PROBLEM

GOVERNMENTS ARE PHASING OUT CONVENTIONAL VEHICLES AND ARE PROMOTING RENEWABLE ENERGY SOURCES TO DECARBONIZE THE GRID.

AS A RESULT, BATTERIES TECHNOLOGIES ARE IN HIGH DEMAND FOR MOBILITY AND ENERGY STORAGE APPLICATIONS.

BUT THE RESOURCES NEEDED TO PRODUCE THE BATTERIES ARE LIMITED AND THE GRID IS STILL HEAVILY RELIANT ON FOSSIL FUELS.

OPPORTUNITY

TOTAL GHG REDUCTION

=

GHG REDUCTION PER VEHICLE

x

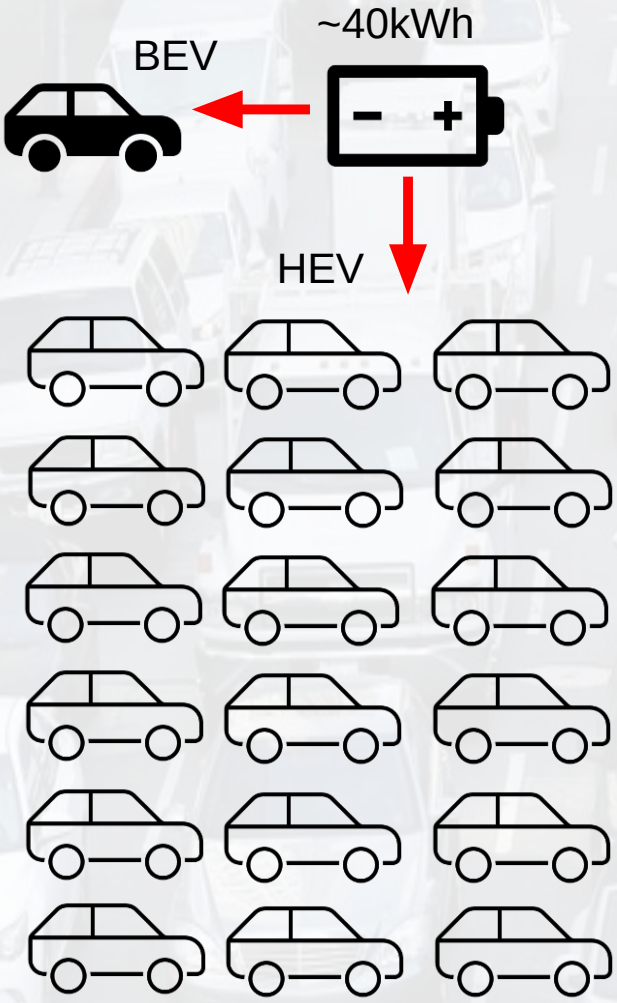
NO. OF CONVENTIONAL VEHICLES REPLACED

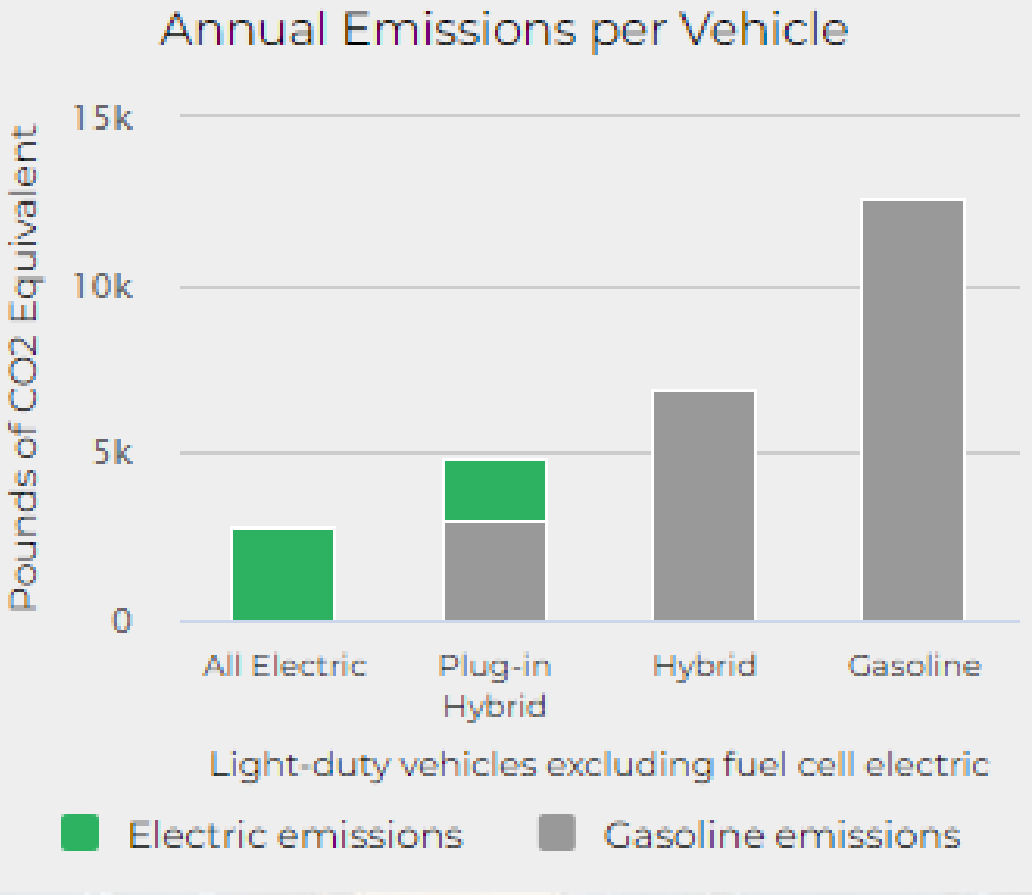
ELECTRIC VEHICLES ARE JUST AS CLEAN AS THE ELECTRICITY USED TO RECHARGE THEM

MAXIMIZING THE NUMBER OF CLEANER VEHICLES IS JUST AS IMPORTANT AS THE GHG REDUCTION PER VEHICLE

SOLUTION

GIVEN THE AVAILABLE RESOURCES, HEV HAVE THE HIGHEST IMPACT ON GHG REDUCTION BY REPLACING MANY MORE CONVENTIONAL VEHICLES THAN BEV





Based on assumptions with 2021 data from EIA
https://afdc.energy.gov/vehicles/electric_emissions.html#wheel

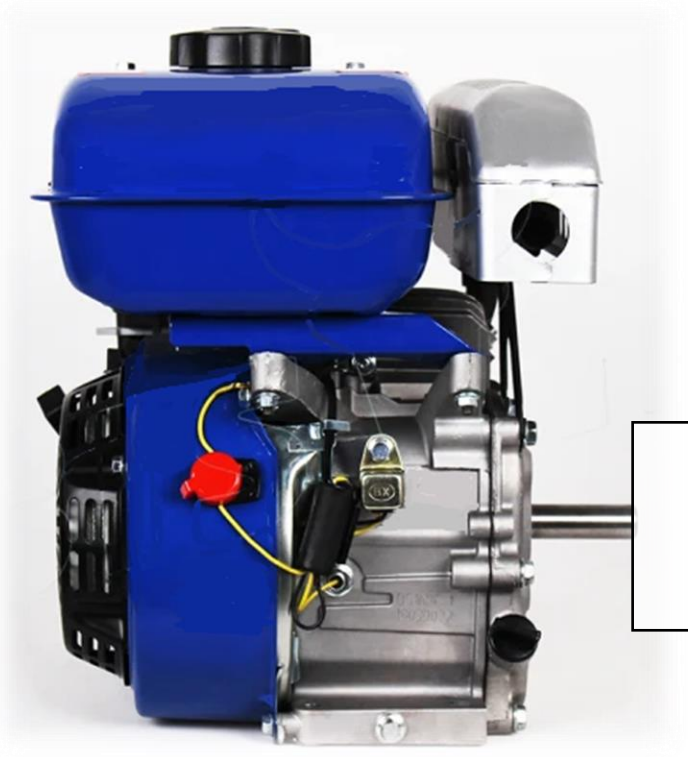
TECHNOLOGY

MOST ECONOMICAL AND VERSATILE PARELLEL HYBRID ARCHITECTURE FOR OEMS' FLEET ELECTRIFICATION!

ENGINE STARTER MOTOR

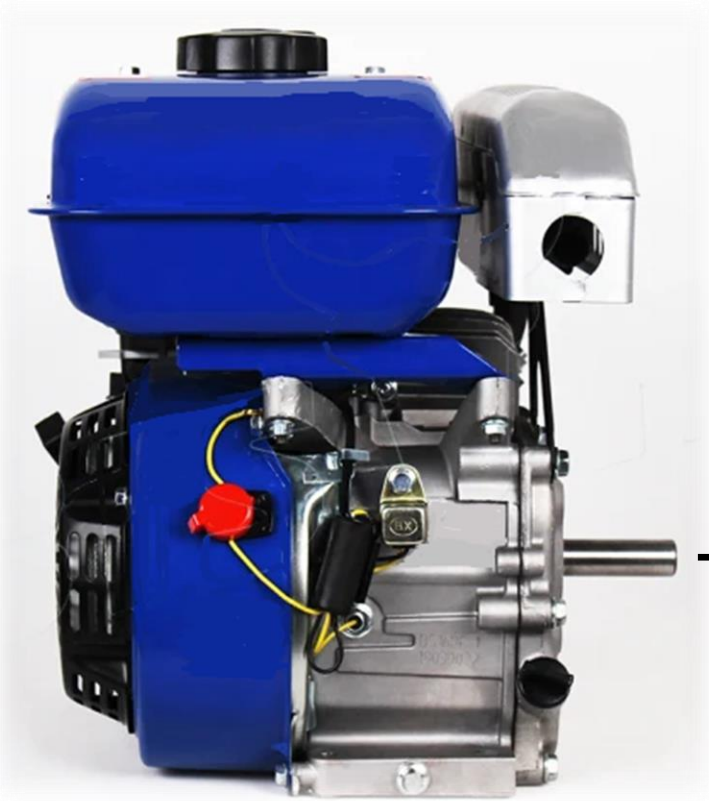
BATTERY CHARGER / GENERATOR

FORWARD AND REVERSE PROPULSION



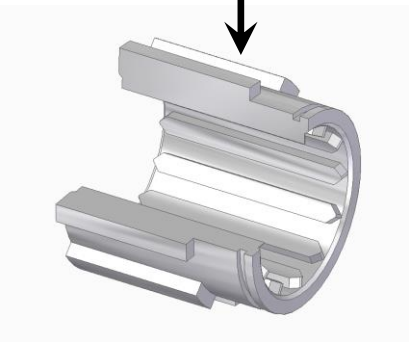
PRODUCT DESIGN

MOTOR / GENERATOR



ENGINE

CENTRIFUGAL CLUTCH



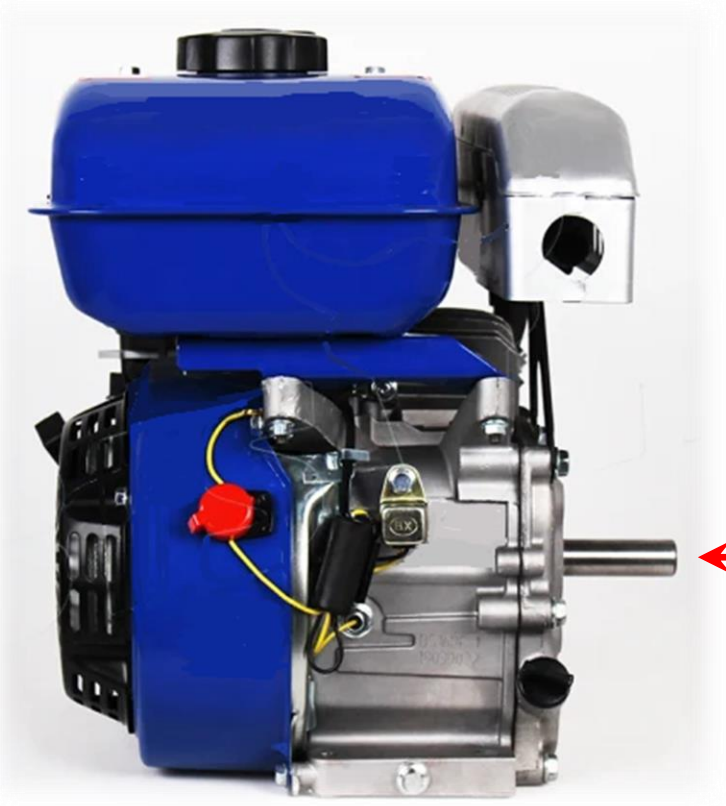
DOG CLUTCH

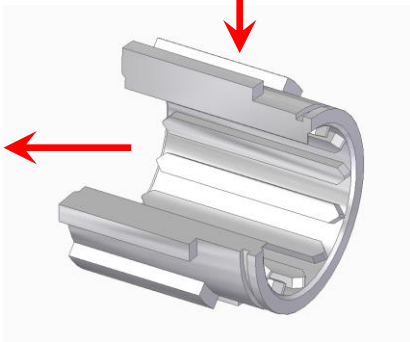
DRIVETRAIN

ENGINE STARTER

ELECTRIC MACHINE WORKS

AS A MOTOR





DRIVETRAIN

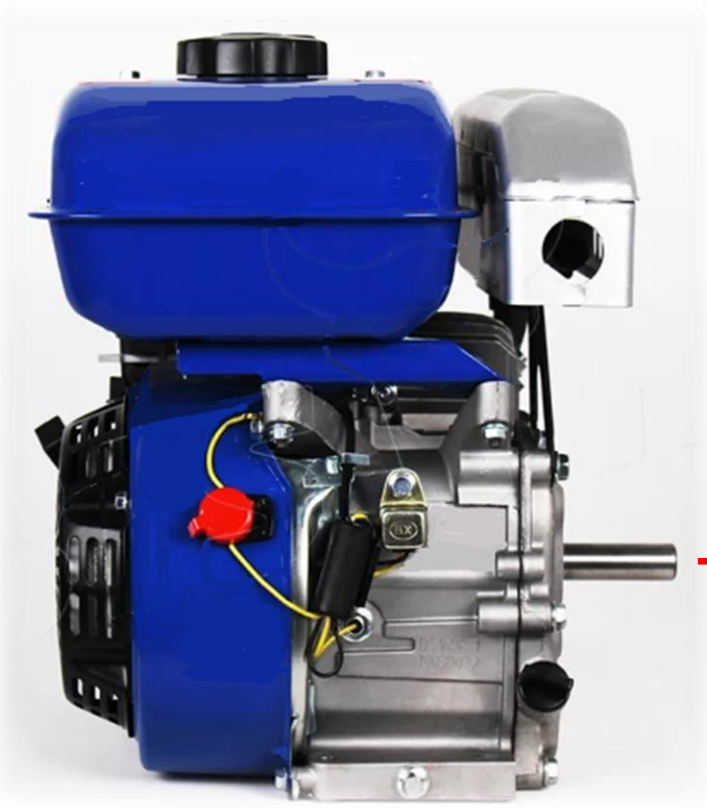
DISCONNECTED

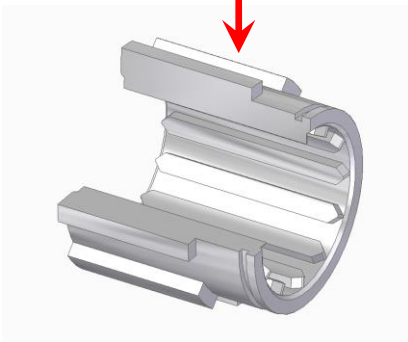
LOCKED

GENERATOR

ELECTRIC MACHINE WORKS

AS A GENERATOR





ENGAGED

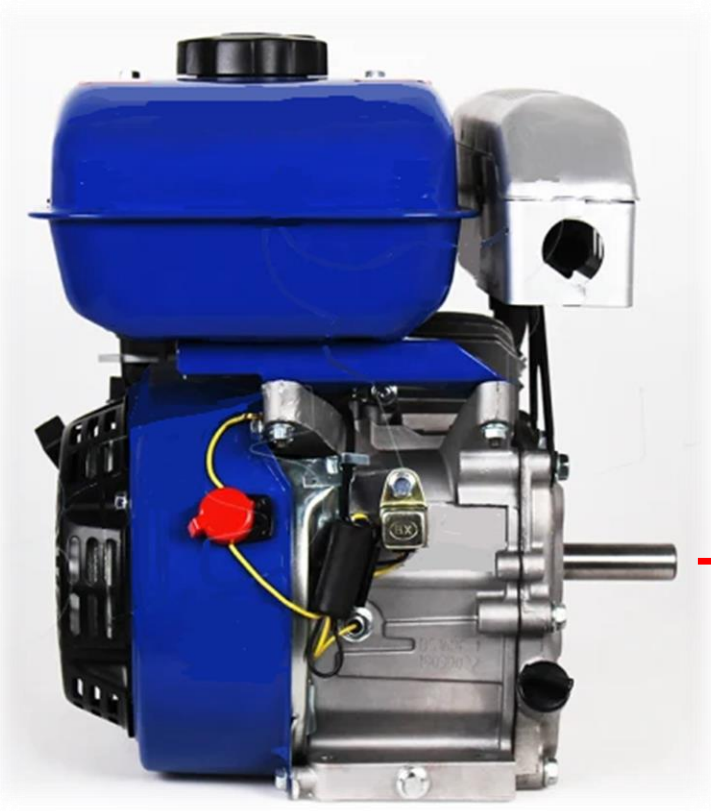
DRIVETRAIN

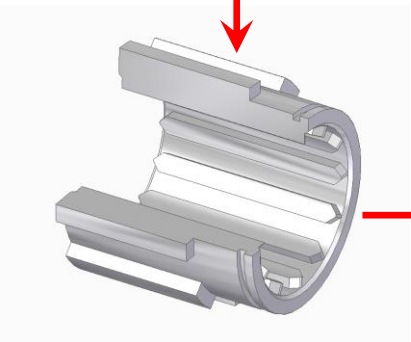
DISCONNECTED

DRIVE MODE

ELECTRIC MACHINE WORKS

AS A MOTOR / GENERATOR

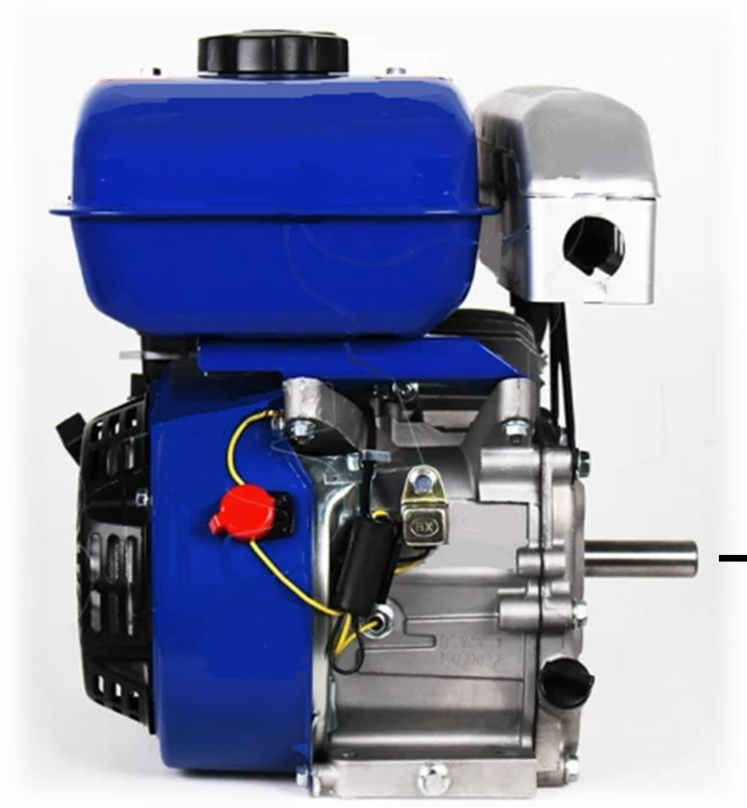


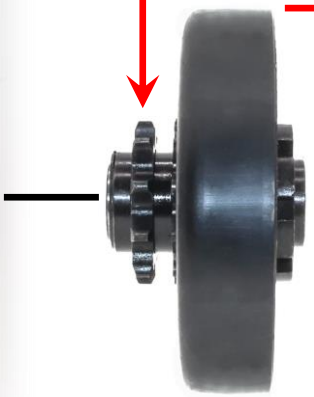


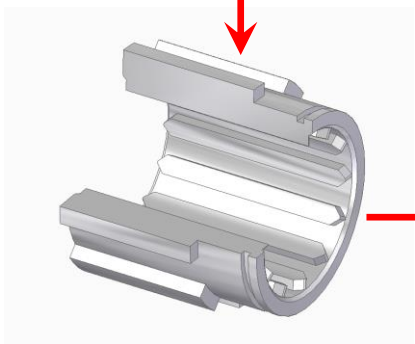
DRIVETRAIN

ELECTRIC DRIVE

LOW-SPEED FORWARD AND REVERSE MOTIONS WITH ENGINE OFF OR IDLE





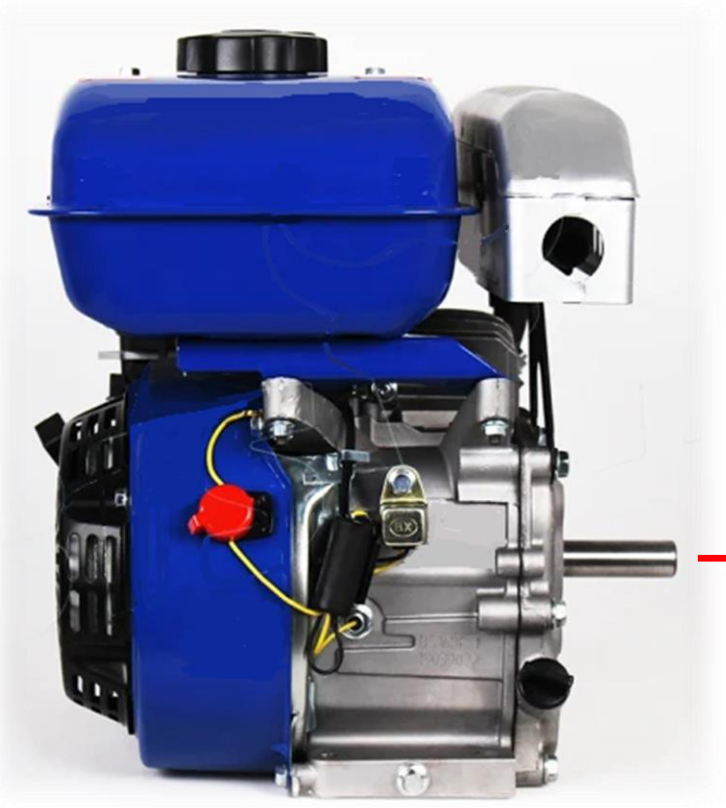


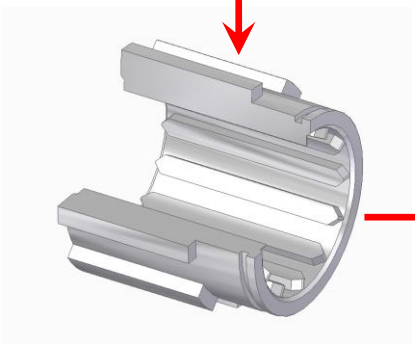
DRIVETRAIN

DISENGAGED

HYBRID DRIVE

HIGH SPEED FORWARD MOTION WITH CLUTCH ENGAGED BY THE ENGINE





DRIVETRAIN

ENGAGED

ROADMAP

2020
- IDEA AND CONCEPT DEVELOPMENT (TRL 1 & 2)
- PROVISIONAL PATENT APPLICATION

2021
- DESIGN AND BUILT OF THE FIRST FUNCTIONAL PROTOTYPE (TRL 3)
- PATENT APPLICATION

2022
- DESIGN AND BUILT OF A SECOND MORE ADAVANCED PROTOTYPE (TRL 4)
- GRANTED US PAT NO. 11,505,054 B2

2023
- CONTROL SYSTEM MODELING AND DEVELOPMENT (TRL 5)
- DESIGN FOR HIGH VOLUME MANUFACTURING

2024
- CONTROL SYSTEM INTEGRATION IN A MINIMUM VIABLE PRODUCT (TRL 6)
- MVP DEMONSTRATION AND FIELD TESTING (TRL 7)