

## **SECTION C**

Wireless Streetcar Applications for the District of Columbia Mayor's  
Streetcar Finance & Governance Task Force Presentation

March, 2013

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**de**streetcar



# **Wireless Streetcar Applications for the District of Columbia**

March 27, 2013

# The Starting Point



Portland, OR



# Power Supply Alternatives

- Ground -Level Power Supply
  - Conduit rail
  - Surface-mounted contact rail
  - Non-contact inductive power
- On-Board Energy Storage
  - Batteries
  - Ultra Capacitors
  - Hybrids



# Technologies Reviewed

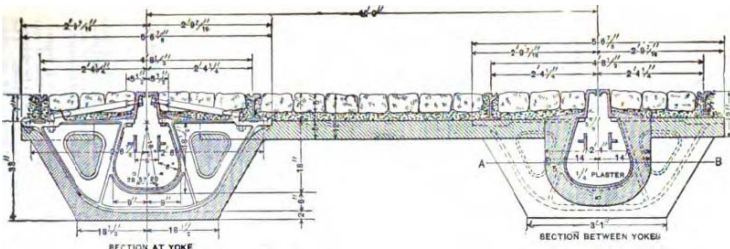
- On-Board Power Generation
  - Fuel Cells
  - Fuel/Electric Hybrids



# Ground Level Power Supply



# Conduit Rail – where we were ...



Washington, DC



London





# Conduit Rail



Washington, DC



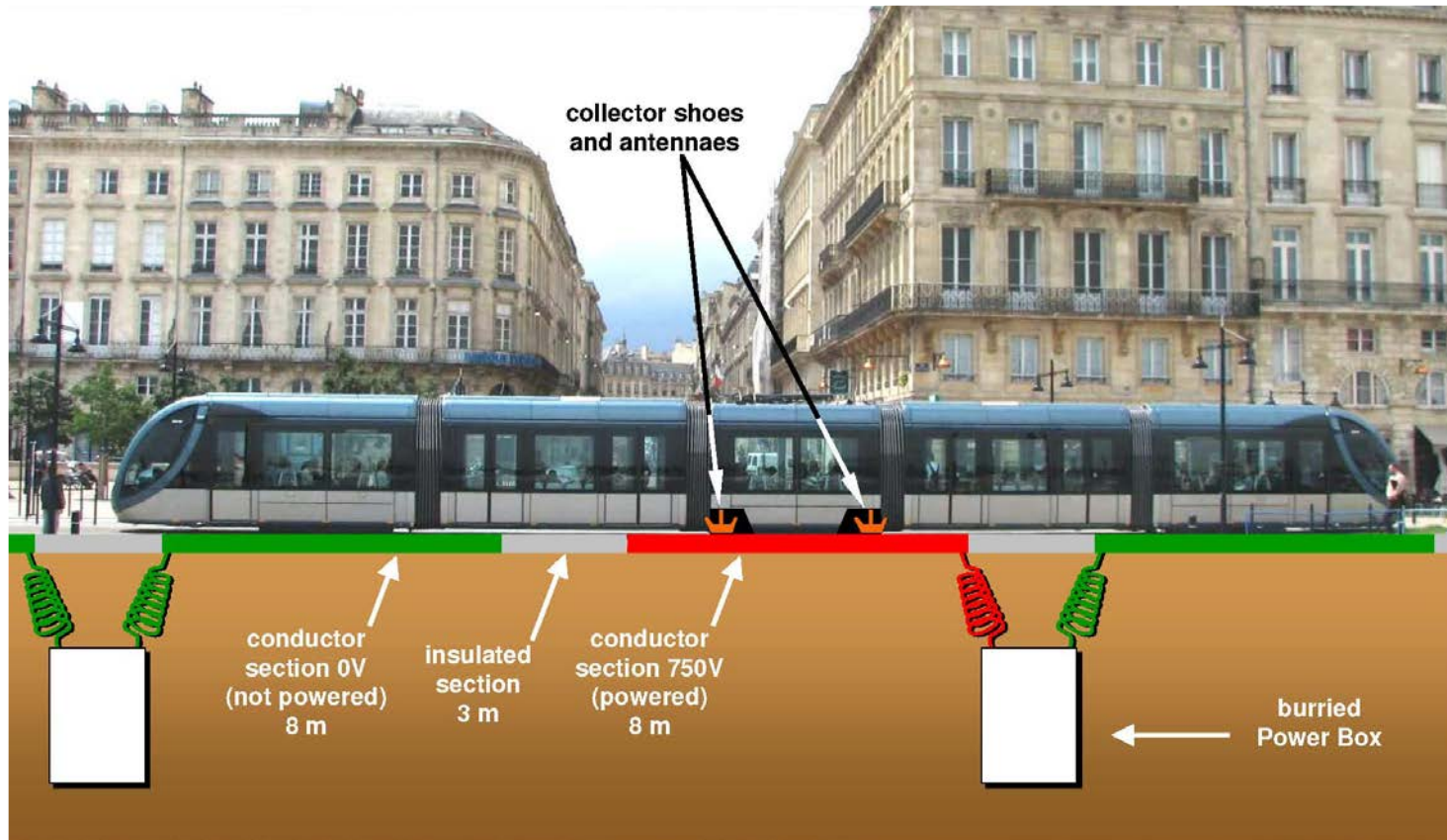
# Alstom APS System



**Bordeaux, FR**



# Alstom APS System



Bordeaux, FR



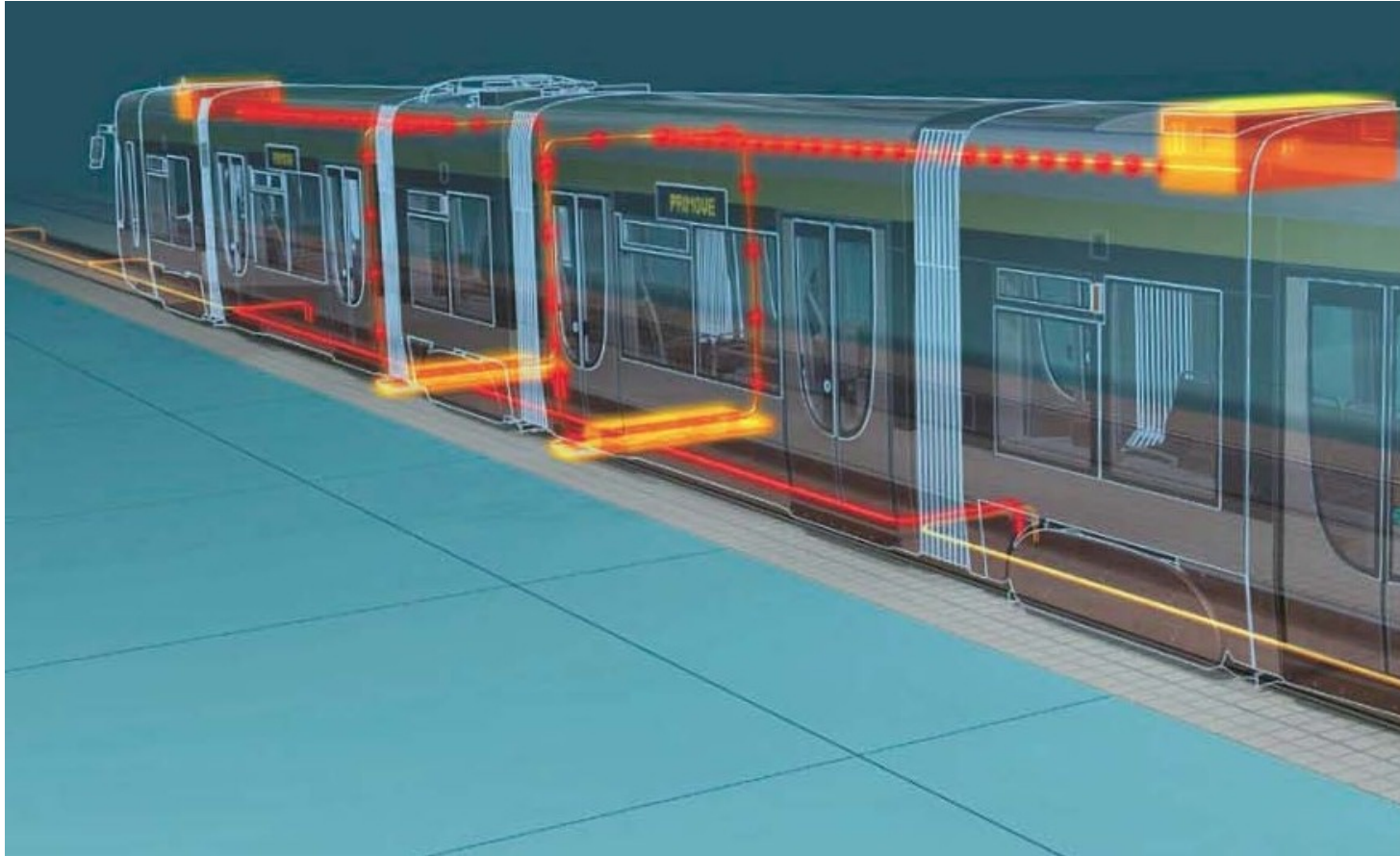
# Alstom APS System



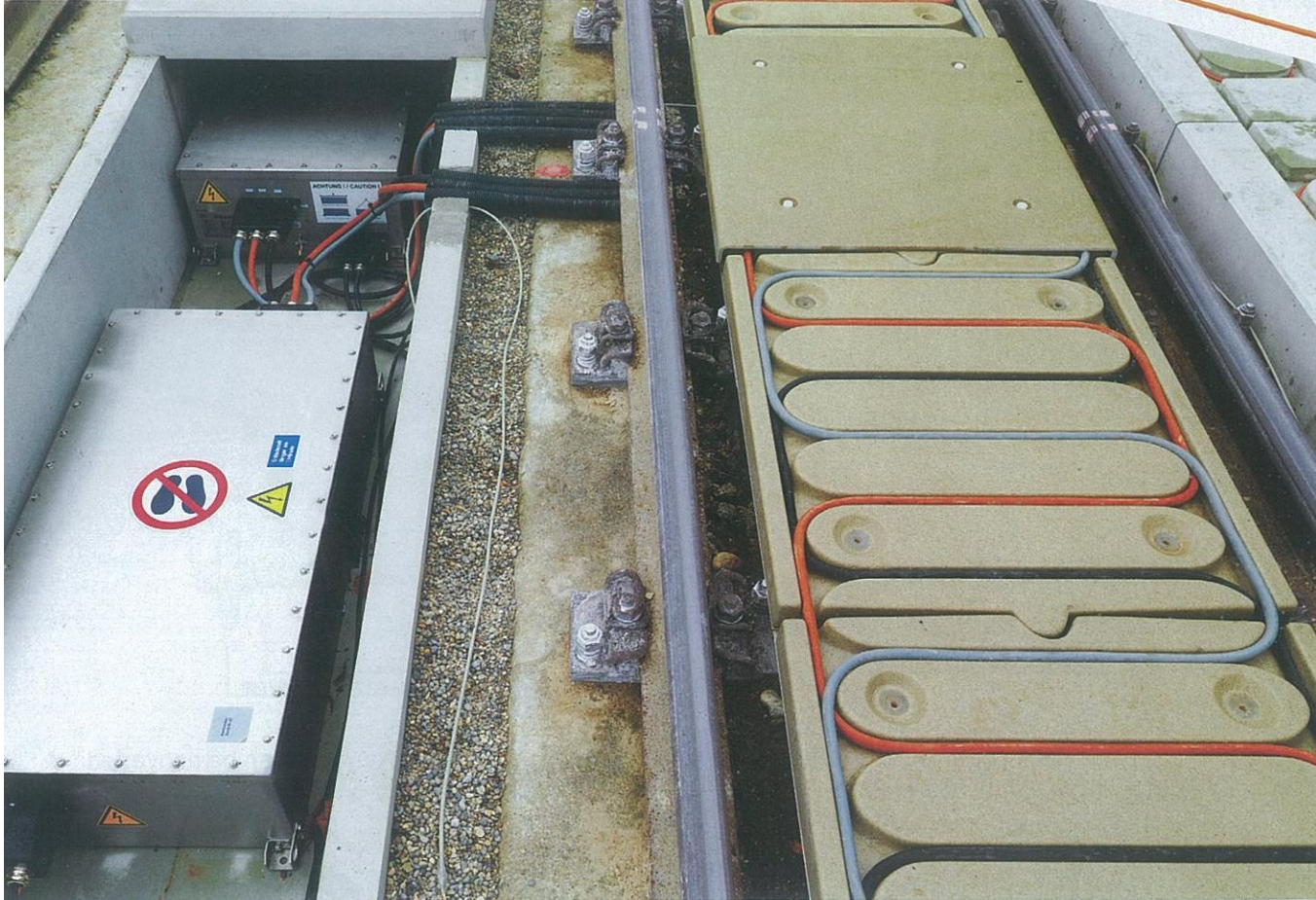
**Bordeaux, FR**



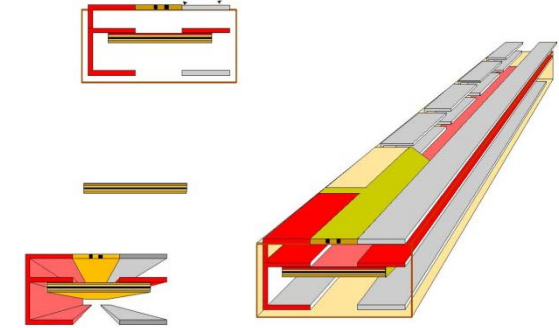
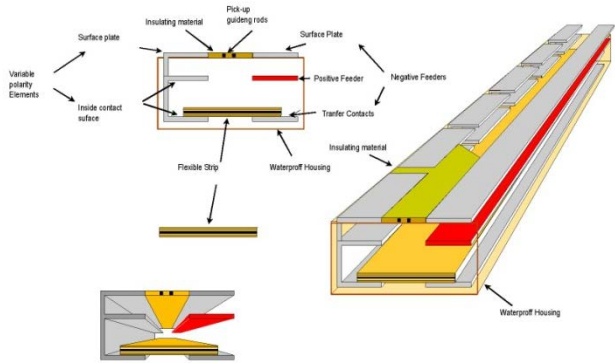
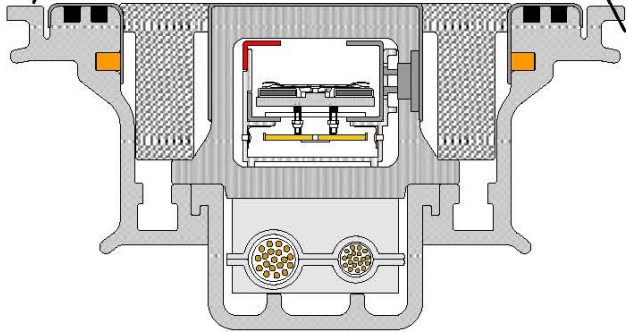
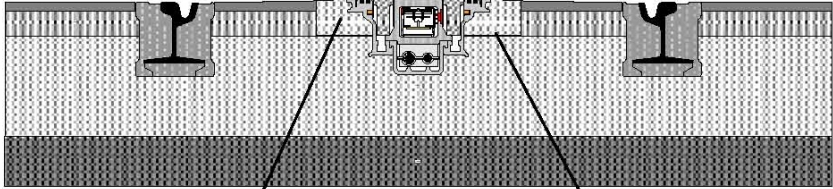
# Bombardier Primove System



# Bombardier Primove System



# AnsaldoBreda TramWave



# AnsaldoBreda TramWave



Naples, IT





# On-board Energy Storage



# Batteries



**Alstom: Nice, FR**



# Batteries



**Kinkisharyo: Ameritram Prototype**



# Hybrid: Batteries/Ultra Capacitors



**Siemens: Doha, Qatar**



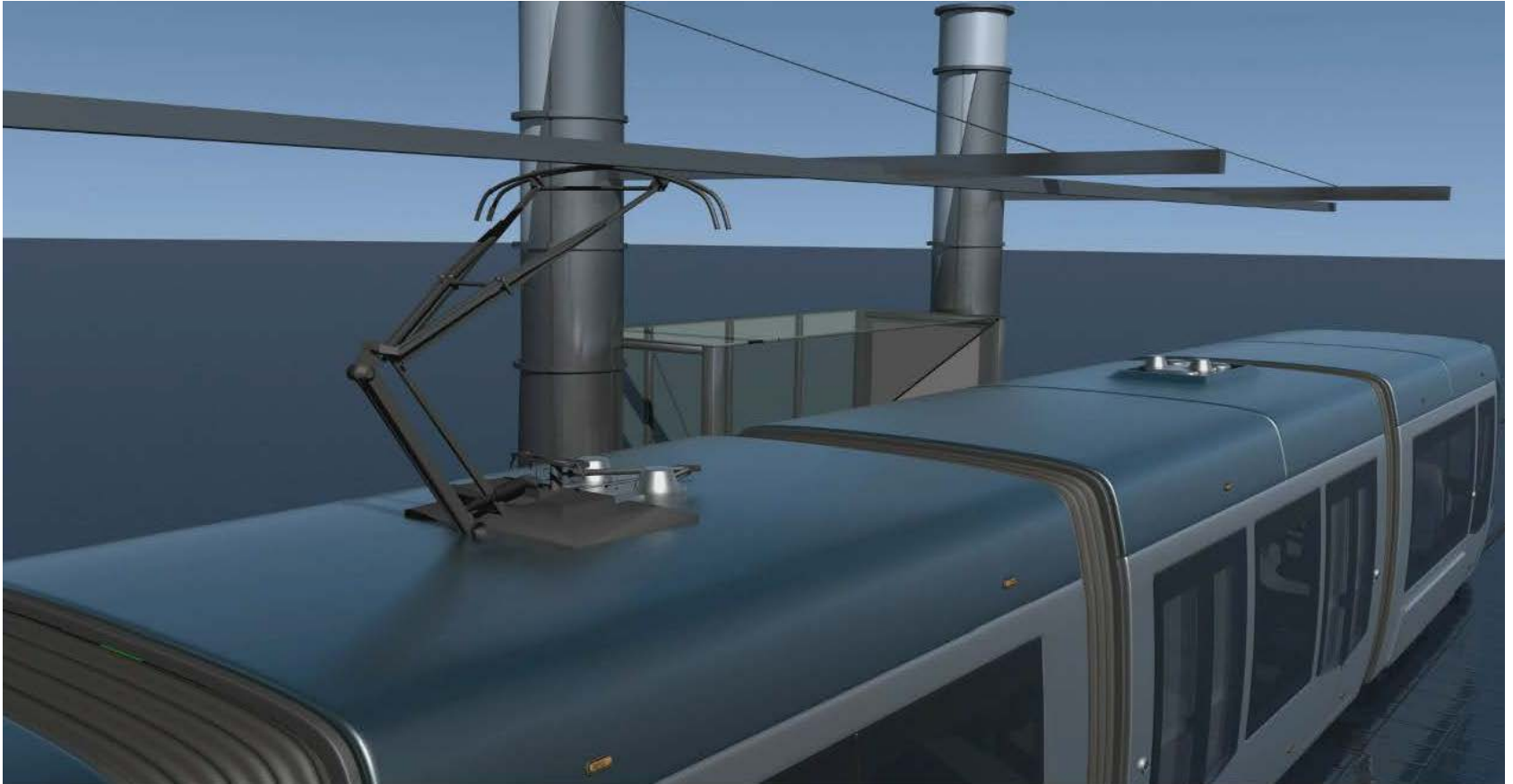
# Hybrid: Batteries/Ultra Capacitors



**CAF: Zaragosa**



# Hybrid: Batteries/Ultra Capacitors



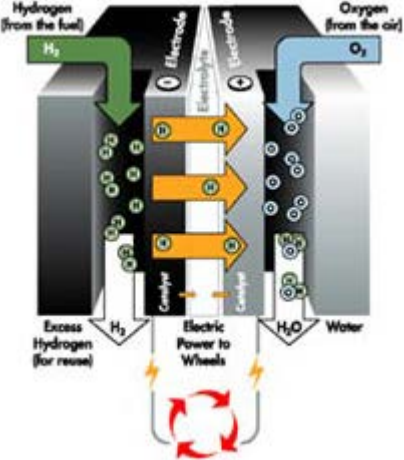
**CAF: Charging Concept during Station Stop**




# On-board Power Generation



# Fuel Cells



AC Transit, Oakland, CA 



# Fuel/Electric Hybrids



**Stadler: NJT River Line, Camden-Trenton, NJ**



# Fuel/Electric Hybrids

Galveston, TX



Siemens: Nordhausen, GM



Alstom: Kassel, GM



Savannah, GA



# Observations/Considerations

- No silver bullets.
- Only one mature design for ground level power supply – Alstom's APS; the rest in some form of R&D.
- All such designs proprietary.
- Some not appropriate for Washington DC environment.
- Onboard energy storage applications growing; Seattle and Dallas will be first in US.



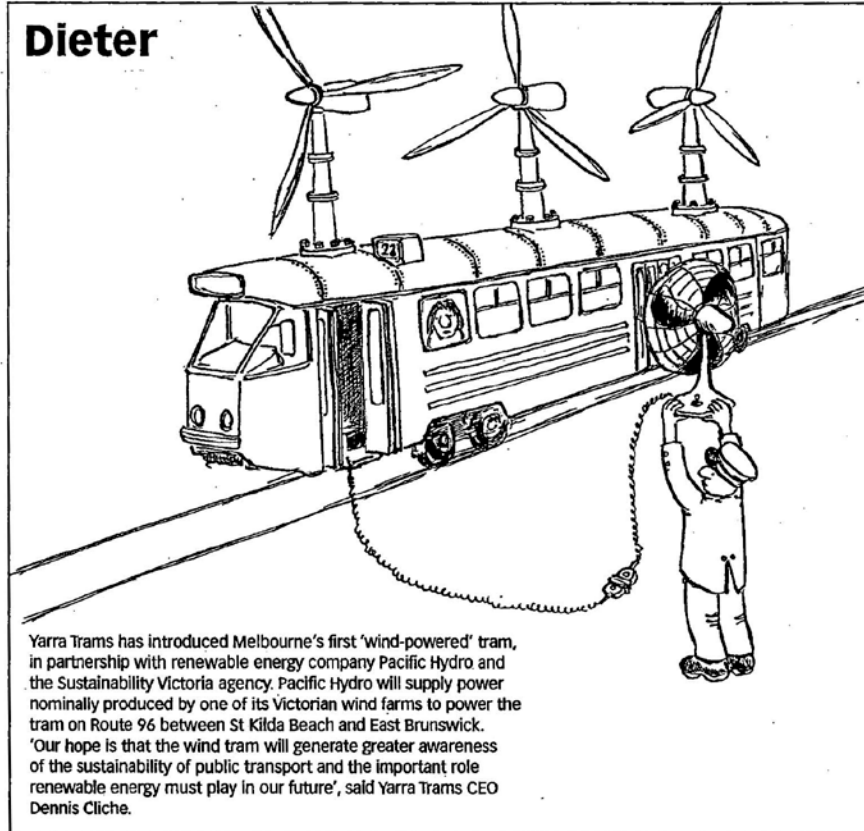
# Observations/Considerations

- Onboard power generation solutions exist, not ideal for streetcar environment.
- Anticipated high capital cost, whether wayside or on-board; high O&M cost depending on application.
- Most designs originating overseas; may need to consider Buy America implications.
- Technology continuously evolving.



# New ideas always popping up

## Dieter



Yarra Trams has introduced Melbourne's first 'wind-powered' tram, in partnership with renewable energy company Pacific Hydro and the Sustainability Victoria agency. Pacific Hydro will supply power nominally produced by one of its Victorian wind farms to power the tram on Route 96 between St Kilda Beach and East Brunswick. 'Our hope is that the wind tram will generate greater awareness of the sustainability of public transport and the important role renewable energy must play in our future', said Yarra Trams CEO Dennis Cliche.



# Questions/Discussion



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## Questions?

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