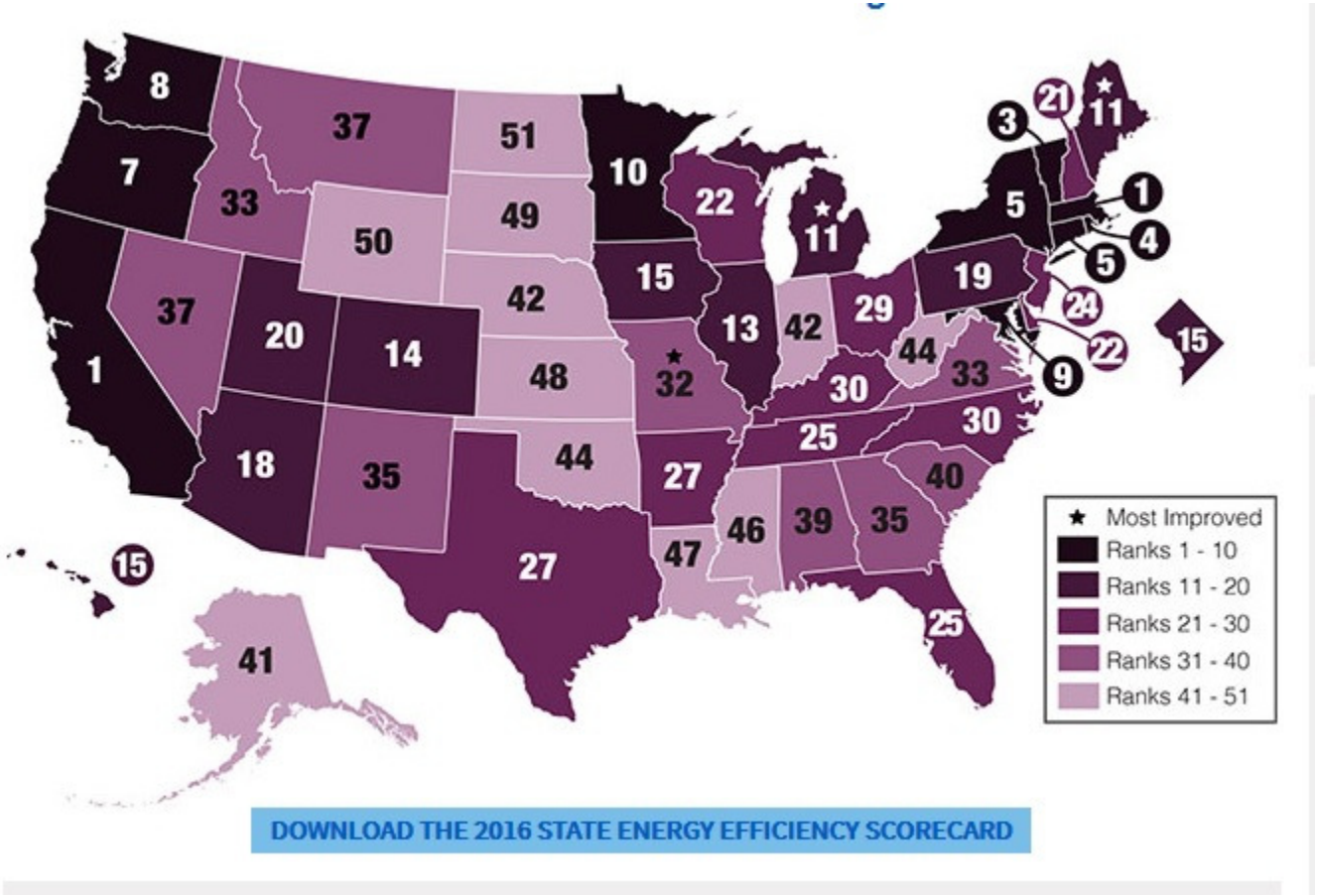
NH spends 10% more than US Average



Massachusetts spends less than the US average



4 of 6 NE States rank in the top 5 for Energy Efficiency by ACEEE. Maine ranks #11 and NH ranks #21



Conclusions on Total Energy

- New Hampshire pays some of the highest prices per unit for energy, but energy efficiency efforts reduce our burden and put us in the “middle of the pack” for cost/person and % of GDP
- Transportation represents 2/3rds of our total energy expense (Why doesn’t the BIA push mass transportation?)

Electricity

2015 Average Monthly Bill- Residential

(Data from forms EIA-861- schedules 4A-D, EIA-861S and EIA-861U)

State	Number of Customers	Average Monthly Consumption (kWh)	Average Price (cents/kWh)	Average Monthly Bill (Dollar and cents)
New England	**6,322,833**	**626**	**19.43**	**121.60**
Connecticut	1,468,958	731	20.94	153.13
Maine	699,241	556	15.61	86.75
Massachusetts	2,794,918	602	19.83	119.26
New Hampshire	607,465	621	18.50	114.90
Rhode Island	440,191	594	19.29	114.50
Vermont	312,060	558	17.09	95.33
South Atlantic	**26,787,726**	**1,118**	**11.74**	**131.20**
Delaware	413,445	977	13.42	131.18
District of Columbia	247,469	841	12.99	109.21
Florida	8,963,967	1,141	11.58	132.16
Georgia	4,191,209	1,122	11.54	129.46
Maryland	2,255,556	1,012	13.82	139.91
North Carolina	4,336,698	1,113	11.28	125.51
South Carolina	2,185,965	1,146	12.57	144.04
Virginia	3,332,083	1,149	11.37	130.58
West Virginia	861,334	1,107	10.08	111.59

California has made major investments in Energy Efficiency and Renewables, but doesn't experience our high rates

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Pacific Contiguous	**18,013,417**	**656**	**14.28**	**93.61**
California	13,380,684	557	16.99	94.59
Oregon	1,686,973	902	10.66	96.24
Washington	2,945,760	964	9.09	87.64

What's in my monthly bill?

Total Charges for Electricity		
Supplier (FAIRPOINT ENERGY, LLC)		
Generation Srvc Chrg***	368.00KWH X $0.08990	$33.08
Subtotal Supplier Services		$33.08
Delivery (RATE R RESIDENTIAL SVC)		
Customer Chrg		$12.89
KWH Distribution Chrg	368.00KWH X $0.04207	$15.48
Transmission Chrg	368.00KWH X $0.02390	$8.80
Strnded Cst Recovery Chrg	368.00KWH X $0.00094	$0.35
System Benefits Chrg	368.00KWH X $0.00330	$1.21
Subtotal Delivery Services		$38.73
Total Cost of Electricity		**$71.81**
Other Charges or Credits		
Nghbor Helping Nghbor Donation Dec 19		$1.00
Electricity Consumption Tax (calculated by rate $0.00055/kWh)		$0.20
Neighbor Helping Neighbor Pledge		$1.00
Subtotal Other Charges or Credits		$2.20
Total Current Charges		**$74.01**

Transmission + Distribution charges on my bill total 6.6 cents/kWh vs US average of 3.4 cents/kWh

Table A8. Electricity supply, disposition, prices, and emissions (continued)
(billion kilowatthours, unless otherwise noted)

Supply, disposition, prices, and emissions	Reference case							Annual growth 2013-2040 (percent)
	2012	2013	2020	2025	2030	2035	2040	
End-use prices								
(2013 cents per kilowatthour)								
Residential	12.1	12.2	12.9	13.5	13.6	13.9	14.5	0.6%
Commercial	10.2	10.1	10.6	11.1	11.1	11.3	11.8	0.6%
Industrial	6.8	6.9	7.3	7.6	7.7	7.9	8.4	0.7%
Transportation	9.5	9.7	10.3	11.0	11.2	11.6	12.3	0.9%
All sectors average	**10.0**	**10.1**	**10.5**	**11.0**	**11.1**	**11.3**	**11.8**	**0.6%**
(nominal cents per kilowatthour)								
Residential	11.9	12.2	14.6	16.6	18.3	20.5	23.5	2.5%
Commercial	10.1	10.1	12.0	13.6	14.9	16.6	19.1	2.4%
Industrial	6.7	6.9	8.2	9.4	10.3	11.7	13.6	2.6%
Transportation	9.3	9.7	11.7	13.6	15.0	17.0	19.9	2.7%
All sectors average	**9.8**	**10.1**	**11.9**	**13.5**	**14.8**	**16.6**	**19.2**	**2.4%**
Prices by service category								
(2013 cents per kilowatthour)								
Generation	6.5	6.6	6.6	7.0	7.0	7.1	7.6	0.5%
Transmission	0.9	0.9	1.1	1.2	1.2	1.2	1.3	1.2%
Distribution	2.5	2.6	2.8	2.9	2.9	3.0	3.0	0.6%
(nominal cents per kilowatthour)								
Generation	6.4	6.6	7.5	8.6	9.3	10.5	12.3	2.3%
Transmission	0.9	0.9	1.2	1.4	1.6	1.8	2.1	3.0%
Distribution	2.5	2.6	3.2	3.6	3.9	4.4	4.9	2.4%
Electric power sector emissions[1]								
Sulfur dioxide (million short tons)	3.43	3.27	1.42	1.44	1.44	1.47	1.53	-2.8%
Nitrogen oxide (million short tons)	1.68	1.69	1.57	1.57	1.56	1.57	1.57	-0.3%
Mercury (short tons)	26.69	27.94	6.58	6.53	6.43	6.40	6.41	-5.3%

Generation Charges (supply) are 10 to 50% higher than US average of 6.5 cents/kWh

…unless you buy default supply service from Eversource which is almost double the US average of 6.5 cents/kWh

Compare the Eversource default energy supply price with this headline from “Utility Dive!”

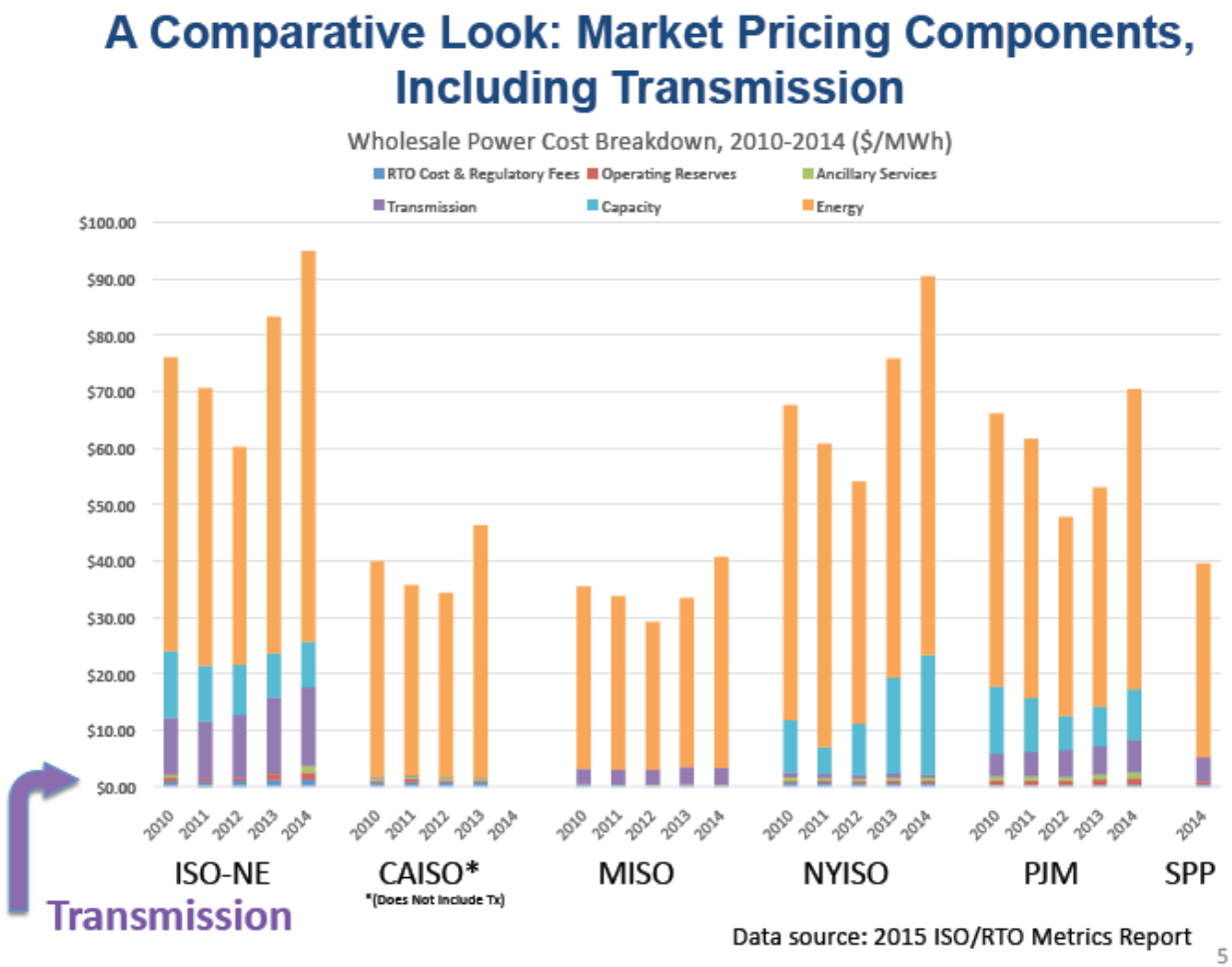
BRIEF

Hawaii co-op signs deal for solar+storage project at 11¢/kWh

Thanks to Restructuring, I can buy my energy supply from a competitive supplier

- 24 month contract with Fairpoint Energy for 8.9 cents/kWh
- 100% renewable energy (covered by Renewable Energy Credits for wind)
- Most commercial and industrial customers have switched to competitive energy suppliers, but only about 20% of residential customers have done so

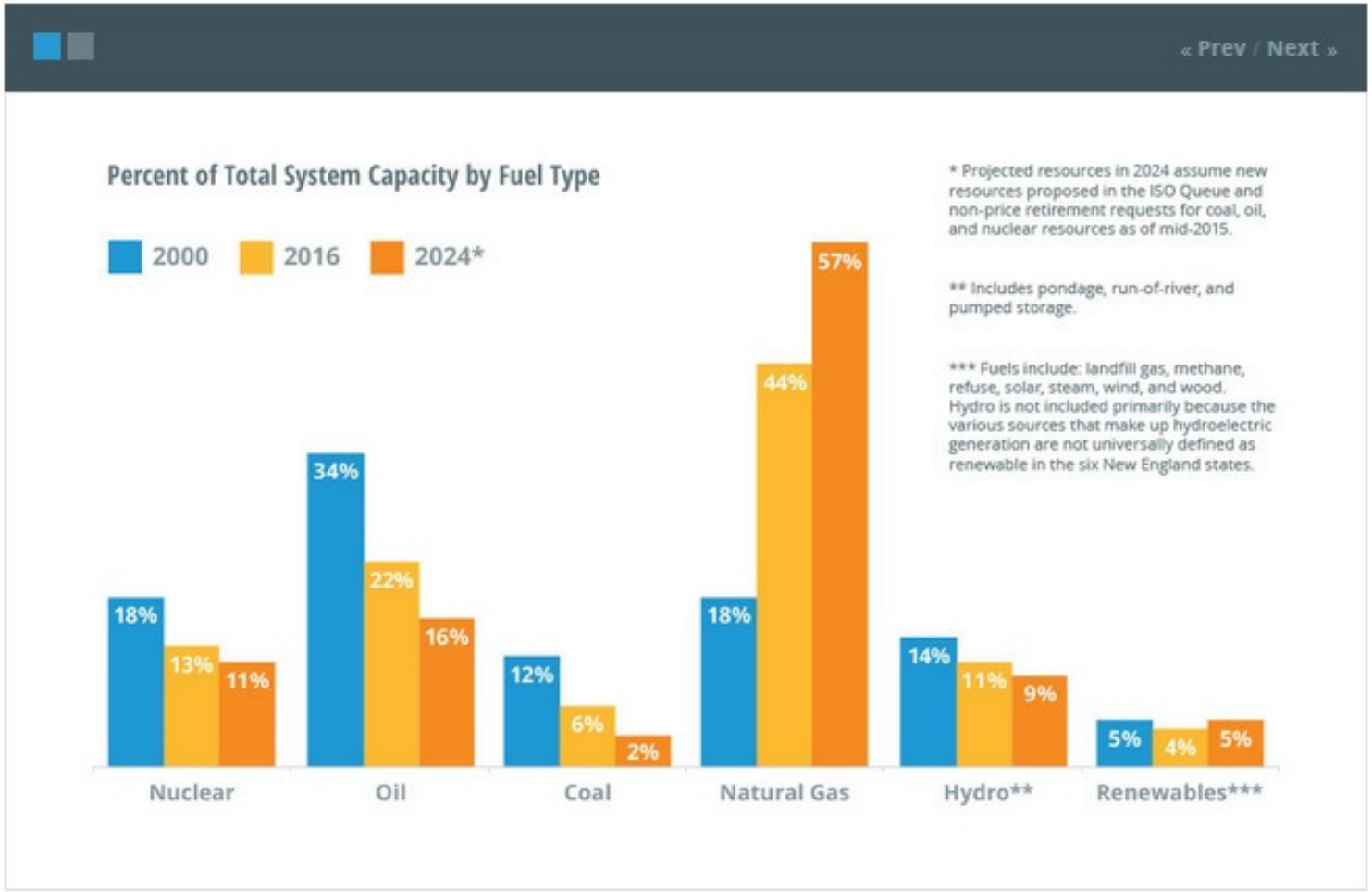
…but, I have no choice with transmission and distribution charges. Why are they so high?



Instead of tackling high transmission and distribution charges, the BIA and ISO-NE are:

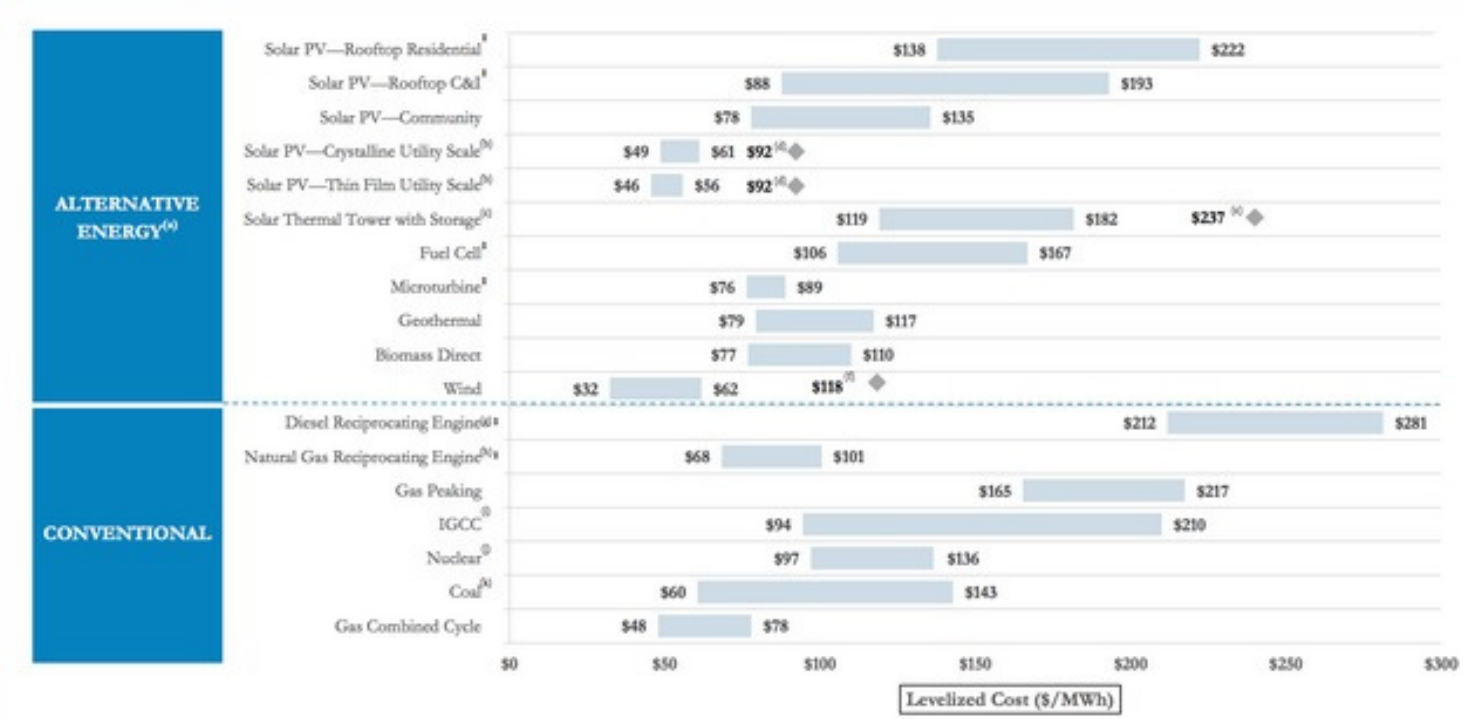
- Trying to upend restructuring by allowing the utilities to charge electric ratepayers a tariff for pipeline construction
- Putting energy supply diversity and renewable energy suppliers at risk by dominating the market with cheap natural gas fired electricity
- Cheaper, but for how long? (All our eggs in one basket…what could go wrong?)
- New England Power Generators Association does not support the electric ratepayer tariff and have not signed contracts for pipeline capacity

Natural Gas and Electricity Generation in ISO-NE (Decreasing fuel diversity)



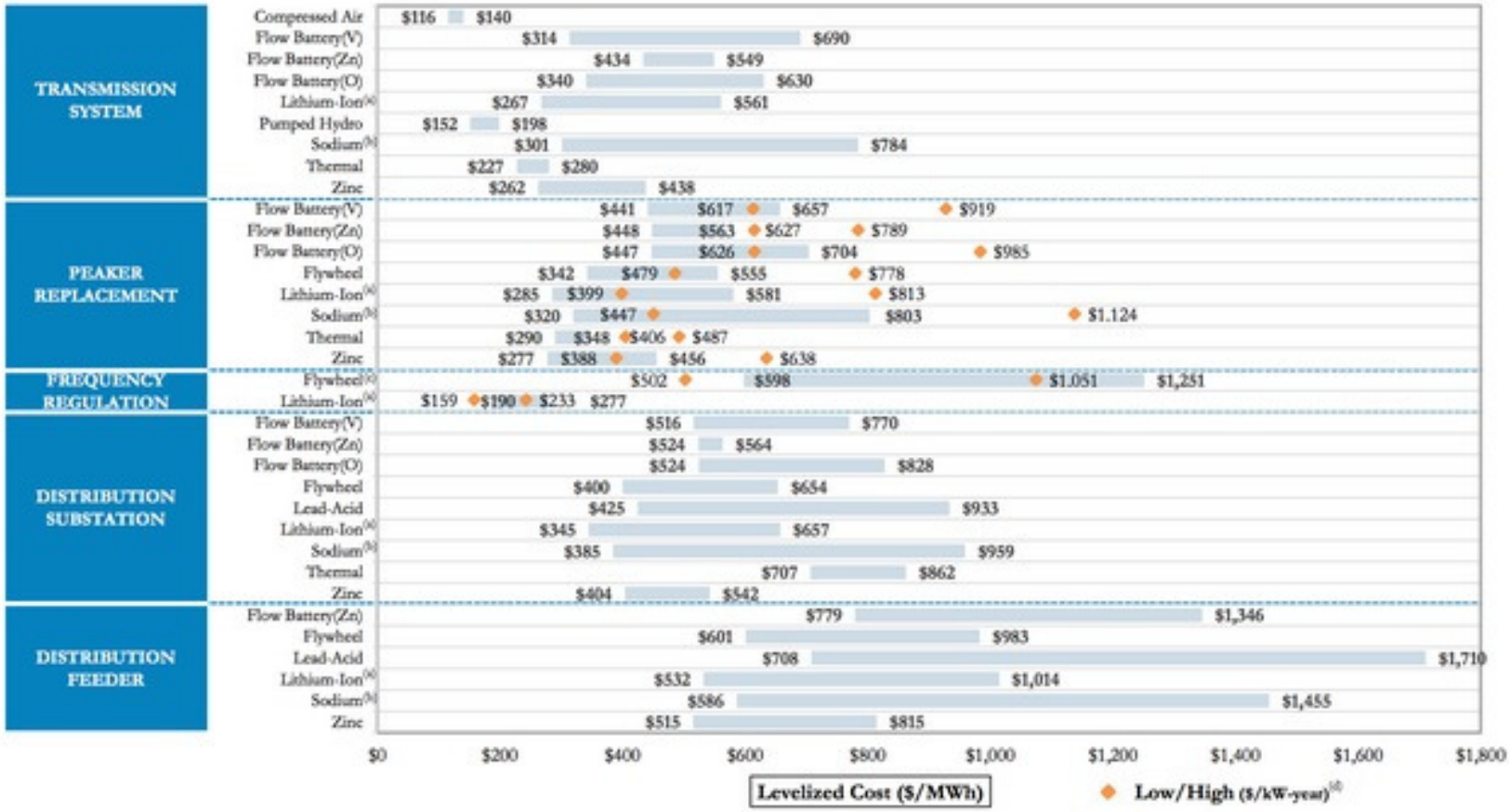
Renewable energy challenges natural gas on price

Utility-scale solar costs had a smaller range, coming in between $46/MWh and $56/MWh for thin film installations. Rooftop and community solar costs were higher, due largely to scale.



Lazard's unsubsidized levelized cost of energy comparison *Credit: Lazard*

Lazard also sees great promise in behind-the-meter storage systems at factories, universities and hospitals, but noted that economic viability depends on local market structure and incentives.



Unsubsidized levelized cost of storage comparison *Credit: Lazard*

Offshore wind resources are plentiful, stronger and more consistent than those on land. Research suggests that more than four times the current generating capacity of US electric power plants is available from state and federal waters off the coast of the United States and Great Lakes.

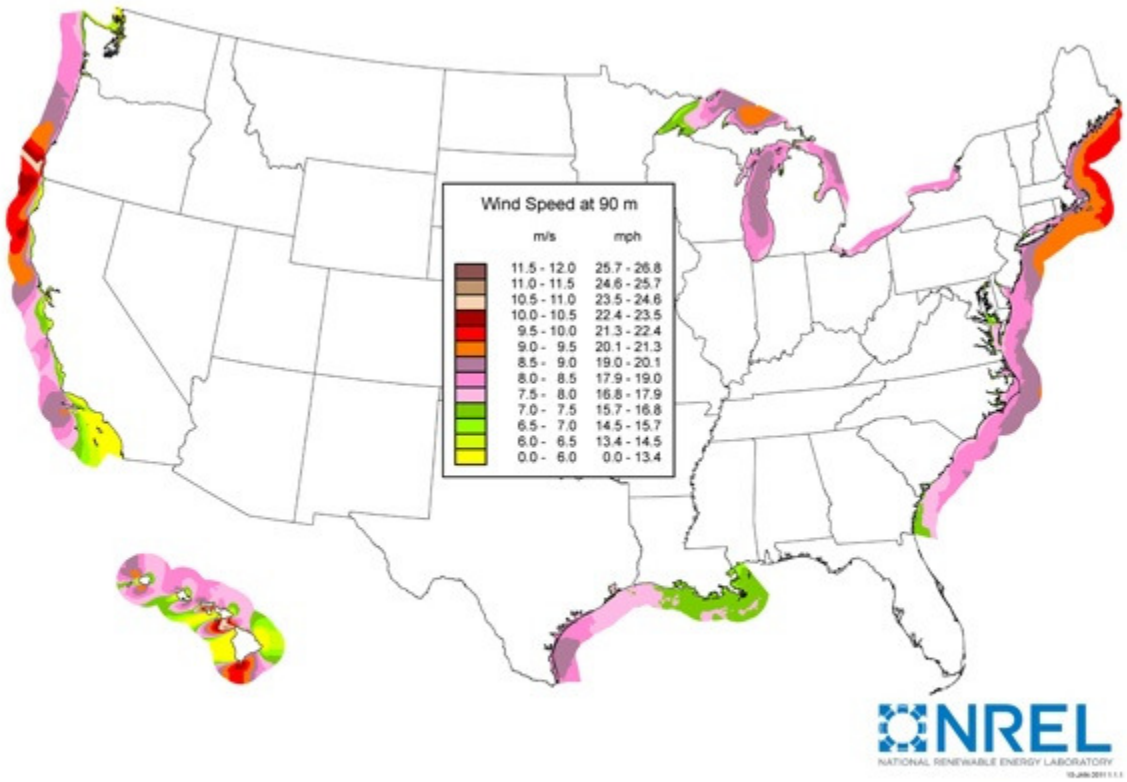
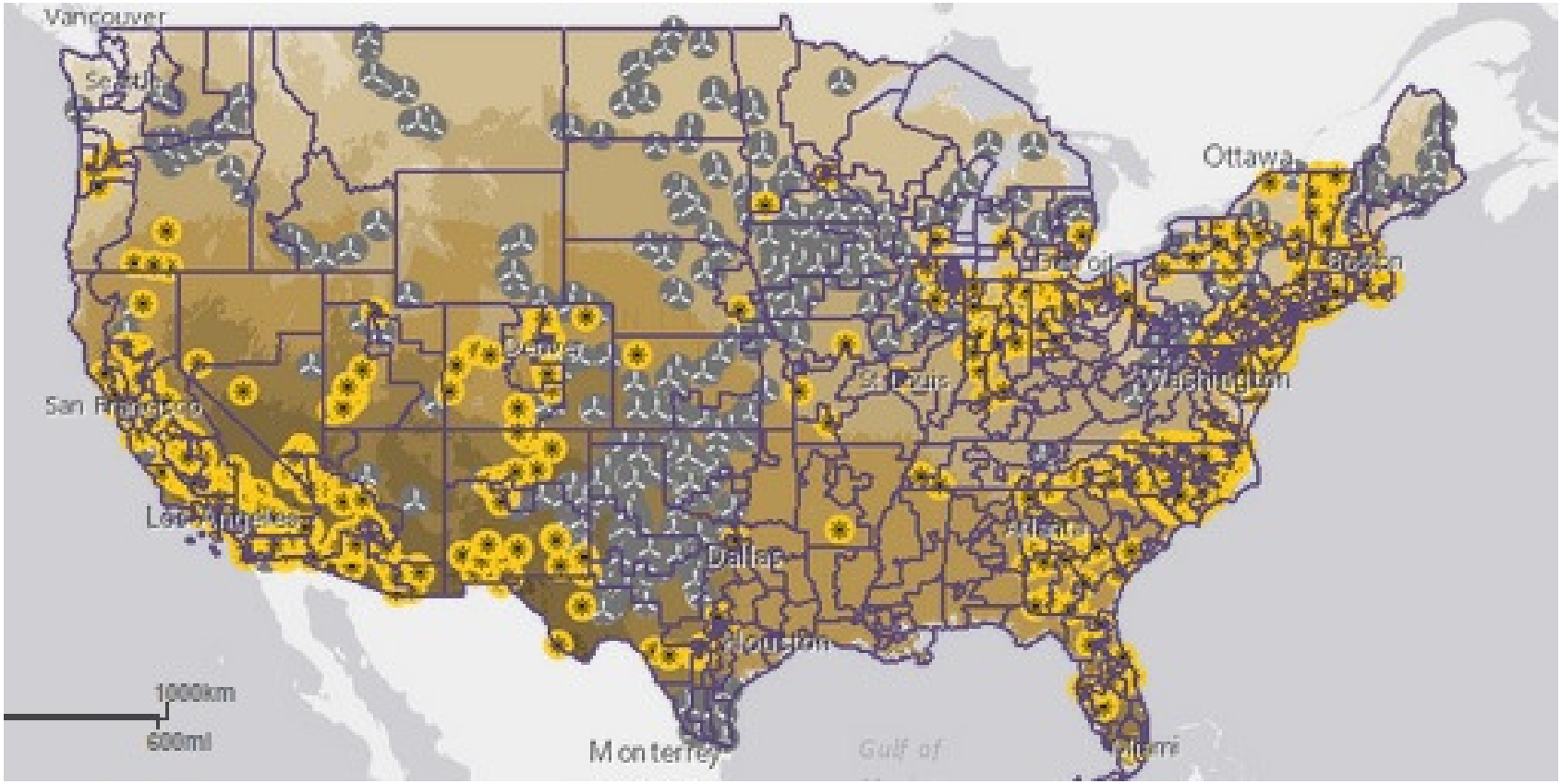
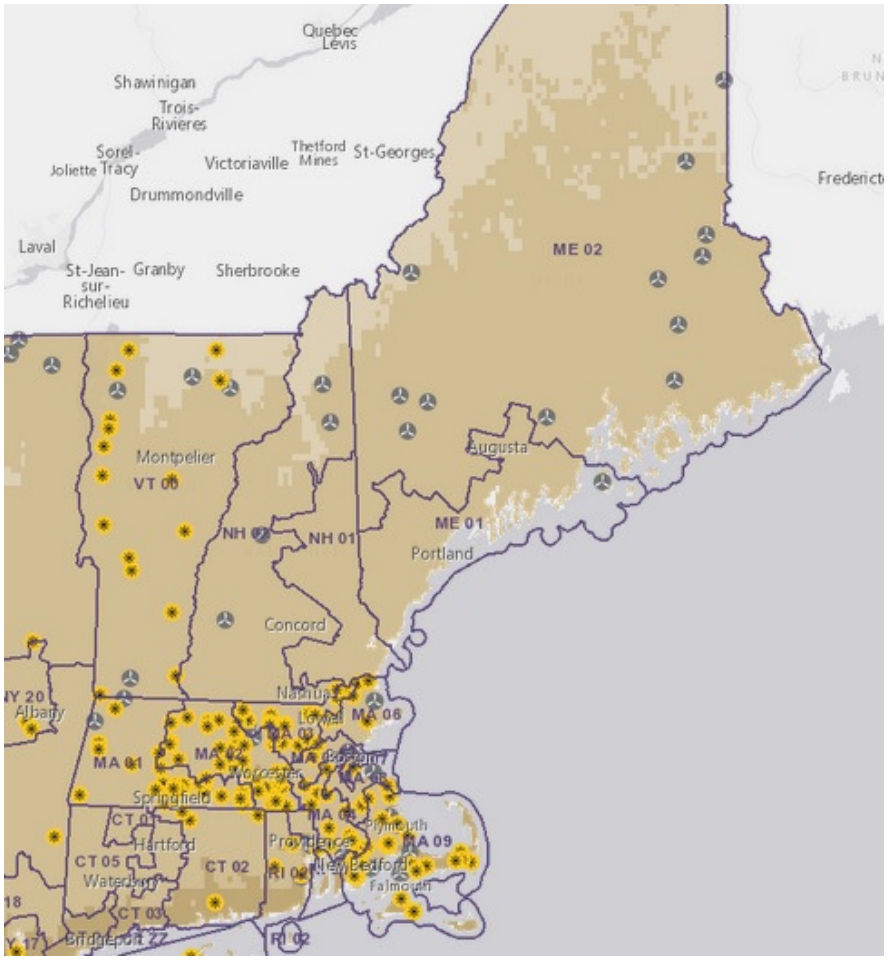


Image courtesy of the National Renewable Energy Laboratory, 2011. Interactive map available with offshore wind energy potential estimates for other coastal states.

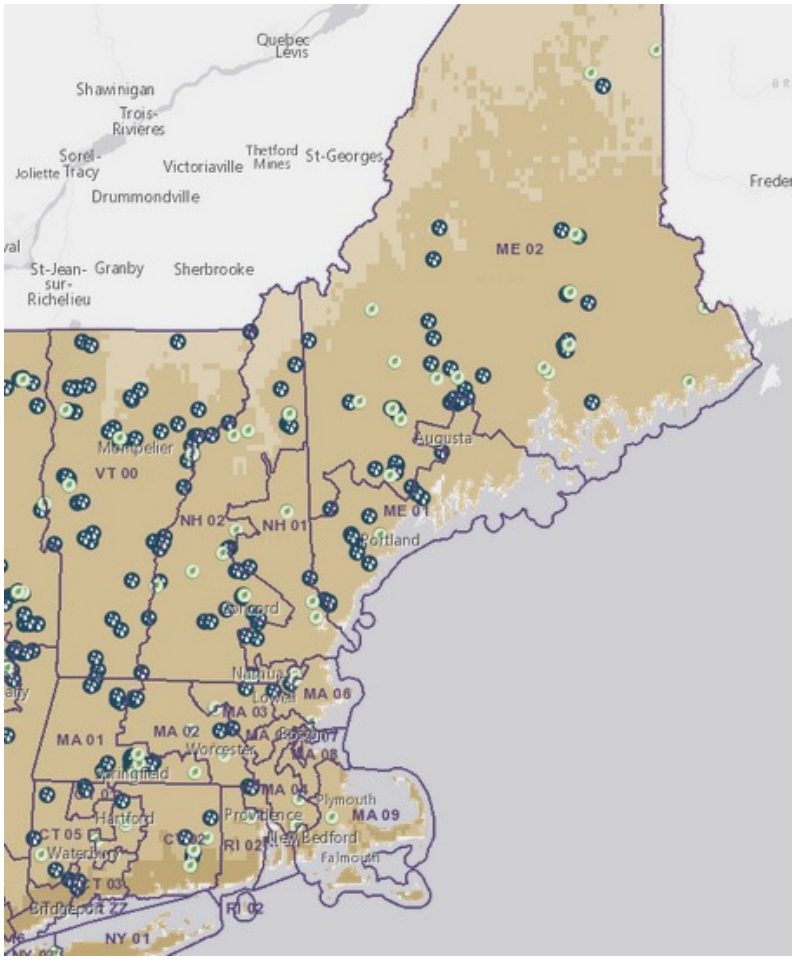
Solar and Wind Plants in the US



Solar and wind plants in New England



Hydro and Biomass plants in New England



Conclusion on Electric Energy costs

- Energy Efficiency measures bring down the cost of our monthly bills
- The BIA opposes RGGI, an Energy Efficiency Resource Standard (EERS) and renewable energy (net metering) despite the success of these programs in neighboring states and (notably) California
- The BIA's (formerly named) Energy Committee is funded (at least in part) by the American Petroleum Institute

Natural Gas for Home Heating

- After decades of gas distribution companies telling towns in NH that expanding natural gas distribution for domestic use was not “cost effective (for them),” Liberty is trying to expand it’s franchises to several regions of the State in order to justify large capacity contracts and more pipelines
- As “customers of last resort,” we are also conveniently located along the path to the coast and LNG export terminals

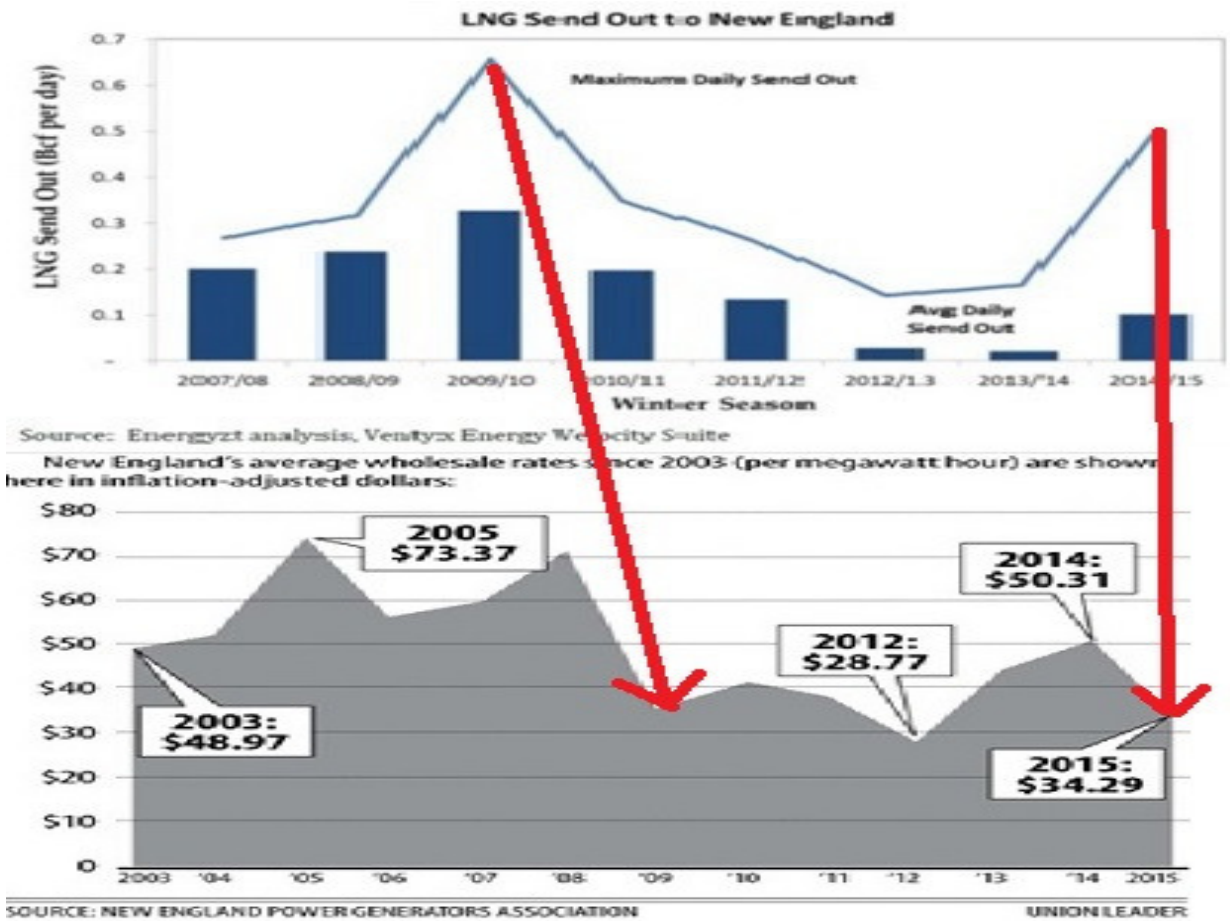
Expedited Gas Exports Poised to Rankle Russia (Bloomberg headline 12/16/16)

- The U.S. first exported cargo out of its lone LNG-capable terminal, Sabine Pass in Louisiana, in February, a shipment that ultimately touched down in Brazil. Since then, U.S. exporters have sent LNG to countries in the Middle East, Western Europe, South America and Asia. The vast majority of 2016 shipments have gone to South America, followed by Asia. As far as Europe, U.S. exporters only landed cargo in Spain and Portugal.
- Yet industry has long complained of a sluggish regulatory process. Nearly 30 export applications remained under review at the Energy Department as of the end of November.

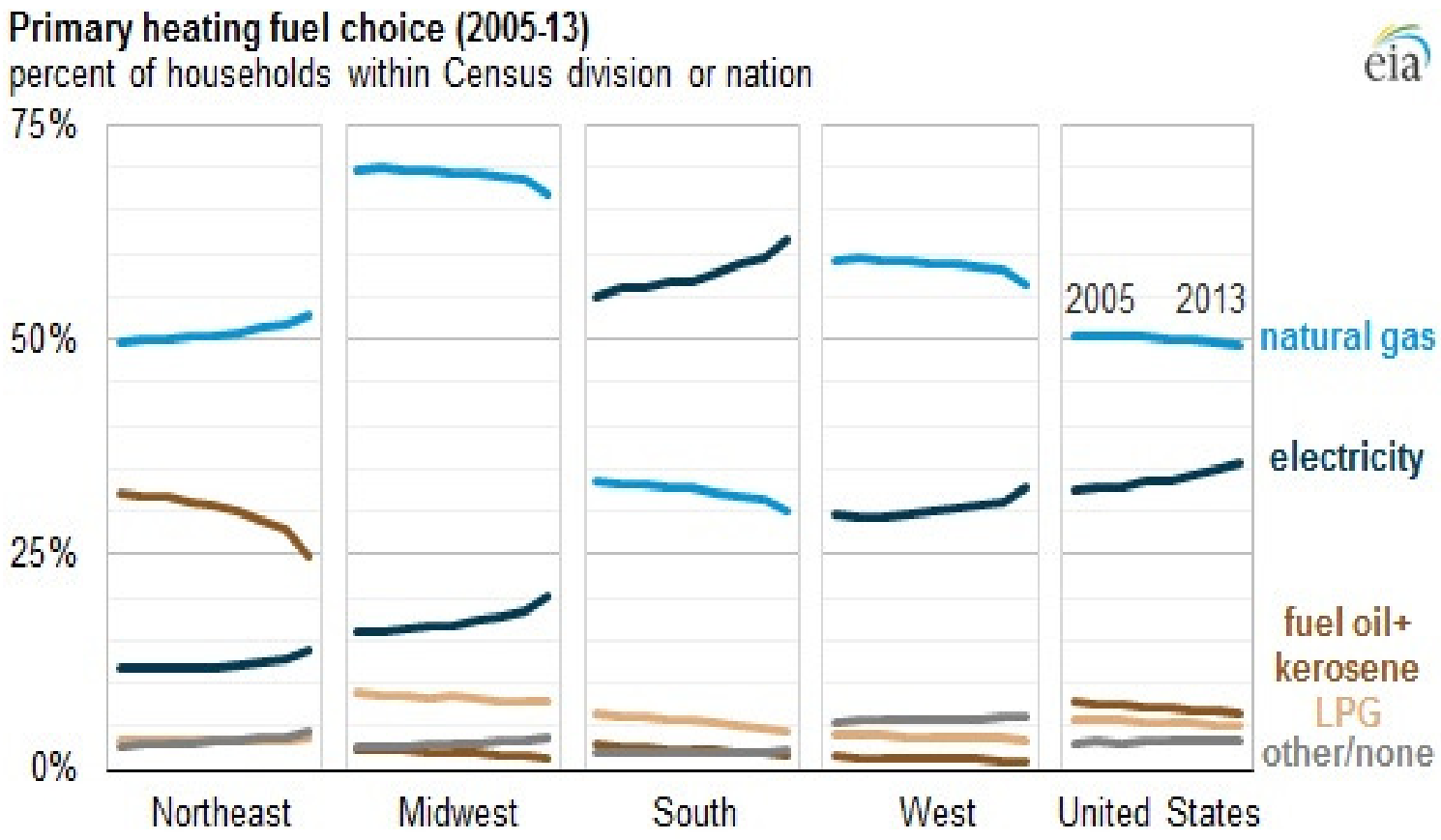
Maritimes & Northeast feeds the Dracut, MA hub, but flow to be reversed

- **Goldboro LNG http://pieridaeenergy.com/goldboro-lng/**
- Pieridae is currently developing the Goldboro LNG project which consists of an LNG processing facility, storage tanks and marine works. The facility will be located at the Goldboro Industrial Park in Guysborough County, Nova Scotia, Canada. The natural gas supply feeding the project is to be delivered via the existing Maritimes & Northeast Pipeline, located directly adjacent to the project.

What could go wrong if we start shipping LNG worldwide?



Trends in home heating – Moving away from Natural Gas (except Northeast)



$0.16/kWh is reasonable with a “Heat Smart” contract

Decrease | Increase | Reset | Calculate

Fuel Type (Units)	Cost per Unit Delivered	Heating System	See Details	Annual Cost
1. Electric (kWh)	$ 0.16	Ductless heat pump	☐	$ 1,269
2. Natural Gas (ccf)	$ 1.20	parlor stove	☐	$ 1,347
3. Electric (kWh)	$ 0.16	ENERGY STAR® geothermal heat pump	☐	$ 1,392
4. Firewood (cord)	$ 250	EPA-certified wood stove	☐	$ 1,508
5. Natural Gas (ccf)	$ 1.20	ENERGY STAR® boiler	☐	$ 1,552
6. Natural Gas (ccf)	$ 1.20	ENERGY STAR® furnace	☐	$ 1,681
7. Oil (gallon)	$ 1.93	ENERGY STAR® boiler	☐	$ 1,895
8. Wood pellets (ton)	$ 258	pellet stove	☐	$ 1,964
9. Kerosene (gallon)	$ 2.45	space heater	☐	$ 1,982
10. Oil (gallon)	$ 1.93	ENERGY STAR® furnace	☐	$ 1,984
11. Wood pellets (ton)	$ 258	pellet boiler	☐	$ 2,253
12. Propane (LP) (gallon)	$ 2.19	parlor stove	☐	$ 2,739
13. Propane (LP) (gallon)	$ 2.22	ENERGY STAR® boiler	☐	$ 3,201
14. Propane (LP) (gallon)	$ 2.22	ENERGY STAR® furnace	☐	$ 3,466
15. Electric (kWh)	$ 0.16	baseboard	☐	$ 4,455

- To talk with a professional about upgrading your heating system, contact an Efficiency Maine

Expanding Natural Gas franchises in New Hampshire:

- Commits the customer to a 20 year investment ($10K residential) in a heating source that is NOT the most efficient (compared with air source heat pumps)
- Makes the competition for available natural gas for electricity generation in New England during the winter months much worse
- At the very least, every additional therm of gas should be offset with a therm of efficiency PLUS EERS commitments

The Future of Energy in NH is ELECTRIFYING!!! (fueled by solar, wind, biomass/fuels, hydro and nuclear)

- Electric and hybrid cars
- Electric powered heat pumps for heat and ac
- Modernized Grid (Smart Grid) manages peak demand response and distributed generation
- Energy Efficiency and renewable energy projects support jobs and entrepreneurship

So, what’s it going to be? This?

Or this?