# ACCELERATE ENERGY PRODUCTIVITY 2030

## Webinar 3: Accelerating Energy Productivity in Transportation and Water

***Wednesday, April 27, 2016***

***https://www.youtube.com/watch?v=xYnuEfBhNuo***

**Welcome & Opening Remarks**

- **Judi Greenwald**, Deputy Director for Climate, Environment, and Energy Efficiency, U.S. Department of Energy
- **Michael Bernstein,** Senior Policy Director, Council on Competitiveness
- **Kateri Callahan**, President, Alliance to Save Energy

**Transportation Presentation: Kathy Kinsey**, Senior Policy Advisor, Northeast States for Coordinated Air Use Management

- NESCAUM – Ass'n of air pollution agencies of eight states; facilitator of collaborative to accelerate electrification of light-duty vehicle sector
- Governors MOU signed October 2013
    - Target: 3.3 million Zero Emissions Vehicles (ZEVs) by 2025
    - Association states: CA, CT, MA, MD, NY, OR, RI, VT
- Transportation Electrification key to achieving climate goals
    - Transportation 48%
    - Commercial 10%
    - Electric Power 21%
    - Residential 16%
    - Industrial 5%
- EVs significantly more energy efficient - 2/3 more energy efficient than comparable gas-powered cars
    - 2015 VW eGolf
        - 116 MPGe
        - Combined city/highway: 29 kWh/100 mi
    - 2015 VW Golf
        - 29 MPG
        - Combined city/highway: 3.4 gal/100 mi (Sources: DoE; www.fueleconomy.gov
    - 1 gallon = 33.7 kWh
- To improve efficiency (conventional vehicle; "only so much you can do"):
    - Reduce vehicle weight
    - Use more efficient systems
    - Improve maintenance practices
    - Careful attention to driving style
- Increasing ZEV sales volume requirements – ramp up starting in 2018
    - From less than 5% manufacturers' sales to over 22% by 2025
    - ZEV (84 mile range) and Plug-In Hybrids weighted differently in compliance scenarios
        - More ZEVs would mean less PIHs needed; longer range get more credit

        - 2017: Just under 100,000 combined (ZEV+PIH) vehicles sales/year
            - 410,000 sold in 2015
        - 2025: Just under 600,000 combined sales (PIH = 400,000 + ZIV = 200,000)
- Real challenge in coming decades = Consumer acceptance of new technology
- Multi-State ZEV Action Plan (May 2014)
    - Eight primary focus areas:
        1. Incentives
        2. Deployment of charging stations
        3. Infrastructure – elimination of regulatory barriers
        4. Workplace charging
        5. Dealers
        6. Fleets
        7. Consumer outreach & education
        8. Hydrogen fuel cell vehicles
- Vehicle and Charging Station Purchase Incentives
    - Seven ZEV MOU states now offer ZEV purchase incentives
    - Tax credits or point-of-sale rebates
    - All ZEV MOU states provide funding for charging stations
- Public and Private EV Charging Outlets
    - §177 ZEV States = 6,000 (2016) = MOU States plus Maine and New Jersey
    - California = 11,000
- Current areas of Task Force emphasis:
    - Utility investment in Transportation Electrification Programs
        - States and Original Equipment Manufacturers (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
    - Raising Consumer awareness and interest
    - Dealership engagement
- 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
    - Generated 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 awareness of industry, energy regulators and ratepayer advocates on the benefits of rate-based utility investment in transportation electrification programs
    - Need to build on/learn from California's experience
    - Also, UK campaign "Go Ultra Low" – national multi-media campaign to raise interest and sales of PEVs
        - 75% of new car buyers have taken action as result of campaign

        - 50% of campaign recognizers are thinking about buying an EV
        - 2014 Q1/2 grant program uptake is 2.5 times 2013 Q1/2
    - Expiration of Travel Provision will boost sales in §177 States
        - Gives automakers credit (in all other ZEV states) for placing cars in California
        - Intended to allow auto makers to focus early technology and marketing in California
        - Many models available only in small numbers, or only in California
        - Expiration of travel provision at EOY 2017 will boost sales in the Northeast states
- EVs – Becoming viable transportation option for mainstream consumers
    - In one generation (2012-2017) range doubled without significant increase in price
        - 2012 Nissan Leaf: $35,200/84 miles
        - 2017 Nissan Bolt: $37,500/200 miles
        - 2017 Tesla Model 3: $35,000/200 miles - $27,500 with Federal Tax Credit

**Q&A**

**Judi**: Question (from online source) on issue of environmental outcome: Obviously, they don't have tailpipe emissions, so that's good, but to generate electricity can produce pollution, so do you know how those things balance out, on a lifecycle basis, whether we're better off with electric vehicles… have you all looked into that?

**Kathy:** There is a lot of work that has been done on that and yes, on the whole, we are definitely better off. The environmental benefits clearly depend on the generation portforlio in the area where the generation where the electricity is being generated. So, in the Northeast, for example, we have been very successful in greening our grid – and in other areas of the country – so the benefits are greatest there, obviously less so in states that are coal-fired. But still, on the whole, an overall benefit, and I think that the exciting thing is that clearly there is a lot of work going into greening our grid. A lot of market forces are having an impact on the emissions portfolio of the power sector of our country. We need to look forward to increasing renewable integration across the country and lower emissions and that all translates into much greater environmental benefits for electric vehicles. So, when we green the grid, we continually reduce emissions from the electrified transportation sector.

**Judi**: (This question's from me) You're part of a group of states that are doing a lot on the policy front to advance electric vehicles. Where do you think more could be done? At the federal level? The State and Local level? Particularly for the Quadrennial Energy Review, we'd be interested in federal policy options….What other policy options are available beyond what you all are doing? What do you recommend other regional organizations adopt that you are doing?

**Kathy:** On the federal side of things, a couple of things. Focusing first on federal incentives: The existing federal tax credit for vehicles is likely going to start expiring for a number of automakers in the next couple of years. We saw with the expiration of the Georgia incentive program, a result of a 90 percent reduction in sales. Purchase incentives are really important in this market. It's not too early to start thinking about defending the federal tax incentive program for all automakers. I don't think we've reached the point where we no longer need incentives. Another thing, point of sale rebates are much more equitable, in terms of incentives than tax credits – some people can't take advantage of them because they don't have the tax liability. And you don't get a reduction, it's not money on the hood kind

of reduction that really reduces the purchase price for consumers. I would say that is a really important thing to start looking at. I would say that the Hydrogen Fuel Cell credit expires at the end of this year. I think that some consideration should be given to extending that federal tax credit as well. I think it's important that we ensure our federal Greenhouse Gas and CAFE standards through 2025 aren't weakened and that standards are strengthened through post-2025 to take into account the technology advances we are seeing now.

The federal government could be very helpful by creating a new model to generate highway funding that is fair to all drivers and doesn't wind up acting like a disincentive to widespread adoption of ZEVs and fuel-efficient vehicles, for that matter. Otherwise, we're going to see more states starting to establish additional user fees for ZEVs, as Georgia and several other states have done. Right now, I think that's probably counterproductive.

All of our states are doing (a number of things) to increase interest but what we really need is a federally-funded, very broad based multimedia national consumer outreach campaign. Build on what states and advocacy organizations are doing. Can't do too much outreach and education.

On the State side, I think a really important one is to have a clearly-articulated state vision for the electrification of the transportation sector. It's an important signal to send to state utilities, to other state policymakers. Establishment of ZEV goals and targets for public fleets and state transportation sectors as a whole is really important. Regulatory requirements drive progress. The last high-level recommendation: Establishment of a collaborative stakeholder organization – really effective in establishing a path forward for states.

**Water Presentation: Mike McDonald, P.E.,** Senior Engineer, American Water

- American Water is the largest U.S. water and wastewater services provider. It operates in most states, serving an estimated 15 million people in more than 15 communities. AmWater treats and delivers more than 1 Billion gallons/day.
- Believes it represents a microcosm of the industry at large due to footprint/geographical diversity
- Water & Energy Connection – inextricably linked
    - Both critical resources to the public – high level of dependency upon each other
        - Resiliency is important to maintain this interdependency
    - Energy for water – take a lot of energy to make water, and it takes a lot of water to make energy
        - Energy & Power production requires water
            - Thermoelectric cooling
            - Hydropower
            - Energy minerals extraction/mining
            - Fuel production (fossil fuels, H2, biofuels/ethanol)
            - Emissions controls
    - Water for energy
        - Water production, processing, distribution, and end-use requires energy
            - Pumping

                - Conveyance and transport
                - Treatment
                - Use conditioning
                - Surface and groundwater
- Gasoline - Takes about 13 gallons of water to make 1 gallon of gasoline
- Shale gas – Each shale well in the Utica and Marcellus formations requires 3-7 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 – 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
- 80-90% of energy used in water system mostly from pumping
    - Typical system ~2,000 kWh/Million gallons
    - Raw water from source, pumped to water treatment plant, pumped to booster stations, to distribution mains and storage
    - Water is heavy – deliver a ton of water every day to each customer (5x55-gallon drums)
    - Energy lost through inefficient pumps
        - Average wire-to-water pumping efficiency ~55%
        - Reduce energy by:
            - replacing or rehabilitating inefficient pumps/motors
            - operating the most efficient pumps in real time
    - Water (and embedded energy) lost through leaking water mains
        - Approximately 6 billion gallons of treated drinking water are lost each day due to system leaks
        - Water loss can be 20% or more of drinking water production
        - Reduce energy by:
            - Decreasing water loss
            - Decreasing pressure in piping
    - Energy lost through inefficient appliances
        - WaterSense has helped consumers save 1.1 Trillion gallons of water
            - More than enough to water to supply all the homes in Texas for a year
        - WaterSense has helped save $21.7 billion in water and energy bills since 2006 inception
            - Reduced amount of energy needed to heat, pump and treat water by 146 billion kWh
                - Enough to power 13.3 million homes for a year
                - Eliminating 54 million metric tons of GHG emissions
                    - Equivalent of planting nearly 1.4 billion trees
            - Declining residential consumption ~1% per year per customer
- Electric peak load can be managed with Water Demand Management

    - Water utilities have flexibility to assist in managing electricity peaks
        - Reduce operating costs and electric utility load by:
            - Shifting water utility operational tasks and matching hourly electric utility demand by adding or removing generation from system
            - Enbala Power Networks currently deployed in several AW systems
    - Water storage allows for:
        1. Stored Energy
        2. Supply buffer
        3. Some operational flexibility
- Resiliency and Efficiency through alternative energy (AW extremely large landholder)
    - Floating photovoltaic panels rise and fall with reservoir level
        - Reduce evaporation
        - Reduce algae growth
    - Looking more at
        - energy efficiency and demand usage
        - coordinating with energy utilities
    - Geothermal Heating & Cooling – Earth's natural heat is collected by water in the pipes, then distributed to heat a building in winter
    - Irrigation – WaterSense labeled SMART controllers measure and irrigate based on soil moisture and web-based weather data; can run remotely
- Wastewater has a lot of potential (equal to or greater than treatment facilities)
    - AW's NPXpress patented technology reduces aeration energy by up to 50 percent
    - Wastewater reuse – recycled membrane bioreactor treated water for flushing toilets, cooling tower water, landscape irrigation
    - Energy recovery
        - Biogas utilization from anaerobic digestion
            - Augmented in other areas (alternative energy, co-digestion, CHP, financing) can help drive toward Net Zero Energy 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 – reduces revenues
        - Competition for capital – "A reliable and safe water supply versus an energy efficiency project"
    - Key policy considerations
        - Motors, pumps replacement and upgrades
            - Electric utility rebates help grow the opportunity
            - Instrumentation and control technology provides additional opportunity
        - Alternative energy as related to resiliency
            - Financing (SRECs, credits, etc.) needed to make projects cost-effective in most cases
            - Energy portfolio diversification provides efficiency and resiliency

- 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 CAA §111(d)
- Water efficiency – rate mechanisms do not promote
    - Continued rebates for low-flow equipment/appliances
    - 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

**Q&A**

Judi: Is there an interesting thing happening in Advanced Water Metering?

**Michael**: Yes, we are making a lot of progress with Advanced Water Metering. That plays into the water loss component from the presentation. Basically by metering more effectively and more accurately, we can track water use better and our water loss better. So we've got a large program underway to roll out an Advanced Water Metering program (AMI) throughout the US.

Judi: Anything we can recommend on the federal policy side?

**Michael**: The rate structure we're operating under. Right now, we're not being encouraged to save water. We're doing what's right for the environment, but we do need to be a sustainable business at the same time. Any policy that would revisit rates would be helpful.

Batteries and storage – it's not our field, but it sure would help because we are 24/7 and it sure would help when the sun shines and the wind blows. It helps get us across the line in many of our states.