Scope of Presentation

• Map and Particulars of Canadian Rail Sector

• Principal Funded Hydrail Activities as of June 2018:
  – Transport Canada policy planning study:
    ‘Prerequisites for Hydrail Deployment in Canada’
  – UBC / SRY / NSERC Hydrail Switcher Research
  – Metrolinx (Toronto) Regional Express Rail (RER)

• Other Hydrail Applications being Examined:
  – Ottawa O-Train Extension to Airport
Status of Hydrail Pursuits in Canada - 2018
Environmental Impact of Diesel Prime Movers on Canadian Railways *

• Canadian Railway Diesel Motive Power Fleet:
  – Mainline Freight Locomotives - 1,298 }
  – Switching, Yard, Work Locos - 850 }
  – Passenger Locomotives - 252 } Total: 2,400

• Annual Diesel Fuel Consumption (litres):
  – Freight operations - 2.02 billion }
  – Passenger (VIA + Commuter) 110 million } Total 2.13 billion

• Annual Diesel Exhaust Emissions (tonnes):
  – Greenhouse Gases (CO$_2$ equiv) – 6.4 million
  – CACs (NOx, HC, CO, PM, SOx) – 86.6 thousand

* Source – Railway Association of Canada ‘Locomotive Emissions Monitoring Program’
Industrial Base in Canada for Hydrail Technology

• Fuel Cell System Suppliers
  • Ballard Power Systems
    • Vancouver, British Columbia
  • Hydrogenics Corporation
    • Mississauga (Toronto), Ontario
Transport Canada Policy Planning Study to Define Prerequisites to Clear Hydrail for Deployment in Canada

- Organizations / jurisdictions surveyed on how their mandates would have to be satisfied to clear Hydrail for operation on commuter and freight railways in Canada
- Contract completed April 2018 by Telligence Group (Peter Eggleton – lead)
- Report Title: *Hydrail Deployment in Canada – Defining the Prerequisites* Transport Canada Publication Number TP15389E
Transport Canada Prerequisites Study (Cont’d)

The Hydrail “Ecosystem”*

* Illustrative Example
Priority Prerequisite Actions Identified

- an agreed-upon Definition of the total Hydrail system for differing railway services;

- the formulation of Safety and Regulatory Norms for the storage and handling of the hydrogen gas, both onboard the rolling stock and within the railway property;

- the training of First Responders to attend to emergency incidents involving Hydrail;

- familiarity by the Public with Hydrail and its acceptance in the Workplace.
Hydrail Switcher Locomotive – Hybridization Optimization Research

• Collaborative project between:
  - University of British Columbia (UBC)
  - Southern Railway of British Columbia (SRY)

with initial funding support from NSERC, the National Science & Engineering Research Council

Platform for research testing is hulk of prototype ‘Green Goat’ battery-hybrid switcher (provided by SRY) retrofitted in 2001 from a GP9 switcher built originally by EMD for Southern Pacific in 1959.
Hydrail Switcher Locomotive – Hybridization Optimization Research
Hydrail Switcher Locomotive – Hybridization Optimization Research

Motivation of Participants:

UBC: to study impact of different hybridization schemes (fuel cell / battery power split vs. locomotive dynamics).

SRY: to fend off legal action against noise & emissions from switching yard.

NSERC: to promote industrial take-up of academic research.
Status of Hydrail Pursuits in Canada - 2018

Toronto-centered Regional Express Rail (RER)

The Heavy-Rail Commuter Railway Targeted in Canada for Possible Hydrail Deployment

Upgrading of Metrolinx GO Train commuter network:
Current Particulars of Metrolinx GO Transit

- Trackage: 452 kms
- Stations: 66
- Locomotives: 75
- Coaches: 725
- Annual Traffic: 70 million
- Tier 4 Diesel Locomotives hauling bilevel 12-coach trains in push-pull arrangement.
Path to Electrification for Metrolinx RER

- 2010 study recommended catenary system.
- Electrification is approved-in-principle.
- Go-ahead delayed for various reasons.
- 2016 - Catenary detail design work initiated.
- Installation designs exposed physical challenges and motivated look at Hydrail option.
- B of D reticent to adopt unproven technology.
- 2017 – In-depth Hydrail Feasibility Study concluded there was equivalence with catenary option in Net Present Value and relative merits.
Path to Electrification for Metrolinx RER
(Cont’d)
Path to Electrification for Metrolinx RER (Cont’d)

• 2018 – Conceptual Design Studies Commissioned
  - Hydrail Bi-level EMU
  - Hydrail Heavy-Rail Commuter Locomotive
• 2018 – RFP to build Prototype Hydrail Locomotive (issued to five locomotive OEMs)
• 2018 – Request for Qualifications (RFQ) issued for Industrial Consortia to take over RER on a Design, Build, Finance, Operate and Maintain (DBFOM) basis, funded by private capital and that it be electrified, but not stating by which electrification option.
Path to Electrification for Metrolinx RER
(Cont’d)

• 2019 – Notification of Prequalified Consortia

• 2019 – Issuance of RFP to three Qualified Consortia
  (on funded basis, involving Infrastructure Ontario)

• 2021 – RFP Closes and Contract Awarded to Winner

• 202? – First Hydrail train enters service on RER
Path to Electrification for Metrolinx RER

(Let’s hope the wayside will still look like this in 202?)
Ottawa O-Train
Possible Hydrail Deployment?

OC Transpo Trillium Line Extension to Ottawa Airport
Ottawa O-Train Possible Hydrail Deployment?

- Extension approved by Ottawa City Council
- Federal Government to provide $1.28B
- Currently operating Alstom Coradia DMUs
- RFP issue for additional railcars imminent
- Alstom Canada prefers to offer DMUs
- OC Transpo management wishes to avoid ‘risks due of introducing new technology’
Study of Hydrail Retrofitting DMU Railcars on Ottawa O-Train
Thank You

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