



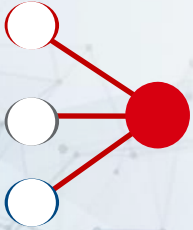
Wabtec Overview

DoE: Gaseous H2 Workshop February 2022



WABTEC

Global leader
in freight and transit
rail technologies



+50 COUNTRIES

~25K EMPLOYEES

FREIGHT: 67%

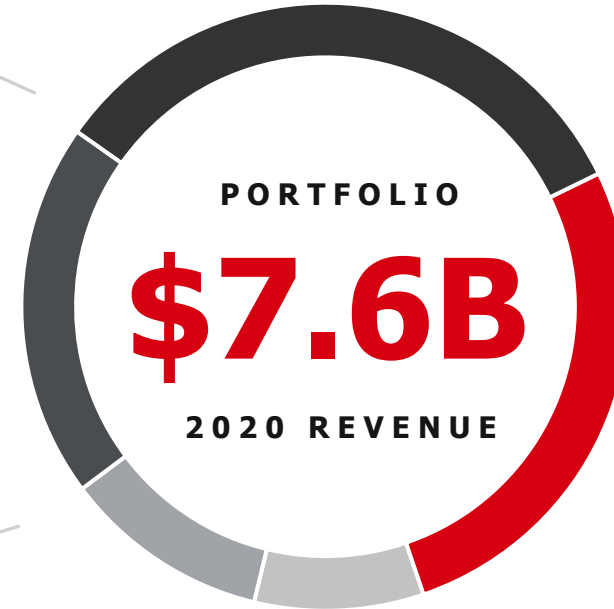
TRANSIT: 33%

27%
Freight Services

20%
Freight Equipment

11%
Components

9%
Digital Electronics



33%
Transit

MARKET
~60%
Aftermarket

GEOGRAPHY
~60% Non-U.S.
Revenues

WABTEC

Rail is well-positioned to tackle world's freight challenges

RAIL VS TRUCKS TODAY

The freight rail network is already considered the largest, safest, and greenest means of transporting goods throughout the world.

TODAY



CARBON REDUCTION

5x less carbon emissions per ton mile



SAFER

22x fewer deaths and injuries per year than trucking



MORE EFFICIENT

3 4x more fuel efficient than trucking

50% SHIFT TO RAIL

~5 BILLION

gallons of fuel eliminated / year

~60 MILLION

5x less carbon emissions per ton mile

~18 MILLION

fewer truckload trips / year

~14 MILLION

fewer injuries or deaths from truck accidents / year

WABTEC

Changing the course on emissions

Wabtec is leading the charge to a low- to zero-emissions rail network with heavy-haul battery-electric locomotives

1st

100%
BATTERY-ELECTRIC
LOCOMOTIVE
WORLDWIDE

7MWh

MORE THAN
7MWH
CAPACITY

30%

UP TO 30%
FUEL & EMISSIONS
SAVINGS



WABTEC

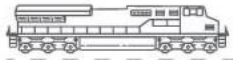
Roadmap to Carbon-zero Locomotives

HYDROGEN AVAILABILITY

GREY H2

BLUE H2

GREEN H2

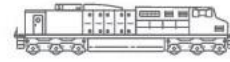


Diesel-Electric
(Bio-Diesel and Renewable Diesel)

TODAY



Battery-Electric
Operating in Consist



Battery-Electric
Lead

LOCOMOTIVE CARBON
EMISSIONS



Hydrogen
Fuel Cell

2015

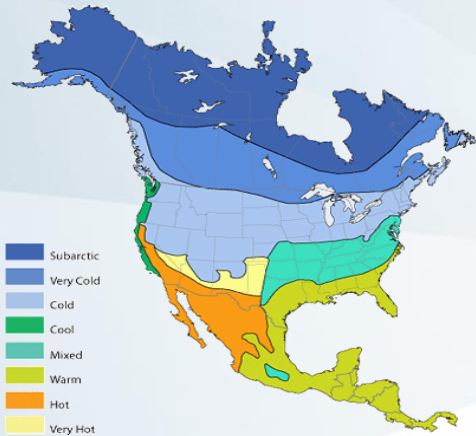
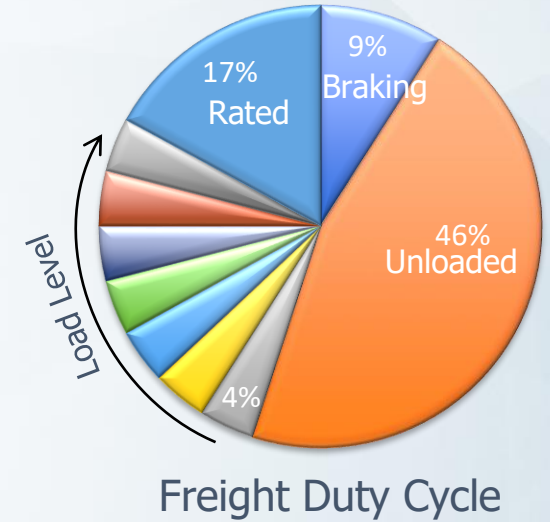
2020

ZERO
CARBON 2030

Locomotive Operation

Aggressive Duty Cycle

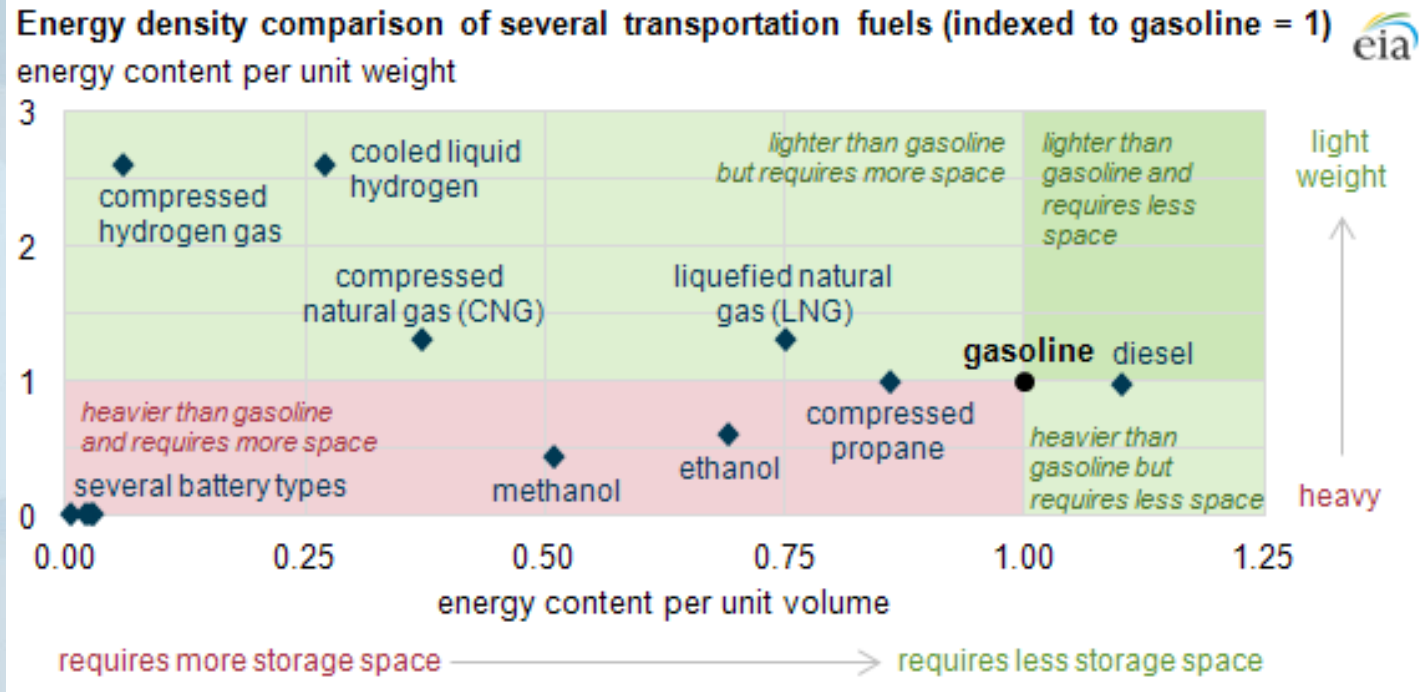
MWh/Yr : **3500-4000**
Power (kW) : **~3300**
Loco Operation : **30+ Yrs.**
Rated Power : **17%+ usage**
Daily Uptime : **80%+**
Diesel used/yr : **~250,000 gals**
Refuel freq. : **~1 week/fill**



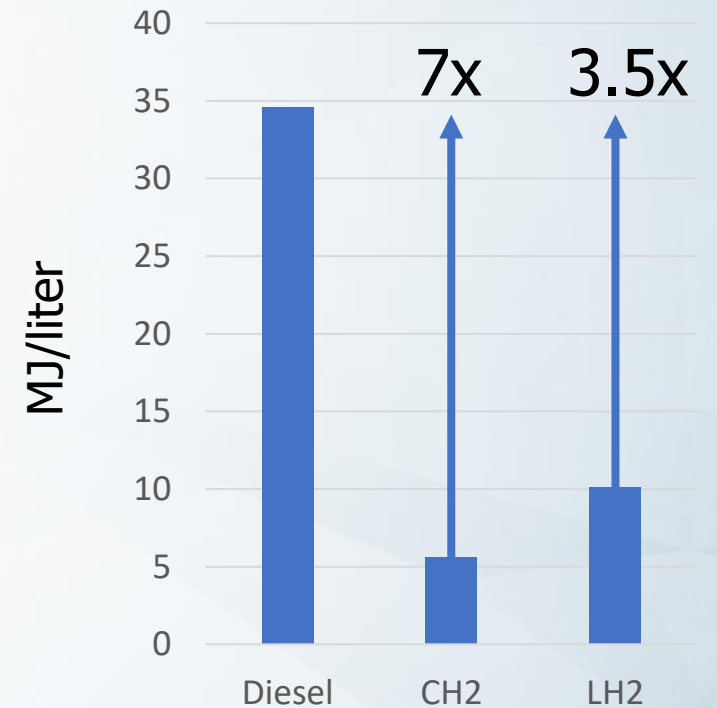
Temperature : **-40°F to >120°F**
Altitude : **0 to 10,000+ ft**

Extreme Conditions

Energy Density walk



Energy Density Comparison



Diesel

- ~70 MWh per tank