



Testimony On The Draft NJ Energy Master Plan



July 15th, 2008

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- **USE LESS: Conservation, Efficiency, and Peak Shaving**



- **Build A More Sustainable Electricity Supply**



- **Set Goals To Electrify Transportation**



- **Begin Heating Supply Transition**



- **Ensure Long Term Success**

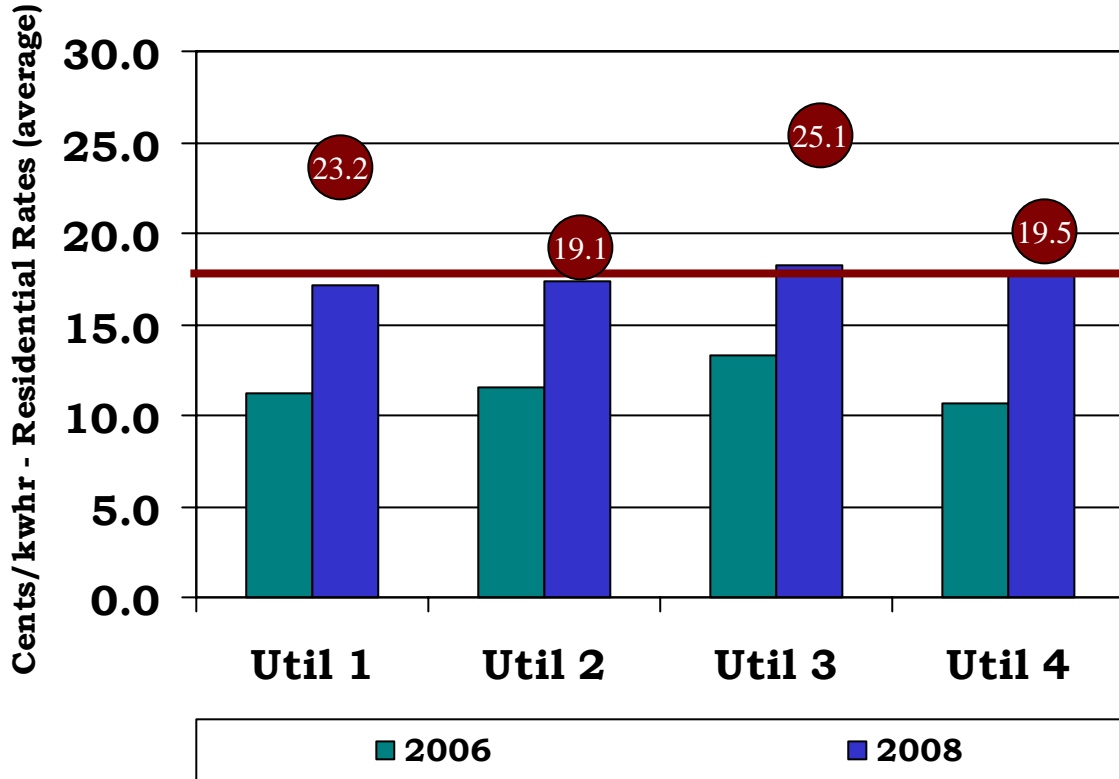
**We Endorse The
NJ SEED Plan As
A Framework For
The Overall EMP**



Input On BAU Assumptions


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- **Establishing A Future BAU Baseline For Energy Costs Is One Of The Most Critical Elements Of The EMP**
- **The “Future BAU Costs” Assumptions – Without The RPS - Will Have A Profound Impact On Policy Decisions, Especially Regarding The Use Of Renewables**
- **The Current BAU Projections – Especially For Electricity – Are Wildly Optimistic (too low), Making Fair Economic Evaluation Difficult**



\$0.18/kwhr: 2020 BAU Case Residential \$/Kwhr (avg)
(page 22 of modeling report)

Recommendation: Adjust BAU cost projections to reflect actual price trends over the last few years, including case showing impact of no RPS.

 = Current maximum price that could be paid by residential customers in the summer

Based on AVERAGE residential rates, weighted seasonal average, lowest priced tier where applicable, tariffs effective June 1, 2008
DOES NOT INCLUDE DEMAND CHARGES, which apply incrementally to commercial customers



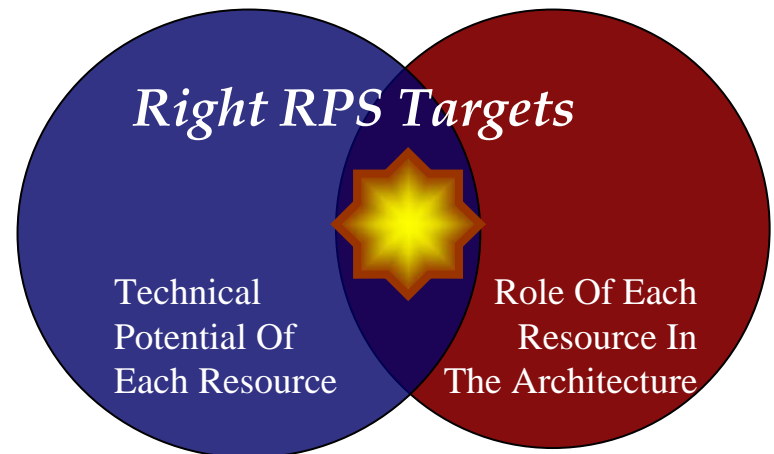
Observations On The Draft EMP

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- **NJ Faces Severe Energy Scarcity And Economic Risk**
 - Fuel shortages & increasing cost, volatility, and vulnerability
 - Growing gap between supply and demand
 - Significant traditional plant retirement
 - Need to reduce import dependence
- **Many Draft EMP Elements Are Based On EXISTING State Commitments**
 - The EMP Is A Chance To Re-Assess Goals, Especially CO2
- **The EMP Draft Leaves Many NJ Renewable Energy Resources Untapped**
 - The state COULD do more, and probably SHOULD do more
- **NJ Must Commit To Significant New In-State Plant Development NOW**
 - New Fossil Fuel Plants
 - Counter to the 2050 CO2 and fuel-independence goals
 - Market not investing in this high-risk plant
 - **OR**, New Nuclear Plants
 - Expensive, no waste solution, safety risks
 - Almost impossible to site
 - **OR**, Build More Renewable Energy Plant Instead

What Type Of New
Plant Development
Will NJ Choose?

- **NJ Is Blessed With Renewable Resource That Could:**
 - Replace all existing traditional plant, especially fossil-fuel plants medium term
 - Avoid the need for new traditional plant development of any kind
- **Renewables Can Play A Significant Role Without Storage Up To About 30%**
 - Increased use of renewables, past 2020, will require large scale storage
- **Different Renewables Play Different Roles In The Energy Architecture**
 - Solar: Peaking Resource
 - Ocean Resources (wind and wave): Baseload
 - Biomass: dispatchable intermediate
- **Optimum RPS Balances Role With Potential**





NJ's Renewable Energy Potential

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Draft EMP Sets Conservative Goals For Renewable Development:

- **Offshore Wind**
 - Technical Potential (after exclusions): 24.5GW, 73,500 Gwhrs/yr
 - Draft EMP: Established goal of 1GW, based on initial 350MW pilot
 - Recommendation: goal of AT LEAST 3,000 MW, with further growth plans to 2050

- **Biomass**
 - 5.5 MDT of biomass currently available for energy annually, 75% of which is waste
 - Which could produce 1.1-1.3GW of electricity (about 9 Twhrs potential), OR 311-335 Million GGE of fuel
 - But this is based on EXISTING feedstocks and waste-streams
 - Draft EMP: 900MW of electricity generation, plus some conversion to heating fuel
 - Recommendations:
 - Development of additional feedstocks possible
 - Focus on distributed non-incineration waste-to-energy technologies, especially distributed gasification
 - Possible expansion of Class II goals given NJ waste-stream

- **Wave Power**
 - Wave Power is probably a key future baseload resource, especially if combined with Wind
 - Recommendation: trials for large scale commercialization, should consider “WaveHub” pilot

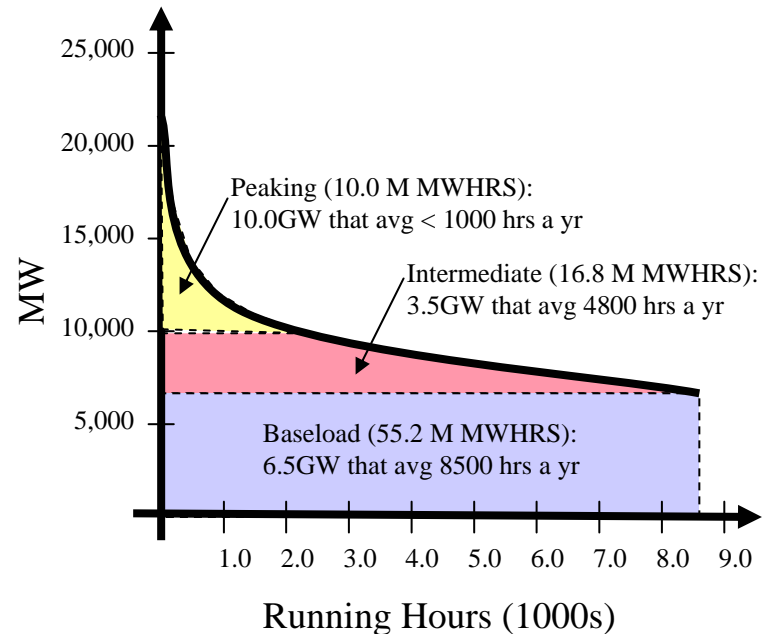
- **Other Class I resources**
 - Technical potential for OTHER (on-shore) renewable resources unclear
 - But programs probably needed to further develop on-shore wind and micro-hydro

Solar Offers Cost Advantages As A Peaking Resource

- Solar tends to displace NJ's most expensive power based on Natural Gas
- Natural Gas prices have doubled in 5 years, increasing volatility and supply risk
- By contrast, Solar is a STABLE PRICED source of peaking power

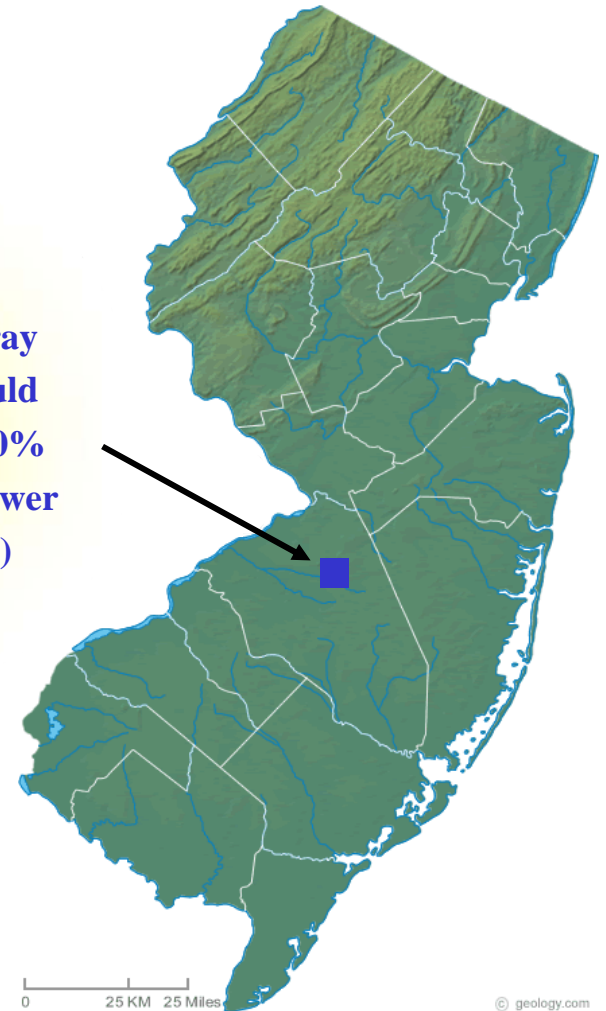
Solar Can ECONOMICALLY Displace The Part of NJ's Plant That:

- **Runs <1000 hours/year**
- **Is used mostly during daylight hours**
- **Is at its peak during the summer**
- **Is based on expensive & volatile NG**
- **For 10 GW of NJ-PV:**
\$45B (\$4.50/W) investment yields
\$45B in electricity (\$0.14/kwhr, 30 yrs)



- **To Produce 20% Of NJ Power (14 Twhrs Annually)**
 - From **EXISTING PV Technology**
 - **250 kwr/acre, 1.1 kWhrs/W-DC**
 - **12.7 GW-DC**
- **50,000 acres (<1% of land area)**
- **A square 9 miles on a side**
- **Area Requirement DECREASES As PV Efficiency Increases**
- **Much Of This Area Could Come From REUSE Of Existing Space:**
 - **Roofs**
 - **Parking Lots**
 - **Marginal Lands**

A PV Array
That Would
Provide 20%
Of NJ's Power
(to scale)

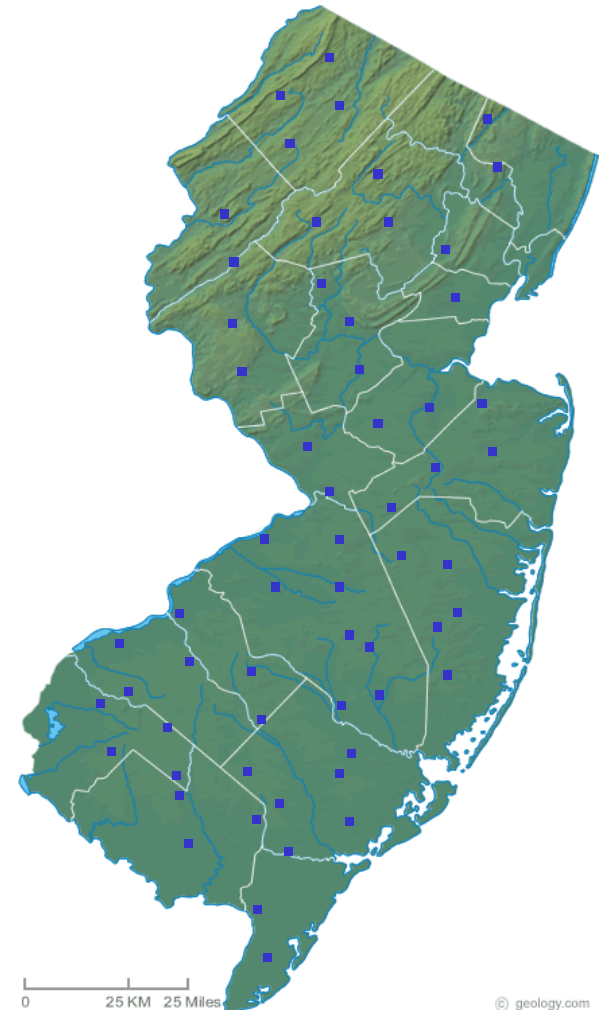


- **Solar PV Is Best Deployed As A DISTRIBUTED Plant**

- **Technical Potential For Solar PV**

	Navigant Analysis	SFN Analysis
Residential	10.4 GW	4-5 GW
Commercial	7.4 GW	10 GW
Community Solar	N/A	Unlimited
Grid Supply	N/A	Unlimited

- **Example: 20% Of NJ's Power Could Come From 50,000 Acres (or less):**
 - 10,000 5-Acre Community Solar Sites
- **Context:**
 - Over 3,500 solar projects done in 5 yrs
 - 162,158 NJ-Acres Preserved by 2007
 - Over 58,000 Acres dedicated between 1995 and 2001 (6 years)





But What Will It Cost?

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- **Economics Should Be Considered As TRADE-OFFs Between Competing Alternatives (i.e., cost of A vs B, in the context of benefits)**
- **While Solar-PV Is More Expensive Than Traditional Supplies Historically, It Is VERY Competitive With NEW CONSTRUCTION, Especially Nat-Gas**

	Solar PV	Nat-Gas Peaker
Total Capital Cost (\$/KW)	\$5500 - 6000	\$650-1500
Fixed OA&M (Annual \$/KW)	\$25.00	\$6.80-27.00
Variable OA&M (Annual \$/MWHr)	Minimal	\$28.00-\$4.70
Fuel Costs (\$/MM-BTU)	ZERO	\$8.00
Capacity Factor (% of hours/yr)	20%	10%
Life Of Plant (years)	20 Yrs	20 Yrs
Levelized Cost Of Energy	\$128 - 154	\$221 - \$334

Nat-Gas Fuel Prices Are Increasing, Beyond Control And Highly Volatile

Source: Lazard



Question: If solar is becoming economically competitive with Traditional supply, why are incentives needed?

- **Market Structure:** Current market mechanisms require that new solar plants compete with AVERAGE prices of all existing plant (not specific new plants)
- **Downward Price Curve:** Since solar is known to be pricing down, additional IRR needed to encourage investment NOW.
- **Old Vs New:** Many established plants are already amortized and/or benefited from “off book incentives” not reflected in typical comparisons. These advantages drive down “average market pricing” against which solar competes.
- **“Break Even” Not Good Enough To Motivate Adoption:** To attract the investment needed for new solar plants, IRR must be much better than “break even”. Must do better than “grid parity” to overcome customer inertia.
- **Host vs Society Benefits:** Many of the benefits of a solar play accrue to society at large, not the customer (or investor) of the system.



- **Solar Is A Premium Peaking Resource In NJ**
 - Commercially proven, highly reliable if managed properly
 - Solar is the most broadly available renewable energy resource in the state
 - Technical Resource:
 - At least 15GW on residential and commercial rooftops, medium term
 - Virtually unlimited if Community Solar and Grid Supply systems are enabled
 - Highly Attractive Compared With New Construction Of Traditional Plant
 - Cheaper than Natural Gas plants, which is the power typically displaced
 - Faster and easier to construct than nuclear, with lower risks

- **Draft EMP Commitment: 1.5GW (or less, depending on interpretation)**

- **Recommendations:**
 - **Implement SREC-securitization program (underway)**
 - **Reassess and revise redundant cost-cap structure**
 - **Enable Community Solar**
 - **Consider A “solar fields” preservation program**



Recommendations For Building A Sustainable Electricity Supply

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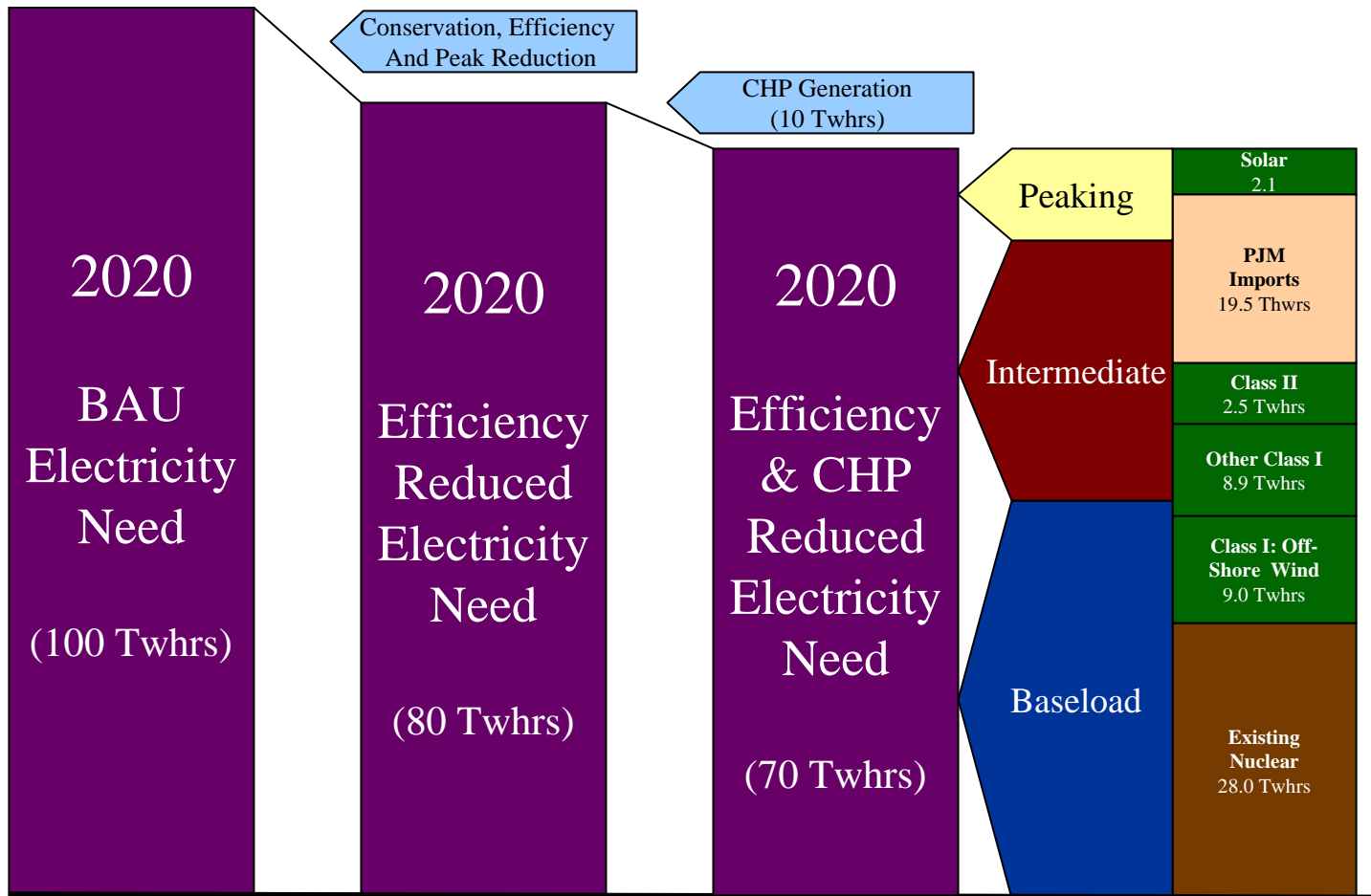
- **Large Scale Development Of Renewable Energy In NJ**
 - **Is Both FEASIBLE And ECONOMICAL**
 - **Could Displace Most Existing Fossil Fuel Plants Medium Term (by 2020)**
 - **If Fully Developed, Would Eliminate The Need For Development Of New Traditional Plant**

- **Strengthen the RPS components of the EMP:**
 - **Reinstate 22.5 Twhr as an absolute renewable goal**
 - **Establish programs to encourage renewable generation IN THE STATE:**
 - **Solar goal of 2,150 Gwhrs, based on programs that:**
 - **Securitize long term financing**
 - **Reassess and revise existing redundant cap system**
 - **Enable Community Solar commercialization model**
 - **Implement a “solar fields” program**
 - **Establish a goal and programs for AT LEAST 3,000 MW of off-shore wind**
 - **Encourage other Class I resources – especially commercial development of Waver Power**
 - **Expand Biomass program, including development of new feedstocks, and expansion of Class II goals**
 - **Create new authority to guide retirement, recycling, and development of traditional plant**
 - **Set a 2025 goal of 40%, with acceleration mechanisms based on cost**



NJ Energy Portfolio (by 2020)

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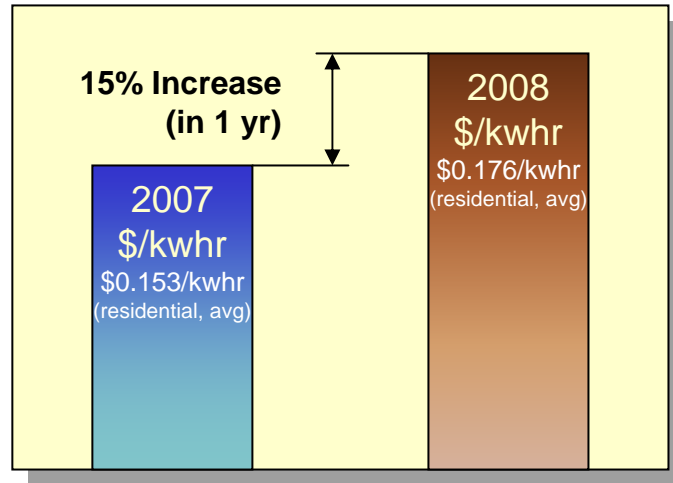
Note: Assumes the retirement of Oyster Creek Nuclear Plant, and does not reflect impact of transportation electrification



Comparing Rate Payer Impacts

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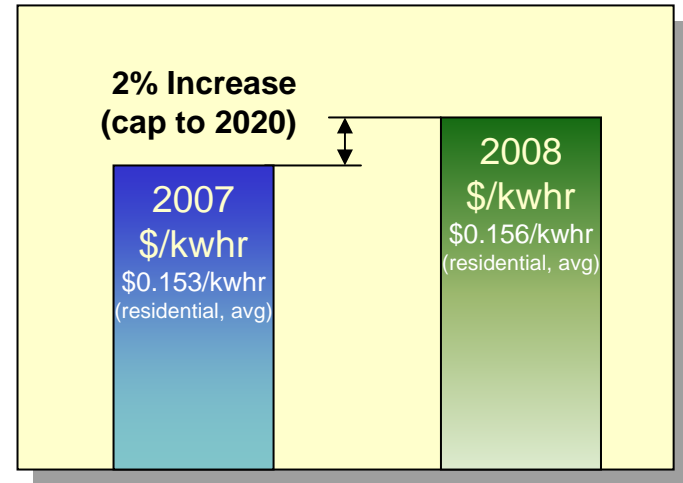
Cost and Benefits Of Depending On BAU



Benefits Realized From Increased Cost:

Additional Generation Capacity	None
Reduction Of CO2	None
Reduced Fossil Fuel Dependence	None
Contains Future Cost Increases	No

Cost and Benefits Of Solar RPS Investment



Benefits Realized From Increased Cost:

Additional Generation Capacity	1.5 GW
Reduction Of CO2	Yes
Reduced Fossil Fuel Dependence	Yes
Contains Future Cost Increases	Yes

Potential Cost Impacts Of Renewables Must Be Compared With FUTURE Costs Of BAU



- **FACT: Electricity Prices In NJ Increased 5 cents/kwhr from 2006 to 2008 (2 yrs)**
- **WHAT IF: that 5 cents/kwhr increase were invested in solar instead:**
 - For 76,000,000 Mwhrs, that is \$3.8B/yr, \$76B over 20 years
 - At \$4.00/W (average over 20 years), that funds 19 GW-DC of solar peaking plant
 - With an average 1.1 production factor, that is 21,000 GWhrs of electricity
 - That is 27% of the power consumed in 2005, 30% of the electricity needed in 2020 (70Thwrs)
- **CONCLUSION: the rate increases ALREADY FORCED on NJ ratepayers over the last two years to cover increasing fossil-fuel generation costs, if invested in solar instead, would provide enough energy to completely displace all coal, oil, and natural gas based generation in NJ (about 30% of existing retail usage)!**
- **Solar Investment Benefits:**
 - Eliminate dependence on fossil fuels, **STABLE PRICED SOURCE OF POWER**
 - Reduced CO2 output, reduced emissions of all kinds
 - Provides the peaking power that is most critical for NJ

The Best Way To Protect Rate Payers From Future Cost Increases Is To Eliminate Fossil Fuel Use



Recommendation Summary

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- **Implement the Goals and Initiatives Of The NJ SEED Plan**
- **Establish more realistic future cost baseline of the BAU case (without renewables)**
- **Ensure the cost of renewables is compared with future BAU price increases”**
- **Renewables have the potential to allow retirement of all fossil fuel plants in the medium term, and if fully developed, to eliminate the need for any new traditional plant through 2050.**
- **Strengthen the RPS components of the EMP:**
 - Reinstated 22.5 Twhr as an absolute renewable goal, apply 22.5% RPS against BAU total (100 Twhrs)
 - Establish programs to encourage renewable generation IN THE STATE:
 - Solar goal of 2,150 Gwhrs, based on programs that:
 - Securitize long term financing
 - Reassess and revise existing redundant cap system
 - Enable Community Solar commercialization model
 - Implement a “solar fields” program
 - Establish a goal and programs for 3,000 MW of off-shore wind
 - Encourage other Class I resources – especially commercial development of Waver Power
 - Expand Biomass program, including development of new feedstocks, and possible expansion of Class II goals
 - Create new authority to guide retirement, recycling, and development (if needed) of traditional plant
 - Set a 2025 goal of 40%, with acceleration mechanisms based on cost