International EV Conference in Macedonia

ELECTRIC VEHICLES
new trends in mobility

Hybrid-electric cars overview

Thursday 27th June 2013

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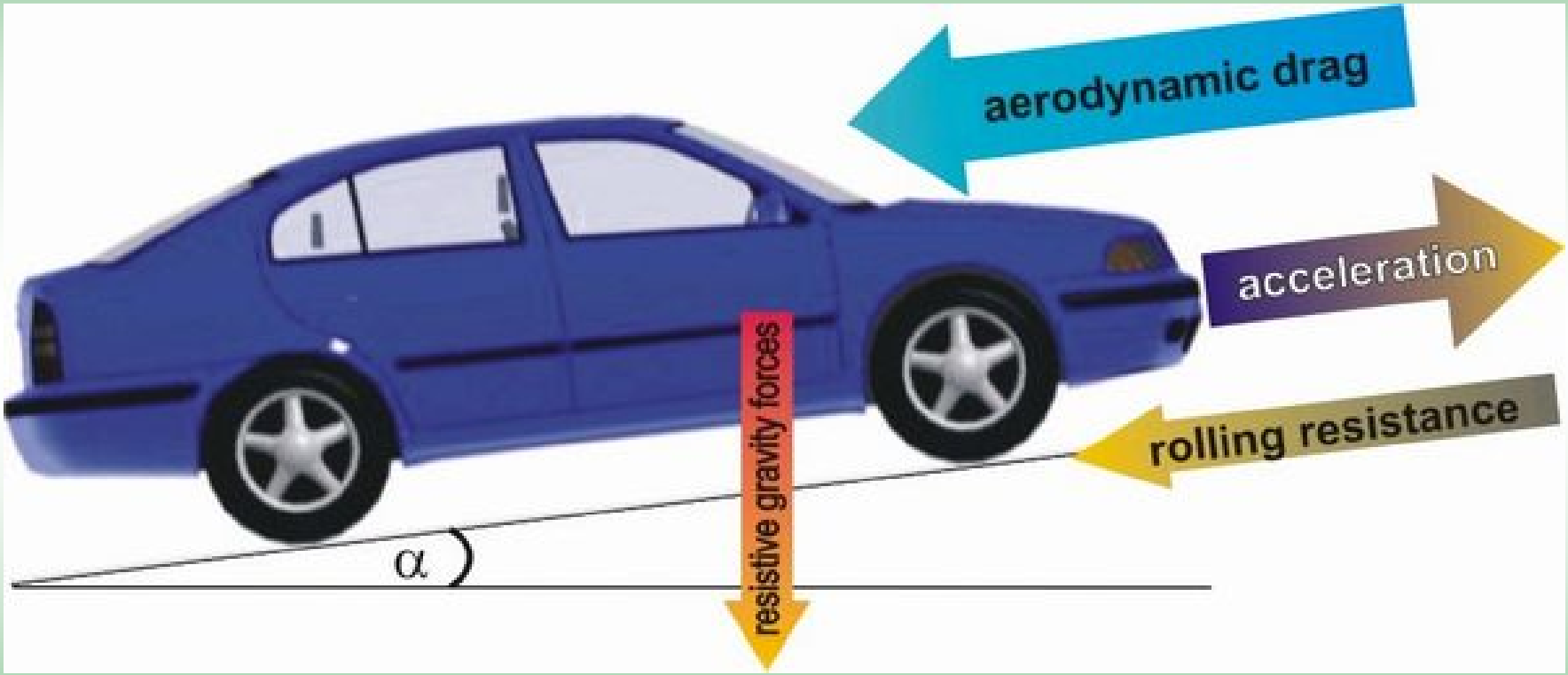
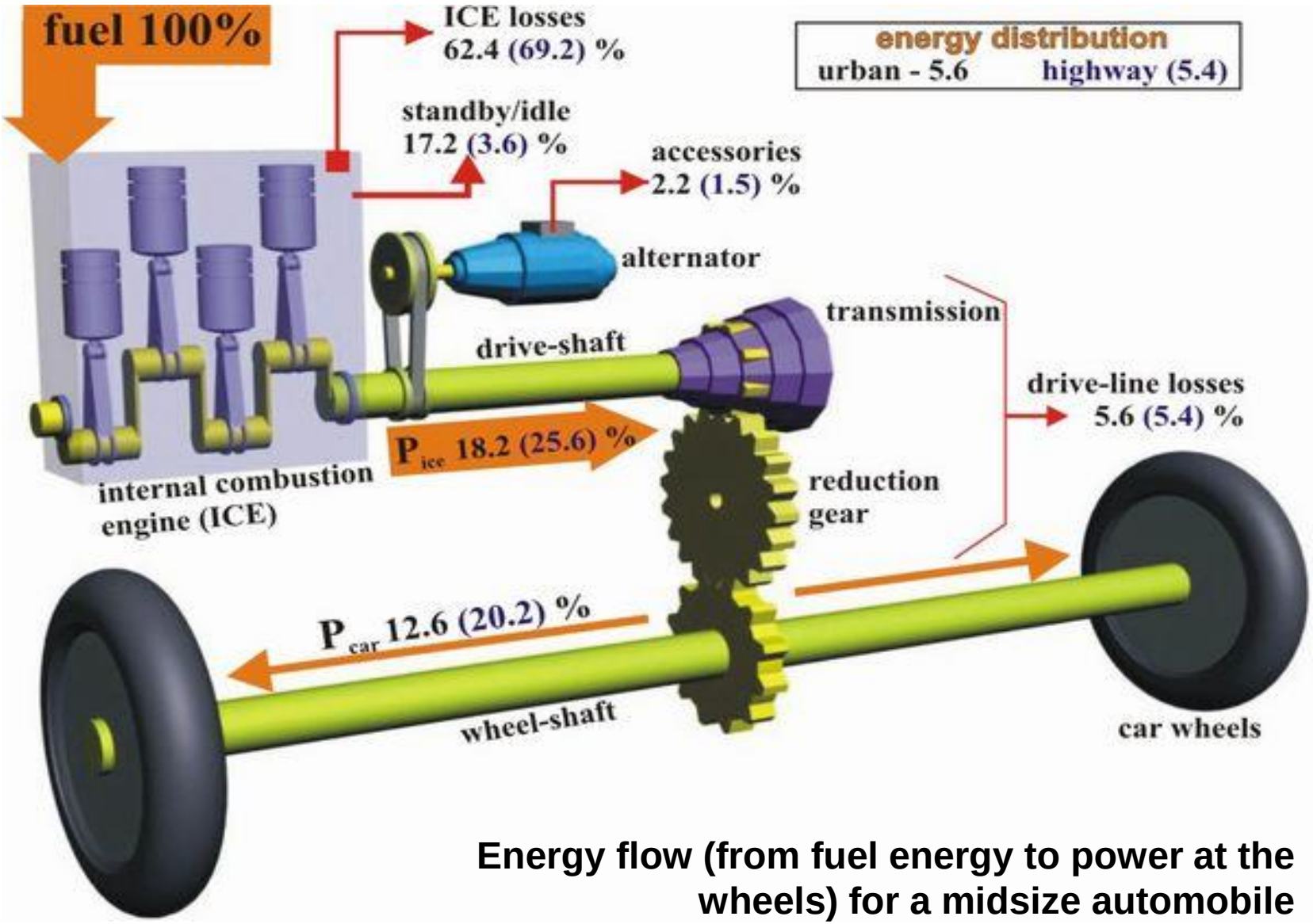
Standard vehicle drive



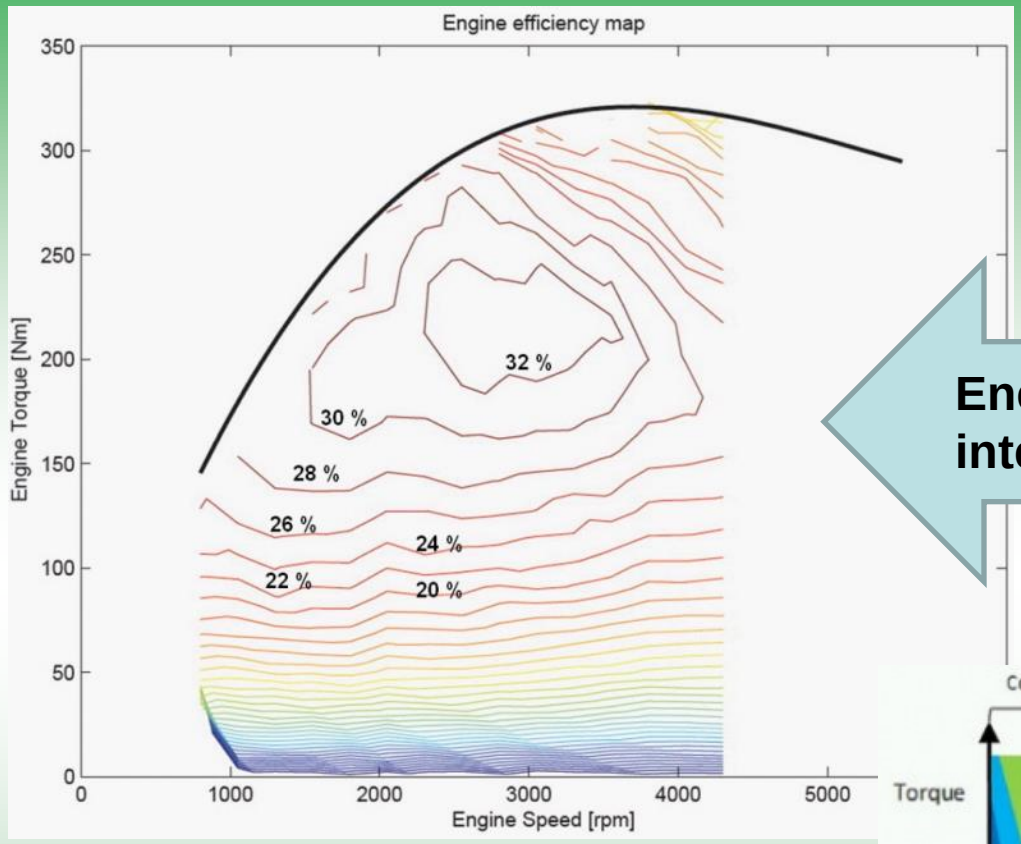
Power demanded phenomenon during the vehicle driving

Standard vehicle drive



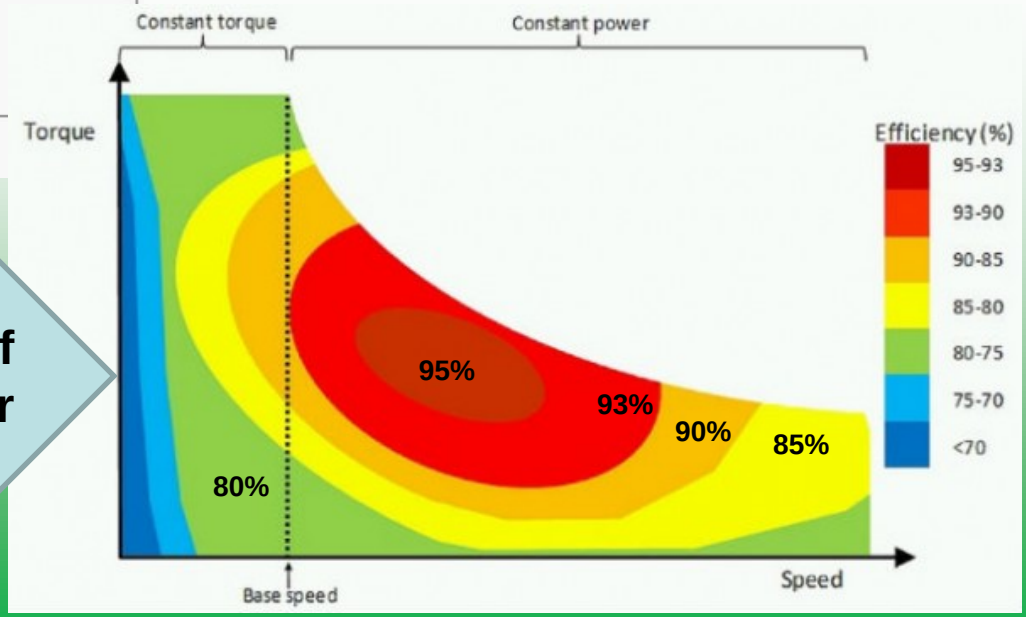
Energy flow (from fuel energy to power at the wheels) for a midsize automobile

Efficiency comparison between ICE and electric traction motor

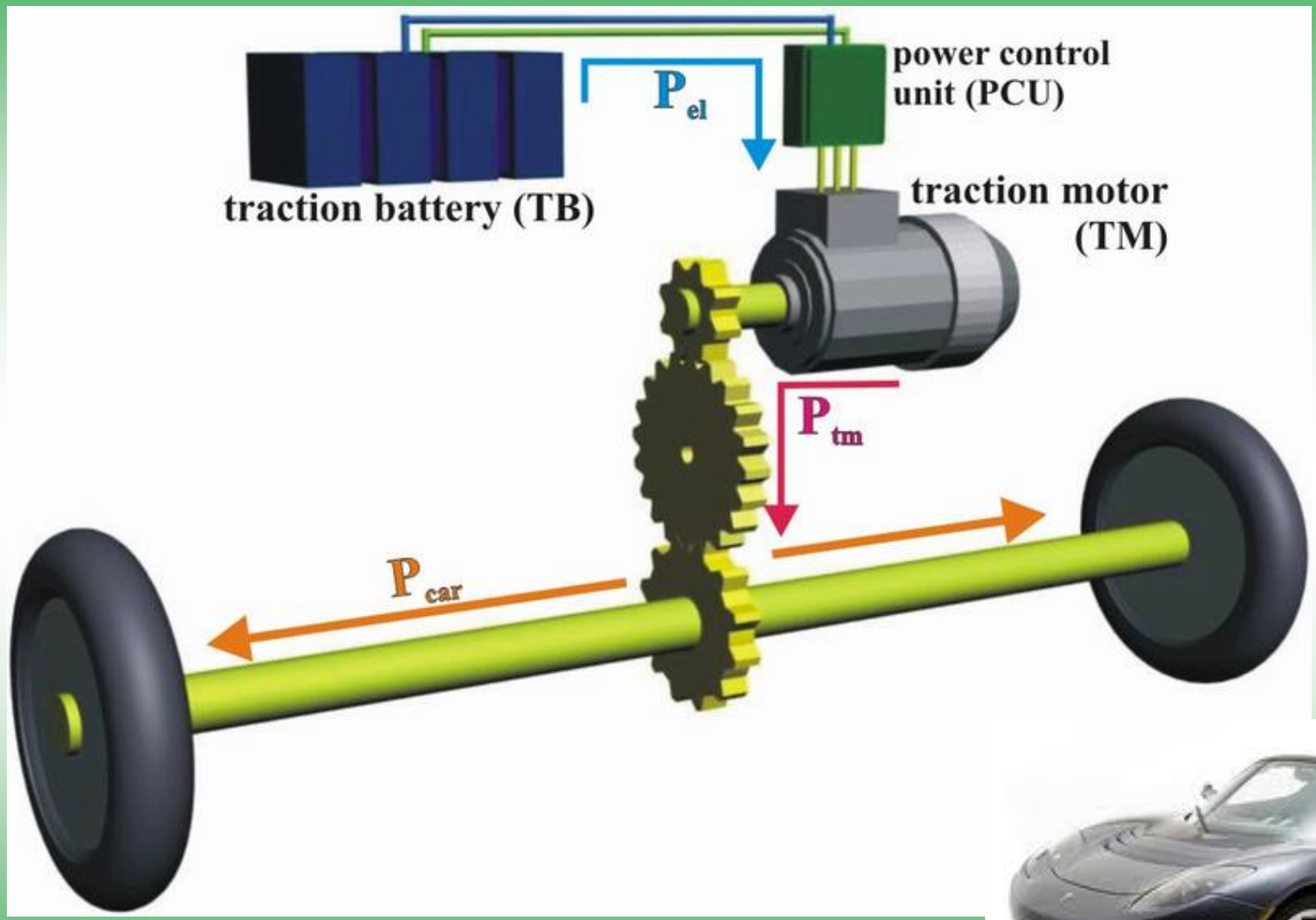


Energy efficiency map of internal combustion engine

Energy efficiency map of electric traction motor



Electrical vehicle drive



Tesla Roadster

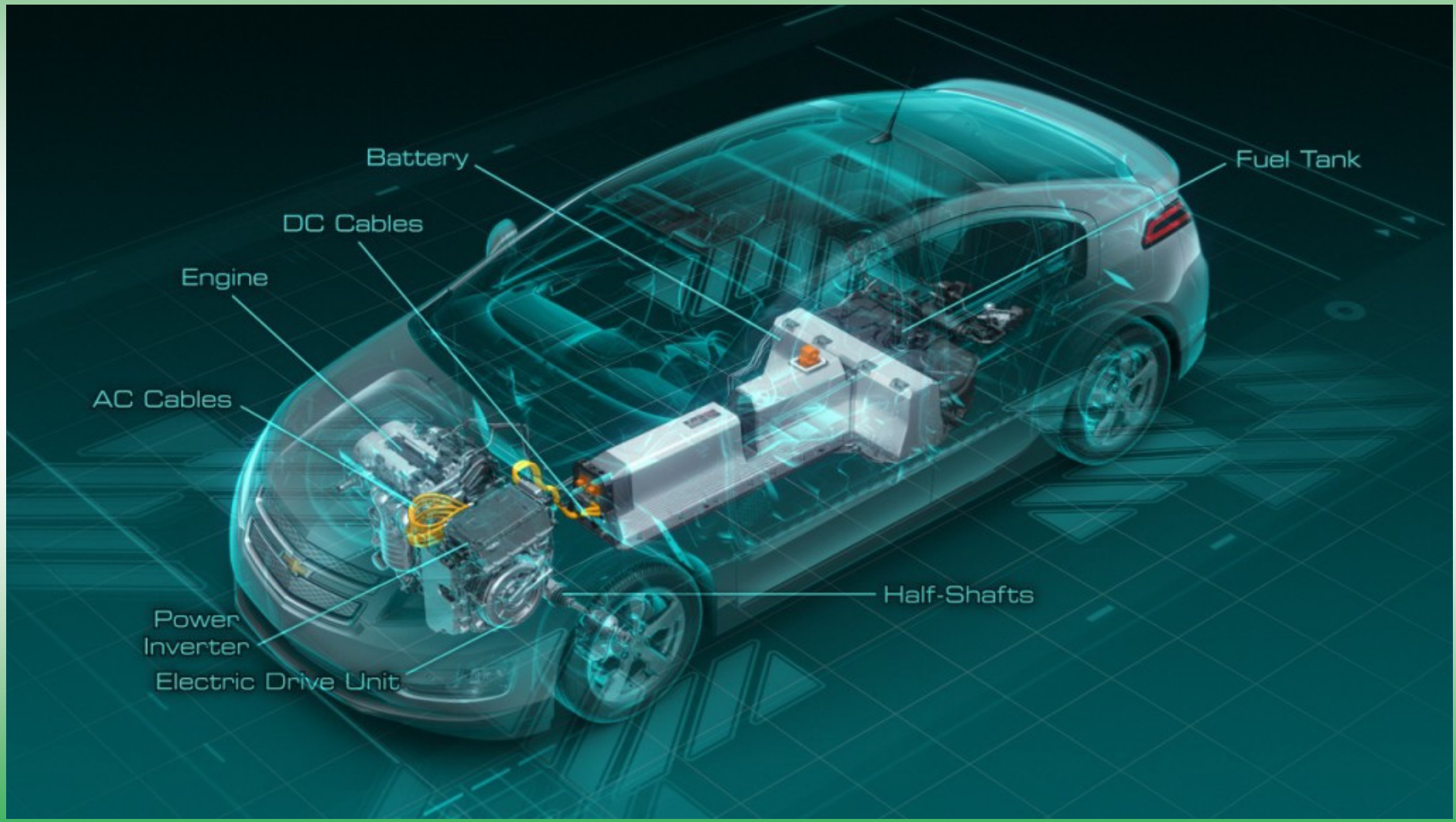
Electric cars types of batteries

Battery type	Specific energy [Wh/kg]	Specific power [W/kg]	Average battery mass for 300 [km] vehicle range with one charge
Lead acid	30-50	150-400	3000
Na-Cd	40-60	80-175	2250
Ni-MH	65-80	200-300	1385
Li-ion	90-120	300	1000
Li-polymer	140-160	300	600
Zn-Air	100-220	100	450

Li-ion

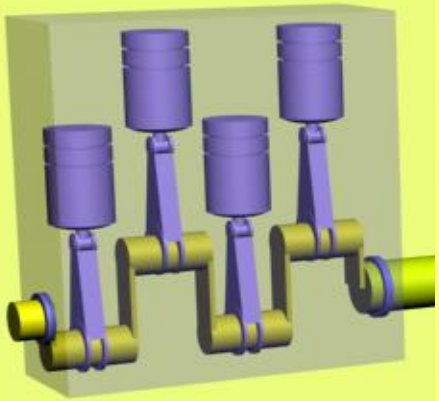
Ni-MH

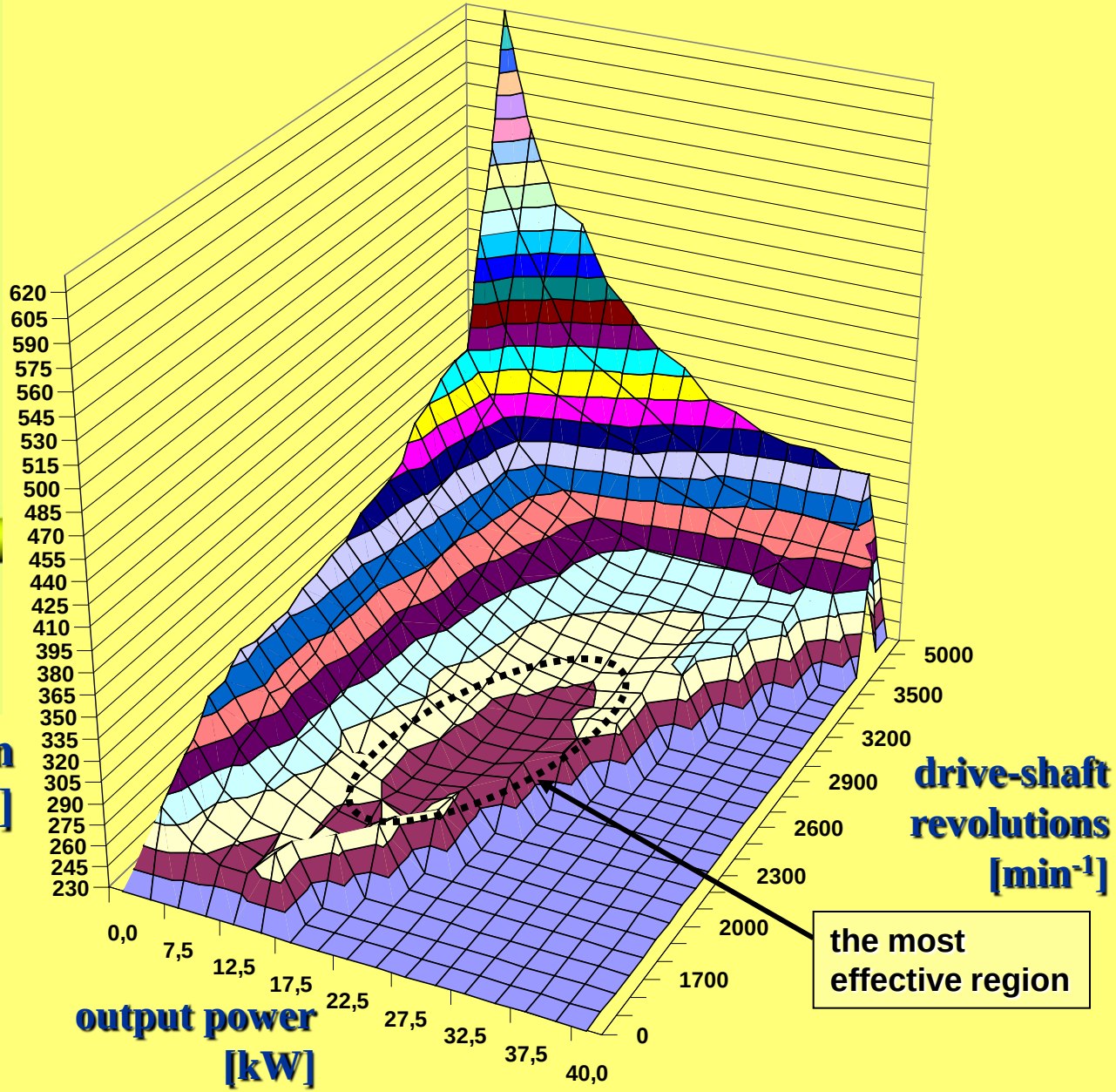
Electric vehicle structural concept



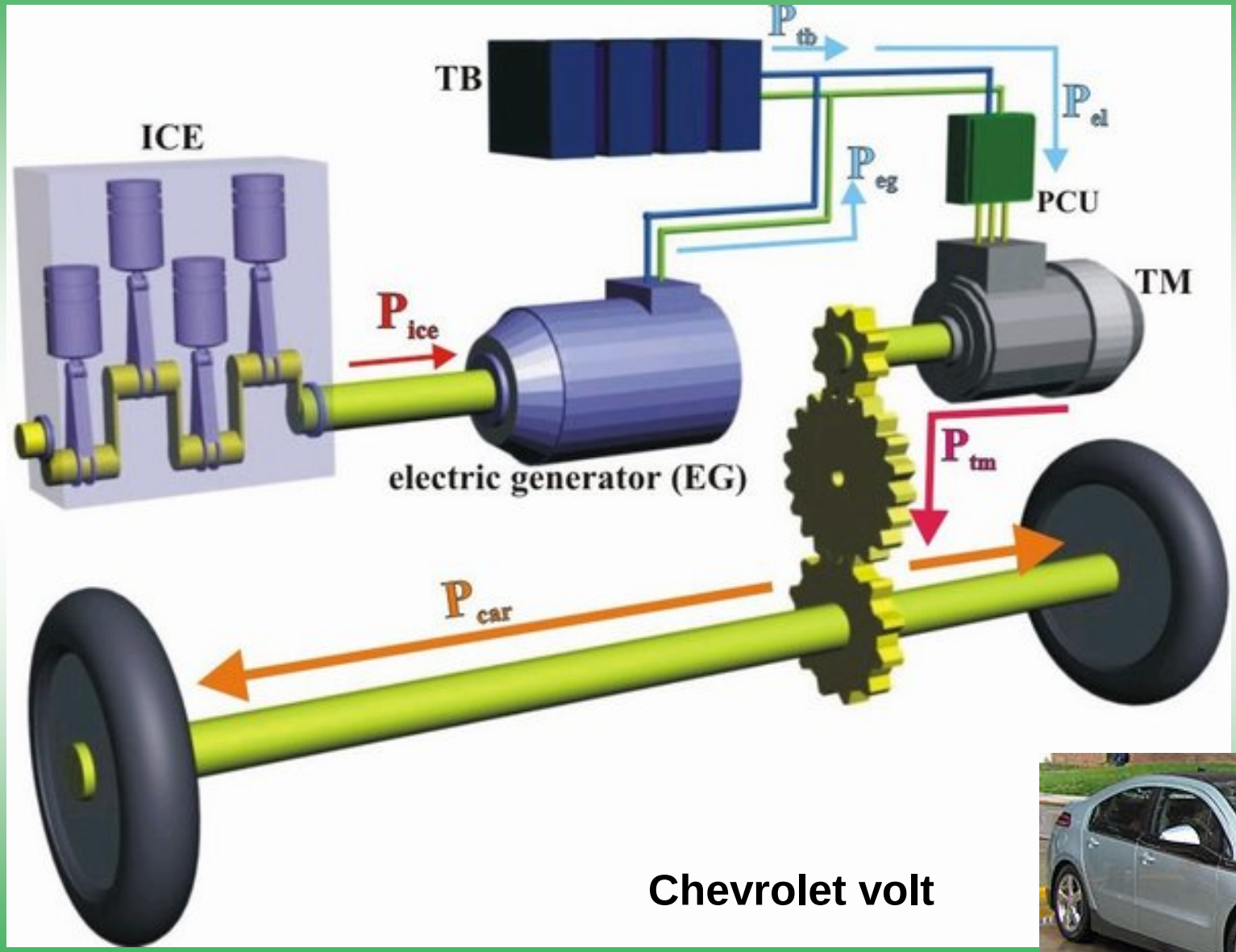
Engine map of the fuel efficiency of ICE

Skoda Fabia
1200 [cm³] engine



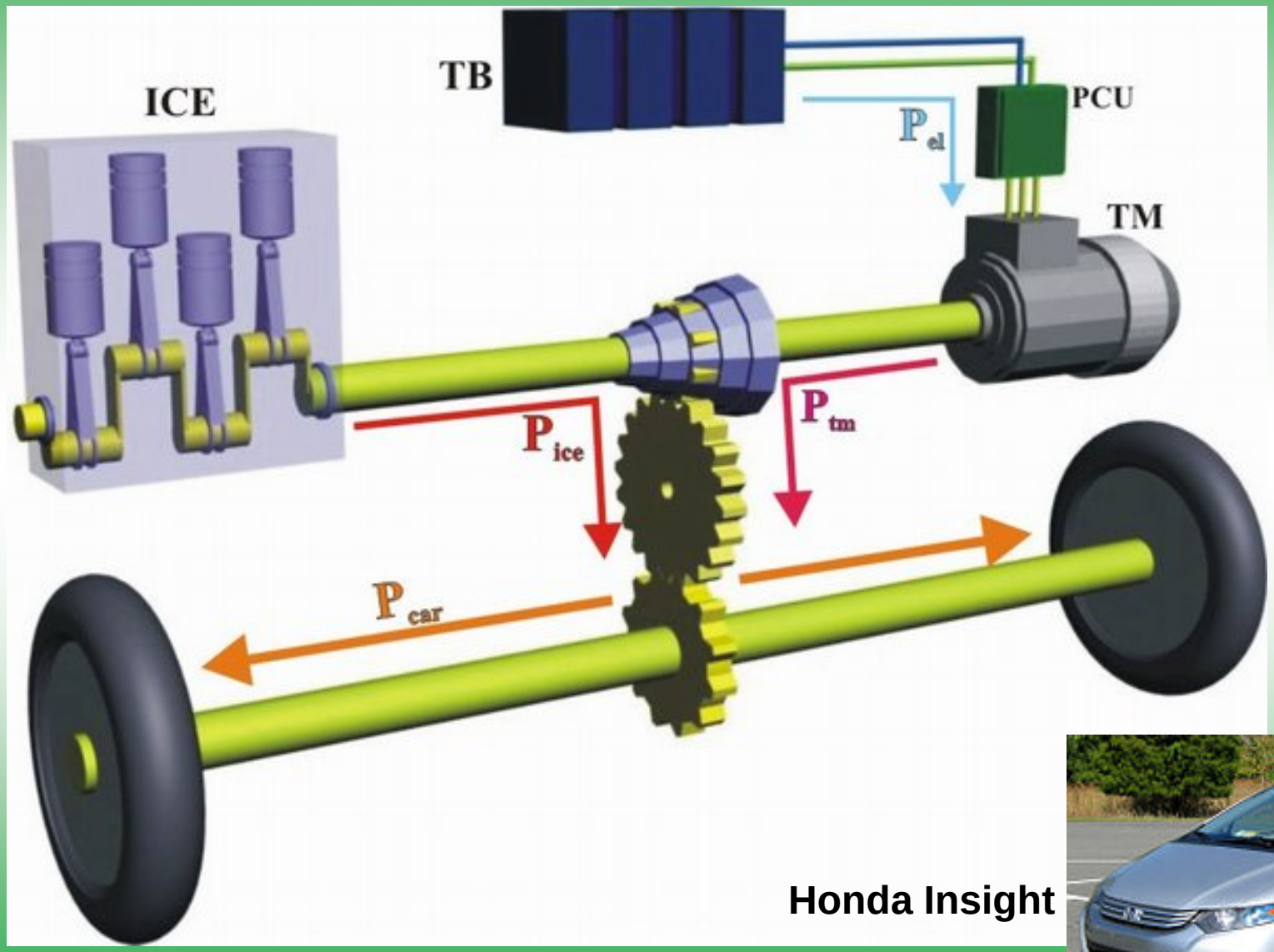


Serial configuration of hybrid-electric drive



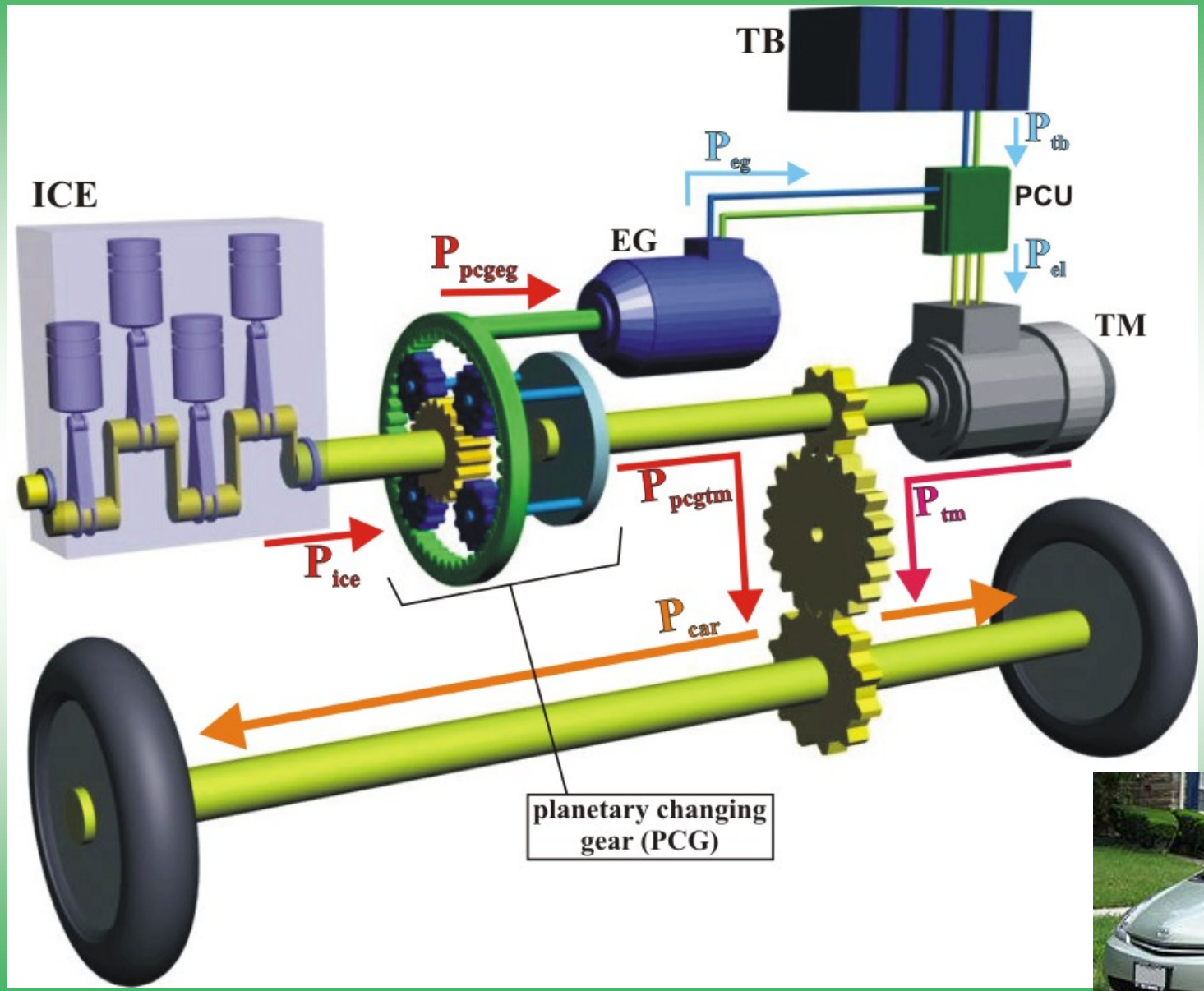
Chevrolet volt

Parallel configuration of hybrid-electric drive



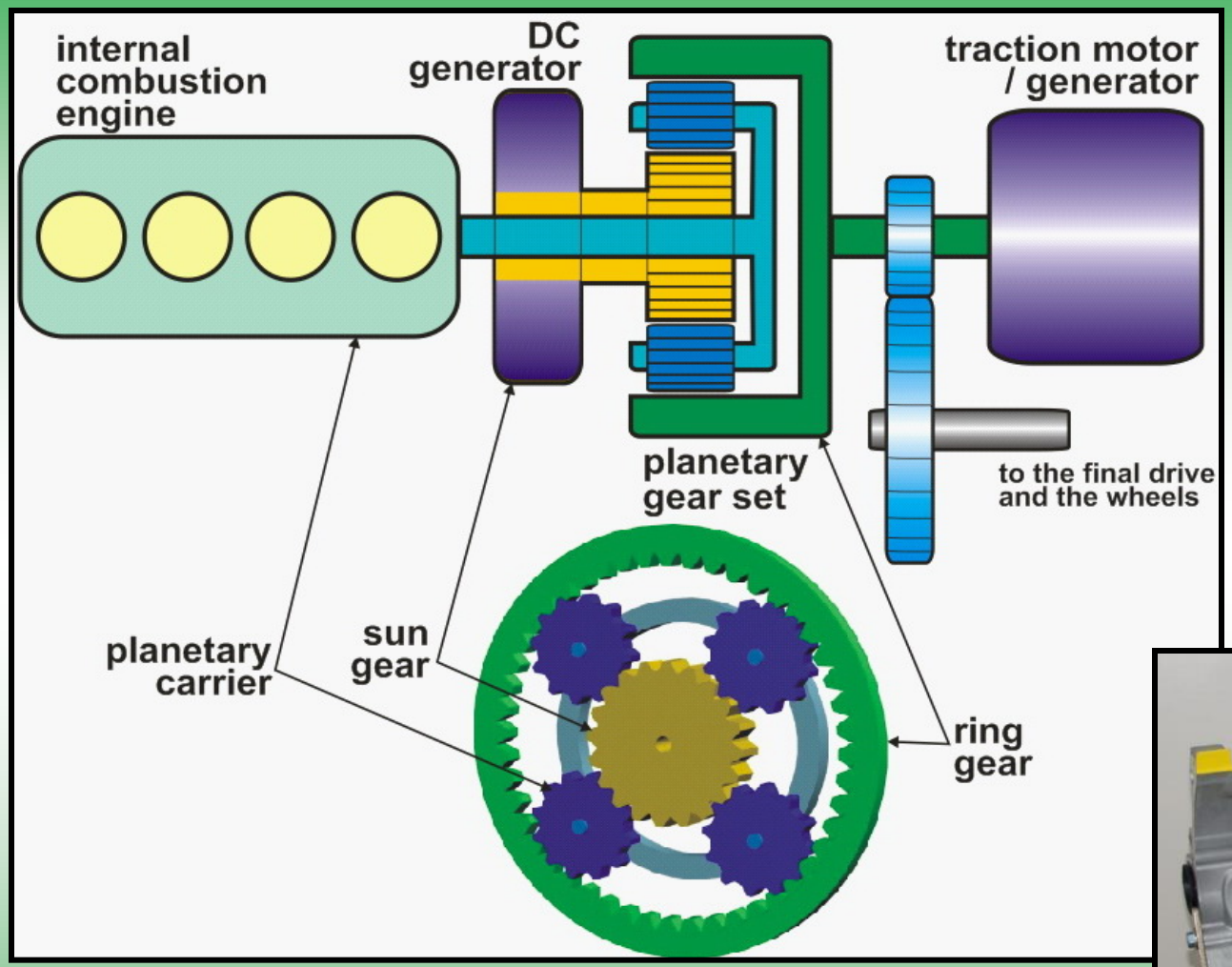
Honda Insight

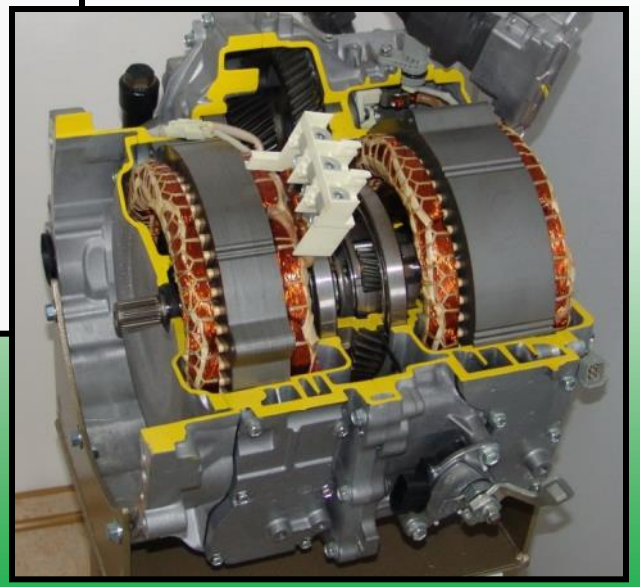
Combined (parallel/serial) hybrid-electric drive



Toyota Prius

Toyota Hybrid Synergy Drive (THS drive)

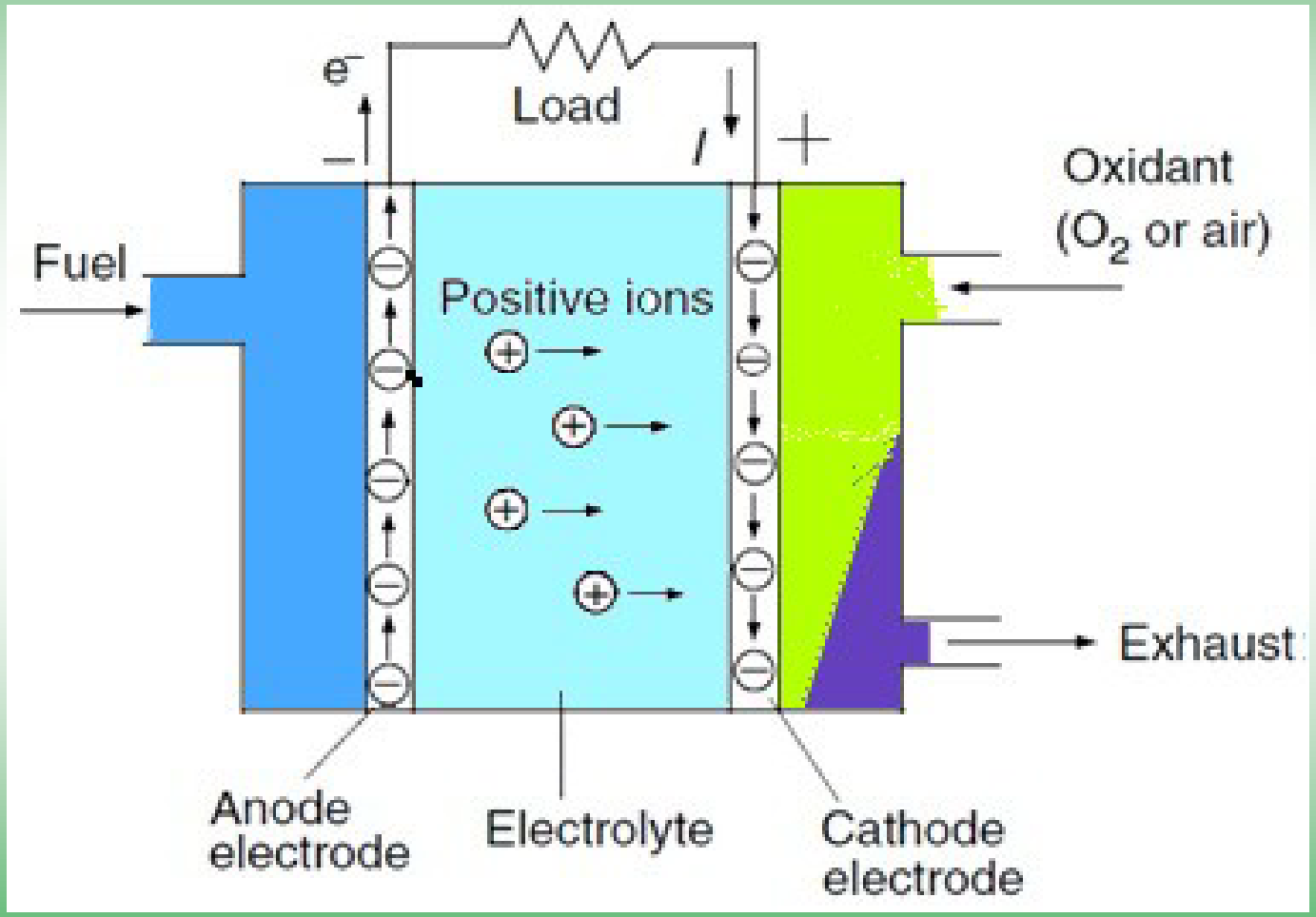




PM generator +
planetary changing gear +
Traction motor(generator)

Fuel cell technology

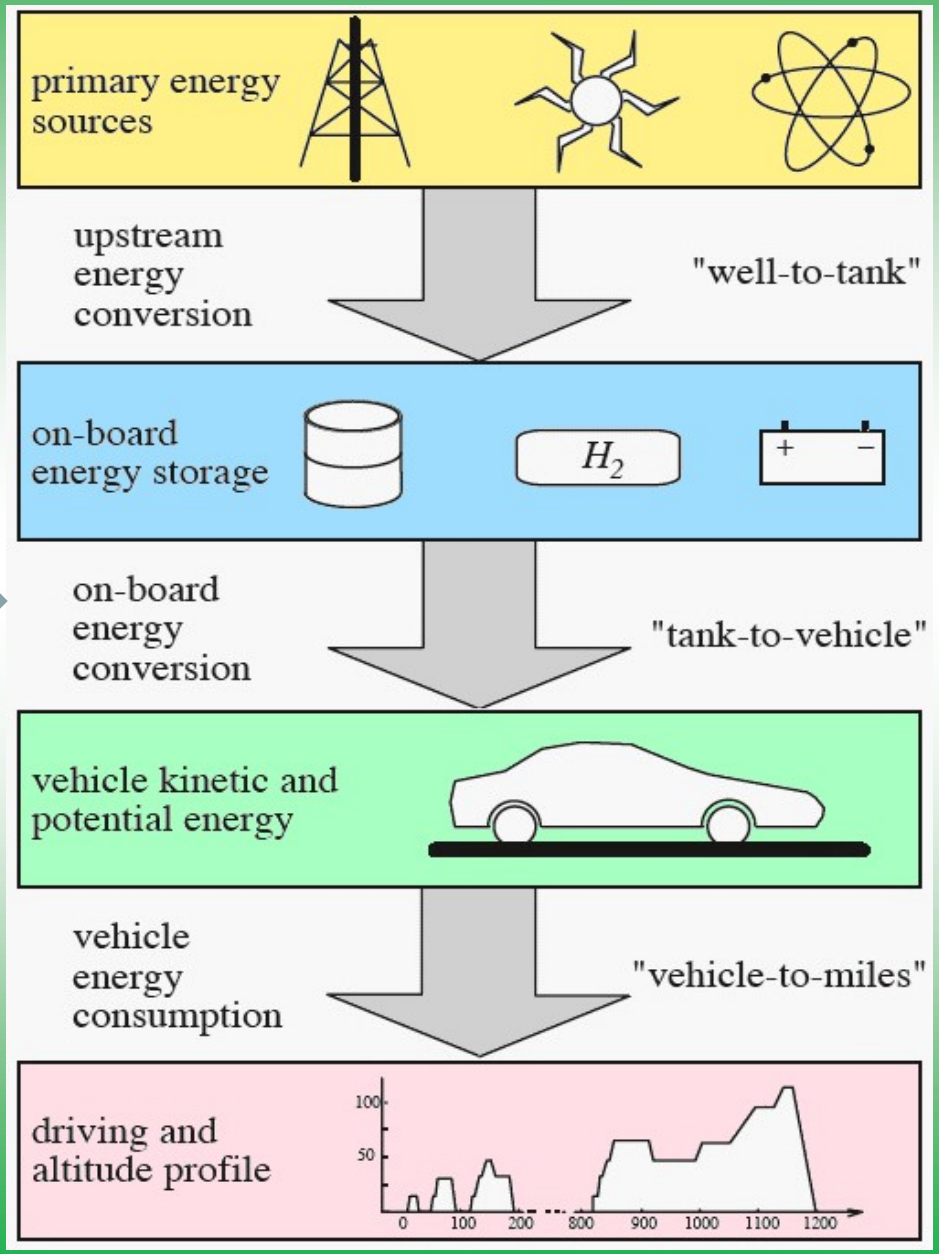
H_2



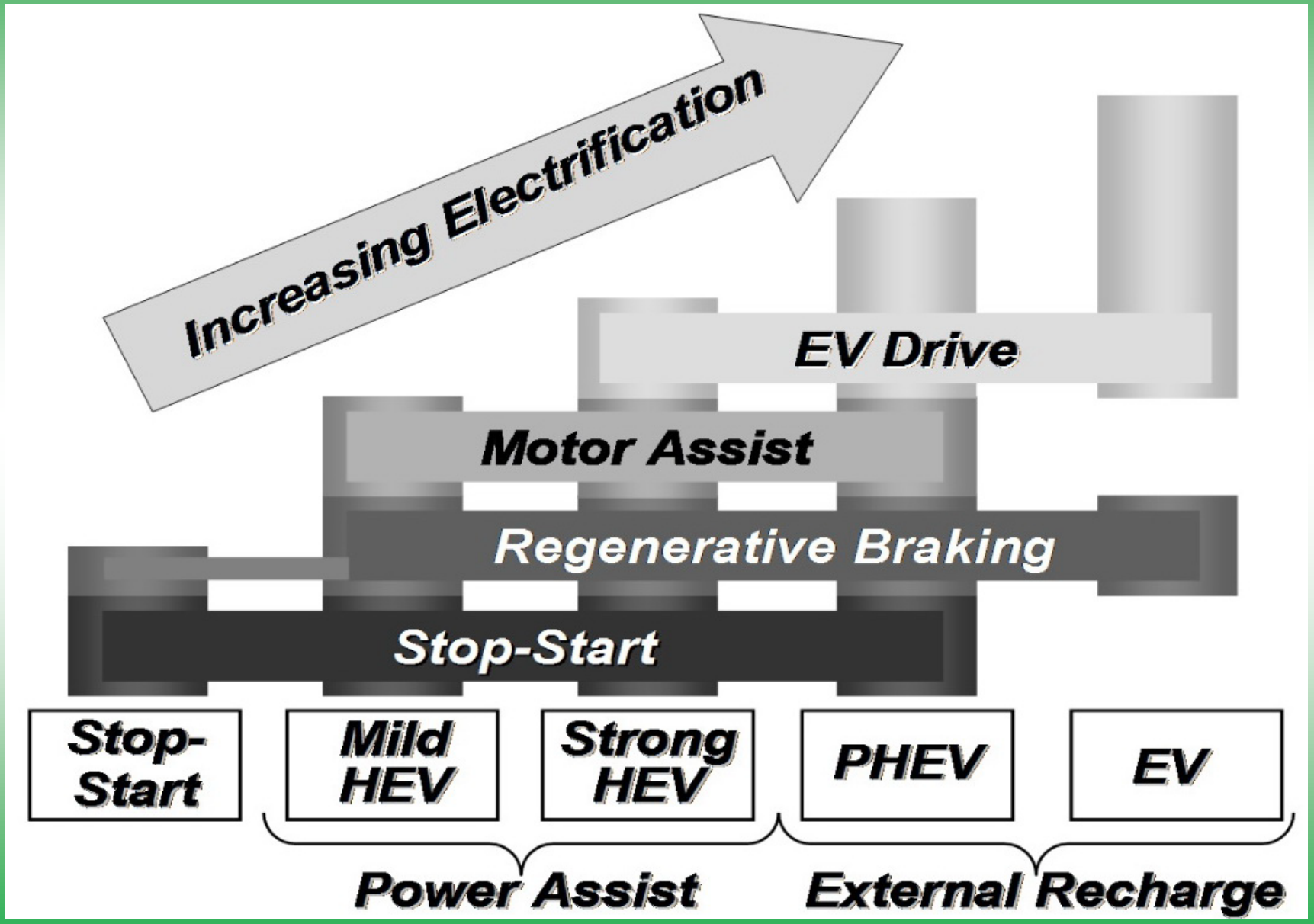
Fuel cell system of operation

Electric propulsion source energy conversion

Stages of energy conversions



HEV and EV classification



EV and ICE comparison