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October 4, 2016

MEMORANDUM

TO: Council Members

FROM: Massoud Jourabchi, Manager, Economic Analysis

SUBJECT: Panel on Customer and Utility Scale Energy Storage Systems (ESS)

BACKGROUND:

Presenter: Panel Presentation

Summary: What are the risks and opportunities in energy storage systems?

The panel will discuss the regional and national challenges and opportunities facing implementation of ESS in the region. Topics discussed include state regulatory requirements and mandates, asset valuation for both behind the meter, and at utility scale. The panel will be moderated by Mr. Patrick Balducci, Chief Economist and Energy and Environment Directorate at Pacific Northwest National Lab. (PNNL). The panel participants include:

- Ms. Rebecca O'Neil, Program Manager (PNNL) discussing state regulatory challenges and mandates.
- Mr. Russ Weed, VP Business Development & Marketing (UniEnergy Technologies) will be discussing flow battery systems and barriers for grid integration of batteries.
- Mr. John Gibson, Manager of Distribution System Operations and Technical Engineering Services (Avista Utilities) will be discussing the opportunities for utility level ESS and will discuss an example in the Northwest.

- Ms. Sarah Van Cleve- Energy Policy Advisor - Tesla – will be discussing the customer owned challenges, drivers and opportunities.

Relevance: Understanding application of consumer owned and controlled ESS in residential, businesses will help inform Council's ability to forecast future demands for electricity. Understanding application utility owned and controlled ESS will help inform Council's ability to model this resource in the future resource plans.

Work plan: B. Maintain Analytical Capability. Action item ANALYS 2 of the 7th Plan calls for tracking and improving long-term load forecast for emerging markets. This presentation focuses on one such market.

Background: Over the past 5 years, staff has been reporting to Council on emerging technologies such as electric vehicles and data centers. This presentation on ESS is an introduction to applications of this emerging field both at the customer and utility scale.

More Info:

Patrick Balducci, Pacific Northwest National Laboratory. Mr. Balducci has 20 years of professional experience as an economist and project manager. He is a Chief Economist at the Pacific Northwest National Laboratory (PNNL) where he has been employed since 2001. He is currently leading the state engagement and industrial acceptance areas of the PNNL Energy Storage Program. He has extensive experience in modeling the benefits of energy infrastructure and in leading research and development efforts supporting the U.S. Department of Energy (DOE) and the electric power industry. He has authored over 100 publications, including journal articles, conference proceedings, and technical reports. He is currently leading research efforts evaluating the benefits of microgrids and energy storage systems in California, Massachusetts (Northampton), Oregon and Washington. He is also leading efforts to enhance energy storage economic assessment tools for the U.S. Department of Energy (DOE). He serves as an Adjunct Professor of Business at Marylhurst University and as the President of the Pacific Northwest Regional Economics Conference's Board of Directors. He holds a BS in Economics from Lewis and Clark College, where he graduated with honors, and an MSc in Applied Environmental Economics from the University of London, Imperial College of London.

Rebecca O'Neil, PNNL. Ms. O'Neil is a program manager for Pacific Northwest National Laboratory, stewarding the US DOE EERE Renewables portfolio as well as performing research related to regulatory development for energy storage and marine energy. She joined PNNL in 2015 from the Oregon Department of Energy, where she spent five years representing the agency on water power development; administering the renewable portfolio standard and environmental commodities; emerging technology such as energy storage and regional integration issues; and managing a multi-million dollar portfolio of federal grants ranging from agricultural efficiency to woodstove

replacement in air quality limited regions of the state. Before her state service, she managed the multifamily energy efficiency program for a contractor of Energy Trust of Oregon and represented a coalition of river conservation and recreation organizations in federal hydropower dam licensing. She serves on multiple organizational boards and advisory groups related to renewable energy.

John Gibson, Avista Utilities. Mr. Gibson is responsible for distribution operations and distribution planning, specifically focused on distributed energy resources, at Avista Utilities. John was the project manager for deployment of Avista's distribution management system (DMS). John is a veteran utility engineer and has owned and operated his own engineering services business. He is acknowledged as an industry expert in the field of distribution management and has spoken on numerous national stages. Mr. Gibson is a key participant in the Avista Innovation Workgroup responsible for moving new ideas forward. John is an expert modeler and an innovative thinker with the ability to take abstract, difficult concepts and use them in the development of viable solutions to engineering challenges.

Russ Weed, UniEnergy, VP Business Development & Marketing. Russ is General Counsel for UET as well. Backed by private equity funding and headquartered near Seattle, Washington, UET produces and delivers large- and medium-scale energy storage solutions for grid, microgrid, and commercial and industrial customers. With a 60,000 square foot manufacturing facility, UET has 20MW / 80MWh of systems deployed, ordered, or awarded globally so far, in Washington, California, New York, Hawaii, Tennessee, Germany, and Italy.

Russ has more than 25 years of experience as a VP business development and general counsel, including at the General Electric Company. At UET, Russ is responsible for business strategy activities; channel partnerships; outbound marketing including public relations and branding; government relations; negotiations and contracting; intellectual property and other legal matters; mergers and acquisitions; and fundraising. He has extensive international experience including in Asia and Europe. Russ is personally committed to help make large-scale clean energy a reality.

Sarah Van Cleve, Tesla, Energy Policy Advisor - Sarah manages Tesla's energy storage policy strategy and interactions, collaborating with policymakers on state and federal energy policies affecting the development of the energy storage market. She leads Tesla's policy activities on various electricity industry issues including integrated resource planning, resource procurement, grid interconnection, and electricity market design.

Prior to working at Tesla, Sarah managed energy storage policy at Southern California Edison where she helped guide the utility's groundbreaking procurement of 264 megawatts of energy storage. Sarah started her career as a financial analyst in electricity and emissions markets working in operations, trading, and market design. She holds a B.A. in Economics from UCLA.