Changes In The Automotive Market: Covid-19 and the New Electrification Technologies

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Some Material from Lyberopoulos Dimitris' (Thesis underway) "Mapping of the Greek Automotive Market"

ΕΒΕΟ ΕΜΠ
ΕΡΓΑΣΤΗΡΙΟ ΒΙΟΜΗΧΑΝΙΚΗΣ & ΕΝΕΡΓΕΙΑΚΗΣ ΟΙΚΟΝΟΜΙΑΣ
Εθνικό Μετσόβιο Πολυτεχνείο

-"What "Changes" are you referring to? Of course markets change all the time!"

Quite Right!

But, there are two -kind of- important reasons that make monitoring the demand, sales and general trends of the automotive industry a more pressing matter these days.

First one: Climate

Since carbon emissions from vehicles have been positively linked to the raising of the average global temperature, there are strong incentives to move automotives from burning of fossil fuels to using battery cells.

However, even if that wasn't the case, cities would still suffer from hyper-topical concentration of nitrous oxides, organic vapours, carbon monoxide and other hazardous pollutants.

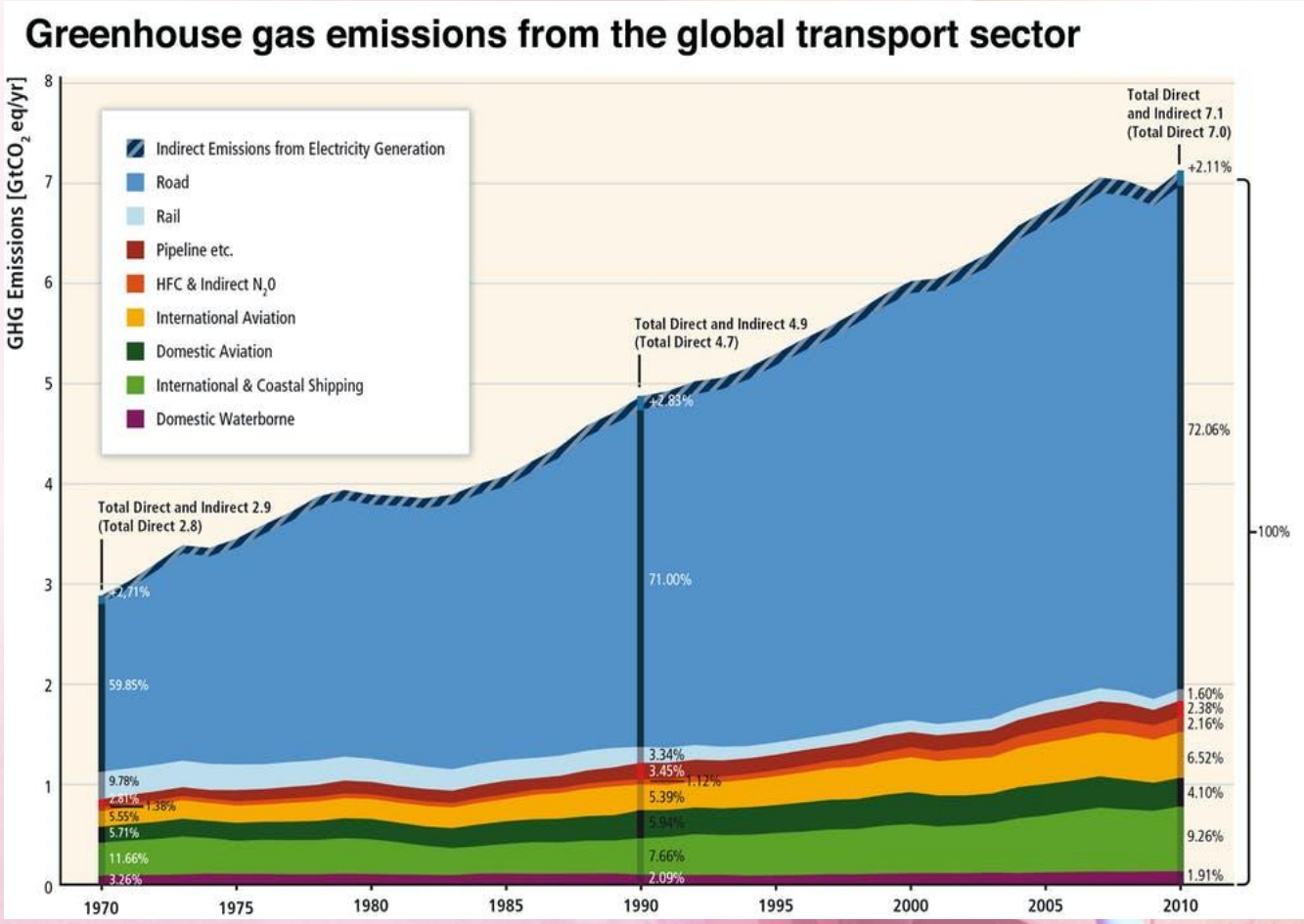
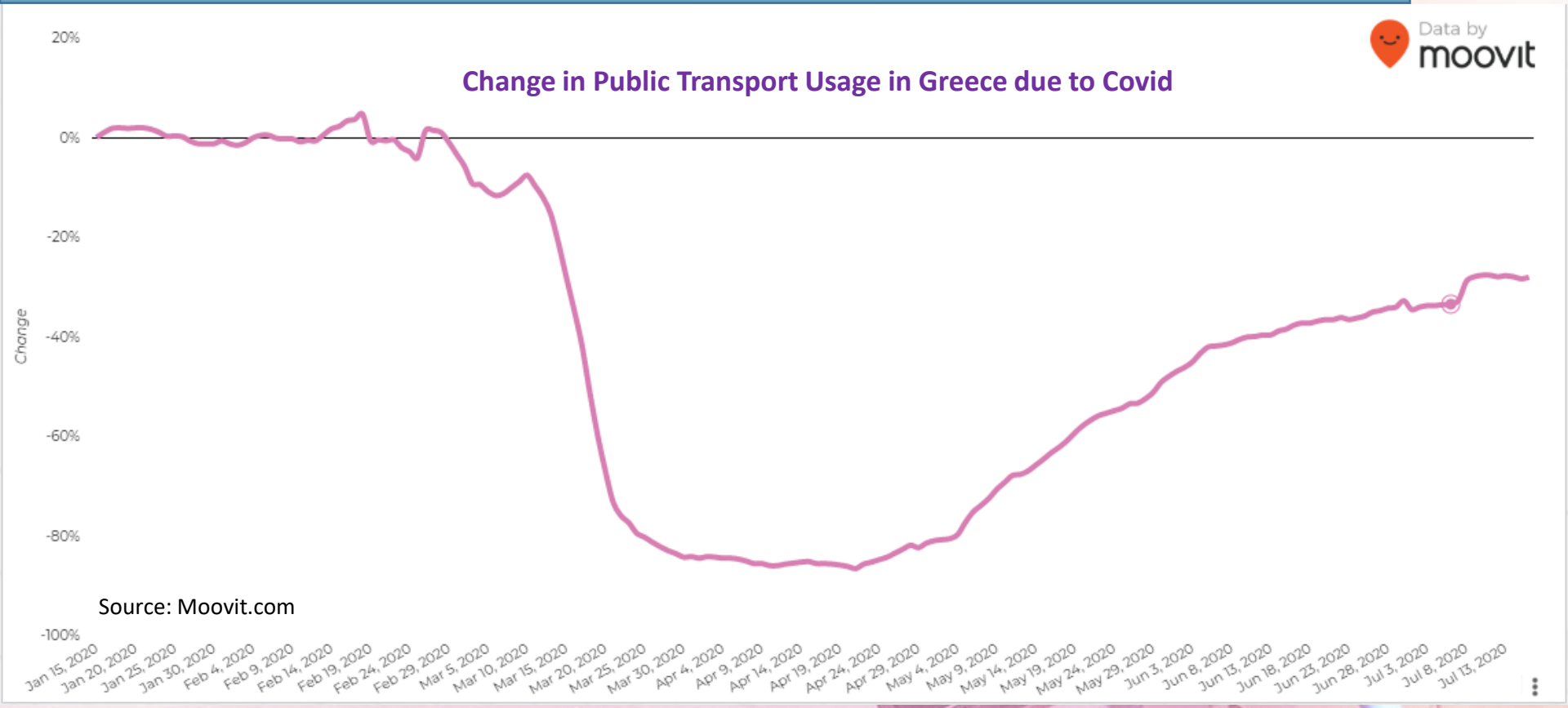


Figure 8, chapter 8 in Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

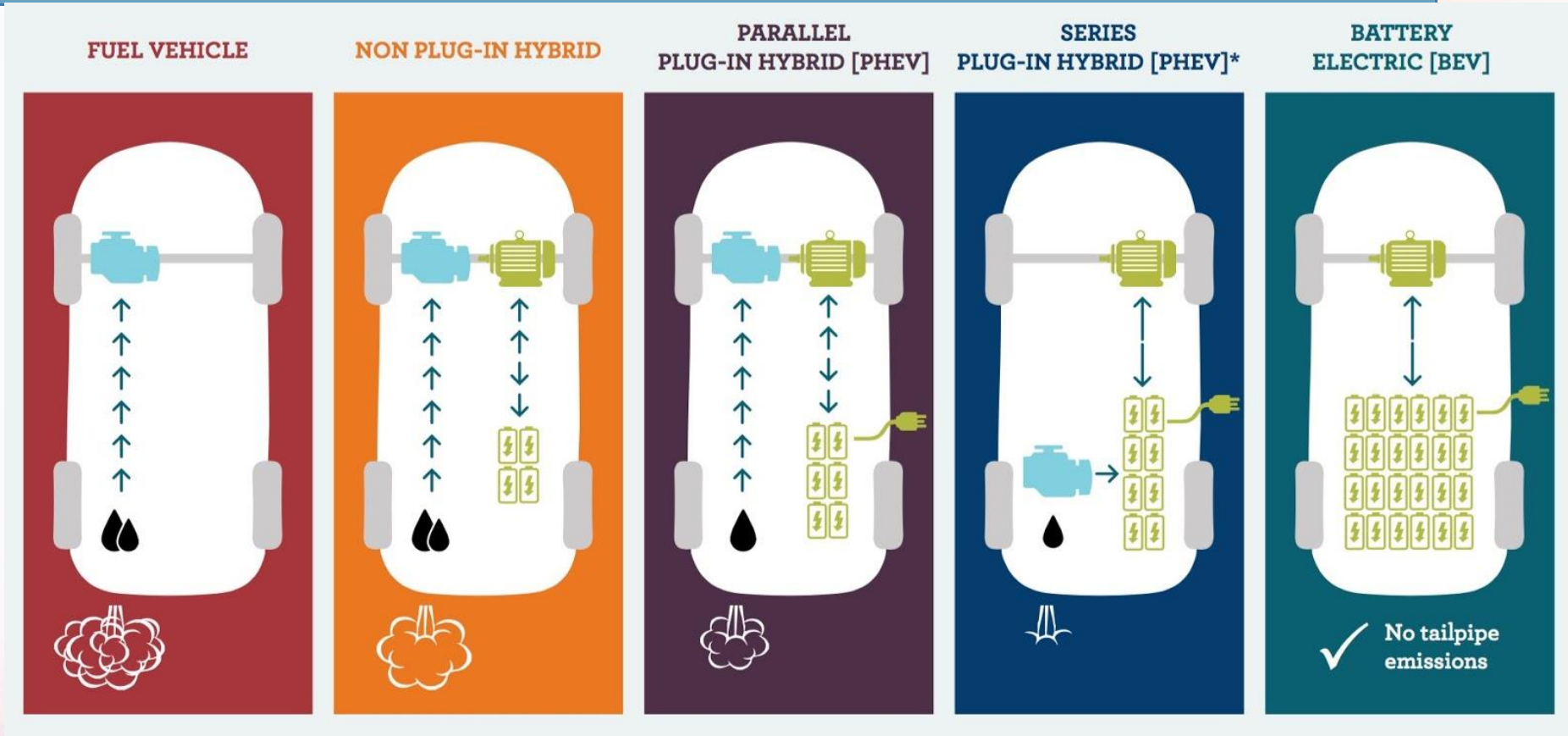
Second: The Covid-19 Pandemic



Source: Moovit.com

- Lockdowns and enforced restrictictions on mobility have drastically decreased the average passenger-kilometers in virtually all countries of the world.
- More importantly, when lockdowns are eventually lifted, public transports are expected to carry a far lower volume of PKMs.
- Therefore, the demand for the alternative –and safer- personal vehicles is again expected to rise.

Confusion about electromobility types



It doesn't help that there are quite a few different ways of implementing electromobility in passenger cars, and not all of them are similar.

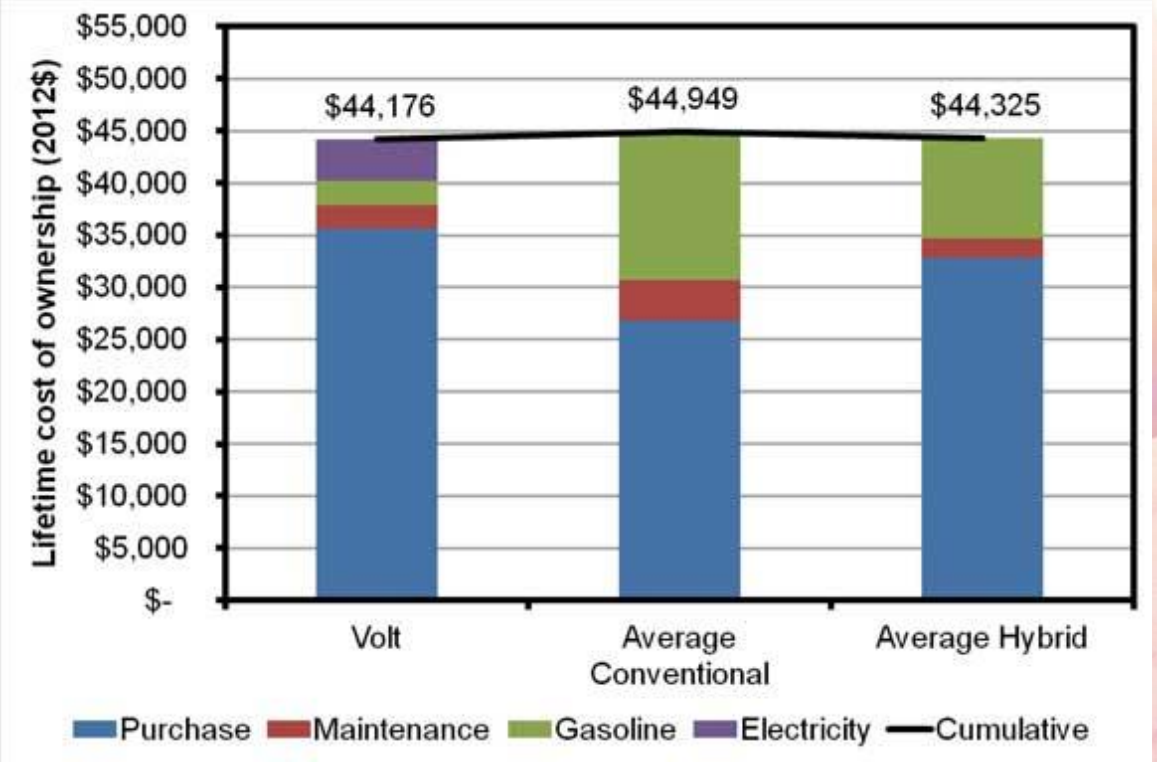
- Hybrids: They have a traditional ICE, but some of the energy is recovered and stored in batteries, which then assist a small electric motor/mild- Hybrids (mHEVs) Hybrids, just with smaller batteries and motors.
- Plug-in Hybrids : Same, but with the ability to charge the battery from a wall AC outlet, increasing range and cutting emissions
- Purely-electric-vehicles (pEVs): Lack ICEs altogether. Charge from grid, then along the way.

EVs or Hybrids?

While they are a relatively old technology, hybrids vehicles have consistently failed to capture an adequate marketshare. Reasons typically include:

- High cost of purchase
- Limited savings on fuel
- Limited savings from road taxing
- Low residual values due to battery deterioration
- Low adoption due to several eccentric design ideas

Pure EVs can negate *some* of these issues.



The uncertainty of pursuing a greener market for mobility

When proceeding to phase out ICEs, the paths ahead are many and the questions hard to answer. For example,

- What engines and drivetrains are we going to have to implement in their place? (purely electric? Hybrids? Plug-ins?)
- How much more is each type expected to cost to the consumer, and subsequently, should the state step in to help?
- How ready is the current market for an adequate substitution of ICEs?
- Since most of our energy is produced by non-renewable sources, are greener vehicles actually more green, or do they shift the carbon load somewhere else?

Studying these questions and providing useful research and policy guidelines for a greener future is essential

Currently, we have been focusing on three main topics:

1. **Mapping** the current state of the demand in terms of volume and types of cars sold, going back at least 15 years
2. Evaluating the **environmental impact** –in terms of tonnes fuel and CO2- resulting from different EV penetration scenarios
3. Constructing an **impactful proposition** of incentives and counter-incentives for the replacement of aging ICEs

So, to sum up…

- We already know that we will have to **eventually** phase out internal combustion engines from cars in favour of some kind of electric motor,
- …that battery costs –and consequently, pure EVs cost, have come down significantly, with more models and mainstream options, government grants and charging stations,
- …that interest in “bridge-technologies” (CNG, LPG, mHEVs,
- H-cell) has been declining
- …and that cars will continue to be a **valuable, high demand asset** for the transition to the post-covid mobility era.

*So, **why not plan a gradual transition to electromoblity now?***

Resulting Registration Database

- Was built in-house, from publicly available but scattered data sources
- Contains records for the last 15 years about
  - Volumes sold per year
  - Brand, model and segment
  - Average fuel consumption per 100km per model variant
  - Average CO2 emissions per 100km per model variant

Aim: to map the current state of the market and quantify demand

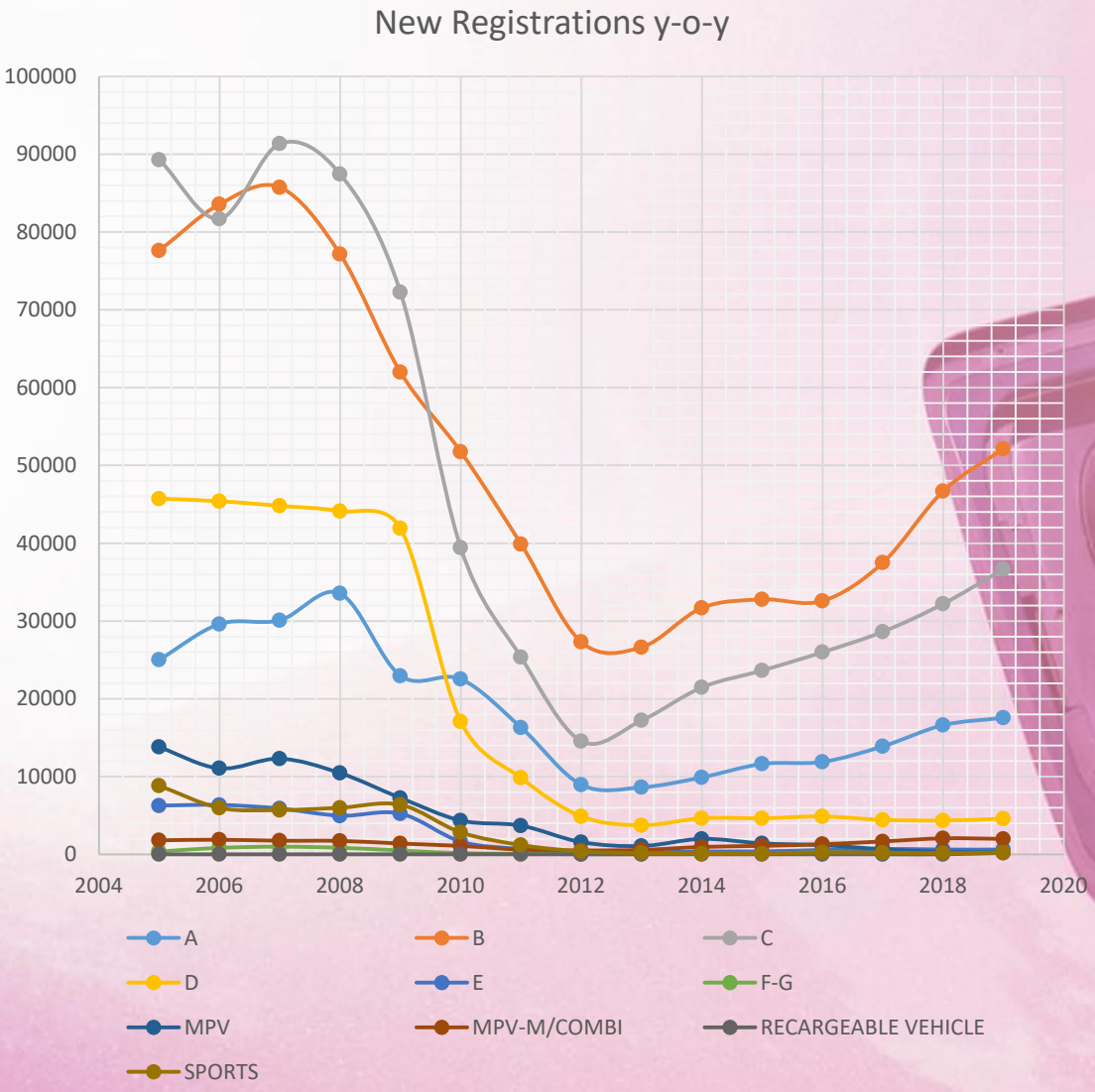
Future expansion: Web data scrapping details about cargo capabilities, weight etc.

What drives demand for automobiles in Greece?

- General economic welfare (in terms of GDP per capita) [r=0.809, p<0.1%]
- Average wages and salaries [r=0.749, p<0.1%]
- Fuel average prices [r=-0.940, p<0.1%]

Segment	Avg Min. Price	Avg of Max. Price	Weight Factor m/M	Weighted Price
A	€ 12,917.63	€ 17,353.95	0.2	**€ 13,804.89**
B	€ 16,346.00	€ 25,677.82	0.31	**€ 19,238.86**
C	€ 22,839.83	€ 40,062.34	0.35	**€ 28,867.71**
D	€ 47,753.60	€ 78,959.20	0.41	**€ 60,547.90**
E	€ 64,476.08	€ 119,481.25	0.45	**€ 89,228.40**
F	€ 108,863.14	€ 177,632.92	0.42	**€ 137,746.45**
M	€ 25,948.73	€ 34,342.66	0.25	**€ 28,047.21**
R	€ 69,631.63	€ 96,746.63	0.25	**€ 76,410.38**
S	€ 80,221.44	€ 121,006.71	0.48	**€ 99,798.37**

Which segments should EVs target?



- Crisis of 2008 causes new car registrations to plummet
- Recovery comes gradually from 2012 onwards
- Demand for the traditional "family" cars (D segment) has evaporated
- The three smallest –and **cheaper-** segments represent most of the market, with the trend expected to continue

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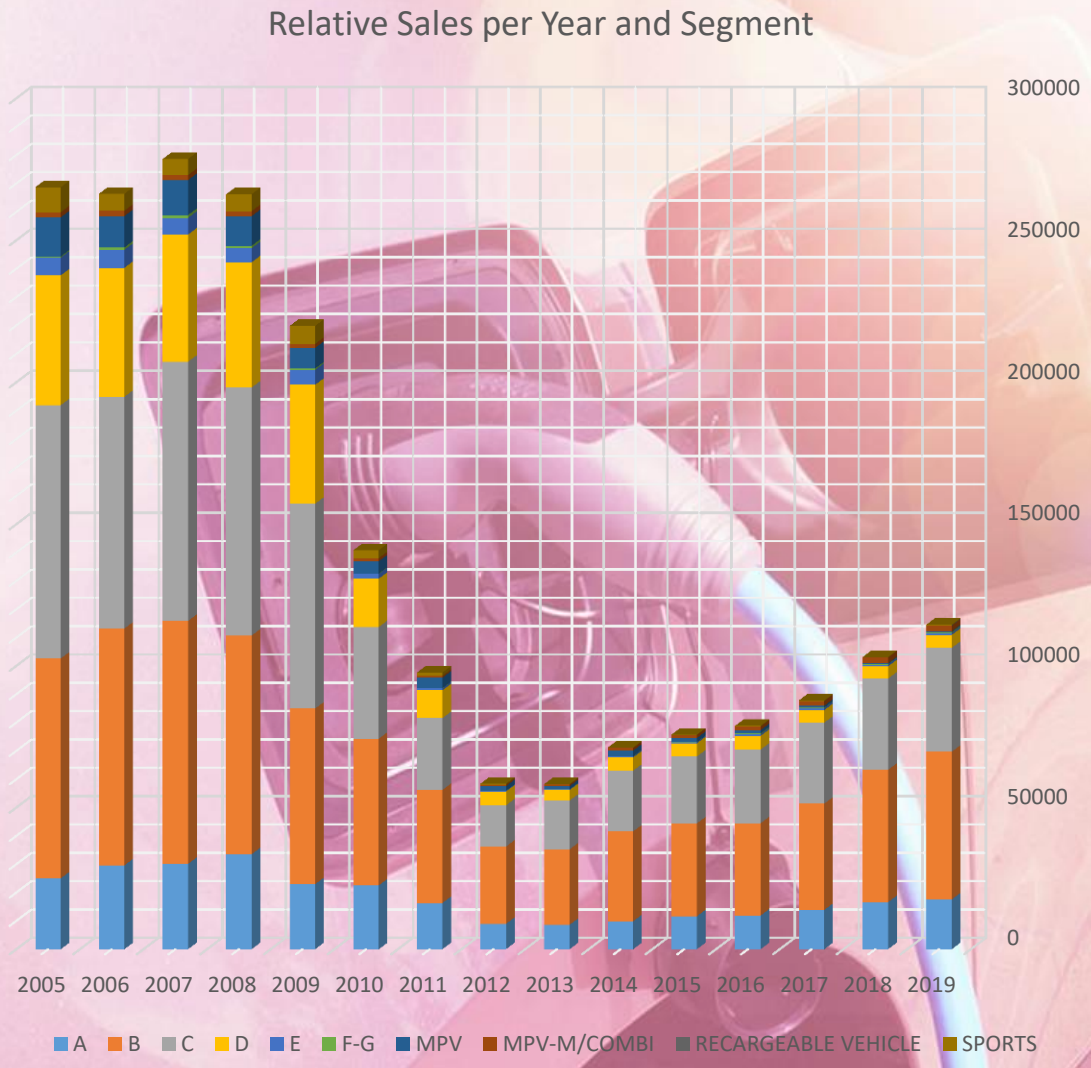
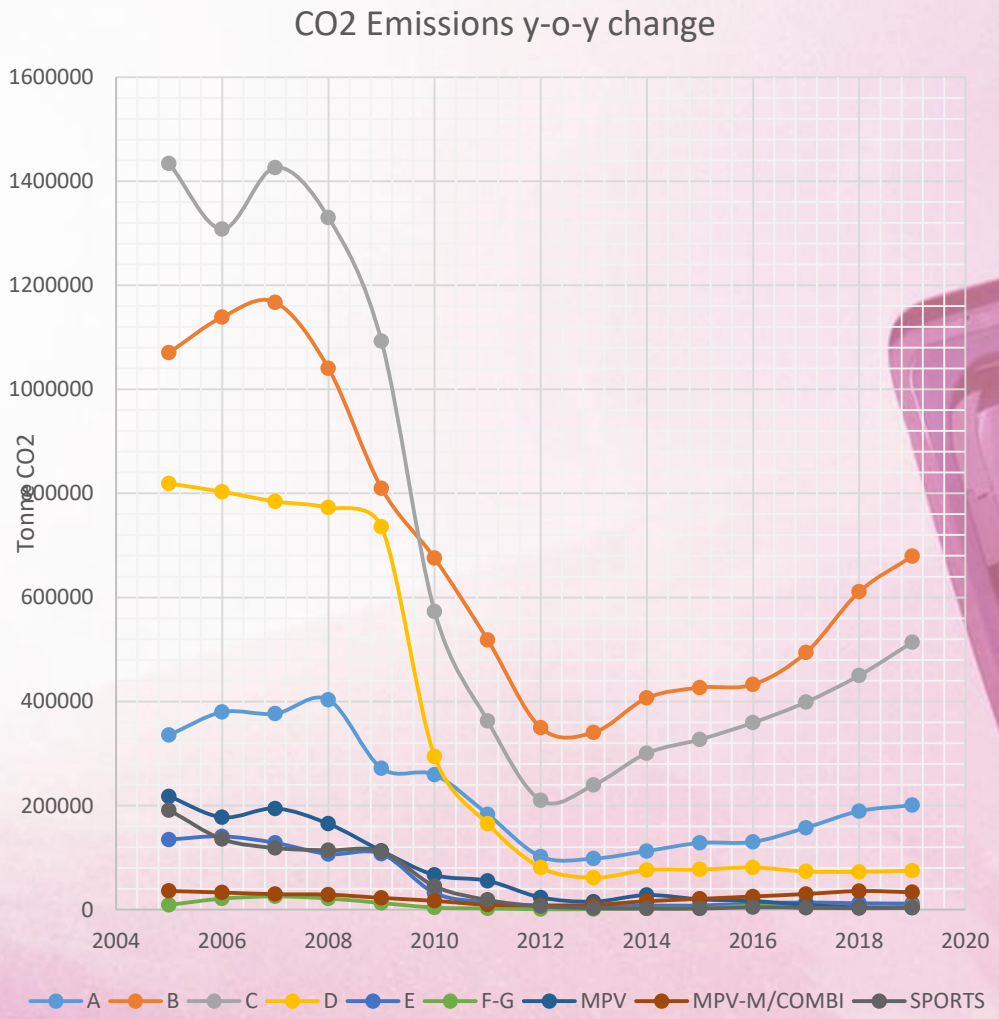


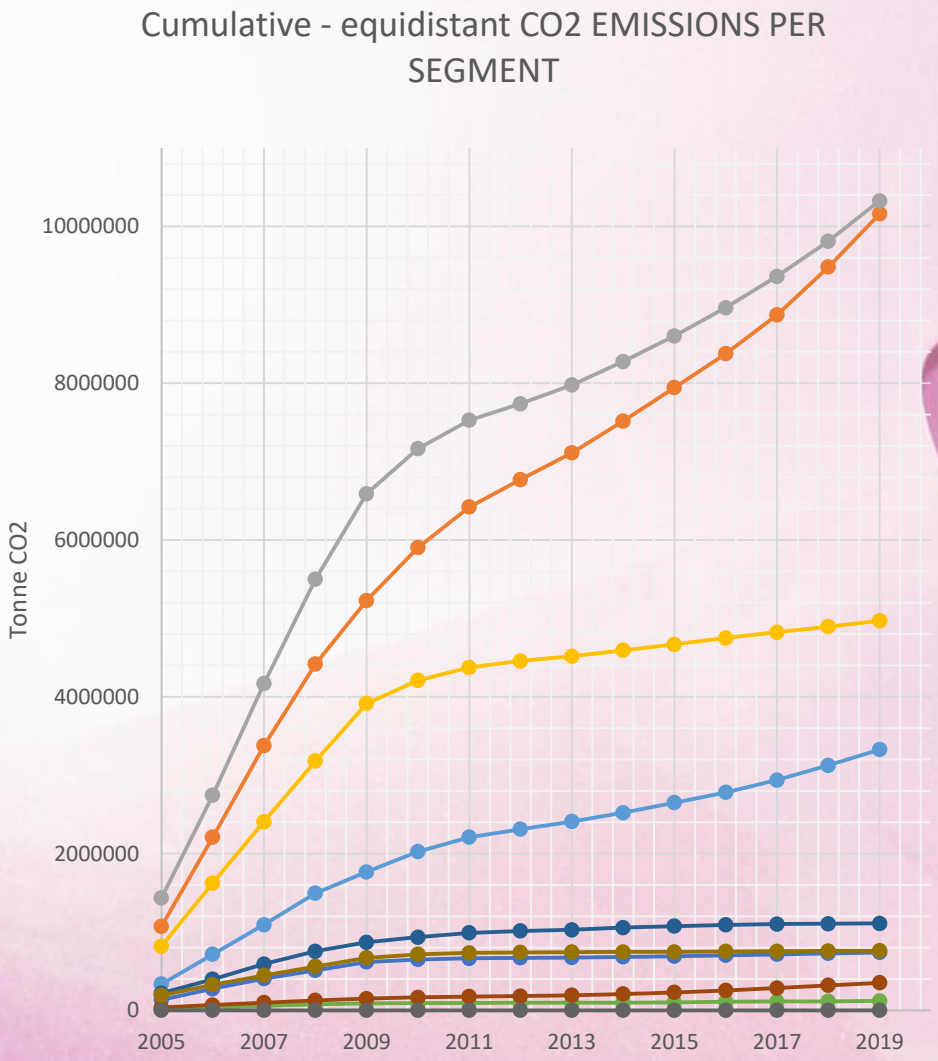
How do emissions change?



- Emissions due to new vehicles fall sharply, following the decline in numbers

BUT…

How do emissions change?



…cumulative emissions due to existing aged fleet slow down –at best- for some segments, and continue to increase for the most popular ones

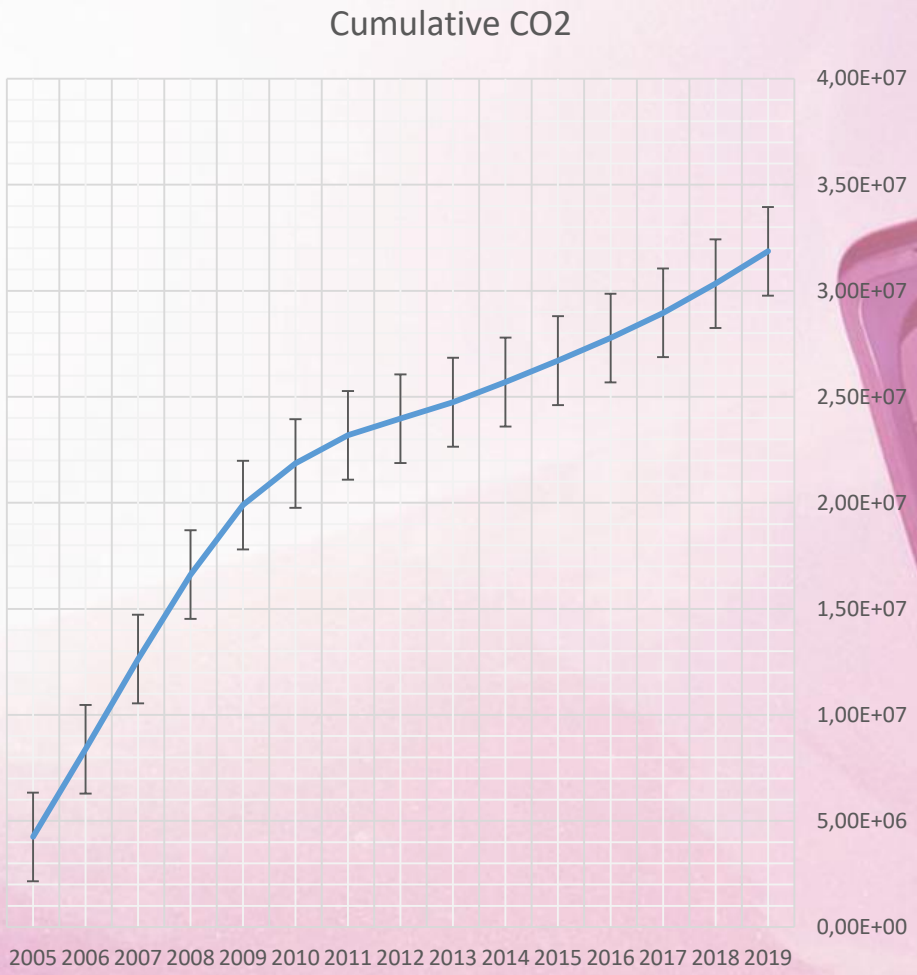
This highlights one commonly misused argument for small cars (A to C): small(er) individual carbon cost does not necessarily apply to very large volumes

All this challenges our general ideas about EVs

The EVs that will be in great demand inevitably won't be like this…

But more like this…

And that is… perfectly fine.



- We do not need everyone to switch to EVs right now, or even most people to stop buying ICE automobiles.
- We need a decent percentage of the existing aged fleet to be retired in favor of Evs for urban use, where air quality most suffers.
- Replacing just 15% of the fleet with more than 10 years in service would remove more than 3.27 million tonnes of CO2.

How do we encourage EV adoption?

Incentives

- VAT reduction on new EV car sales
- Elimination of registration fees on EVs (already done)
- Elimination of road taxing of EVs (already done)
- Government grants for EVs purchases (under discussion – how much?)
- Development of charging grid and stations on public places
- Retiring bonus for older vehicles for every new EV (ensures aging cars are removed from market)

Counter-Incentives

- Increasing road tax for ICEs with age as well as for CO2 grams
- Increasing registration cost for old imported vehicles

Attention is needed to altering the cost of fuel (VAT, SCT, FT) as any more increases are likely to stall the entire new-vehicle market way before EVs take off.

Thank you for your attention and time!