

# Market Value of Hydro Projects

**ANR Small Hydro Workshop**

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**828-4082**



# Market Value of Hydro Projects Outline

- Valuing a project
  - Marketable Products
  - Sources for Prices
  - Forecasts of Prices
- Contracting for Sale of Output



# Basic Cost Effectiveness Equation

**COSTS** < **REVENUES**

**P + I + O&M + T <=**

**E + C + R + Other**



# Basic Cost Effectiveness Equation

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**Energy**

**Capacity**

**Renewable Energy**

**Certificates**

**Other**



# Energy

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- Energy is Settled Hourly
- Energy is Locationally Priced
  - Approx 750 pricing nodes in NE, 50 in Vermont
- Energy is priced at an Hourly Clearing Price
- Intermittent resources, like hydro receive a real time price



View Calendar for Current Notices

Power System Condition: New England Normal

BINDING CONSTRAINTS: Sampling Period: 2007-04-16 11:40

Limit on K26A\_TEWKSBRY\_O215\_A Contingency N/A

DAY AHEAD

REAL TIME

REAL TIME ANCILLARY SERVICES

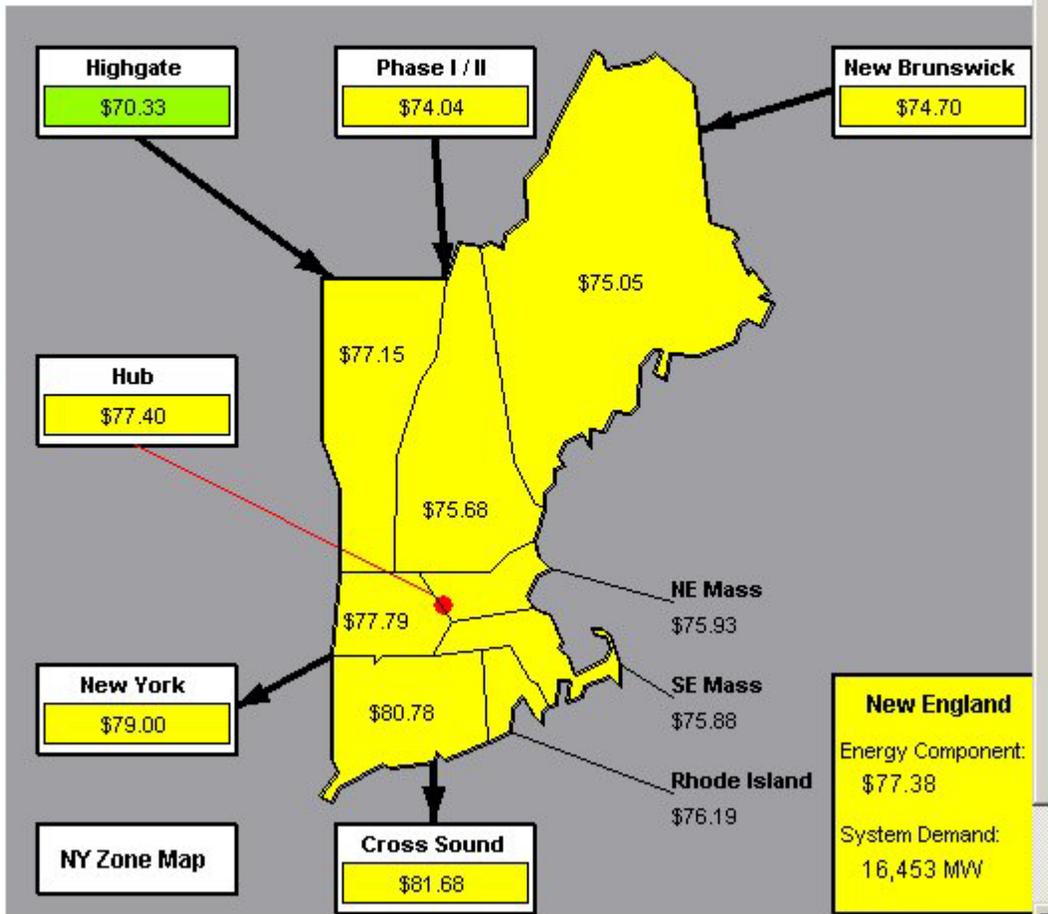
REAL TIME MARKET - ZONAL LMP - Dollars per MWH

Valid As Of: 2007-04-16 11:50

INSTRUCTIONS: Move cursor over zone to view loss and congestion pricing. Move cursor over black line between zone and external interface to view actual interface flow. Use the color key below for an at a glance interpretation of the market.

**PRICE COLOR KEY**

Red	\$1,001 +
Orange	\$501 - \$1,000
Brown	\$201 - \$500
Tan	\$151 - \$200
Light Orange	\$101 - \$150
Yellow	\$71 - \$100
Light Green	\$41 - \$70
Green	\$21 - \$40
Dark Green	\$0 - \$20
Blue	under \$0



# Energy Forecasts

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- Forecasting is difficult, especially if it involves the future
- Short Term - APB Quote Sheet
  - Prices for blocks
  - Guaranteed – not unit contingent
  - Energy only
- Long Term - AESC Forecast
  - Forecast of zonal prices
  - Energy, Capacity, RECs
  - <http://publicservice.vermont.gov/pub/aescstudy.html>

# Nepool Quote Sheet

# Short Term Price Information

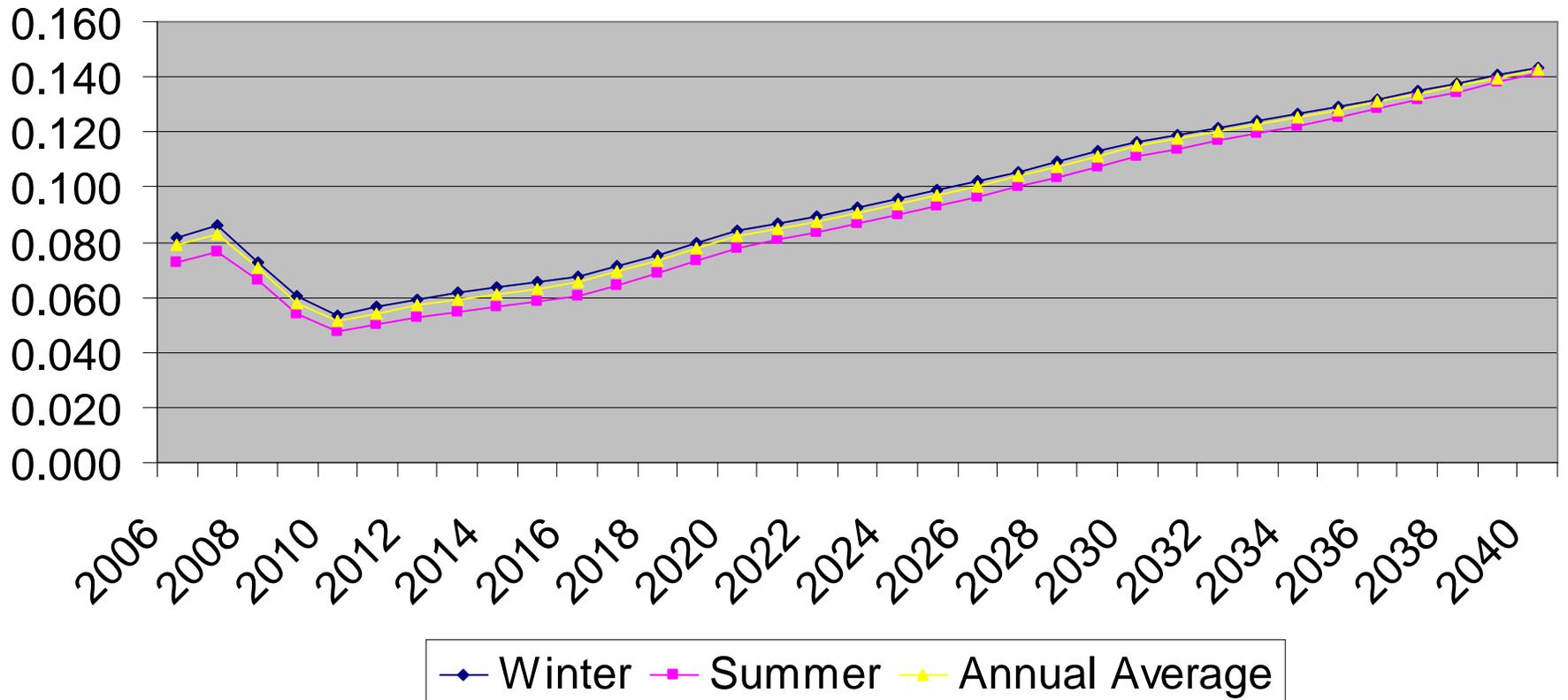
April 11-2007

At the Hub

Nepool Term	Nepool 5 x16 Bid	Nepool On 5 x16 Offer	Nepool Off 5x8, 2x24 Bid	Nepool Off 5x8, 2x24 Offer	Nepool Flat 7 x 24 Bid	Nepool Flat 7 x 24 Offer
12-Apr	\$ 90.00	\$ 93.00	\$ 65.00	\$ 66.50		
13-Apr	\$ 90.00	\$ 90.50				
04/16-04/30	\$ 79.50	\$ 81.00	\$ 62.50	\$ 63.50		
May'07	\$ 77.90	\$ 78.00	\$ 60.60	\$ 60.80		
June'07	\$ 85.40	\$ 85.50	\$ 61.50	\$ 62.50		
Summer'07	\$ 97.50	\$ 98.50	\$ 68.25	\$ 68.75		
Sept'07	\$ 84.25	\$ 84.50	\$ 62.75	\$ 63.00		
Oct'07	\$ 85.25	\$ 85.50	\$ 63.50	\$ 64.00		
Nov'07	\$ 87.70	\$ 88.00	\$ 66.00	\$ 67.00		
Dec'07	\$ 95.00	\$ 95.25	\$ 74.00	\$ 75.00		
Q4'07	\$ 89.00	\$ 89.50	\$ 68.00	\$ 69.00		
Jan-Feb 08	\$ 114.75	\$ 115.00	\$ 91.25	\$ 91.75		
Cal' 08	\$ 93.00	\$ 93.25	\$ 69.75	\$ 70.25		
Cal' 09	\$ 88.50	\$ 88.70	\$ 67.00	\$ 67.50		
Cal' 10	\$ 84.75	\$ 85.25	\$ 64.25	\$ 65.00		
Cal'11	\$ 81.75	\$ 82.25	\$ 62.50	\$ 63.00		

# Current Forecast - Nominal Dollars

## AESC Avoided Cost Forecast 2006 - 2040



# Forecast Variation 2003 - 2005

Year	On-Peak					
	2005 Analysis (2005\$/MWh)		2003 Analysis (2005\$/MWh)		Difference	
	Summer	Winter	Summer	Winter	Summer	Winter
Levelized 2005-2037 @ 2.03%	72.33	67.24	75.51	51.68	-4.2%	30.1%

Year	Off-Peak					
	2005 Analysis (2005\$/MWh)		2003 Analysis (2005\$/MWh)		Difference	
	Summer	Winter	Summer	Winter	Summer	Winter
Levelized 2005-2037 @ 2.03%	47.79	55.31	40.52	40.43	17.9%	36.8%

# Capacity

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- Capacity is Settled Monthly
  - Capacity value is based on performance during critical winter and summer hours (“Reliability Hours”) 200 + hours/year
    - Initially based on engineering assumptions, but blended into a 3 year average with actuals
  - Through 2010 prices are fixed. After that based on FCM auction prices.
  - Details of the capacity market continue to evolve
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# Capacity

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Each ICAP Resource will receive an ICAP Payment for each month that it is listed that will be calculated as the product of the resource's UCAP rating and the following fixed payment rate (ICAP Transition Rate):

December 1, 2006 to May 31, 2007	\$3.05/kW-Month
June 1, 2007 to May 31 2008	\$3.05/kW-Month
June 1, 2008 to May 31, 2009	\$3.75/kW-Month
June 1, 2009 to May 31, 2010	\$4.10/kW-Month

After May 31, 2010, the price will be determined through the Forward Capacity Auction.



# Capacity

<b>Illustrative Capacity Value Calculation</b>			
(1)	Installed Capacity	250 kW	
(2)	Summer Capacity Rating	50 kW	
(3)	Winter Capacity Rating	150 kW	
(4)	Cleared Capacity Value	\$5.00 /kW-Month	
	Summer Payment = (2) * (4) * 4	\$1,000.00	
	Winter Payment = (3) * (4) * 8	\$6,000.00	
	Total	\$7,000.00	
	Annual Capacity Factor	0.5	
	Annual kWh	1,095,000	
	Revenue/kWh	\$0.0064	

# Renewable Energy Certificates (“RECs”)

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- What are RECs?
  - Other New England states have adopted Renewable Portfolio Standards which require Load Serving Entities to procure a certain percentage of their energy from renewable sources
  - RECs are the attributes of the power – not the electrons.
  - RECs are the vehicle with which to demonstrate compliance with an RPS
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# Renewable Energy Certificates (“RECs”)

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- RECs are **NOT** administered through the ISO market
- RECs are bought and sold bilaterally
- Price for RECs is based on Supply, Demand and the default price
- Supply is influenced by new projects coming on line or changes in the rules
- Demand is influenced by the requirements set by the states.
- Default price is approx 5 cents/kWh



# Renewable Energy Certificates (“RECs”)

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RECs are **NOT** available to net metered projects

- Individual states have their own definitions, but generally newly constructed renewables are premium renewables.
- RECs are sold within New England
- Don't plan on double counting - REC and Carbon offset



# Renewable Energy Certificates (“RECs”)

Monthly Market Update

REC Markets

March 2007

## Compliance RECs

### CT CLASS I CERTIFICATES

▼ TERM	▼ BID	▼ OFFER	▼ LAST	▼ DATE
2006	\$26.00	\$34.00	\$30.00	03/07/07
2007	\$46.00	\$52.00	\$49.50	03/06/07

### CT CLASS II CERTIFICATES

▼ TERM	▼ BID	▼ OFFER	▼ LAST	▼ DATE
2006	\$0.40	\$0.75	\$0.50	03/19/07
2007	\$0.40	\$0.75	\$0.60	01/29/07

### ME CERTIFICATES

▼ TERM	▼ BID	▼ OFFER	▼ LAST	▼ DATE
2006	no bid	\$0.40	\$0.15	12/22/06
2007	no bid	\$0.40	\$0.20	02/26/07

### MA “NEW” CERTIFICATES

▼ TERM	▼ BID	▼ OFFER	▼ LAST	▼ DATE
2006	\$51.00	\$55.00	\$54.00	01/16/07
2007	\$51.50	\$55.50	\$54.00	01/07/07

<http://www.evomarkets.com/>

# Contracting for Sale

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- Bilateral Contract
  - Most likely with interconnecting utility
- Because of SPEED utilities receptive to renewable projects
- May have to adjust price expectations due to unit contingent nature of output and hydro load shape
- Details of the power market continue to evolve.



# Contracting for Sale

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- What does a contract look like?
  - Pricing Terms
    - Approximate current market price projections
    - Could be a fixed price (indexed)
    - Could be the hourly nodal price
    - Could be a collar (not to exceed X or go below Y \$/MWh)
  - Recommend against contract pricing that is a percent of the market price
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