Sustainable Freight

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Pascal Amar – Volvo Group
Talking points

- Productivity and sustainability
- Technology selection – drivers and obstacles
- Technology integration
- Learning from concept vehicles
- Getting to (near) zero emission vehicles
Productivity is key to a sustainable freight ecosystem

Truly sustainable freight means both environmental and economic sustainability.

- Downtime
- Payload capacity
- Utilization
- Maneuverability
- Routing
- Driver training
- Connectivity
Technology selection is a complex process

- There is no ‘one-technology-fits-all’
- Emission impact of new technologies depends on how vehicles are used i.e. application
- Technologies must work across multiple applications, markets, infrastructures, etc
- New technologies must provide ROI for customers
Greater connectivity & automation will play a critical role

Connectivity and automated driving solutions will advance efficiencies at the vehicle and system levels.

Education/outreach activities and partnership with other technology companies/public agencies are key to realizing these technologies.
Electrification is a key enabler, in specific applications.
Technology evaluation & selection: drayage trucks
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- **PHEV#1**
  - Feasibility of PHEV technology & geofencing in port drayage
  - Complete vehicle technology package
  - PHEV#1 concept vehicle built & verified

- **PHEV#2**
  - PHEV#1 in revenue service >6 months
  - 'Self learning' dynamic geofences & refined design to maximize ZE operation
  - PHEV#2 concept built & in revenue service

- **PHEV "Ultra"**
  - Integrate ITS / PHEV / EATS technologies to achieve ultra-low in-use NOx emissions
  - Evaluate concept#3 in revenue service
  - Evaluate pathway to commercialization
Drayage PHEV – lessons learned

A large battery isn’t necessary to deliver Zero Emissions where it matters most

10kWh ESS / >20 miles in ZE mode per day

Marrying existing technologies creates significant new opportunities

GPS & integrated driveline controls maximize Zero Emission operation
Productivity and Technology Integration

Our concept vehicles demonstrate more than just electrification

- Replaces a wheel loader one size larger
- Dramatic reduction in noise
- Improved visibility
- Ease of operation
- Can carry 2,000lb more payload
- Less rolling resistance and tire scrub
- Improved maneuverability & steering
- Vehicle specs optimized for drayage operation
Evolutionary improvements at work in drayage PHEV#1

‘evolutionary improvements’ in PHEV#1

- Vehicle spec optimization
- Lightweight components
- Liftable 6x2 pusher axle
- Aerodynamic configuration
- LED lighting & reduced parasitics

→ Boosted Zero Emission range by ~25%
→ Reduced hybrid component size & cost

(and they improve freight efficiency today)
SuperTruck: amplifying effect of incremental improvements

- Bumper-to-bumper Aerodynamic optimization
- High-efficiency Integrated Powertrain
- Lightweight Designs & Materials
- Reduced Rolling Resistance
- Predictive Energy Management
- Idle-free Hotel Mode

3,200 lb lighter
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<th><strong>Breakthrough concepts</strong></th>
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<td>Improved cab thermal insulation</td>
<td>Curved &amp; sloped windshield</td>
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<td>Aluminum wheels</td>
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<td>Engine downsizing</td>
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**SuperTruck Technology Content**
We can address NOx *today* while we work on the long term.

**today**

- Vehicle efficiency improvements
- Engine right-sizing & optimization

**tomorrow**

- **Electrification**: start-stop / APU / PHEV / BEV ...
- **Automation**: queue assist / platooning ...
- **Control strategies**: geofencing / self-learning / predictive ..
- **ITS**: eco-routing / speed advisory / traffic avoidance ...

**2030**

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Pascal Amar – Volvo Group
Evolutionary improvements are the foundation of sustainable freight

- They reduce energy requirements & increase freight capacity
- They prepare the market and increase chances of earlier commercialization
- They reduce risk of product reliability issues (i.e. market push-back)
- They reduce total product cost increase to the customers
- They pave the way for societal acceptance

→ Start improving sustainability of goods transport today
→ Increase chances of market acceptance / real-world impact tomorrow
→ Continuously integrate mature solutions instead of forcing technologies to mature faster
Can Policy Help Expedite Adoption of New Technologies?

YES!.. by removing obstacles (not by picking a winning technology)

- Cost of compliance on current & new technology: R&D burden curbs innovation
- Local & regional regulations: waivers facilitate cross-pollination between markets
- Absence of clear technology policy positions and deployment timelines hinder connected vehicle infrastructure.
- Absence of guidelines for testing and validating levels of automated driving hinder market introduction and adoption
- Slow, complex & expensive permitting hinders critical investments for some concepts
Summary & closing thoughts

- The challenges of bringing new technologies to market are far from being just technical.
- The real world impact of a technology strongly depends on how (many) vehicles are used.
- We need to address NOx today while we keep working on technologies for tomorrow.
- Evolutionary improvements are an integral part of the roadmap to meeting California’s long-term air quality goals.
- Sustainable transport solutions –for freight and people- require technologies that sustainably address environmental, economical, and safety challenges worldwide.