WEBINAR TRANSPORTATION & WATER



Organized By ACCELERATE ENERGY PRODUCTIVITY 2030



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Note: Today's presentation is being recorded and will be posted on Energy2030.org



A Partnership To Double U.S. Energy Productivity by 2030



What Doubling EP Means for Our Country:









2X \$327

ECONOMIC OUTPUT

Getting twice as much economic output from each unit of energy^[1]

BILLION

Saved annually in avoided energy costs ^[1]

1.3

MILLION

Jobs created^[1]



IMPORTS

Reduced to represent a mere portion of overall energy consumption^[1]

ENERGY ACCELERATE ENERGY 2030 PRODUCTIVITY 2030

ENDORSE THE GOAL ENERGY2030.0RG

136 Endorsers To Date



Webinar 3: Accelerating Energy Productivity in Transportation and Water

Speaker 1: Transportation





Kathy Kinsey Senior Policy Advisor, Northeast States for Coordinated Air Use Management

Speaker 2: Water



Mike McDonald Senior Engineer, American Water



Collaborative State Efforts to Accelerate Electrification of the Light Duty Vehicle Sector



Kathy M. Kinsey Senior Policy Advisor Northeast States for Coordinated Air Use Management April 27, 2016

Governors ZEV MOU: Eight-State Collaborative

- Governors MOU signed October 2013
- 8 ZEV Mandate states: California, Connecticut, Massachusetts, Maryland, New York, Oregon, Rhode Island, Vermont
- Target: 3.3 million ZEVs by 2025
- Multi-State ZEV Action Plan completed in May 2014





Transportation Electrification: The Key to Achieving Climate Goals



2012 Section 177 ZEV State CO₂ Emissions



Source: EIA

Electric Vehicles Significantly More Energy Efficient

- Reducing vehicle weight, use of more efficient systems, improved maintenance practices, careful attention to driving style improve efficiency
- Electric vehicles are 2/3rds more energy efficient than comparable gas-powered cars

Source: U.S. DOE; <u>www.fueleconomy.gov</u>





1 gallon= 33.7 kWh

Increasing ZEV Sales Requirements





Projected ZEV Compliance Scenario for the MOU States



Source: Multi-State ZEV Action Plan



Multi-State ZEV Action Plan



MULTI-STATE ZEV ACTION PLAN



Eight Primary Focus Areas:

- Incentives
- Deployment of charging stations
- Infrastructure—elimination of regulatory barriers
- Workplace charging
- Dealers
- Fleets
- Consumer outreach & education
- Hydrogen fuel cell vehicles



Vehicle and Charging Station Purchase Incentives

- 7 ZEV MOU states now offer ZEV purchase incentives
- Tax credits or point-of-sale rebates
- All ZEV MOU states provide funding for charging stations







Drive-

Electric

Vermont

MUK-LV Massachusetts Offers Rebates for Electric Vehicles





Public and Private EV Charging Outlets



Source: Alternative Fuels Data Center

Current Areas of Task Force Emphasis



- Utility Investment in
 Transportation
 Electrification Programs
- Raising Consumer Awareness and Interest

• Dealership Engagement



Need for Utility Investment

- States and OEMs playing critical role in current infrastructure build-out
- Limited resources to support the charging network on the scale needed
- Electric utilities are in the infrastructure business and best positioned to lead deployment

BMW, Volkswagen team up to build electric car charging stations Nearly 100 DC fast chargers will be installed to support long distance and metropolitan electric vehicle travel with the BMW i3, Volkswagen e-Golf and other electric cars, along heavily trafficked corridor

Ford to install electric vehicle charging stations for employees

Ford Motor Co (F.N) said on Monday it will install charging stations at more than 50 of its U.S. and Canadian offices and plants so that employees can refill their electric vehicle batteries at work.

The second-largest U.S. automaker said it will start installing the charging stations and the second state of the second state

Nissan's DC Quick-Charging Stations: 630 CHAdeMO Sites Live Today

John Voelcker In **January** 2013, there were roughly 160 CHAdeMO quick-charging sites live, mostly on the West Coast and in Texas. Nissan said then that it hoped to <u>triple that number over</u> the following 18 months, adding up to 500 fast chargers in locations

Attorney General Gansler Announces \$1 Million for Network of Electric Vehicle Fast-Charging Stations Throughout Maryland

Devices will allow for 30-minute charging, promote sale and use of electric vehicles statewide

Baltimore, MD (April 24, 2014) - In an Earth Week announcement,

Attorney General Douglas F. Gansler outlined a new publicprivate grant program to build a statewide network of Level 3

Utility Business Case for Investment in Transportation Electrification



- Charging infrastructure promotes widespread EV adoption
- EVs new source of load to compensate for stagnating and declining load growth
- Generates revenue in excess of energy delivery costs
- EV charging increases throughput and reduces fixed costs of operating grid
- Facilitates integration of solar and wind energy sources



Engaging Northeast and Mid-Atlantic Utilities

 Need for focused utility and PUC outreach and education effort to raise the awareness of industry, energy regulators and ratepayer advocates on the benefits of rate-based utility investment in transportation electrification programs

• Build on, and learn from California experience



Additional Action Needed To Raise Consumer Awareness

Go Ultra Low Campaign

A **national multi-media campaign** to raise interest and sales of PEVs in the UK

75% of new car buyers have **taken action** as a result of seeing the campaign

50% of campaign recognizers are thinking about buying an electric vehicle

2014 Q1/2 UK EV Grant Program uptake is 2.5 times 2013 Q1/2



Expiration of Travel Provision will Boost Sales in Section 177 States

- Travel provision gives automakers credit in all other ZEV states for cars placed in California
- Intended to allow auto makers to focus early technology and market development in California
- Many models available in small numbers, or only in California
- Expiration of travel provision at the end of 2017 will boost sales in the Northeast states



EVs – Becoming a Viable Transportation Option for Mainstream Consumers

In one generation (2012-2017) affordable full battery electric vehicles will have increased range by about 2.5x while holding costs consistent.









2017 Tesla Model 3: \$35,000 / 200 Miles (projected MSRP)

\$27,500 w/Federal Tax Credit

Green Car Reports: <u>"Tesla Model 3: Revealed Next Year,</u> Production Starts 2017, Company Confirms."



Accelerating Energy Productivity in Water

Accelerate Energy Productivity 2030 U.S. Department of Energy Alliance to Save Energy Council on Competitiveness April 27, 2016

Michael McDonald, P.E. Senior Engineer American Water



American Water – History and Operations



- Heritage dates back to 1886
- Largest U.S. water and wastewater services provider
- Serves an estimated 15 million people in more than 1,500 communities
- Approximately 6,400 employees
- Treat and deliver more than 1 Billion Gallons /Day
- Issues facing American Water systems are representative of those impacting water industry as a whole



Water and Energy Connection



Transportation



Water and Energy Connection

- □ Gasoline It takes 13 gallons of water to produce one gallon gasoline
 - Shale Gas Each shale well in the Utica and Marcellus formations requires 3 to 7 million gallons of water per frack.



- Power Generation Thermoelectric power plants withdraw around 200 billion gallons of water per day (approximately 40% of all fresh water withdrawn), most of which is efficiently returned to the source.
- Water Treatment Likewise, around 4% of all electricity used in the U.S. is for the treatment and movement of water.



Electric and Water Utility Similarities

Transmission and Distribution



Old and Deteriorating Infrastructure





Energy in Water Use is Mostly from Pumping

80% - 90% OF ENERGY USE IS FROM PUMPING!





Water is Heavy

We deliver one TON of water to each customer every day!!

Cubic yards of mulch ~3 yards³



55-gal drums of water ~5x55-gallons





Energy Is Lost Through Inefficient Pumps

- 80% 90% of total water system energy is used for pumping.
- Average wire-to-water pumping efficiency is approximately 55%.
- Reduce energy by replacing or rehabilitating inefficient pumps / motors
- And by operating the most efficient pumps in real time







Water (and Embedded Energy) is Lost Through Leaking Water Mains

- In the United States, approximately <u>six billion gallons</u> of treated drinking water are "lost" each day primarily due to system leaks Source: Alliance for Water Efficiency, 2016
- Water loss can be 20% or more of drinking water production

Reduce Energy By:

- *Decreasing Water Loss
- *Decreasing Pressure in the Piping





Energy Is Lost Through Inefficient Appliances



- WaterSense has helped consumers save 1.1 trillion gallons of water. That's more than enough water to supply all the homes in Texas for a year!
- WaterSense has helped save \$21.7 billion *in water and energy bills* since the program's inception in 2006.



 Declining Residential Consumption ~1% Per Year Per Customer

Source: US Environmental Protection Agency, http://www.epa.gov/watersense Data as of 2014



Electric Peak Load Can Be Managed With Water Demand Management

 Though Water and Energy Distribution Have Many Common Traits, there is One Big Difference -



Storage Allows For:

- 1. "Stored Energy"
- 2. Supply Buffer
- 3. Some Operational Flexibility

Water utilities have the flexibility to assist in managing electricity peaks -

- **Gamma** Reduce Operating Costs and Electric Utility Load By:
 - Shifting water utility operational tasks and matching the hourly electric utility demand by adding or removing generation from the system.
- Enbala Power Networks currently deployed in several AW systems.

Resiliency and Efficiency Through Alternative Energy

 American Water uses a lot of energy and land – good for solar application

SOLAR / WATER APPLICATION

- Floating panels rise & fall with reservoir level
- Reduces reservoir evaporation
- Reduces algae growth

Canoe Brook WTP, Short Hills NJ

New and Emerging Technologies

 <u>Geothermal Heating and Cooling</u> Earth's natural heat is collected by water in the pipes, then distributed to heat a building in the winter.

AW New York Geothermal Facility

 Irrigation - WaterSense Labeled SMART Controllers Measure and Irrigate. Based on Soil Moisture, Web- based weather data. Can be run remotely.

Wastewater Has Lots Of Potential

- <u>NPXpress</u> American Water patented technology reduces aeration energy by up to 50 percent
- <u>Wastewater Reuse</u> American Water "Solaire" facility uses recycled membrane bioreactor (MBR) treated water for flushing toilets, cooling tower water, and landscape irrigation

Energy Recovery –

- Biogas utilization from anaerobic digestion is most advantageous. Augmented in other areas (alternative energy, co-digestion, CHP, financing) can help drive toward Net Zero Energy (NZE) facilities.
- Heat recovery from raw and/or treated water.

POLICY CONSIDERATIONS

Challenges of Investing In Energy Efficiency

- Water utilities are facing significant fixed costs to renew aging infrastructure and improve resiliency.
- Declining Use Reduces Sales, which, in turn, reduces revenue.
- Competition for Capital Dollars.

Key Policy Considerations

- 1. Motors, pumps replacement and upgrades -
 - Electric Utility rebates help grow the opportunity.
 - Instrumentation and Control Technology Provides Additional Opportunity.
- 2. Alternative Energy as Related to Resiliency -
 - Financing (SRECs, credits etc.) are needed to make projects cost effective in most cases.
 - Energy portfolio diversification provides efficiency and resiliency.
- 3. Increase Collaboration Between Utilities -
 - Continued progress toward water operations load shifting (time of day use)
 - Leveraging New Technologies
 - Improved synchronization of water and energy efficiency programs.
 - Note: Credit for efficiencies gained through the water/wastewater industry was recognized in EPA Clean Air Act 111(d)

Key Policy Considerations (cont'd)

- 4. Water Efficiency Great Progress Made Since 1994 Opportunities Still Exist –
 - Continued rebates for low flow toilets, showerheads, washers, dishwashers
 - Alternative rate mechanisms that encourage water efficiency
 - Optimize / reduce customer irrigation
 - Demand side management programs should be considered cost recoverable similar to capital projects for new water supplies
 - Pipe Replacement tied to energy savings

THANK YOU!

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