STATE OF NEW HAMPSHIRE

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Public Utilities Commission
21 S. Fruit Street, Suite 10
Concord, NH 03301

Re: IR 15-296 Investigation into Grid Modernization

Dear Executive Director Howland:

Pursuant to House Bill 614, on July 30, 2015 the Commission issued an Order of Notice opening a non-adjudicative investigation into Grid Modernization. Consistent with suggestions contained in the state 10-year energy strategy developed by the New Hampshire Office of Energy and Planning (OEP) the Commission will conduct an information-gathering proceeding as a first step to give stakeholders a chance to learn about grid modernization and to explore to what extent grid modernization is workable in New Hampshire. See http://www.nh.gov/oep/energy/programs/documents/energy-strategy.pdf

I. INTRODUCTION

The OCA appreciates the opportunity to submit comments in Docket IR 15-296 relative to the definition and elements of grid modernization. Today's electric gird was picked by the National Academy of Engineering as the greatest engineering feat of the 20th century. For the past 100 years the electric grid has been a collection of switching stations transformers and wires delivering energy to customers. Over the next 100 years as Smart Grid technologies are injected into various points the electric grid will develop three new traits:

1. Two way power flow;
2. Two way (data) communication flow; and
3. Decentralized power supply and control.

Regulatory challenges will arise as new products, new services, new competitors and new markets emerge outside the boundaries of a traditional natural monopoly.

II. DEFINITION

Without implying the existence of a single universal definition, the OCA notes fundamental similarities in the underlying concepts associated with the terms: Grid Modernization[1], Smart Grid[2], Integrated Grid[3], and Gridwise Vision[4].

According to Electric Power Research Institute (EPRI) a Smart Grid is one that incorporates information and communications technology into every aspect of electricity generation, delivery and consumption in order to minimize environmental impact, enhance markets, improve reliability and service, and reduce costs and improve efficiency. [5]

III. ELEMENTS OF GRID MODERNIZATION

The OCA proposes that the informational gathering process should be organized around three basic elements needed for successful transformation to a modern 21st century grid. These elements are:

1. Technology;
2. Utility Business Transformation & Process Re-engineering; and
3. Customer Engagement.

The review must include a focus on the interrelationships and dependencies that cross cut and link (integrate) the three elements. Following is a brief outline.

#1 Technology

Grid modernization requires technology and hardware. A common aspect underlying definitions and research of US DOE, EPRI and Gridwise is that they all require the introduction and integration of three core technologies. The three core technologies are communications, sensors and software (SG=C+S+S). Examples of communications technology are wireless, high bandwidth 2 way, local area network, wide area network, and internet. Examples of sensors are meters and voltage sensors. Examples of software are business enterprise applications, centralized and distributed databases, compiled components & objects with decision making algorithms, service oriented architecture, reporting programs, mobile and browser based applications and websites.

Smart grid technologies are implemented as phased projects following a systems engineering approach. Smart grid projects fall into one of two categories – Smart Grid Infrastructure Projects and Smart Grid Application Projects. An example of Smart Grid Infrastructure is Advanced Metering Infrastructure (AMI) which enables Smart Grid Applications. An

[1] The term "Grid Modernization" has be used by Mass.gov, (D.P.U 12-76)
[2] The term "Smart Grid" has been used by US DOE / Energy.gov, CPUC, Smart Grid Consumer Collaborative
[3] The term "Integrated Grid" is used by EPRI
[4] The term "Gridwise Vision" is registered by Gridwise Architecture Council
[5] http://smartgrid.epri.com/

example of Smart Grid Application is a Time-of-Use Pricing Plan which in turn leads to achieving strategic energy goals such as consumer savings or load shifting.

Smart Grid technologies are highly complex and can be viewed at either a detailed micro level or at a business oriented macro level. Both formula definitions of Smart Grid Technology shown below are equivalent:

Micro definition →	Smart Grid Technology	=	Communications Systems	+ Sensors	+ Software	
Macro definition →	Smart Grid Technology	=	Smart Grid Infrastructure	+ Smart Grid Applications		

For this informational docket OCA recommends focusing on the Macro definition of Smart Grid Technology shown above. With this approach grid modernization energy goals can be mapped to required Smart Grid Applications and Infrastructure.

#2 Utility business transformation & Process Re-Engineering (benefit to the utility & grid):

The technology investments made by utilities (SG=C+S+S) will bring organizational change to company business operations. New systems, often run by new personnel, are introduced to replace or become integrated with legacy (existing) systems. Existing proven workflows must be examined and redesigned due to new inputs, new outputs and changing business requirements. For each Smart Grid Application the utility must review its processes and define a future state work flow. For example, a Time-of-use pricing plan would require a redesign of the utility's billing system.

#3 Customer Engagement (benefit to the consumer):

The technology investments made by utilities must produce cost effective benefits for the consumer. Many benefits will be delivered through successful deployment of Smart Grid Applications that enable the consumer with information and technology to actively participate with the electric grid. Some examples of enabling applications and services are in-home monitors, demand response programs, critical peak pricing, peak time rebates, room by room reliability standards, carbon footprint energy supply options, smart appliances in the home, time of use pricing plans, pre-pay option plans, electric vehicle charging plans, and distributed generation. With long term grid modernization and proper incentives customer engagement will mature. Wide scale customer investments in distributed generation generates savings and avoids costs. Similar to how energy efficiency is recognized as the cheapest energy source, customer owned distributed generation/storage assets become a low cost high priority grid resource in grid operations and planning.

Thank you again for the opportunity to provide comments. Moving forward this fact finding docket can focus on the energy goals the state wishes to achieve and then identify the grid modernization elements needed to reach those goals over time.

Respectfully,

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Consumer Advocate

James J. Brennan
Finance Director

Cc: Service List electronically