BEFORE THE
COUNCIL OF THE CITY OF NEW ORLEANS

IN RE: RESOLUTION REGARDING PROPOSED RULEMAKING TO ESTABLISH INTEGRATED RESOURCE PLANNING (IRP) COMPONENTS AND REPORTING REQUIREMENTS FOR ENTERGY NEW ORLEANS, INC.	**DOCKET NO. UD-17-01** **MAY 22, 2017**

BUILDING SCIENCE INNOVATORS' (BSI) REBUTTAL TO ADVISERS REPORT ON IRP DESIGN

In response to the fact that current IRP software cannot model the new technologies which have substantially displaced the need for traditional supply-side investments, **auctions, pilots and similar methods** are being used as alternative means to calculating resource planning in order to arrive at a mix that better approaches IRP goals. As outlined in Appendix A, revolutionary advances in technology are forcing changes in the structure of the IRP process in many states. Traditional IRP calculation is no longer “the unique tool” of the IRP process.

Most of these IRP process changes are separately referenced in Tom Stanton’s comments on the Advisers report.[1] BSI agrees with Mr. Stanton — that the driving force of major changes in the IRP process are the advances in the technologies facing the 21st century electric utility. While Mr. Stanton’s primary focus is upon the IRP changes caused by advances in Distributed Energy Resources (DER), BSI is equally concerned about the other two groups of technologies (described in Appendix A and repeated just below) that are potentially just as transformative as DER. These will also require the IRP process to change because the full integration of such technologies is also impossible to calculate with current IRP software. Appendix A concludes: “With these many advances in the three major arenas of integrated planning: 1) classical supply-side economics, 2) the advent of distributed energy resources, and 3) the revolution in classical energy efficiency, it is not surprising that current IRP software is unable to estimate the range, much less the economics, of these opportunities. That is why IRP work is in major flux.”

Mr. Stanton’s comments primarily only give *references* to the work discussed. Thus, we will review some of the background technology.

Integrated Resource Planning includes full consideration of the range of future investments of (i) utility resources used to provide power and (ii) opportunities on the demand-side (i.e., what can be done to reduce demand for energy and power by utility customers). The IRP concept, conceived in the 20th century using 20th century technology, is a utility planning process designed to *integrate and optimally balance* all power producing and reducing resources and strategies in order to reliably satisfy customer demand throughout the year, without interruption.

---

[1] *Stanton Comments on NOLA IRP Advisors Report,* May 20, 2017. “I offer these comments as a private citizen who happens to be professionally involved in this subject matter. These comments are my own and do not represent the views of my employer, the National Regulatory Research Institute (NRRI), or its Board of Directors.” Personal Communication. Written on request of Councilman James Gray.

However, in the 21st century, these two phrases "provide power" and "reduce demand", are not inclusive of all choices. Consider this DER example. How does one model a customer-owned battery which sells some of its energy back to the grid? On what side of the meter is this asset? Which and how to you assign the values to the many parameters needed to economically model it? 20th century IRP software cannot be relied upon to handle 21st century technology. These modeling challenges come from the lack of empirical data needed to choose these parameters.

Ductless AC equipment provides an example of advanced energy efficiency. It cannot be modelled by standard residential energy design software because use of this equipment violates each of the following assumptions of that software: 1) it is zoned; 2) it will not produce the standard ratio of cooling to drying; 3) it will not be run at standard cooling set-points; 4) it only cools a small part of the home; and 5) it will not be run during the entire period of the year typically allocated to cooling. This is another case where 20th century IRP software cannot be relied upon to handle 21st century technology.

Batteries are even more disruptive to the IRP process — beyond the modelling challenge they pose — because batteries help micro grids, smart grids, or even single buildings, provide their own reliability, thereby ameliorating the need for the most expensive job of the utility! This is already happening, and, as it does, the whole goal of the IRP process inexorably shifts.

Demand side management (DSM) is a well-accepted and indispensable tool that continuously contributes to achieving IRP goals, even though DSM program design is not part of an IRP calculation. Classical DSM is direct or indirect investment of utility dollars on the demand side (customer side) in two ways: via energy efficiency (EE) and demand response (DR). EE means reducing kWh use of buildings and appliances via improvements like additional insulation. DR curtails customer use at times of peak power — by remote control of HVAC units, for example. With DSM, the utility can lower its Peak Usage resource requirement measured in KW. However, classical DSM does not exploit DER (Distributed Energy Resources) — e.g., rooftop solar or consumer-owned batteries. Note that batteries are never 100% efficient and thus require more electric utility output; however, by careful choice of the times power is bought and sold, a battery can help alleviate the need of the utility to provide more peak power and the associated capital expenses for production and transmission resources. This time transfer is often more cost-effective than most EE investments. The numbers are shown in the table below. Both Advanced-EE or DER DSM require new ways to approach an IRP's goals. In these cases, neither the IRP nor these advanced DSM program designs can be calculated.

With this brief explanation, we can better understand why 20th century IRP concepts like adding generation resources to handle increased energy use are no longer clearly optimal for multi-decade, 21st century IRP work; why a new rate structure is required to ensure the profitability of the utility; and why pilot projects are needed to quantify the parameters incorporated in this concept. We can also better appreciate why it would be difficult to predict the required power production capacity for the long-term future.

Customer Lowered Electricity Price

To better address these issues, BSI developed an electricity pricing methodology called Customer Lowered Electricity Price (CLEP) which incentivizes most of the technological advancements listed in Appendix A — including timed appliance use, advanced energy efficiency, shared renewable energy investment, in-home battery storage, and battery assisted rooftop solar — while ensuring a desirable rate-of-return for the utility.

Since BSI does not believe that an IRP can be calculated, but the IRP goal is laudable, BSI created CLEP in 2015 and is continuing to further its development and promotion.

CLEP is financed by two new ideas:

1. Both the standard “pass-through costs” for energy and the more than twice as large “pass-through costs” associated with assuring electricity reliability which together comprise over 95% of the cost of electricity; these can be ameliorated by customer incentives to generate net income for the utility and simultaneously reduce the cost of electricity for all customers, and

2. Electricity reliability can be slowly shifted from the utility grid to each utility consumer while causing economic growth and market transformation.

The reader of this document is urged to read another BSI submission of today. The table on page 13 of *CustomerLoweredElectricityPrice-PitchFor12Apr2017-v49.pdf* helps to explain CLEP’s applications and their effects after CLEP is introduced and defined on previous pages.

Probable First Costs and Annual Savings of CLEP for a Customer using Entergy New Orleans Electricity[2]

	First Cost	Annual Savings without CLEP		Additional[1] or Alternative[2] Annual Savings with CLEP			CLEP VS no CLEP
		$	lbs of CO_2[3]	CLEP5	CLEPm	lbs of CO_2	$ / $
Dishwasher	$0	$0	0	$6	$20	130[1]	26 / 0
Water Heater[4]	$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[5]	$27,500	$900	10800	$250[2]	$1550[2]	0[1]	1800 / 900

- **<u>CLEP's 1st Costs and Annual Savings</u>** shows $ & CO2 savings for 5 ways to apply CLEP
- CLEP5 and CLEPm are in separate columns. For energy efficiency, these values are ***additional*** income, but are ***alternative*** income for the solar examples.
- The last column shows that cashflows for EE and rooftop solar double.[6]
- The five ways to use CLEP — ordered by increasing investment — are
    1. **Programming appliances for off-peak use** —reduces wholesale prices and peak demand costs, but maybe not kWh's used.
    2. **Energy efficiency investments —** were already covered.
    3. **Community solar** (jointly-owned and locally sited) is 3 x as accessible and lucrative, so lucrative — it allows 20% subsidies to low income residents.
    4. **Whole-home batteries** project ten-year payback for a $10,000 battery; good, because that's their warranty period.
    5. **Rooftop solar with a battery** — reaps 100% more than solar alone — because of timely production.

---

[2] 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

[3] @ 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

[4] Heat Pump Water Heater.

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

[6] 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.

Response to the Advisers' April 25, 2017 Comments on BSI's Feb 3, 2017 Motion to Execute an IRP by Market-Based Acquisition

1. *BSI's Motion muddles several concepts from different dockets and various Council requirements…*

   While the proposal was somewhat lengthy, because of the multiple concepts introduced in light of the many new 21st century technologies currently available, its concepts were well-defined. However, they might be considered confusing for those who are not yet fully aware of the current changes in technology — and BSI would be glad to clarify them. It is also to be noted that, in their subsequent statements, the Advisers did appear to understand the gist of BSI's proposal. (Please also see number 7 below.)

2. *… establish how ENO will demonstrate that a major investment is needed, which BSI suggests should be done through execution of the first two steps of an industry-standard IRP process…*

   BSI notes that this is how and why IRP work is done in Michigan.

3. *BSI's proposal that the decision to build a combustion turbine power plant in New Orleans be resolved in an iterative IRP process. 85 ENO's proposal to build a combustion turbine plant is being considered in Council Docket No. UD-16-02, and is well beyond the scope of this proceeding ...*

   This statement would only appear to be true in the context of the advisors' subjective framework. In fact, Michigan traditionally does IRP's for such a purpose. Michigan is reviewing this decision; but that was the status quo.

4. *Though not relevant to the Council's IRP rulemaking proceeding, BSI renews its proposal previously rejected by the Council to start a rulemaking proceeding to fashion a way to compensate intervenors for their participation in Council dockets.*

   The following quote comes from BSI's August 30, 2015 filing into docket UD-08-02, the 2015 ENO IRP.

   > Compensate intervenors whenever their contributions contribute to rulings that save more money for ratepayers than the fair consulting fees and costs of the intervenors. The California Public Utilities Commission has a mature process and has been paying intervenors for decades; similar laws exist in at least two other states. Also, after a decade of experience utilizing a public law requiring the payment for intervenor services in the California insurance industry, $100 Billion was saved at a rate of 400 times as much public benefit than was paid to intervenors. Paying intervenors is a well-established practice and New Orleans should join a number of other jurisdictions where this policy is the law.

Had BSI's recommendations been implemented at the time they were made, the city might have saved 1.5 years and millions of dollars in legal fees and utility efforts to create a final product in January 2017, a product that was ultimately rejected. As described above, this practice has worked well in California and other forward-thinking parts of the country, which BSI has monitored for years. (In fact, BSI's understanding of energy conservation principles, such as energy efficiency, led it to be selected to be part of the Honeywell team, the company chosen by the City Council to administer the New Orleans Energy Efficiency Programs (NOEEP) in 2005, before Hurricane Katrina's devastation caused funding to be withdrawn.)

5. *BSI proposes to discard a traditional IRP approach in favor of implementing a Continuously Effective IRP (CE-IRP), an Iterative IRP and an IRP by Market-Based Acquisition ("IRPbMBA"). The Advisors note that BSI has neither identified such a structure operating elsewhere in the nation that it proposes the Council adopt, nor has it described the proposed structure in sufficient detail for the Council, Advisors and parties to understand, specifically, what is being proposed.*

The following quote comes from *"Submission Letters To This Docket UD-08-02-12 Dec2016.pdf"*

> "From the grid edge in" approaches to integrated utility planning have been very successful in a few prominent states because of its ability to cost-effectively ensure that supply matches demand and has resulted in lowering implementation costs by as much as 80% to 90%. "The 'edge', in this case, means the proximity to end-use customers (at their homes, businesses, or at distribution systems very close to both) rather than at power plants or along transmission lines. California periodically holds multi-megawatt auctions for delivery three years later. New York's ConEd uses a more granular approach by making purchases in much smaller increments; it pays $2000/kW rebates to commercial interests who deliver demand reductions within a few months. ConEd's market-based strategy is to set the rebate low and slowly increase it over years."

Careful reading of both Mr. Stanton's comments and extensive reading of his quoted references will show that although New York and California may be outliers, the trend is moving toward their approaches and away from the traditional IRP calculation-only process. New Orleans is in fact quite lucky to be reconsidering its IRP process at this time — when other states are doing important work to adjust utility business models, regulatory structures and incentives, and IRP and distribution system planning, all to accommodate the major changes that are coming about as a result of rapidly growing markets for new DER technologies.

BSI reminds the Advisers, that the current DSM program, Energy Smart, is in fact a CE-IRP. All BSI is saying is the currently functioning Energy Smart is not all that ENO needs because compared to CLEP, Energy Smart completely ignores DER, under-incents EE and operates at a far greater cost per kWh saved.

6. *… the issuance of an RFP for pilot programs is well beyond the scope of the consideration of whether the Council's IRP Requirements should be modified.*

   But it is consistent with the points Tom Stanton makes that there are many ways to lower Customer Demand outside of a standard utility-run DSM program… If you don't try pilots to get there, how will you get there? And without pilots, the needed empirical data for completing IRP, using competent modeling software, cannot be gathered.

7. *BSI's proposal that the Council upgrade CURO staff and take advantage of various free resources from the National Association of Utility Commissioners ("NARUC") and its research arm, the National Regulatory Research Institute ("NRRI"). Such matters regarding the Council's staffing and utilization of its NARUC membership are beyond the scope of a proceeding regarding proposed modifications to its IRP Requirements and procedures.*

   BSI believes that the Advisers comments are disingenuous in their rebuke of BSI considering that the CURO office never tried to communicate with NRRI before the most recent 30-day period and that neither the Advisers nor the CURO staff display any evidence that they are even aware of, much less, well versed, in the rich literature offered by Mr. Stanton, who is a principal researcher at NRRI.

Appendix A.
Technology Advances that Drive Changes in the IRP Process

Owing to the multitude of advanced ***technologies***, the entire structure and process of how to accomplish IRP work has extensively changed in many states and continues to change. Most of these ***IRP process*** changes are referred to in Tom Stanton's comments on the Advisers report submitted May 20, 2017. BSI submits that the driving forces of this revolution in IRP processes are advances in the underlying technologies of the 21st century electric utility compared to those of the past. The following summarizes assumptions based on 20th century technologies as compared to the new opportunities present in 21st century technologies.

1) Until the last few decades, IRP work proceeded under the following technology assumptions:

a) Rate Structures depended upon meters that could not provide time-dependent use and thus, neither rates structures nor meters were deemed integral to reach IRP's goals.
b) The reliability of electricity in a building was 99+% dependent upon the electricity grid and effectively nothing could be done by or in a building to ameliorate this.
c) Electricity must be produced on demand because electric battery storage was neither competent nor cost-effective.
d) Electricity production was virtually always flowing from the grid to the customer and not the reverse.
e) Grid defection was deemed technically impossible or economically unattractive to virtually all customers.
f) Wholesale electricity markets, which pool assets and require the price of power to be market-adjusted every five minutes and be location-dependent were largely unknown.
g) Local generation facilities did not need to economically compete with inexpensive-to-negatively priced electricity produced hundreds to thousands of miles away.
h) Demand Side Management (DSM) (i.e. utility investments in customer's buildings to reduce energy consumption and demand) was largely restricted to two activities: Energy Efficiency (EE) (reduction in kWh consumption) and Demand Response (DR) (i.e., request for or control of very short-term curtailment of customer demand).
i) But, by far, the most critical assumption of IRP work was: that in this relatively simplistic world of the last century, everything can be reasonably accurately calculated.

2) BSI submits, these were just the supply-side assumptions. Perhaps an even greater revolution in technology was happening on the demand-side but were also "producing electricity". The following comprise most of what is collectively called Distributed Energy Resources (DER).

a) Smart Meters, which can collect consumption and generation data every five to fifteen minutes, arrived and became common.
b) Photovoltaic-powered, electricity generation increasing by over 75% a year for over a decade and now provides more than 1% of US generation.
c) Wind-powered generation provides 5% of US generation and continues to grow despite the fact that many to most generators must sell electricity at a loss a good part of the year.
d) Batteries installed in buildings became increasingly economical. At first, this was restricted to applications to reduce demand charges for commercial buildings, but

economical residential batteries sufficient for a day's consumption may already be in the marketplace.

e) The economics of customer-owned solar is *in the midst of* yet another revolution called Community Solar, (CS) (where more than one customer owns a single solar array). When implemented at grid scale (1 MW or greater) the cost of ownership is comparable to or below average wholesale electricity prices.

f) With the availability of these new technologies, smart grid and micro grids have proliferated. These have often come about because of the expensive price of (and often otherwise unavailable) high electricity reliability that is not as economically available from the traditional grid as compared to a much smaller grid, like one on the scale of a few tens of buildings servicing a university campus or hospital complex.

g) Thus, grid-defection is happening at both the Nano level, like a single home at a time, and at the Micro level, as just explained.

3) But even these technology revolutions do not completely describe the obstacles facing design of 21st century IRP software, this is because traditional DSM is also about to be largely revised.

a) As BSI has already explained in its Feb 3rd, 2017 filing, residential energy design software is completely incompetent BY DESIGN to use ***control***, (i.e., choice-dependent electricity use) as a means to lower energy costs. ***Zoned AC*** equipment, use of ***non-standard cooling set-points***, ***cooling outside of or not fully within industry-standard times*** of day or days of the year, or even drastically ***changing the ratio of cooling to drying*** are all **MAJOR** ways to save energy by control that are grossly outside of and purposefully excluded from modern residential energy design software.

b) As BSI has also explained in its Feb 3rd, 2017 filing, building energy design software is largely incompetent to use ***timing*** (i.e., time-dependent electricity use) as a means to lower energy cost. Since, as described above, the cost of kWh is highly time-dependent, DSM's pursuit of EE will have this deficiency for many years to come. This was not so important in the past, since a utility without smart meters was the norm. But now more than 50% of US customers have smart meters and the trend is clear. A host of appliances reached the market that could easily operate when electricity is cheaper — these included both major energy and power consumers like ice-making HVAC equipment, and the far more ubiquitous, smart appliances that can be preset or computer controlled.

c) Major appliances are also going through a host of revolutions in their technologies which do much more than greatly improve energy efficiency, they also create major ancillary benefits heretofore deemed irrelevant. For example, internal lighting is no longer the primary driver of cooling loads in commercial buildings and residential heat-pump water-heaters can do half or more of the cooling and drying work normally assigned to HVAC equipment.

With these many advances in the three major arenas of integrated planning: **1**) classical supply side economics, **2**) the advent of distributed energy resources, and **3**) the revolutions in classical energy efficiency, it is not surprising that current IRP software is unable to estimate the range, much less the economics, of these opportunities. That is why IRP work is in major flux.