Can Solar PV Rebates Be Funded with Utility Cost Savings?

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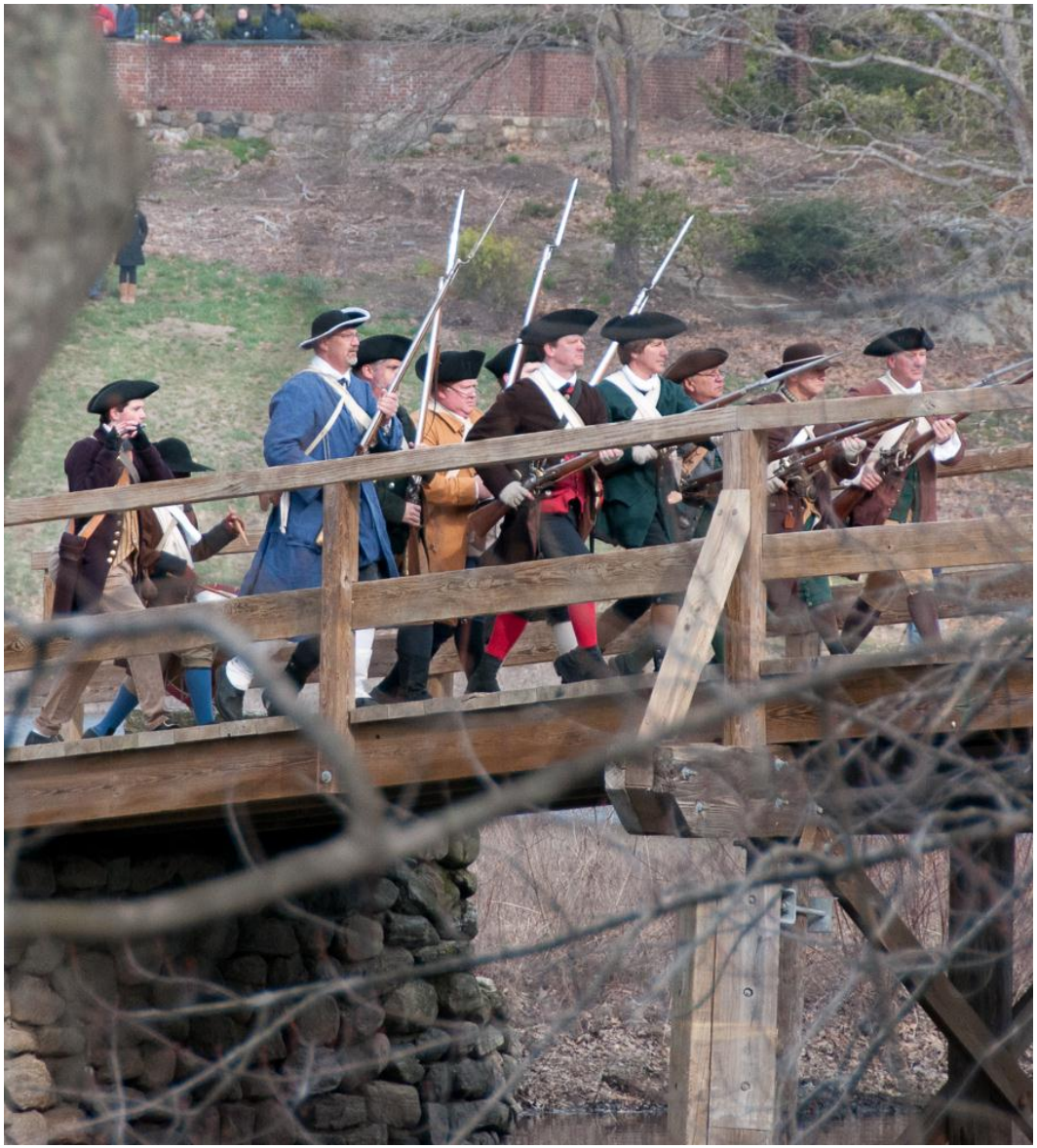

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- 7,600 Customers
  - 6,000 Residential
  - 1,600 Commercial/Institutional/Governmental
- Retail Sales: 180,000,000 kWh per Year
- Peak Electrical Demand: 40 MW
- Power Purchased from Facilities in Northeast

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Distributed PV Capacity

Year	*# of Installations*	*kW DC*	*kW AC*
1999	1	5	5
2008	3	4.2	4.0
2009	5	75.0	74.6
2010	3	158	151
2011	7	36	35
2012	19	143	137
2013	2	8.2	7.7
Total	40	429	414

Residential	35	178	170

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2008 Rebate/Net Metering Offering

- $1,000 per kW AC, up to $5,000
- Retail Net Metering

Goal: Jumpstart Adoption of Solar PV in Concord, Primarily by Reducing Upfront Cost Barrier

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2010 Rebate/Net Metering Offering

- Replaced Retail Net Metering with Wholesale Net Metering
  - Credit at Avg. Monthly Spot Market Energy Price
- Rebate: 10 Years Worth of Estimated Cost Savings, Up to 5 kW AC of Installed Capacity

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Savings Due to PV Installations

- Transmission Cost Savings
- Forward Capacity Market Cost Savings
- Substation Capacity Upgrade Cost Savings

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Monthly Transmission Cost

Peak Electrical Demand: 10/5/12, 1-2PM		23,769 kW
Transmission Charge	X	$7.16/kW
October's Transmission Cost		$170,186

1 KW ↓ in Peak Demand = $7.16 in Savings/Month

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Est. 10-Year Avg. Transmission Cost @ 6% Increase per Year

YEAR	KNOWN OR ESTIMATED TRANSMISSION COST /KW/MONTH
2013	$ 7.16
2014	$ 7.59
2015	$ 8.04
2016	$ 8.53
2017	$ 9.04
2018	$ 9.58
2019	$ 10.16
2020	$ 10.77
2021	$ 11.41
2022	$ 12.10
AVG.	**$ 9.44**

- 1kW AC of Installed Capacity = .47 kW AC of Power Generated at Peak from June – Oct. on Average
- 1 kW AC of Installed Capacity → $4.44 of Savings/Mo., i.e. 0.47 kW x $9.44/kW, for 7 Months/Year

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2013 Forward Capacity Market Cost

2012 Peak Electrical Demand on July 18th, 1-2PM		40,897 kW
2012 Peak Electrical Demand + 35% Reserve		55,211 kW
2013 Forward Capacity Market Charge	X	$2.95/kW
Months per Year	X	12
2013 Forward Capacity Market Cost		$1,954,469

1 KW ↓ in Peak Demand = $2.95 x 1.35 kW = $3.98 in Savings/Mo.

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Est. 10-Year Avg. Forward Capacity Market Cost

YEAR	KNOWN OR ESTIMATED FCM CHARGE /KW/MONTH	
2012-2013	$	2.95
2013-2014	$	2.95
2014-2015	$	3.21
2015-2016	$	7.00
2016-2017	$	7.00
2017-2018	$	7.00
2018-2019	$	7.00
2019-2020	$	7.00
2020-2021	$	7.00
2021-2022	$	7.00
AVG.	**$**	**5.81**

X 1.35 = $ 7.84

- 1kW AC of Installed Capacity =.28 kW AC of Power Generated at Peak in July
- Using June – Oct. Avg. of .47 kW AC Until We Have More Data Points for Annual Peak
- 1 kW AC of Installed Capacity → $3.68 of Savings/Mo., i.e. 0.47 kW x $7.84/kW, for 12 Months/Year

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Substation Capacity Upgrade Cost Savings

- Cost of Adding Incremental Capacity:
  - $75 – $100,000/MW → Avg. of $88,000/MW
- Carrying Cost of Investment = 10% of Cost
  - 4% Depreciation
  - 5% Interest
  - 1% Taxes
- 1kW ↓ in Peak Demand = $8.80 in Savings/Yr
- 1 kW AC of Installed Capacity → $4.13 of Savings/Yr, i.e. 0.47 kW x $8.80/kW

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Total Annual Cost Savings for 1kW AC of Installed Capacity

Savings Type	Savings /kW/Mo	Months	Savings /kW/Yr	Savings /kWh/Yr*
Transmission	$ 4.44	7	$ 31.08	$ 0.026
Forward Capacity Market	$ 3.68	12	$ 44.16	$ 0.037
Substation Capacity	--	--	$ 4.13	$ 0.003
Total Savings/Year			**$ 79.37**	**$ 0.066**

*Annual kWh Generation = 1,200

Net Savings Calculation

Savings/kWh/Yr	$	0.066
Revenue Loss/kWh/Yr [6]	$	(0.017)
Net Savings/kWh/Yr	$	0.049

$0.04/kWh x 43% of power generated that is used on-site.

Net Svgs for 1,200 kWh/Yr	$	58.45
Net Svgs for 1,200 kWh/Yr for 10 Yrs	$	584.52

Solar PV Rebate = $585/kW AC of Installed Capacity, Up to 5 kW AC

Retail Residential Electricity Rate

Component	Charge/kWh
Energy	$0.06
Transmission	$0.02
Forward Capacity Market	$0.02
Infrastructure/Operations	$0.04
Total	$0.14

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Challenges

- Part of Funding for Solar PV Rebate Has Come from Other Ratepayer Revenue, Not from Cost Savings
- Estimating Costs 10 Years into Future is Hard
- Determining Actual Demand Reduction due to Solar at Monthly/Annual Peaks Requires Long Term Data Collection
- Wholesale Net Metering Can Incent People to Shift Electric Use to Times When PV Production is High. Those Times May Overlap with Monthly/Annual Peaks, Increasing Demand.
  - In late 2012, Concord Light's BOD Reinstated Retail Net Metering (Minus $0.04/kWh for Fixed Costs) While Continuing Rebate Offering

Questions?

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