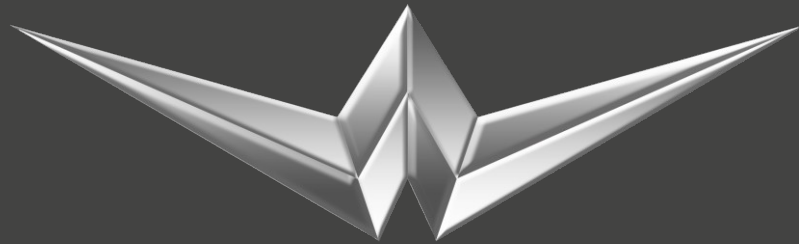


DOCKETED

Docket Number:	15-MISC-04
Project Title:	Fuels and Transportation Merit Review
TN #:	206878
Document Title:	Presentation Wrightspeed Powertrains - Scaling up
Description:	Ian Wright: CEO, Wrightspeed, Inc.
Filer:	Tami Haas
Organization:	Wrightspeed, Inc./Ian Wright
Submitter Role:	Public
Submission Date:	12/7/2015 5:14:24 PM
Docketed Date:	12/8/2015



WRIGHTSPEED
POWERTRAINS

Ian Wright: CEO, Wrightspeed, Inc
CEC Merit Review, December 2 2015

Scaling up

Milestones, First 5 years

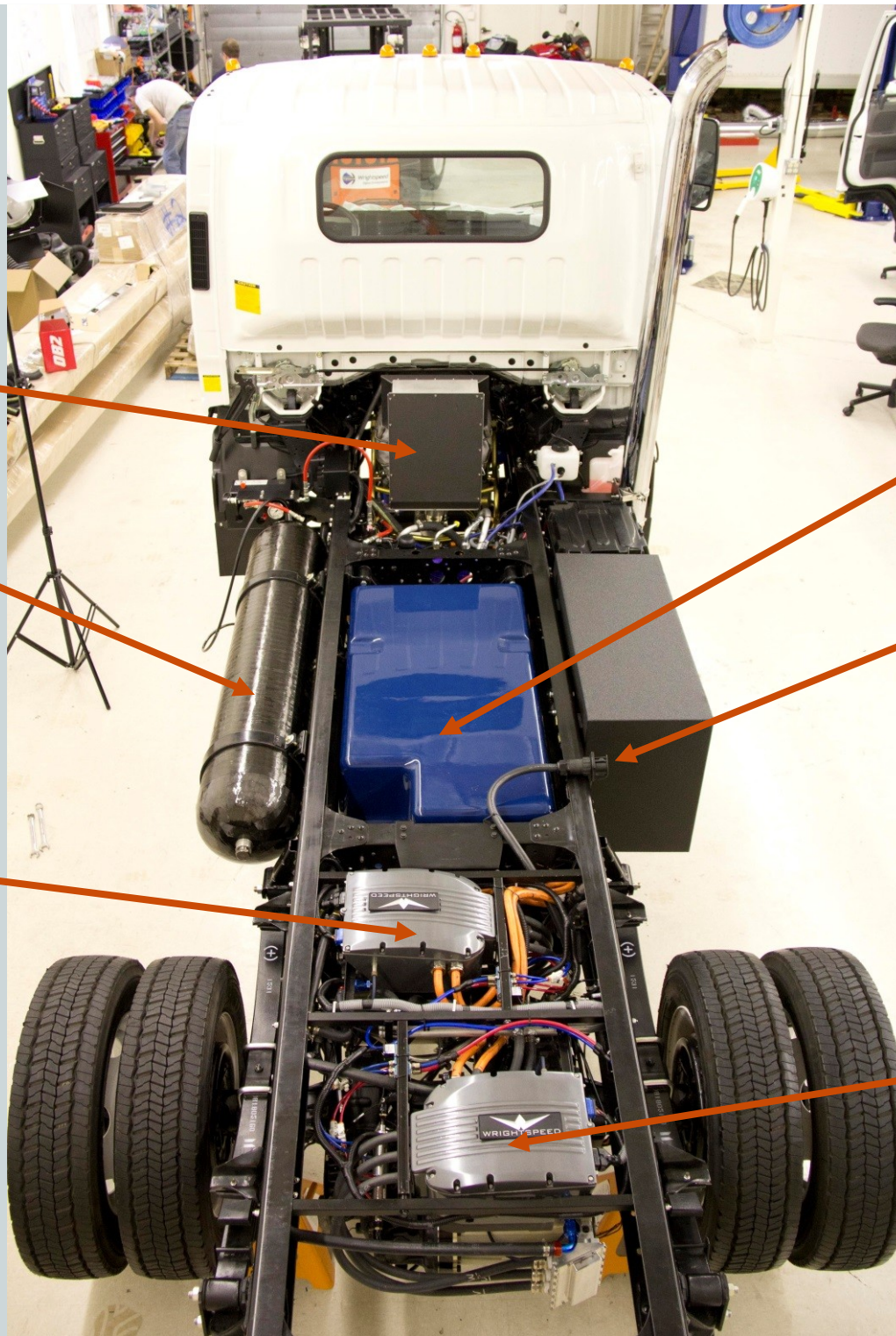
- Sept 2010, first funding and first CEC grant, \$1.2m, build 4 protos
- First truck on the road Nov 2011
- CEC grant June 2012, \$5.7m, establish production facility
- First ship to FedEx Nov 2013
- First Refuse truck order Feb 2014
- Announce Fulcrum turbine May 2015
- First bus orders in process now
- Move to Alameda factory Feb 2016
 - ┆ Backlog of 42 trucks

Route TM REV powertrain

**Turbine
Generator**

**Compressed
Natural Gas Fuel
Tank**

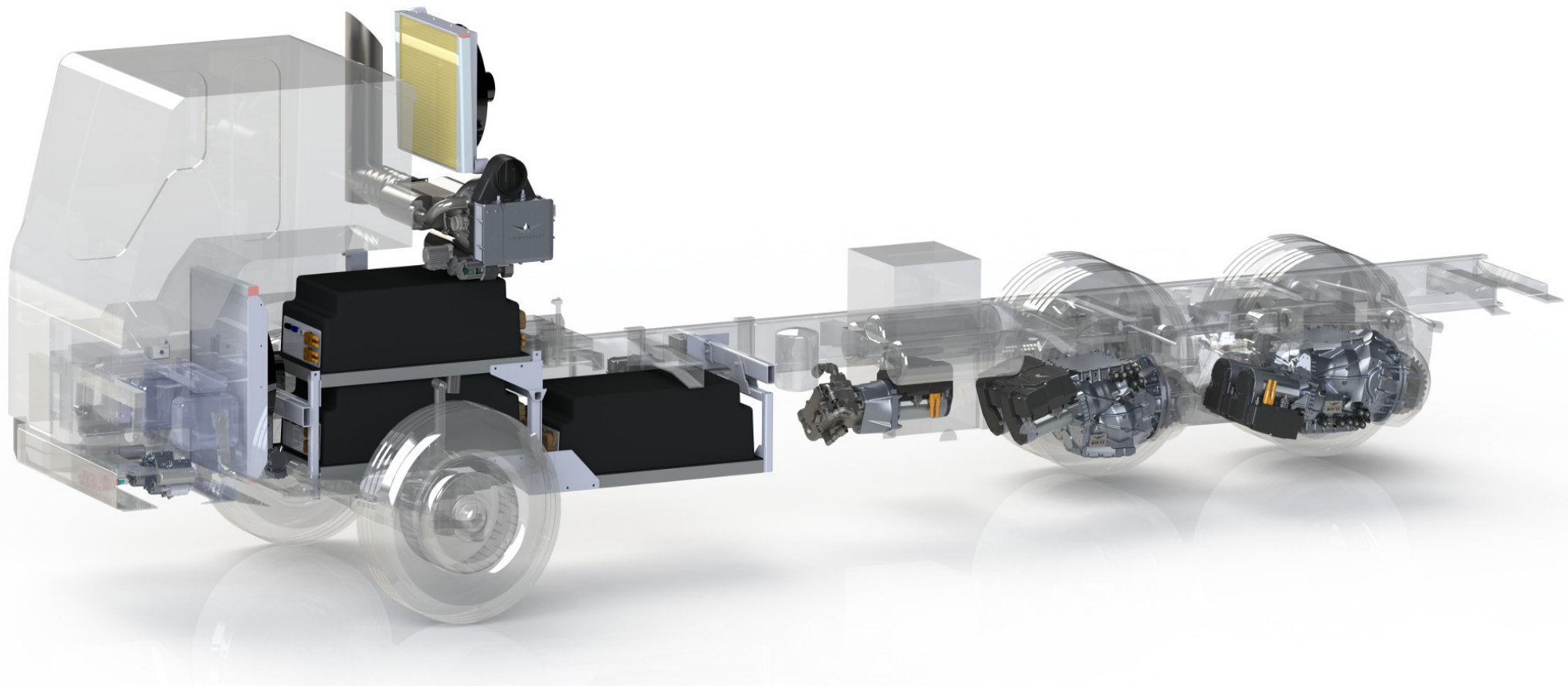
**200kW inverter,
motor, and 2-
speed gearbox**



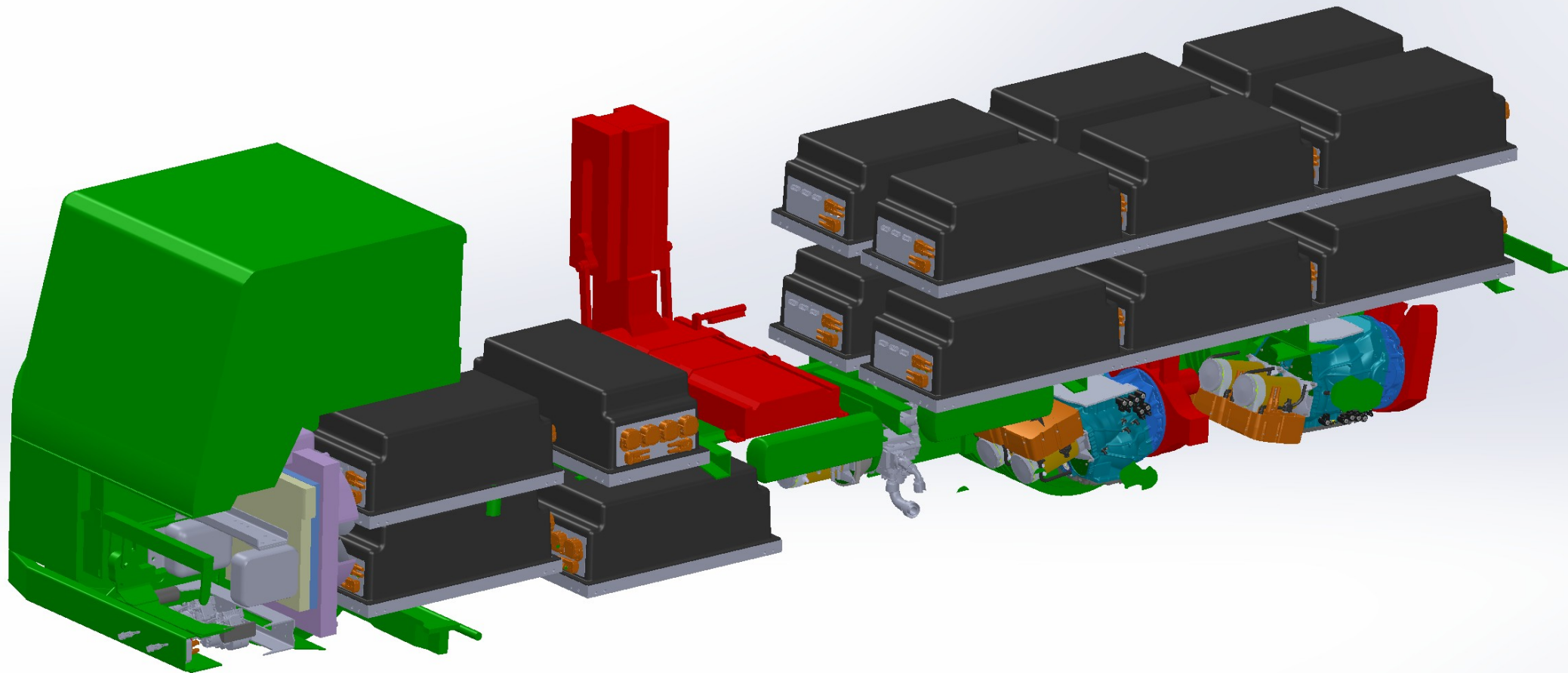
Battery Pack

Plug it in

**200kW inverter,
motor, and 2-
speed gearbox**



Why Range-Extended?

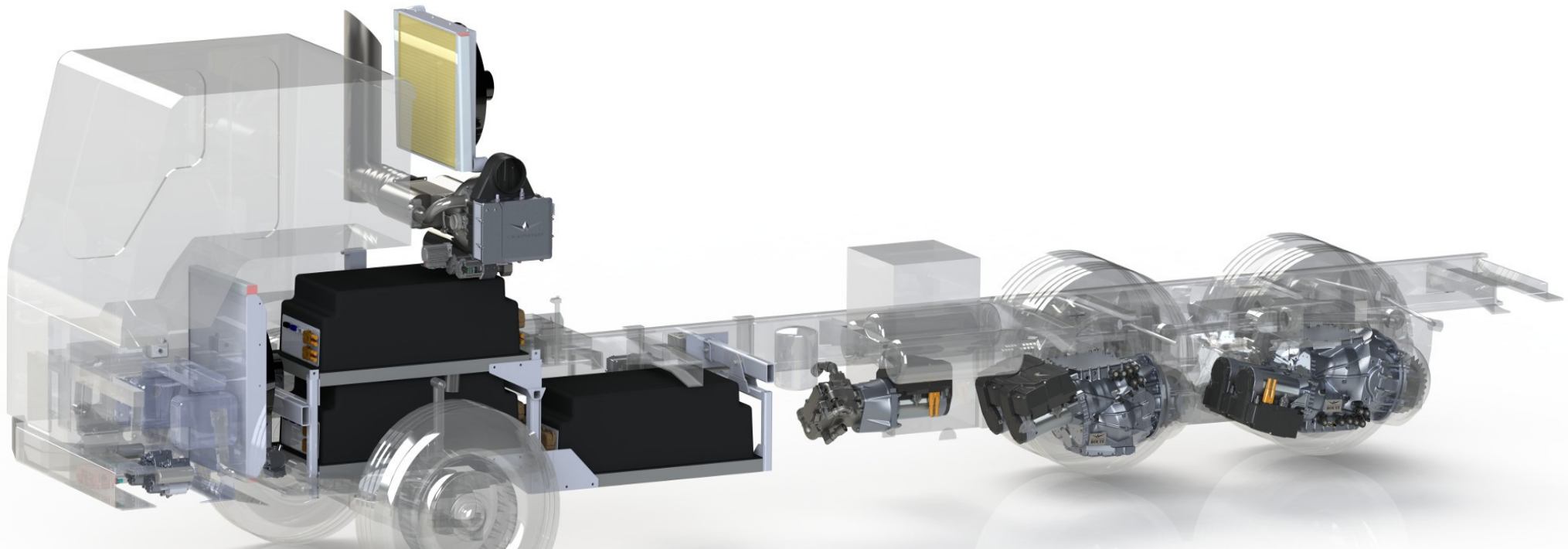


130 miles/day average, 2kWhr/mile

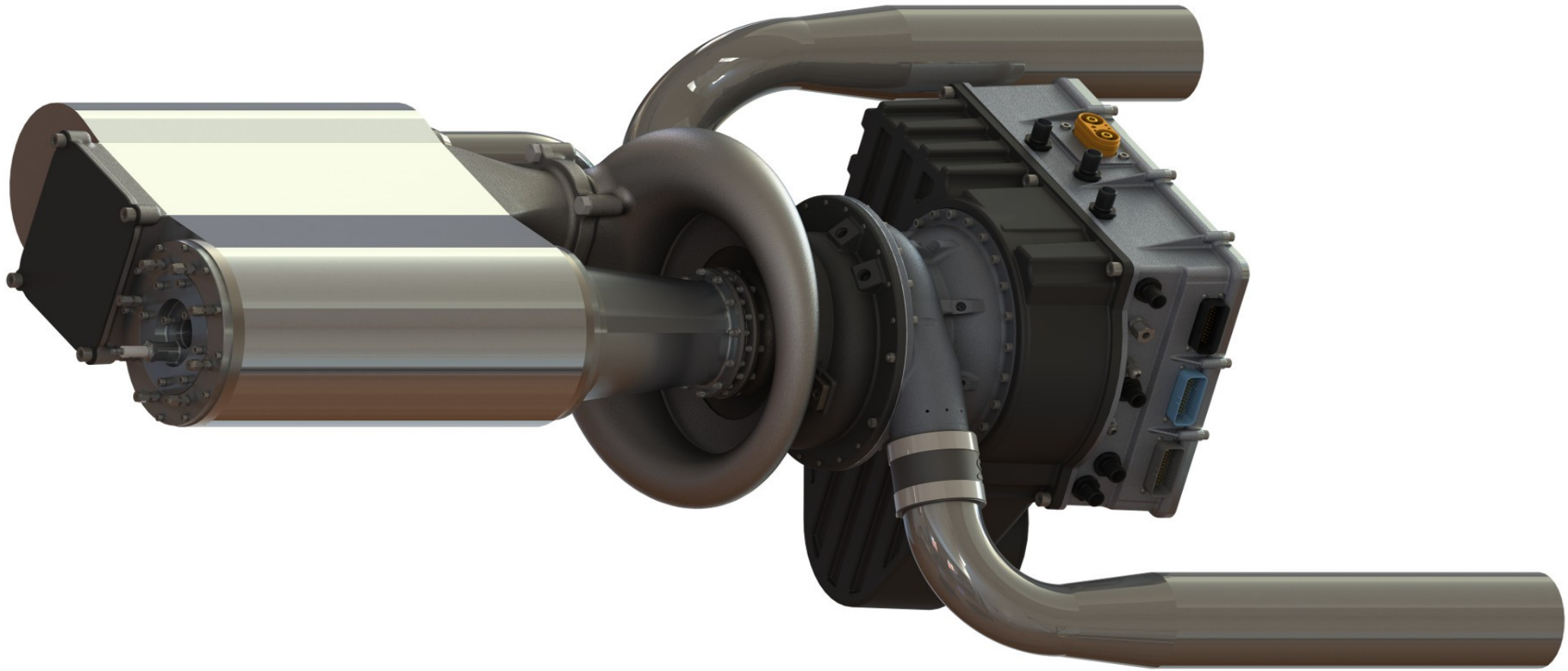
Derate for low temperature, longer than average route, battery aging, <100% SOC range

Half the payload, have the load space, half a million \$

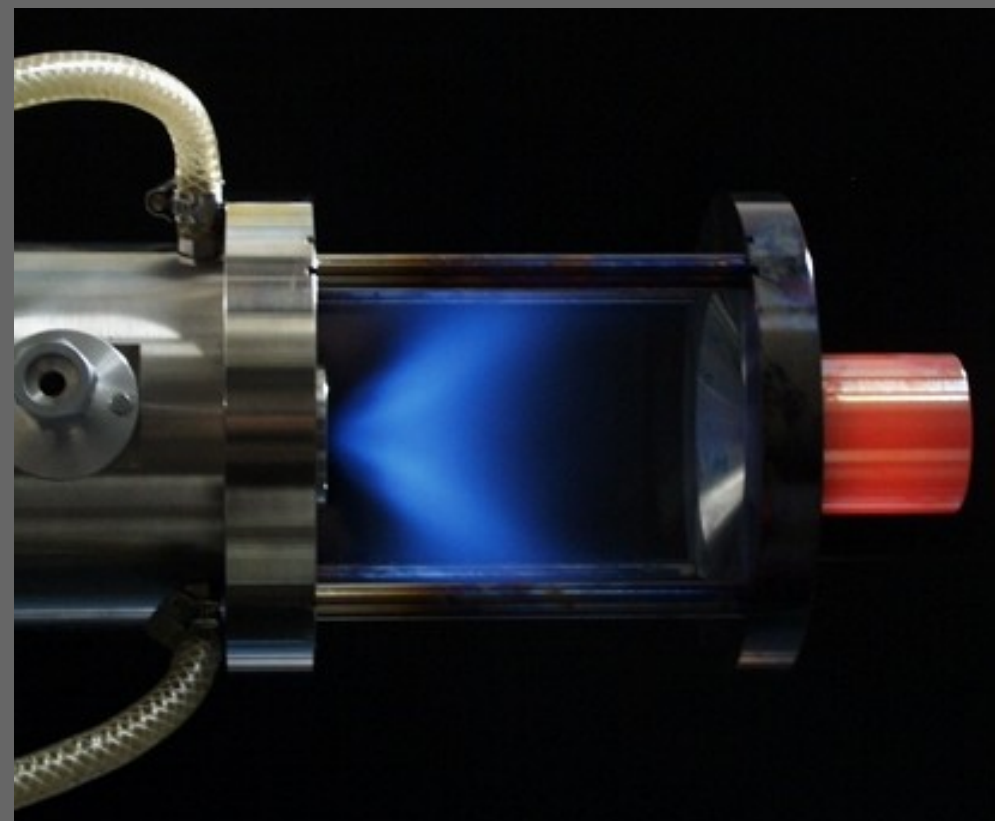
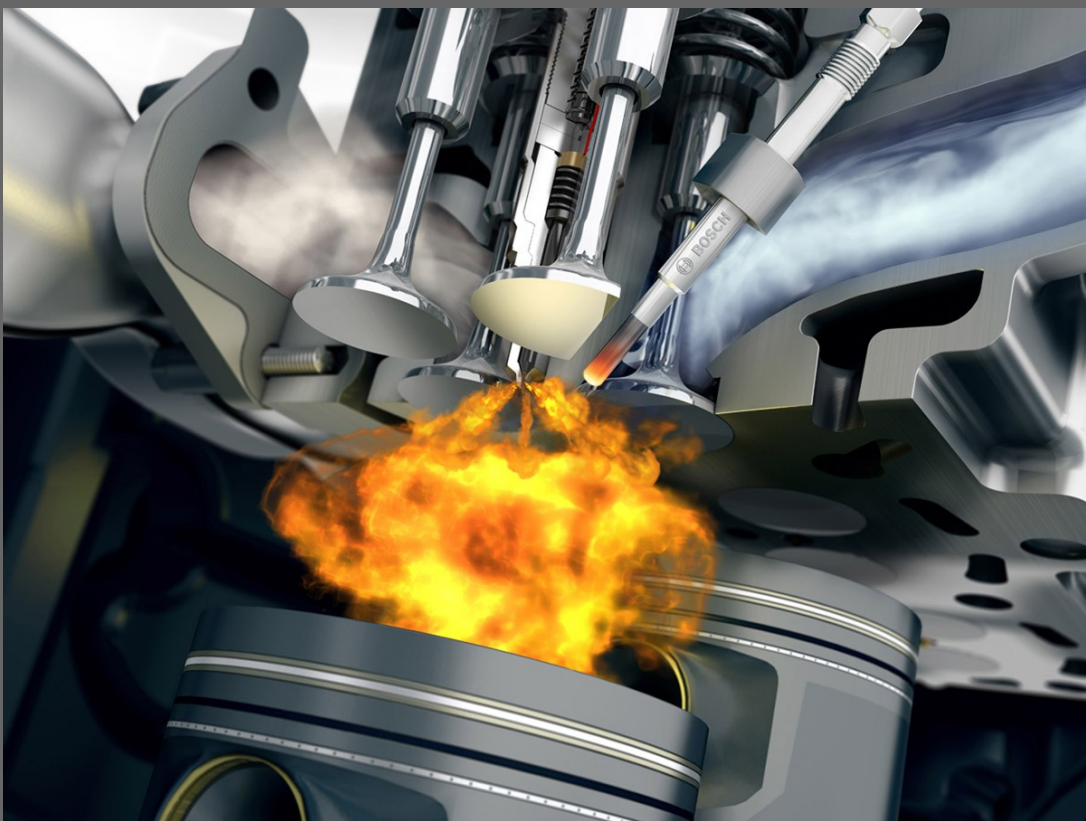
Needs a range extender

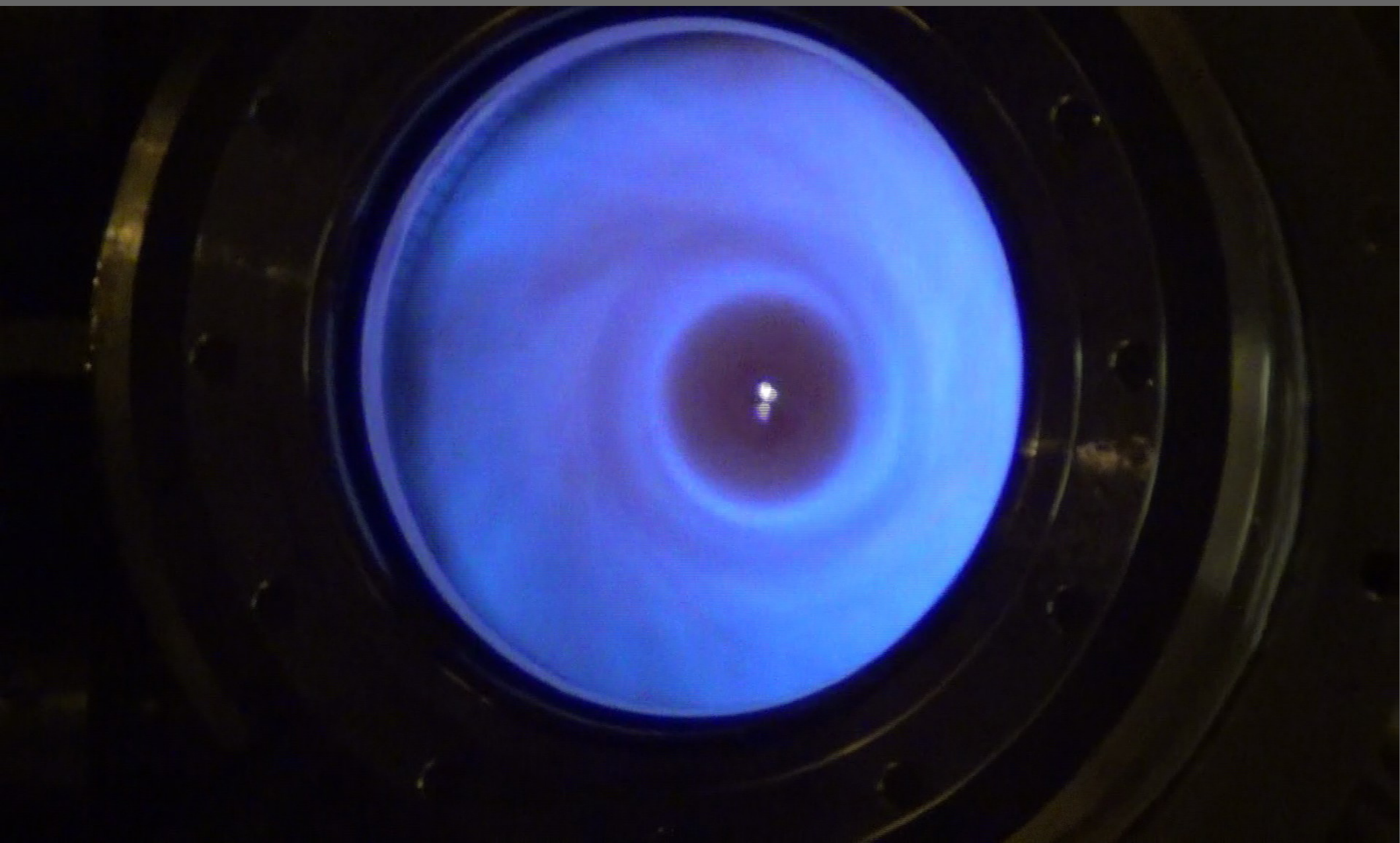


Range-unlimited with refueling, multi-fuel
Can displace the highest fuel consuming trucks with the longer routes
Turbine cheaper than batteries
Therefore, shortest payback





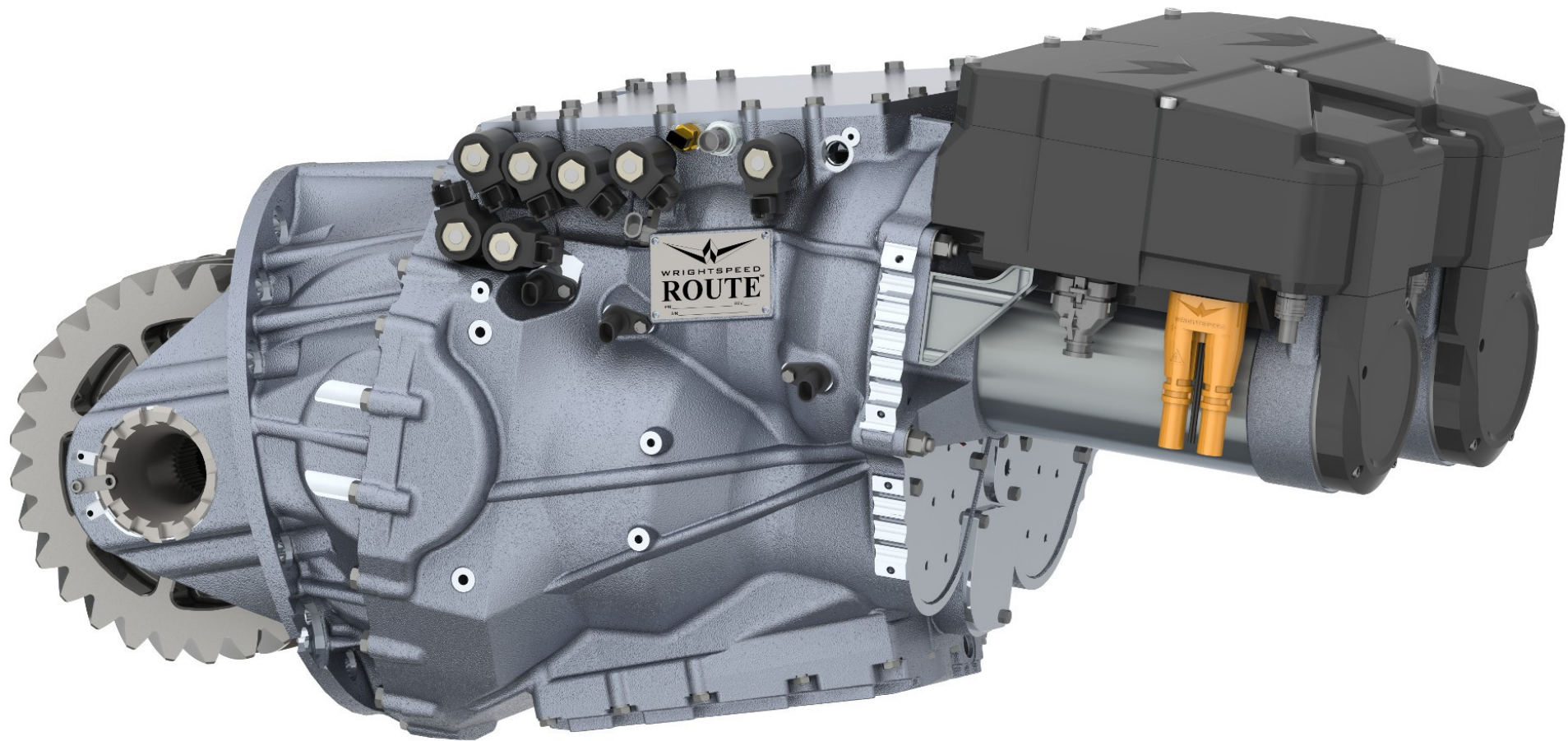




Cleaner than an EV



Wrightspeed's generator burns cleaner per kWh than the average mix of US electric power plants, making Wrightspeed's products cleaner, on average, than EVs.



Lessons:

Focus relentlessly on payback and scalability

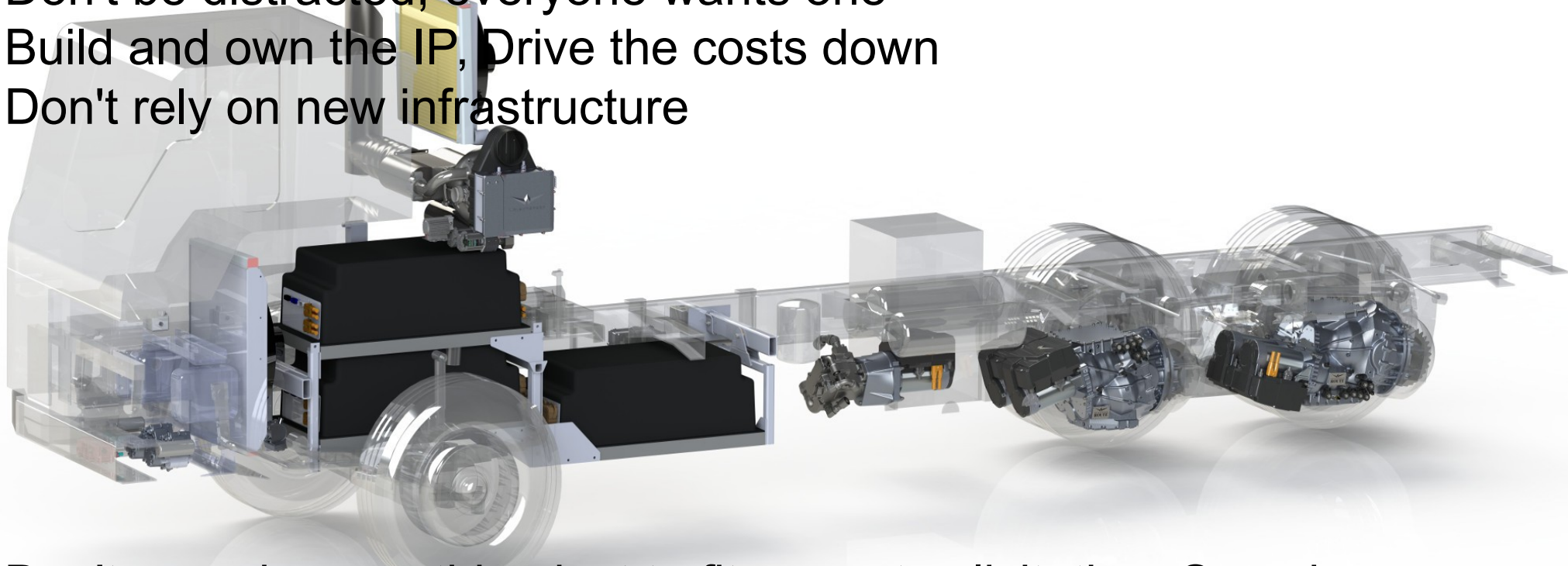
Do the numbers! Don't kid yourself.

Most fuel and maintenance savings per truck per year. Not most mpg.

Don't be distracted, everyone wants one

Build and own the IP, Drive the costs down

Don't rely on new infrastructure



Don't ever do something just to fit a grant solicitation. See above.

Listen to customers! Refuse trucks was a customer pull.

Sell first to end-users

Absolutely must match diesel performance

Grade, power, speed, range, driveability, startup time