



NOVEMBER 15, 2023 Meeting Program – Motive Power Workshop & Transmission Session

Welcome To the Council’s full-day meeting on railroad motive power (morning workshop) and the state of electric transmission development (afternoon discussions). The meeting addresses these two components of the Council’s agenda to emphasize that many of the same players are important to both subject matters and that they should be encouraged to collaborate about future developments in both industries. Participants are invited to actively express themselves on any and all matters presented today. Given the pace of technological, regulatory, and commercial change in these critical industries, the Council looks forward to future such discussions.

MORNING AGENDA

9:00 a.m. Morning KEYNOTE – Hon. Patrick Fuchs, Member, Surface Transportation Board

9:30 a.m. Workshop begins. ***(see detailed Guide, page 3)**

- Introductions
- Presentation of goals and questions
- Core Stakeholder “Discussant” remarks (5 – 10 minutes each)
 - Ryan Stege, Director, Locomotive Operations & Maintenance, Norfolk Southern,
 - Chris Zappi, Senior Director, Global Strategy & Marketing, Wabtec
 - Kellen Schefter, Director Electric Transportation, Edison Electric Institute
 - Doc Claussen, Vice Chairman, Gulf & Ohio Railways,
 - Joanna Pardini -Deputy Chief Engineer Electric Traction, and Christopher White-Direction of Traction Power Engineering, Amtrak
 - Mark Baker, International Representative at IBEW-Utility Department, and Al Russo, Director IBEW Railroad Department

10:00 a.m. Responses and discussion among discussants and attendees

10:30 a.m. Discussion of questions outlined below.

11:45 a.m. Closing remarks and future planning

LUNCH ON THE PREMISES

AFTERNOON AGENDA

12:15 PM KEYNOTE

Hon. Richard Glick, Former Chairman, Federal Energy Regulatory Commission
(In Dialogue with Jim Hoecker, Counsel to REC, Former FERC Chairman)

1:15 PANEL 1— Planning and Building the Big, Interregional Transmission Projects -- Who? What? Where? Reflections on the Mechanics of Grid Expansion and Integration

The need for long-line, interregional transmission projects was overlooked in FERC's Order 1000. Although transmission has been a separate line of business for two decades, intra-regional planning criteria and near-term horizons have dominated transmission expansion plans. Concerns about grid reliability, extreme weather and system resilience, and the age and limitations of the existing transmission grid have refocused attention on lines that cross state, market, and RTO boundaries and the interregional movement of large quantities of power over HVDC cables to address emergencies, spiking demand, and changing patterns of generation. Where are we today?

PANELISTS – Johannes Pfeifenberger, Michael Hagerty, Principals of The Brattle Group
Bob Harrison, EVP Engineering, Champlain-Hudson Power Express
John Kopinski, Director- Development, NextEra Energy Transmission

BREAK

2:45 PANEL 2 – UPDATING TRANSMISSION INITIATIVES AT FERC, DOE, AND THE STATES

Following the Infrastructure Investment and Jobs Act and the Inflation Reduction Act, the level of government activity involving the finance and deployment of energy infrastructure, and transmission in particular, has been unprecedented. The same is true for railroad modernization at the Department of Transportation. The American power delivery and railroad systems are historically founded on private property operated and regulated for the public's benefit. The roles of publicly- and member-owned utilities and market-driven development companies considerable. Investment, innovation, and strategic vision in each of these infrastructure industries are critical to achieving Congress' ambitious objectives.

PANELISTS – Zach Zimmerman, Research & Policy Manager, Grid Strategies
Gretchen Kershaw, Senior Advisor, Transmission, DOE/Grid Deployment Office
Karin Herzfeld, Transmission Ass't to Chairman Phillips, Federal Energy Regulatory Commission (Invited)
David Terry, Executive Director, National Association of State Energy Offices

ADJOURNMENT

GUIDE TO RAIL MOTIVE POWER WORKSHOP

November 15, 2023 9 a.m. – 12 Noon

I. PURPOSE OF THIS WORKSHOP

There is an urgent need to improve the sustainability of how freight, and passenger traffic, is moved by rail. Technology choices for reducing the energy requirements of moving railcars are being advanced by disparate commercial actors and policy makers. Progress on these developments can only be accomplished effectively through collaboration. To be able to evaluate and commit the necessary resources that help advance new technology options, stakeholders must understand the timing and potential opportunities for infrastructure development and patterns of energy demand. Stakeholders affected by the railroad and electric power industries should neither underestimate nor overestimate the cross-sector implications of electrification on the demand for capital, the value of system reliability and resilience, economic development related to changes in motive power, the future of labor in these industries, co-location of electrical facilities within legacy real estate assets, and the need to maintain safety and achieve positive impacts on the customers of both networks.

TO ALL STAKEHOLDERS: Welcome to the inaugural workshop on railroad motive power, sustainability, decarbonization, technology, and electrification. This is the first half of a day-long meeting. It is dedicated to finding viable pathway(s) forward involving the need to improve how freight and passengers are moved on North American railroads. Below are a series of questions we ask you to consider and answer, in anticipation of our discussion on November 15. The organizers will seek the views of all attendees willing to participate. The workshop is not designed to arrive at specific conclusions, but your answers will be illuminating.

II. RULES OF ENGAGEMENT

1. The discussion will be moderated to ensure it moves forward within the time allotted. Chatham House rules mean that no comments will be recorded for attribution. A summary will be distributed after the meeting.
2. After introductions, a few representative stakeholder organizations or “discussants” will deliver brief remarks about the general subject matter from their individual perspectives.
3. The moderators will seek comments from attendees in the room or online in response to the issue(s) raised and the questions provided below.
4. The workshop is held to elicit views of disparate commercial actors and policymakers about the future of transportation, technology, operations, and regulation. Those views may range considerably.
5. The workshop is not designed to reach ultimate conclusions or achieve a specific result. To the extent that stakeholders find the discussion to be a productive exchange of views and information, the Council will be pleased to schedule further meetings for the benefit of all stakeholders.
6. It is time to transform how we collectively evaluate and commit resources to major new technology options, climate mitigation strategies, fuel flexibility and efficiency, and reliable supply chains – including aspects of both the electric power industry and railroads.

7. The Council extends its sincere thanks to OnTrackNorth America, and the North American Freight Forum for its contribution to the workshop design and questions.

We ask all participants to respond to the Introductory questions below in advance of the workshop, you are encouraged to email your thoughts directly to Steve.Griffith@nema.org or at the least collect your thoughts for a discussion on the day of the workshop itself. They will elucidate this and future workshops and Council decisions. Today's Workshop moderators will open discussion about these questions to all attendees.

Below are the Core and Introductory Questions, and a catalog of relevant questions that will be addressed in this and subsequent interactions. Participants are invited to submit additional questions and issues to add to our collective thinking on these important subjects. The discussions and observations will probably reveal that there are multiple pathways to future electrification and decarbonization and that those pathways may vary company to company, regionally or internationally, according to the economic strength of businesses or the economy as a whole, or in accordance with regulatory prescriptions and public policies. The Council nevertheless contends that the interests of energy and transportation providers and consumers, and the pathways to the electrified future, are likely to converge.

III. CORE QUESTION

How can technology developers, railroads, investors, and policymakers make the wisest energy and operational efficiency decisions so that North American railroads can contribute to lowering the emissions and resource requirements of freight and passenger movement?

Introductory Questions

1. What does 'sustainable' mean in the context of rail motive power? How will this be measured?
2. What are the primary challenges rail electrification faces?
3. What questions about rail electrification have to be answered more effectively?
4. What stakeholder groups need to align with rail electrification?
5. What concerns do railroad management have about a move away from established (diesel) traction? To what extent do investors, consumers, and policy makers share those apprehensions How can their fears be addressed or balanced by anticipation of new economic opportunities or social gains?
6. What entities and resources can (or should) be mobilized to advance such an industry transformation carefully but deliberately and economically?

Catalog of Rail Electrification Questions:

General Questions

1. What is the per gallon price of diesel that would make electrification an obvious economic choice? Is this the key metric or only part of a more complex analysis?
2. How can AAR's Transportation Technology Center, Inc. (MvX) or other RD&D efforts, including the national labs and the Electric Power Research Institute, facilitate the exploration, selection, and certification of technologies and manufacturers?
3. What can we learn from the history of rail electrification?

Final

4. What can we learn from rail electrification in other countries?
5. How do the operating costs (besides fuel) compare with diesel locomotives?
6. How much faster are electric locomotives and what difference does that make in track capacity?
7. How much lifecycle emissions reduction can be gained from the use of electric locomotives?
8. How many fewer all-electric locomotives can be employed for the same service(s), compared to the same train using diesel-electric power?
9. How much cheaper is electricity as a motive fuel?
10. What effect will electrification have on ECP brake implementation?
11. Is there internal railroad resistance to a move away from established (diesel) traction?

Locomotives

1. How can locomotives be designed to take advantage of regenerative braking, vibration harvesting, and other waste energy capture methods?
2. What models of locomotives are candidates for conversion in the relatively near-term? Is this the most cost-effective option or an incremental approach?
3. What companies can perform the conversions?
4. What battery technologies are best suited to railroad use, both on-board and trackside, at the present time? What technological developments will enhance that suitability?

Power Delivery

1. How can power suitable for locomotives be drawn from very high-voltage transmission lines? How would this affect transmission development decisions?
2. What are the cost and construction implications of each power delivery method (i.e., overhead wire, third rail, induction from buried cable, etc.?) Can a forensic and credible analysis demonstrate the variations, strengths, and weaknesses?
3. What is the experience with overhead catenary suffering pole and wire damage from shifted loads and/or damaged railcars? How can this risk be minimized?
4. How does the use of battery-powered locomotives impact the need for catenary? Does the use of batteries in locomotives necessarily require external charging facilities? What are battery capabilities now and potentially in the future?
5. What are the lifecycle economics of using composite catenary poles versus steel poles?
6. What is the experience with catenary clearing double-stacked containers and other taller railcars?

Electric Grid Synergy

1. What are the needs of the electric industry for new transmission corridors?
2. What practical questions must be answered to evaluate the co-location of new transmission lines along rail rights-of-way? Are priorities compatible between rail and utilities?
3. How will rail electrification expand the market for the construction of new remote renewable power generation?
4. What is the value of grid-connected idle switching (and road) locomotives offering peak shaving, line conditioning, and backup electric power?
5. What potential benefits to trackside communities could be available from access to higher voltage?
6. What other elements could use grid electric power, such as reefer units and crossing signals?

Implementation

1. What differences, if any, from the international state-of-the-art catenary installation will North America require?
2. What portion of the North American rail network should be electrified?
3. How are target sections determined?
4. How should electrification be staged to secure maximum benefits?
5. How will electrification coexist with residual diesel-powered segments?
6. What companies can build the machines that build the catenary? Can the electrification process be “industrialized” to support rapid implementation?
7. How is the Benefit-Cost Analysis of the catenary and battery/hybrid balance determined?

Financing

1. How much of the power delivery infrastructure would electric transmission providers fund?
2. How can the remaining infrastructure costs be funded? Have capex and leasing models been considered?
3. How much and which electrification expenses should be borne by the government, and what are the implications of this?
4. What current Federal sources might be utilized for funding this conversion?
5. What new funding approaches can be established for new locomotives?
6. What new funding approaches can be established for construction?

Other technologies [For Discussion at Later Workshops]

Hydrogen Fuel Cell

1. Are fuel cells an overly complex technology for locomotives?
2. What is the environmental impact of hydrogen derived from natural gas?
3. How can hydrogen infrastructure developed for other freight modes be useful to rail?
4. Who can build new fuel cell locomotives?
5. What are the real capabilities of fuel cells in heavy long-haul applications?

Biodiesel

1. What are the potential biodiesel feedstocks and production methods that would significantly increase the percentage of fuel blends within Class I railroads?
2. What has been the performance experience of the previous use of biodiesel for rail motive power?
3. What are the production challenges of supplying biodiesel fuel to the rail industry?
4. What are the logistical challenges of supplying biodiesel fuel to the rail industry?
5. What performance evidence do railroad mechanical personnel need to utilize biodiesel at higher percentage blends, especially in cold climates?
6. What grants and subsidies are available for railroad use of biodiesel?
7. What success measures are proposed?

Internal Combustion with Compressed Natural Gas

1. Given the costs of locomotive conversion, fuel tender acquisition, required infrastructure, revenue car space loss, and a limited carbon benefit, is it financially prudent to transition to natural gas power? What prior (limited) industry experience can be cited?
2. How much gas leakage during transportation, storage, and fueling is acceptable? What rules and regulations govern the use of this fuel?
3. What has been the prior experience of railroads using compressed natural gas?
4. What federal subsidies (CMAQ, etc.) are available to pay for conversion costs?
5. How does this compare with other fueling options in terms of energy efficiency and related capex/life costs/
6. How can infrastructure costs (e.g. – condensing and fueling stations at intermodal transload facilities) be shared with other entities?