EVolution Hybrid
A Public-Private Project to build a Hybrid Class 8 Semi Truck
Project Rational

- Complexity of modern drivetrains
  - Diesel mechanic workforce and training shortfall
- Emissions controls lead to reliability issues
- Emissions and efficiency needs and regulations still exist within the trucking industry
- All electric (plugin) is not a viable solution for many trucking applications
- Grid infrastructure is not currently built to handle plug-in electric vehicles on a large scale
Project Goals

• Decrease complexity and increase reliability of drivetrain
• Decrease emissions and raise efficiency
  • 60% reduction in emissions
  • 80% reduction in cost/mile (plug-in only)
  • 50% reduction in cost/mile (hybrid mode)
• Run-on electricity from the grid or run-on electricity generated from range extending device
• Design a truck that will appeal to current drivers
• Bridge the gap between all or nothing approach currently seen in industry
• Marriage of technologies to make a better solution
Project Funding

- $2.3 million EDA grant
- 20% from TrainND Northwest
- Perkins Electric Innovations
Electric Drivetrain

- Electric Motor
  - 300 KW Motor
    - 460 Horsepower
    - 1850 ft/lbs torque
    - AC Induction motor
    - Highly Intelligent Controllers (HIC)
      - 380 Volt AC output
  - Liquid cooled
  - 96% efficient
  - HMI (in cab)
Electric Drivetrain

- Transmission
  - 7 speed fully automated
    - 1st gear 8.5:1
    - 7th gear 1:1
  - PTO Function
Electric Drivetrain

- Range Extending Device
  - Diesel Combustion Engine
    - Cummins 2.8 liter
    - Meets tier 4 final emissions standards
  - Direct current (DC) generator head
  - Exploring micro-turbine possibilities
Electric Drivetrain

- Battery System
  - 400-600 KW/H Battery Pack
    - In frame battery storage
    - Thermally managed
Chassis

- Kenworth W900A cab and sleeper
- Custom built frame
- Eaton 21K rear drive axels
  - 3.73:1 gear ratio
- Regenerative braking
- Air drum brakes
- Low Roll Resistance (LRR) tires
  - 30% less Drag
Plans for the Truck

• Mobile CDL simulator trailer
• Program recruiting
  • Job fairs
  • High Schools/CTE Centers
  • Truck Shows/Competitions
• Student EV/Hybrid orientation
• Next step
  • Post secondary Class 8 EV mechanic training
• Repeatability and Scalability
• Alternate fuels