Customer Lowered Electricity Price CLEP Pitch for 12Apr17

Each page of the Script corresponds to a page of the Handout that is numbered 10 more. For this page of the script, please view page 11.

Einstein once said, “If I had an hour to solve a problem and my life depended on it, I’d use 55 minutes to find the right question…” After decades of thinking about this, I believe that I FINALLY found the right question:

How can we ENGAGE the MARKET PLACE to solve CLIMATE CHANGE?

And, a very good an answer: Customer Lowered Electricity Price. or *CLEP will*

1) *Revolutionize how electricity is bought and sold—by letting every customer participate in the wholesale market.* And it will *put control of the grid where it belongs—in the hands of the consumer.*
2) *Lower electricity prices for all of us and provide net income for some,* and
3) Allow us to *use the latest battery technology in our homes* — like the one pictured— by offering a way *to fully finance* them, and *ensure resilience against a changing climate.* But… *Why the emphasis on home batteries*?

Home batteries turn power customers into energy customers and thus cause a fast & cheap transition to a 100% renewable energy future.

4) *How does CLEP do all this?*
   a) *Powered and controlled by supply and demand CLEP rewards timely consumption and sales AND reduced demand;* and by so doing,
   b) CLEP doubles cashflows for energy efficiency and renewable energy.
5) The best way to try CLEP employs its multi-home battery pilot. Selling it, shouldn’t be so hard, because one such a pilot was already approved in Rutland, VT—*but ours has one very important difference — ours will be FINANCED with CLEP!*

Please view page 12 of handout.

HOW DOES CLEP WORK?

(Page 2 of the handout shows CLEP's formal definitions which are needed to create utility bills.)

CLEP customers pay their normal electric bills; but, also *receive* two *cashflows*:

1) CLEP5 pays for buying when wholesale prices are low, and for selling when prices are high,
2) CLEPm pays a "negative demand charge" *reward* for low demand during peak hours.

Using (utility-provided) smart meters, customers effectively buy and sell at real-time wholesale prices AND are paid to avoid demand at the same annual rate as (the utility) charged commercial customers.

All CLEP income comes from current or future utility-cost savings.

Since the utility retains 5%, CLEP lowers prices for ALL — not just those who chose CLEP.

The next table shows CLEP IN ACTION.

Customer Lowered Electricity Price CLEP Pitch for 12Apr17

Please view page 13 of handout. This table summarizes and corrects content in the CLEP video.

1) CLEP's First Costs and Annual Savings shows $ & CO_2 savings for 5 ways to apply CLEP
2) CLEP5 and CLEPm are in separate columns. For energy efficiency, these values are *additional* income, but are *alternative* income for the solar examples.
3) The last column shows that cashflows for EE and rooftop solar double.[1]
4) The 5 ways to use CLEP — ordered by increasing investment — are
   a. Programming appliances for off-peak use —reduces wholesale prices and peak demand costs, but maybe not kWh's used.
   b. Energy efficiency investments — were already covered.
   c. Community solar (jointly-owned and locally sited) is 3 x as accessible and lucrative, so lucrative — it allows 20% subsidies to low income residents.
   d. Whole-home batteries project ten-year payback for a $10,000 battery; good, because that's their warranty period.
   e. Rooftop solar with a battery — reaps 100% more than solar alone — because of timely production.

But what happens when the grid goes down or a Storm Comes?

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[1] Notice that neither appliance programming nor home batteries reduce kWh use and doubling income for rooftop solar + a battery is all about proper rewards for timely production.

Customer Lowered Electricity Price CLEP Pitch for 12Apr17

Please view page 14 of handout. Impending hurricane grossly destroyed electric grid.

1) *Investing in buildings is still where we need to focus, but we can no longer afford to dismiss batteries.*

2) I've come up with the term whole home batteries to describe what I published 3 years ago –
   a) that all *homes need them*,
   b) they *can be financed by savings on both sides of the meter,* and
   c) they should be *able to store a day's electricity in 4 hours*. BSI, 2014 [2]

3) The *SOCIETAL* benefits of home batteries dwarf the *100% renewables* goal of this competition for many people, because they provide reliability, excellent power quality, resilience — and can save lives!

4) So, along with 100% renewables goal, we need lots of home batteries, and, in fact, batteries in all buildings.

5) Switching from *power* to *energy* provider avoids trillions in infrastructure. This (grid) model is easily exported to developing countries — where most electricity will be used by 2050; In fact, many such countries already have energy provider grids.

So, if batteries are so good, how can get them into buildings?

That's where the battery pilot comes in.

[2] *Inverted Demand Compliant Construction, a Key to a Renewable Energy Future*, EEBA conference, 2014.

Customer Lowered Electricity Price CLEP Pitch for 12Apr17

Please view page 15 of handout. Associate underlined phrases to spreadsheet elements.

FROM PROTOTYPE to IMPLEMENTATION: CLEP's 10-year BATTERY PILOT's business model is based on Rutland, VT's 2015, utility-initiated & -funded pilot.

1) It will deploy 12 MWH among 1000 residences.
2) If you look at the numbers, highlighted in yellow — the utility's out-of-pocket cost (Undepreciated Leased Assets) peaks at $5.8 million in the 2nd year and goes to ZERO in ten years using 4 cashflows:

$2.5 (million) profits from *sales*; $3.7 (million) for *rate of return* profit

$6 (million) from *depreciation*, $6 mil from *CLEP-associated savings*

ALL without burdening non-participants (Contribution to Cost of Service).

4) This distributed power plant supplies 8 MW for 1.5 hours and can be 100% cycled, 3 times daily, for a decade.

(That's thrice daily for 250 fortnights — if you're British!)

5) So, for 3/4 the $1/W price of a 200 MW peaking plant — it pays back 3X faster and has tiny operating costs.

6) Deploying 25,000 batteries matches the peaking plant's capacity but with a 10 X *higher* capacity factor.[3]

7) But, in fact, peak demand *WILL* drop by *much more* than 200 MW, because CLEP pays in the 4 more ways already described (2 pages back).[4]

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[3] Energy Storage Association presented on 3-29-17 at New Orleans' City Council utility committee meeting.

[4] This synergy between *whole-home batteries* **AND** *CLEP* that simultaneously provides peaking power and greatly reduces demand, exposes part of the power of CLEP to solve the original problem that caused this researcher to invent CLEP in the summer of 2015. During BSI's efforts to respond to the 2015 Entergy New Orleans Integrated Resource Planning process, BSI realized an *IRP cannot be calculated much less approach its goal in any fashion*

page 16 of handout is blank

Regarding Scalability

1) Once debugged, a CLEP pilot can be easily scaled in any U.S. utility — but best adjusts to the 50% with smart meters.
2) Changes are needed when exporting CLEP, because of different rate structures and demand charges,[5] but are feasible.
3) Utility-provided batteries make scaling much easier.

OK… So — What's so good and special about CLEP?

anywhere! BSI invented CLEP to resolve this dilemma. By design, *CLEP uses the market to automatically and continuously approach the least cost balance of supply- and demand-side utility investments.*

[5] For example:

- Demand charges in Germany only accrue when a building's demand coincides with utility peak demand.
- China's demand charges are based on market forces, even though electricity prices aren't. CLEP5 may not fly in China—but CLEPm, which makes up 90% of CLEP's cashflow, should work.
- Europe is fertile ground because smart meters are widely available.)

Please view page 17 of handout.

The Utility Regulators' View of CLEP Compared to Alternative Strategies graphic illustrates CLEP's uniqueness and benefits.

1) This tables lists 30 ATTRIBUTES, or GOALS, that characterize electricity delivery, like *Improves Reliability*, *Promotes EE* or *Not a Subsidy*, vs STRATEGIES used to achieve them, like *Inclining Block Rates*, *Demand Response* or *Net Energy Metering*.
    - Notice that CLEP is the only strategy that accomplishes most of the goals, and
    - CLEP is the only way to fully fund whole-home batteries.
2) *Like Time-of-Use Rates, CLEP lowers demand during peak hours, but unlike TOU rates, CLEP also lowers total kWh consumption.*[6]

[6] This is just a partial list of CLEP's benefits. The full list includes those noted under the batteries section above, the last section that discusses why CLEP should win, and the CLEP description on the Bright Minds Challenge website.

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With the help of the Bright Mind Challenge team —

1) the battery pilot's business model and other applications of CLEP
   a) can be audited,
   b) evaluated,
   c) improved and
   d) customized to each utility and wholesale market.

2) A marketing strategy and promotional plan can be created that:
   a) Successfully lobbies *utilities and* utility regulators; and
   b) Builds support among CLEP's natural allies, and other potential allies (— both public and private). *One way to do that might be to create a cellphone app that simulates CLEP.*

Page 19 of handout.

CLEP SHOULD WIN THIS COMPETITION because

CLEP is unique in the following ways

It shifts the utility economic structure from incentivizing what we don't want to rapidly incentivize what we do[7] — both economically and environmentally. CLEP does this by engaging the market place to —

1) Convert economic self-interest by one — into cost reductions for all;

2) Stimulate innovations that cause market transformations and create jobs, and

3) Reward activities that move us toward the goal of *integrated resource planning.*

Moreover, CLEP is also very special because:

1) CLEP surpasses any *1* technology because it *multiplies* rewards for most technologies — whether renewables, batteries or efficiency — all will be more successful in a world with CLEP, and

2)) CLEP (is apolitical because it) appeals to both the conservative & progressive mindsets.

Climate Change's problems are far too broad, deep and imminent to look beyond the *single* solution that CAN REALLY ADDRESS their scope.

CLEP has been endorsed by many energy professionals

CLEP just needs one utility to run a pilot, iron out the kinks, and prove itself.

Thank you for your time and consideration.

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[7] Gabrielle Stebbins, personal communication, 29Mar17.

Customer Lowered Electricity Price   CLEP   Pitch for 12Apr17

March 30, 2017

Judges of the Bright Minds Challenge,

This is a short note to inform you that the content of the spreadsheet and tables found hereinafter is very detailed, and it is suggested that you look them over in advance.

Please carefully watch the 12-minute video found on the BMC's CLEP webpage and find a few assertions that are not repeated in the pitch, e.g., CLEP forestalls grid defection.

The following information is highly relevant for both understanding CLEP and BSI's efforts to promote CLEP in New Orleans.

- All of BSI's submissions in 2015 ENO IRP docket are and have been available in the DropBox folder link on the CLEP page within the BMC website since the beginning of February 2017; this includes three CLEP pilot submissions.
- Please read the summary and conclusions of that effort found in the 10-page document, BSI-motion-IRPbMBA-UD-17-01-3FEB2017.pdf , filed roughly 2 months ago.

I look forward to meeting you at Greentown Labs in Boston on April 12.

Thank you for reading this.

Myron

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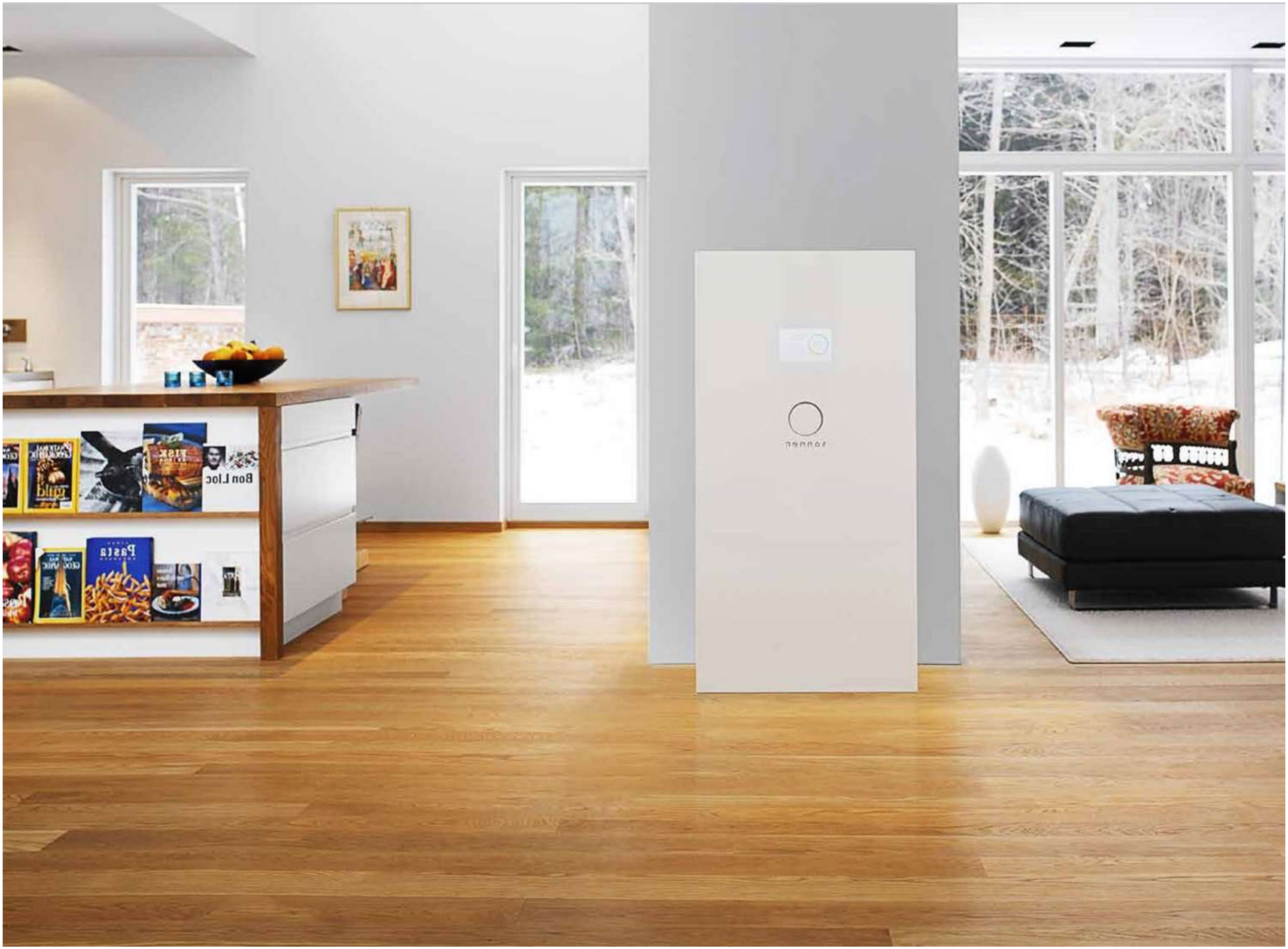


Definitions of Customer Lowered Electricity Price, (CLEP)

For a *residential* ratepayer who voluntarily accepts the CLEP tariff,

A Monthly CLEP Payment = CLEPm + ∑ CLEP5

where: **CLEP5 = p * n * (e - w)** is calculated every 5 min

p = Utility-regulator determined, "percent" and $0 < p < 2$;

n = Number of kWh purchased by the customer.

If the flow is outbound (i.e., a sale), **n** is negative;

w = Wholesale cost of power

e = Monthly average cost of energy (***fuel cost adjustment***)

where: **CLEPm = q** * $50 * **d** is calculated monthly

d = ***Average demand during utility peak hours*** avoided

(*i.e.,* **d** = observed reference building demand **minus** observed demand)

q = Utility-regulator determined "percent" and $0 < q < 2$.

Buy Low
Sell High

Negative
Demand
Charge

For a *non-residential* ratepayer who voluntarily accepts the CLEP tariff,

CLEP is the same as defined for residential ratepayers except,

CLEPm is redefined and replaces all demand charges

CLEPm = q * $50 * **d** is calculated monthly

d = ***Average demand during utility peak hours***

When **d** *is positive,* ***CLEPm*** *creates a high demand charge paid by the customer***.**

When used to finance *Community Solar*, CLEP is the same as defined for non-residential ratepayers except,

CLEP5 is replaced with **p * n * w**

*Notes***:**
A. *The "$50" factor in CLEPm's definitions may be adjusted to optimally encourage CLEP acceptance but not undermine: CLEP transactions lower the electricity price for all customers.*
B. *The negative demand charge paid to a residential customer viewed in $/KW-y should not exceed 2x the highest demand charge paid by a non-residential, non-CLEP customer in $/KW-y.*
C. *If a customer does not have air-conditioner-dominated demand, then replace $50 with $50/2.*
D. *Utility peak hours are annual and occur within May through Sept, weekdays, and are between 2 p.m. and 7 p.m.; otherwise CLEPm = $0 for that month.*
E. *CLEPm generates a payment whenever* ***average demand during peak hours*** *is negative.*
F. *Avoided demand is observed by* real-time *comparison to performance of homes of similar age.*
G. *"p" and "q" are extra controls to allow the utility regulator to ensure that goals are met.*

Probable First Costs and Annual Savings of CLEP for a Customer using Entergy New Orleans Electricity[8]

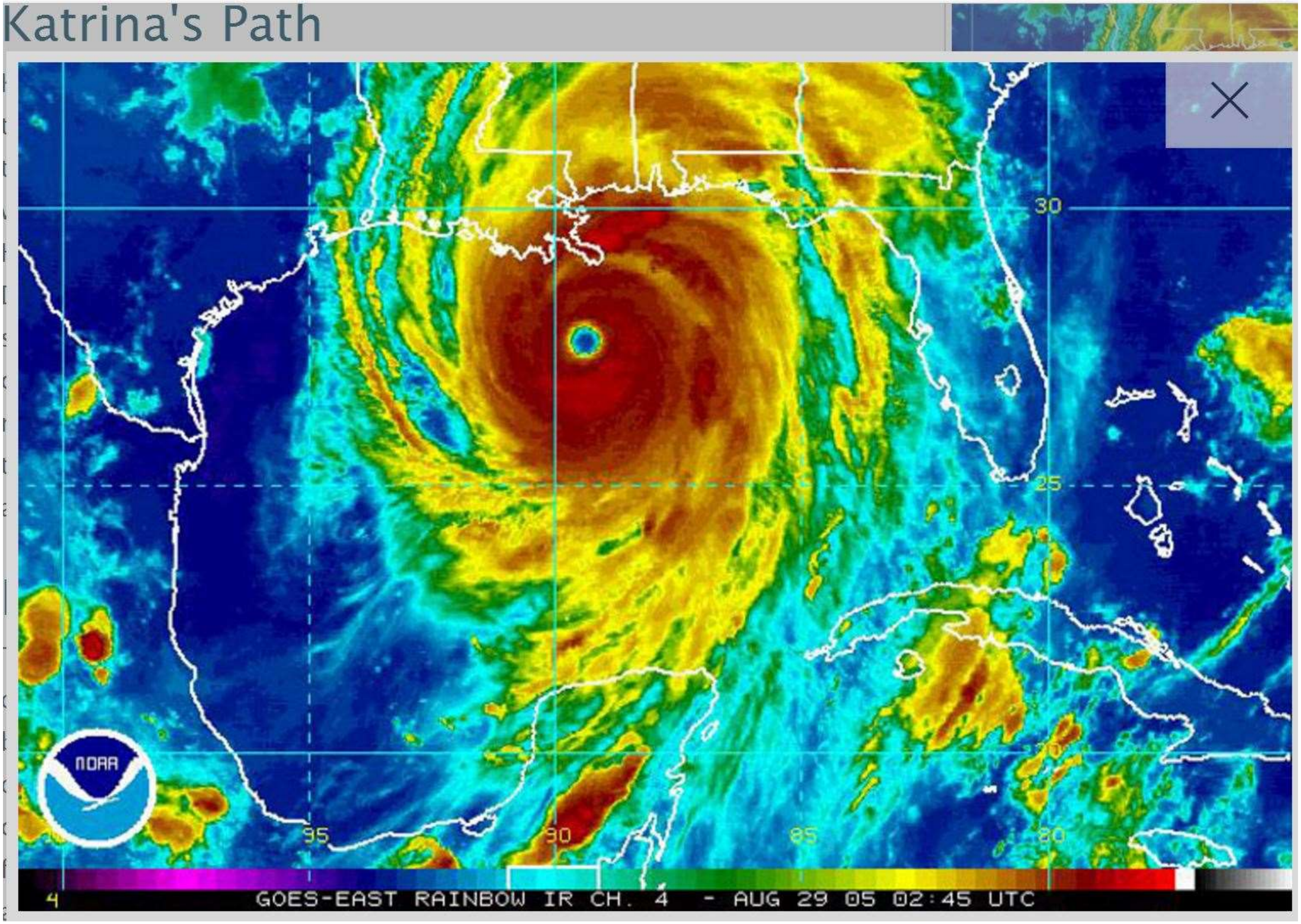
	First Cost	Annual Savings without CLEP		Additional[1] or Alternative[2] Annual Savings with CLEP			CLEP VS no CLEP
		$	lbs of CO_2[9]	CLEP5	CLEPm	lbs of CO_2	$ / $
Dishwasher	$0	$0	0	$6	$20	130[1]	130 / 0
Water Heater[10]	$1000	$250	2500	$20[1]	$250[1]	570[1]	520 / 250
Community Solar	$5,000	$900	10800	$360[2]	$625[2]	0[1]	985 / 900
Whole Home Battery	$10,000	-$10	0	$100	$900	2400[1]	1000 / 0
Rooftop Solar with Battery[11]	$27,500	$900	10800	$250[2]	$1550[2]	0[1]	1800 / 900

[8] Entergy New Orleans experiences roughly 1800 MW of peak demand. Current installed capacity is around 40 MW of solar, no wind, 20% nuclear and 4% coal during the day, and perhaps access to 20% wind, no solar, 20% nuclear and 4% coal at night; the rest is natural gas — most of this is combined cycle

[9] @ 1.2 lbs of CO_2 / kWh national average during the day and 80% lower during the night and assuming electricity cost is $0.10 / kWh

[10] Heat Pump Water Heater.

[11] $15,000 for 5KW of rooftop PV, and $12,500 for 15 kWh battery.


Katrina's Path
30
25
20
95
90
85
80
NOAA
GOES-EAST RAINBOW IR CH. 4 - AUG 29 05 02:45 UTC

CLEP Battery Pilot Cashflow Over 10 years

First & last years are 6 months long

Sold Units[12] **Year**	1	2	3	4	5	6	7	8	9	10	11	**SUMS**
Total # of Units Sold	600											
Mid-Year Convention	300											
Cumulative # Units Sold	300	600	600	600	600	600	600	600	600	600	600	
# Sold Units under Direct Control	200	400	400	400	400	400	400	400	400	400	200	
DOLLARS												
Sales												
Retail Revenue[13]	$10,920,000											$10,920,000
Wholesale Costs for sold units[14]	$8,400,000											$8,400,000
Sales Tax	$840,000											$840,000
Bill Credit for Control by Utility[15]	$285,000	$570,000	$570,000	$570,000	$570,000	$570,000	$570,000	$570,000	$570,000	$570,000	$285,000	$5,700,000
Power Supply benefit from control[16]	$300,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$300,000	$6,000,000
Leased Units[17]												
Total # Units Leased	400	400	400	400	400	400	400	400	400	400	400	
Mid-Year Convention	200	400	400	400	400	400	400	400	400	400	200	
DOLLARS												
Undepreciated Leased Assets[18]	$3,080,000	5,852,000	5,236,000	4,620,000	4,004,000	3,388,000	2,772,000	2,156,000	1,540,000	$924,000	$308,000	$0
Lease Revenue[19]	$105,600	$211,200	$211,200	$211,200	$211,200	$211,200	$211,200	$211,200	$211,200	$211,200	$105,600	$2,112,000
Power Supply benefit from control	$300,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$300,000	$6,000,000
Depreciation	$308,000	$616,000	$616,000	$616,000	$616,000	$616,000	$616,000	$616,000	$616,000	$616,000	$308,000	$6,160,000
Return on Rate Base[20]	$338,800	$643,720	$575,960	$508,200	$440,440	$372,680	$304,920	$237,160	$169,400	$169,400	$33,880	$3,726,800
Marketing	$5,000											
Other O&M	$100,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$200,000
Contribution to Cost of Service[21]	$1,348,800	$428,520	$360,760	$293,000	$225,240	$157,480	$89,720	$21,960	$45,800	$113,560	$68,720	$200

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[12] 2/3 of Sold Units and all Leased Units will be under Utility control; the other 1/3 of Sold Units are fully paid for by the customer and only contribute to Retail Sales Profit.

[13] Retail Sales of battery/inverter hardware and installation profit = Retail Revenue – Wholesale Costs = $2.52 million.

[14] The wholesale price with installation and profit for the installer is assumed to be $14,000 / home on average.

[15] This is the actual CLEP payment with the 95% factor employed. That is p = q = 95%.

[16] This is the CLEP payment before multiplying by 95%. It is a very conservative $1000 / unit because customers are likely to more deeply exploit the CLEP cashflows with experience.

[17] Leased units will be more aggressively controlled and are projected to generate 50% more income than the “sold units under direct control”.

[18] Total out-of-pocket cost to the utility peaks in the 2nd year to $5.852 million.

[19] As more and more customers deeply exploit the CLEP cashflow, the monthly lease charge to customers who lease units can be decreased… potentially to zero.

Scalability page is blank.

[20] Utility Profit. This is set in RED because the philosophy of this economic model is to make sure that non-participants do not have to support the pilot.

[21] A positive Contribution to the Cost of Service means a decreased burden on non-participants.

Utility Regulators' View of CLEP Compared to Alternative Strategies

Goals vs Strategies	Simple	Quick to Implement	Cheap to Implement	Continuously Effective	Improves Reliability	Low Administrative Cost	Low Regulatory Burden	Reduces Consumption	Reduces Demand	Promotes Energy Efficiency	Requires Smart Meters	Shifts Time of Use	Market Transformations	Shaves Peaks	Treats Peak's Shoulders	Not a Subsidy	Timely Charge or Reward	Balances Supply vs Demand	Helps Finance Rooftop Solar	Looks Like a Subsidy	Pays as well as Retail	Reduces CO_2 Production	Tax	Finances Community Solar	Real Performance Based	Lowers Electricity Prices	Market Based	Adequately Granular	Adjusts to Changes	Fully Pays for Whole Home Batteries
Fixed Price Rates	x	x	x			x	x																							
Demand Charges	x			x			x		x				x	x	x							x								
Inclining Block Rates				x				x		x												x								
Time of Use Rates				x	x				x		x	x	x	x	x		x					x								
Load Management					x				x				x	x								x							x	
Demand Response			x		x				x				x	x								x							x	
Demand-Side Management								x	x	x					x							x								
Consumer Education	x		x	x		x	x	x		x		x										x								
Critical Peak Pricing			x		x						x			x			x					x							x	
Peak Time Rebate			x		x						x			x			x					x							x	
Real-Time Pricing			x	x	x						x			x			x					x					x	x	x	
Net Energy Metering				x				x	x				x						x	x	x	x			x					
Value of Solar				x				x	x				x						x			x		x	x					
Integrated Resource Planning					x			x	x																					
Carbon Tax				x																		x	x		x					
CLEP		X	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x		x	x	x	x	x	x	x

HOW CLEP COULD USE BMC's ASSISTANCE is blank.

CLEP Endorsements

New Orleans

- Neil Abramson, J.D.; Ways & Means Chairman, Louisiana House of Representatives
- James Gray, J.D.; New Orleans City Councilman; Utility Committee member; very interested in CLEP
- Pres Kabakoff, Pres., HRI Properties; national real estate developer; civic leader; philanthropist
- Marcel Wisznia, AIA; Past Pres AIA of LA., Wisznia Associates; developer; business-civic leader
- Tommy Milliner, J.D.; utility watchdog advocate for over two decades; Energy Law Fellow, Tulane Univ.
- Daniel Weiner, AIA; LEED AP; past president The Green Project; founder of Tulane Green Club
- Z Smith, PhD, AIA; solar technology innovator; past president USGBC, Louisiana

National Energy Industry Professionals

- Michael Holtz, FAIA; President, Light Louver; past President, Architectural Energy Corp. (developer of REM/Rate); past Chief, Bldg Systems Research and Acting Director, Solar Energy Research Institute (now NREL); founding board member, RESNET
- Richard Faesy, Prin., Energy Futures Group; Energy Efficiency Mgr., Vermont Energy Investment Corp; founding board member, RESNET; RESNET Lifetime Achievement Awardee
- Ken Fonorow, founding president National Energy Raters Association; board member RESNET, RESNET Market Transformation Leadership awardee, consultant for 1st Zero Energy Home, SE U.S.
- Gary Nelson, Owner, Energy Conservatory; innovator of building performance testing and diagnostics instruments
- Gary Klein, Gary Klein & Associates; Staff of California Energy Commission; water and sustainability consultant and RESNET leader
- Dennis Stroer, current board member RESNET; past president, National Energy Raters Assoc.
- Gabrielle Stebbins, past Executive Director, Renewable Energy Vermont
- Ned Ford, former member, National Global Warming and Energy Committee, Sierra Club; Energy Efficiency analyst, activist and advocate in Ohio