



Hybrid Semi-Trailer Trucks in Forestry

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Task Force on Vehicle Weights and Dimensions Policy



OBJECTIVE

To develop and test two hybrid truck configurations to enhance **productivity**, **efficiency**, and **safety**.



Eastern Prototype: QC

- Log Haul – Quad Axle Semi-Trailer



Western Prototype: BC

- Biomass Haul – Tridem Semi-Trailer

HOW – TRAILER MODIFICATION

LOGGING – QUEBEC



BIOMASS – BRITISH COLUMBIA

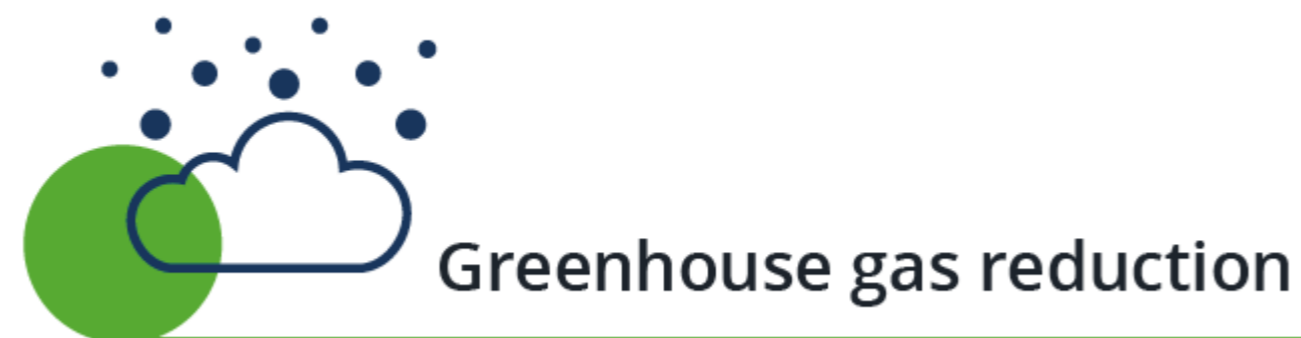


- Replace one trailer axle with a drive axle
- Replace one trailer suspension with a truck suspension
- Add an electric motor, batteries, heating and cooling
- Configure a custom control system between the trailer and the tractor

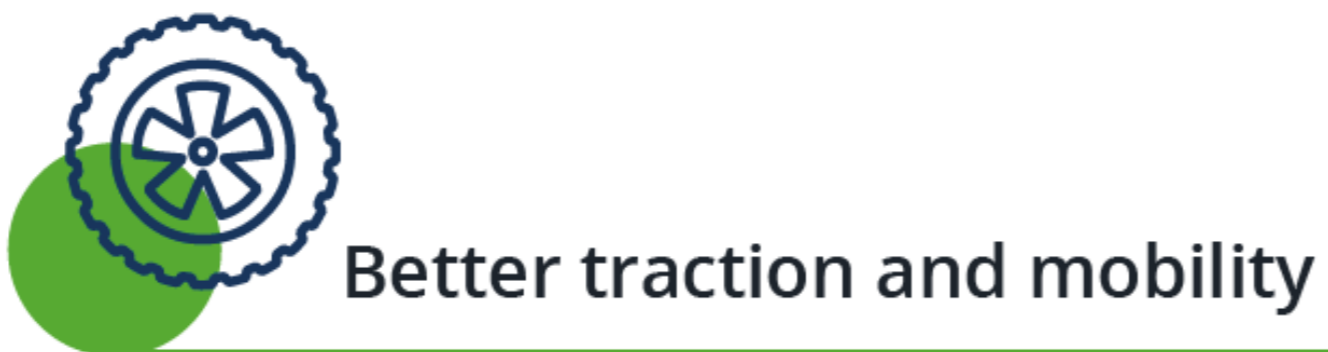
WHY – KEY BENEFITS



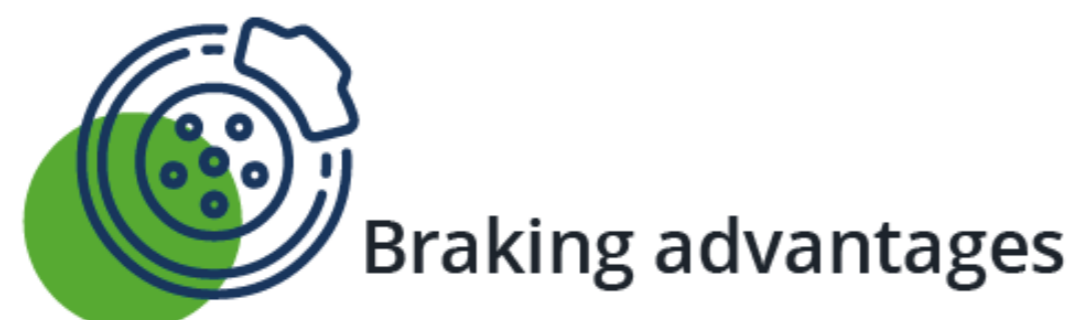
- Projected up to 15%, dependent on application and drive cycle, with typical value expected closer to 10%



- GHG reductions up to 40 tonnes per truck per year, dependent on duty cycle and utilization rate



- Extra driven axle can provide almost 50% more traction on slippery surfaces and off-road conditions



- Up to 250 kW (335 hp) of regenerative braking power can reduce brake fade and increase safety in mountainous terrain

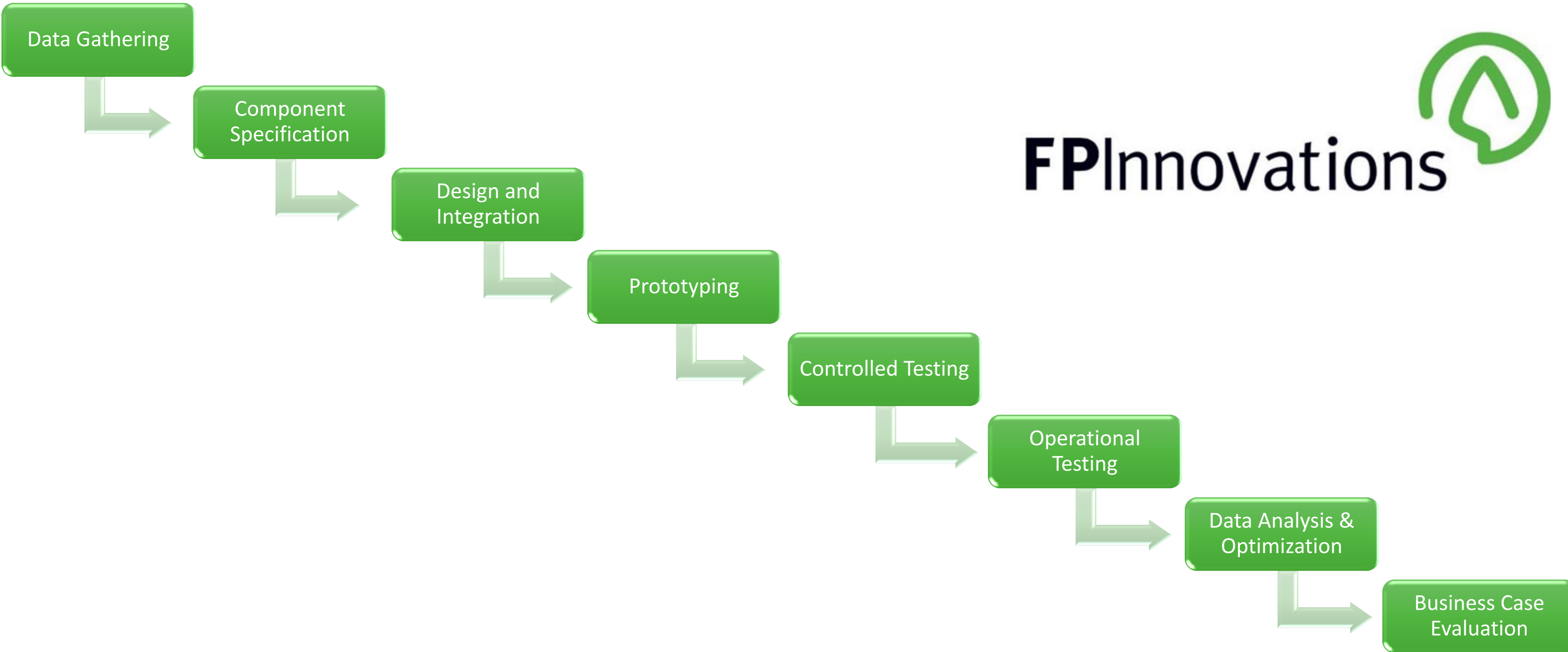
WHO – COLLABORATION



Project collaborators to be revealed in official announcement to come!



PROJECT PHASES



Integrated electric powertrain on a forestry trailer

- ***Fuel Savings & Reduced GHG***
- ***Increased Traction***
- ***More Braking Capacity***
- ***Reduced Downtime***

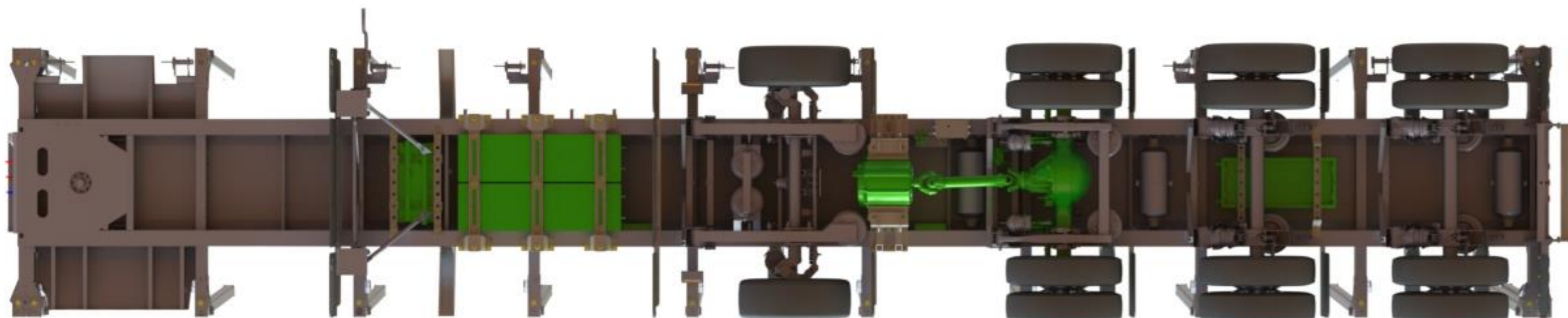
PROJECT STATUS

Key Specifications

- Batteries
 - 2 x 21 kWh packs
 - Liquid cooled and heated
- Motor
 - 250 kW (335 hp) peak power
 - 2300 N·m (1695 ft-lb) peak torque
- Drive Axle (26K lb)
 - 6.14* ratio
 - Driver controlled differential lock
- Truck Suspension (26K lb)
 - Air ride

System Weight

- Net increase of 1.5 - 2 tonnes
 - Seeking weight allowance



OVERVIEW OF TESTING

Overview

- Testing will be performed on both the electrified trailer and on its standard model.
- The tests can be performed with either one or two batteries.
- The electric motor can be programmed to simulate its smaller variant.

Tests

- Fuel efficiency
- Greenhouse gas emissions
- Traction
- Braking

Additional Data Monitoring

- Dynamic behaviour of the trailers
- Vibration and shock
- Kingpin loads
- Productivity



TESTING TIMELINE – QC

Preliminary Controlled Testing

- Summary: initial validation and troubleshooting
- Duration: 1 week
- Estimated Period: April 2021

Controlled Track Testing

- Summary: system calibration and overall testing
- Duration: 4-5 weeks
- Estimated Period: April / May 2021

Controlled Field Testing

- Summary: tests in a forestry setting with a simulated load (no logs)
- Duration: 3 weeks
- Estimated Period : May / June 2021

Operational Testing

- Summary: tests within real operations for the transportation of logs
- Duration: 3 weeks
- Estimated Period: June 2021



COMPREHENSIVE APPROACH

Forestry Applications

- Logging Trailer – extra traction for high off-road utilization
- Walking Floor Trailer – highly versatile, can accommodate many applications

Data Acquisition

- Thousands of hours of onboard data collected in BC and QC
- Key Outputs – energy capture potential, motor sizing, battery sizing

Fleet Surveys

- Insight into yearly fuel expenditure and savings potential
- Insight into costs related to lost productivity (haul assists)

Subsidies Evaluation

- Subsidies for R&D, for commercialization and for technology acquisition
- Examples include the CleanBC (BC) and Écocamionnage (QC) programs

Weight Allowances



- Evaluation of special allowances for more environmentally sustainable technology
- Examples include 225 kg for APUs (MOU) and 1500 kg for LNG / CNG trucks (BC)



GOVERNMENT SUPPORT

Goal

- Reduce GHG emissions while maintaining safe and sustainable infrastructure

Examples – Light Internal Combustion Engines (ICE)

- Quebec to phase out new light ICE vehicles as of 2035
- British Columbia to phase out new light ICE vehicles as of 2040

Heavy Haul

- Trucking plays an important role in GHG emissions within the transportation sector
- Due to the loads and energy requirements, fully electric powertrains are not yet feasible

Hybrid Trucks

- Hybrid powertrains are a technological stepping-stone to fully electric trucks
- Hybrid powertrains are also a market adoption-stepping stone for ardent diesel truckers

Weight Allowances



- Policy can provide some of the most effective incentives for market adoption
- Weight allowances will be an important factor in the final business case evaluation





FOR MORE INFORMATION

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