



# Electrical driving with Trailers



Polyteknisk Flyvegruppe



But why, mister Bond?



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## But why, mister Bond



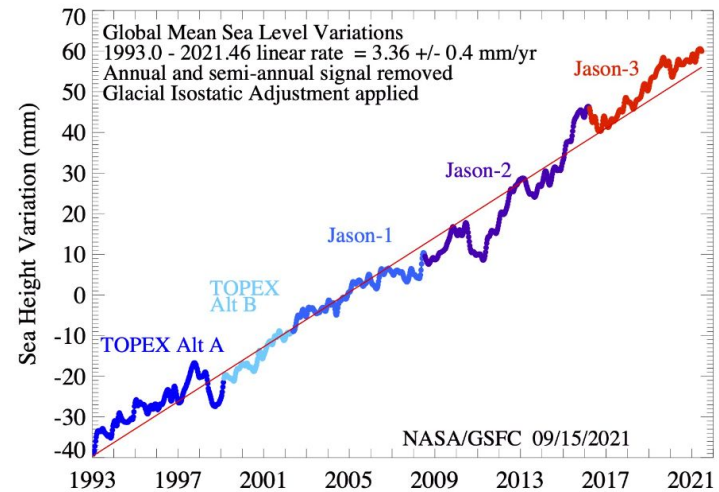
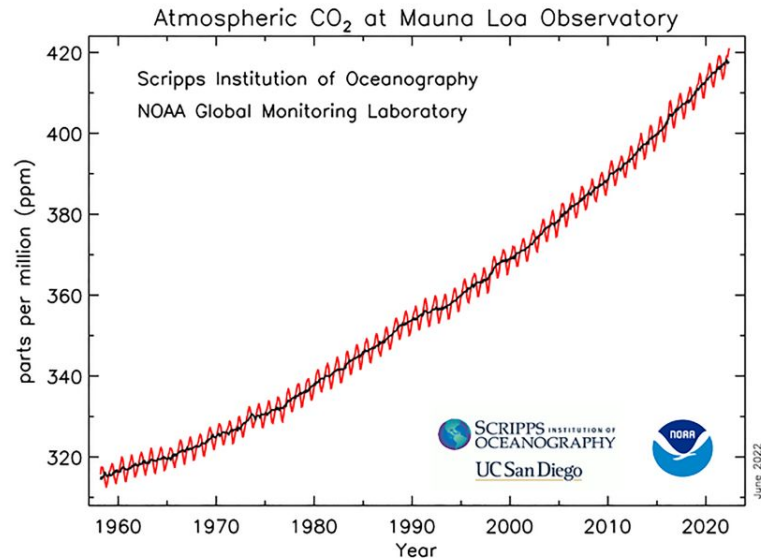
1964



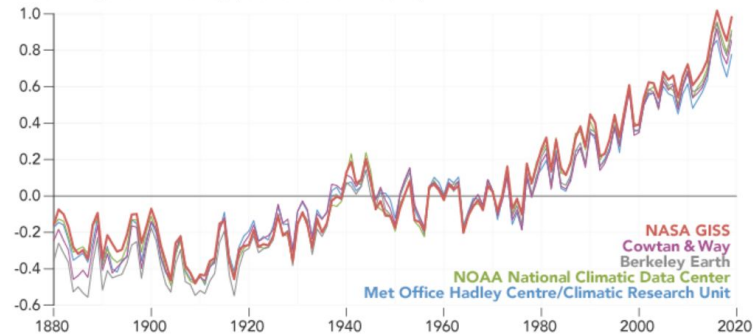
25/8-2022



# But why

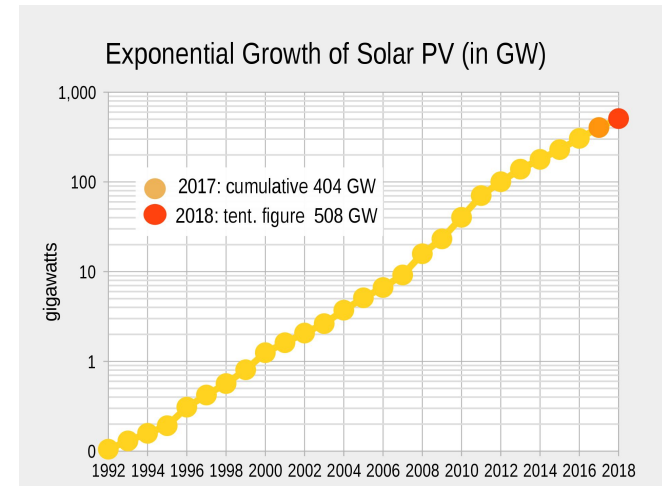
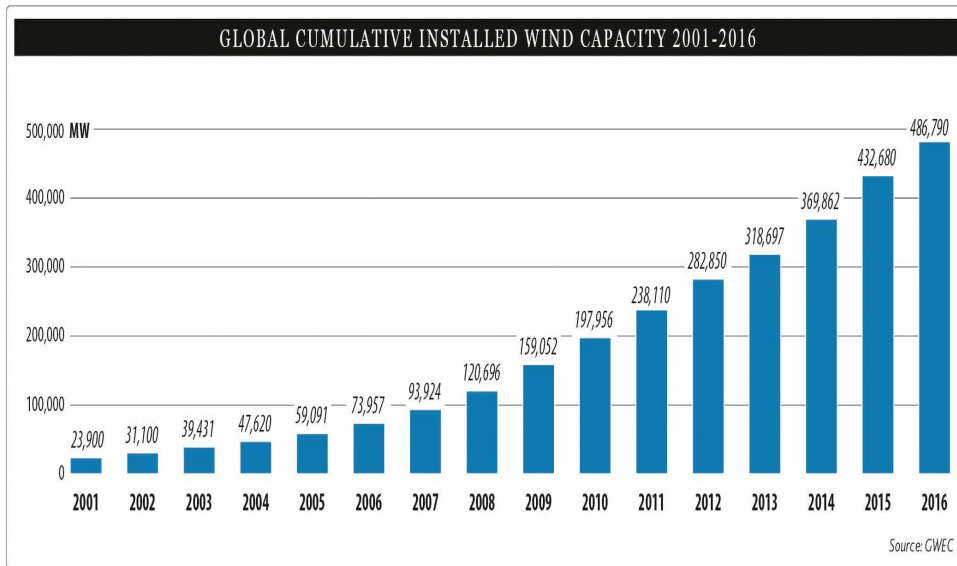


**A World of Agreement: Temperatures are Rising**  
Global Temperature Anomaly (relative to 1951-1980, °C)

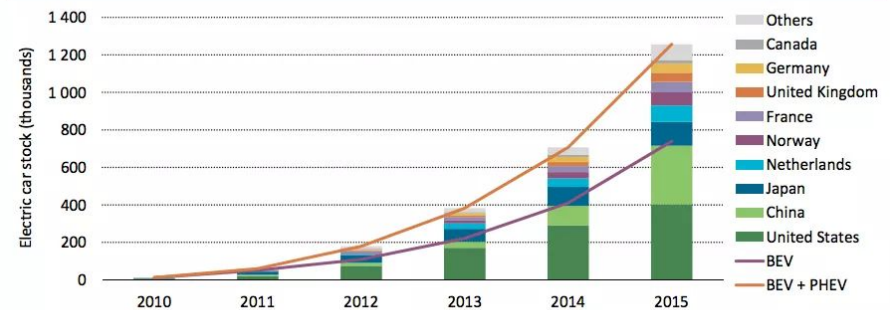




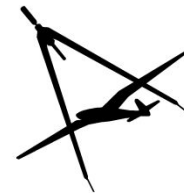
# Going electric



**Figure 1 • Evolution of the global electric car stock, 2010-15**



Note: the EV stock shown here is primarily estimated on the basis of cumulative sales since 2005.



## Who I am

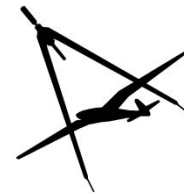
- Born in 1965 on a small island(Ærø) with nearly no thermals
- Start gliding in 1984
- Instructor 1993
- Mechanical Engineer 1993
- Instructor 1993
- Biggest task 700+ km
- Danish champion 2019 in 15m
- Electrical Car owner since 2020
- Proud owner of a Ventus 2ct 15/18m
- First Danish citizen starting from danish ground in an electrical plane "Electrical Aviation Day"
- **7000+ km with trailer and a electrical car**
- Next step electrical glider?



# Electrical “plane” experience

- Onix
- AS-34
- B13E
- Discus 2FES
- LAK-17C FES
- ASG-32EL





# Why did i buy an electrical car?

- Economics.
- **Reduce CO2.**
  
- I want it.
- I want it.
- I want it.







## Which car to select?

One requirement:

- Must be able to tow 1000 kg (Ventus 2ct)

Possibilities (2020):

- Audi E-tron
- Tesla X
- Mercedes EQC
- **Tesla 3**





## Why tesla 3 LR

- Cheapest car that could tow 1000 kg.
- Best aerodynamics
- Fastest charger
- Best charging network
- Most experienced electrical car manufacture
- Most modern car
- It's a 2000 kg Ipad

## Why not tesla 3

- It is best for 2 persons.
- The hook system
- To strange for grown up people
- Buy a Tesla Y



**Driving an electrical car long distance is like flying a task in a glider :-)**





## Experience long distance driving with Tesla 3

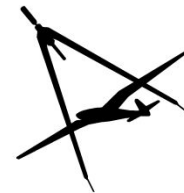
### Pro:

- Very stabil.
- Easy Overtaking.
- Good charging network



### Con:

- It's a mess when charging
- Charging network is often too far away from the autobahn



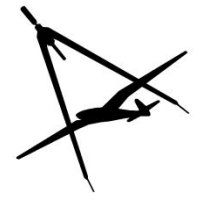
## Tesla 3 as a Glider Competition Car

### Pro:

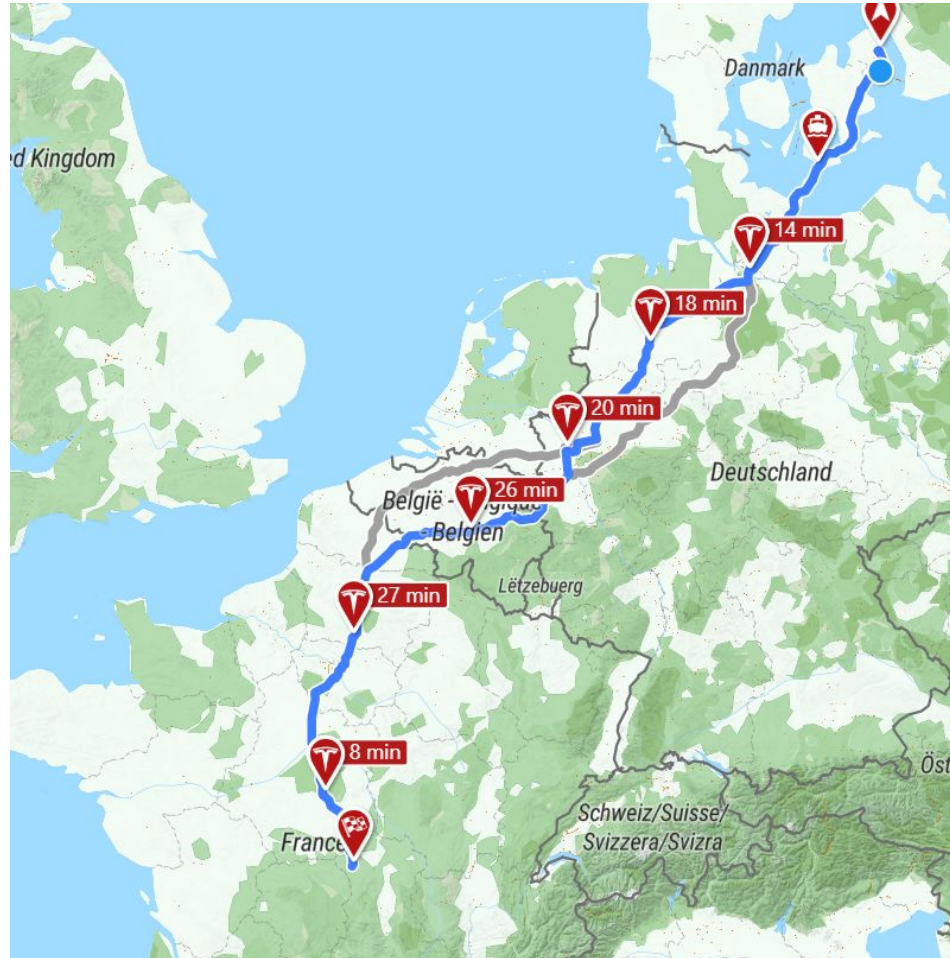
- Legal aircondition on the grid
- Fantastic to tow gliders on the airfield
- Easy to keep an eye on the glider while towing
- Easy to get on the scale

### Con:

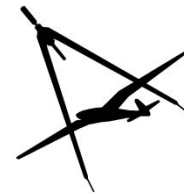
- A little too low to drive on fields.
- Difficult to get tail dolly, wingdolly and towbar into the car.
- Limited space on the backseat.



# Longest trip...











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A1 fx Årlige omkostninger

	A	B	C	D	E	F	G
1	Årlige omkostninger	<b>Skoda 1.6 TDI DSG</b>	<b>Tesla 3 LR</b>	<b>Tesla 3 Standard</b>	<b>Brugt Skoda</b>	<b>Ny Skoda</b>	
2	Km/år	42.000	42.000	42.000	42.000	42.000	
3							
4	<b>Service/år</b>						
5	Service	5.000	0	0	5.000	5.000	
6	Service Interval (km eller år)	30.000	8	8	30.000	30.000	
7	Pris pr. år	7.000	0	0	7.000	7.000	
8	Dæk	680	1.259	1.259	680	680	
9	Dæk Interval	70.000	70.000	70.000	70.000	70.000	
10	Dæk/år	1.632	3.022	3.022	1.632	1.632	
11	<b>Forsikring</b>	5.500	7.500	5.500	3.500	3.500	
12							
13	<b>Energi/år</b>						
14	Km/l wh/KM	20	161	151	20	20	
15	Brændstof pris ( km/l) (kr/kWH)	11	1	1	11	11	
16	Forbrugt el/Diesel (Kr)	23.100	6.762	6.342	23.100	23.100	
17			564	529			
18							
19	<b>Vægt afgift</b>						
20	Pr. Halvår (kr)	1.090	330	330	1.090	1.090	
21	Totalt	2.180	660	660	2.180	2.180	
22							
23	<b>Nypris</b>						
24		70.000	470.000	400.000	150.000	350.000	
25	Afskrivningsperiode	11	15	15	11	11	
26	Pr År	6.364	31.333	26.667	13.636	31.818	





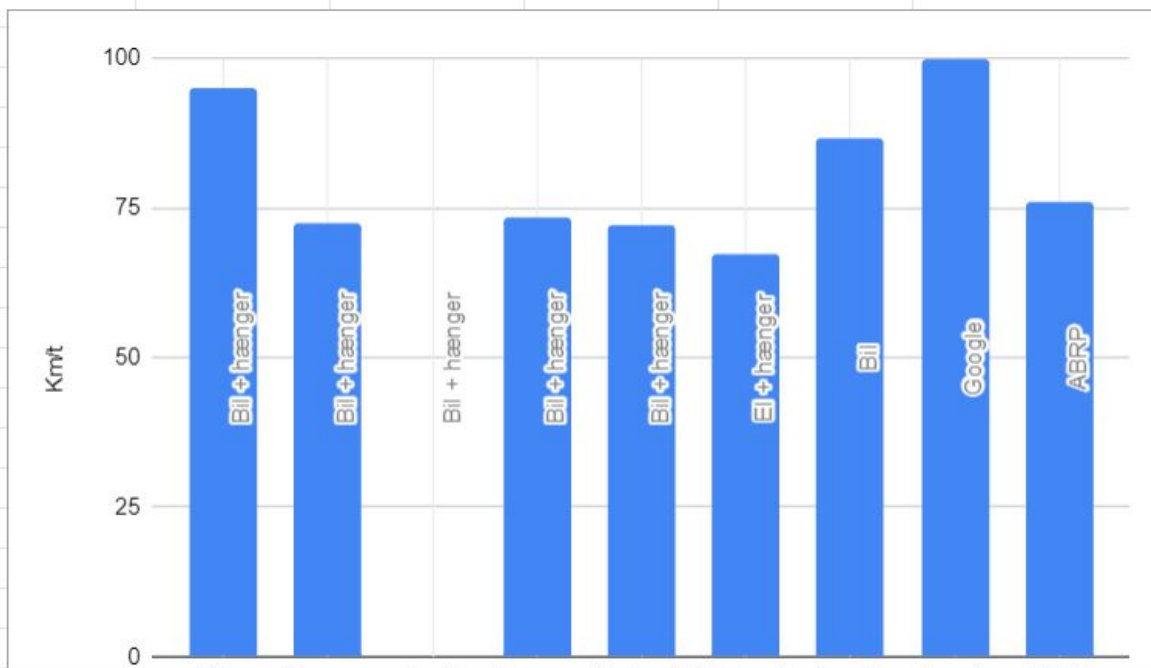
## How to get the best average speed?

- Start with nearly maximum SOC
- Good aerodynamic
- Good charging network
- High charging speed
- No waiting time
- Get to charger with low SOC
- Arrive at a place with destination charger

Drive the car like you would like fly aggressively in a competition

- Start the task with maximum height
- Good aerodynamic
- Find the good thermals
- Good climb
- Center the thermals fast
- Low finish height

driver	start Monlucon	stop Nat	start Morning	arrival Denmark	Trailer	Denmark Destination	Distance	Tid1		Total tid
Filip	09.05.00	23.59.59	00.00.01	02.45.00	Ja	Kongsted	1678	14.54.59	02.44.59	17.39.58
Thomas	11.15.00	22.00.00	08.00.00	19.15.00	Ja	Skinderholm	1596	10.45.00	11.15.00	22.00.00
Jan B				06.00.00	Ja	Slaglille	1647	00.00.00	06.00.00	
Rasmus	11.30.00	00.00.00	03.00.00	10.30.00	Ja	Haderslev	1466	12.30.00	07.30.00	20.00.00
Morten H	11.30.00	19.00.00	07.30.00	20.30.00	Ja	Rødekro	1475	07.30.00	13.00.00	20.30.00
Morten B	10.44.00	23.20.04	08.41.35	22.05.00	Ja	Hørsholm	1745	12.36.04	13.23.25	01.59.29
Lars S	09.41.00	20.31.00	06.26.00	14.20.00	Ja	Ringsted	1622	10.50.00	07.54.00	18.44.00
Google							1745			17.27.00
ABRP							1731			22.45.00
Tesla										





It is still a good idea?:



190 wh/km

Any questions?

