

Bogserplanens miljöpåverkan

Björn Regnström

Göteborgs SFK

regnstrom@flowtech.se





KLIMATET DÅ?

- 1 liter bensin \rightarrow 2,4 kg CO₂
 - Medelsläp Pawnee 7,2 liter \rightarrow 17,3 kg CO₂/släp
 - Säsong 20 släp \rightarrow 345 kg CO₂/år
 - TMG 4 liter/släp \rightarrow 192 kg CO₂/år
 - UL 3 liter/släp \rightarrow 144 kg CO₂/år
 - XZI 2,4 liter/släp \rightarrow 115 kg CO₂/år
 - Medelsvensk konsumtion \rightarrow 10 ton CO₂/år
 - Men... 0 ton/år 2050, -2 ton/år 2080 (-10 Gt/år)
- Trafikflyg
90 kg CO₂/h
Höjdeffekt:
180 kg CO₂/h

PÅLITLIGA SPÅDAMER GER SVAR PÅ DINA FRÅGOR

spådom
24.se

0939-1147171

29.90 KR/MIN 18 ÅR

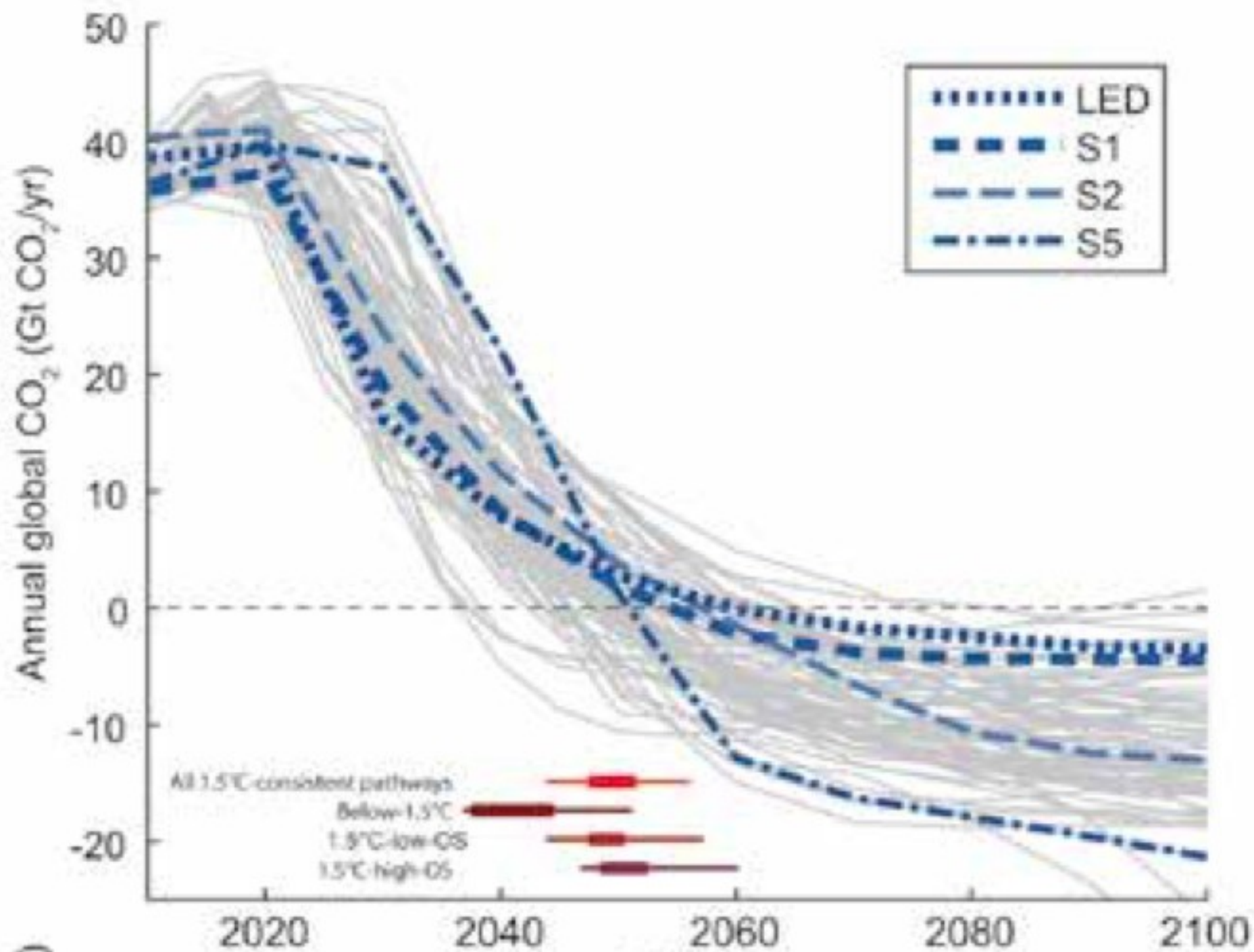
ARE YOU COMING TO BED?

I CAN'T. THIS
IS IMPORTANT.

WHAT?

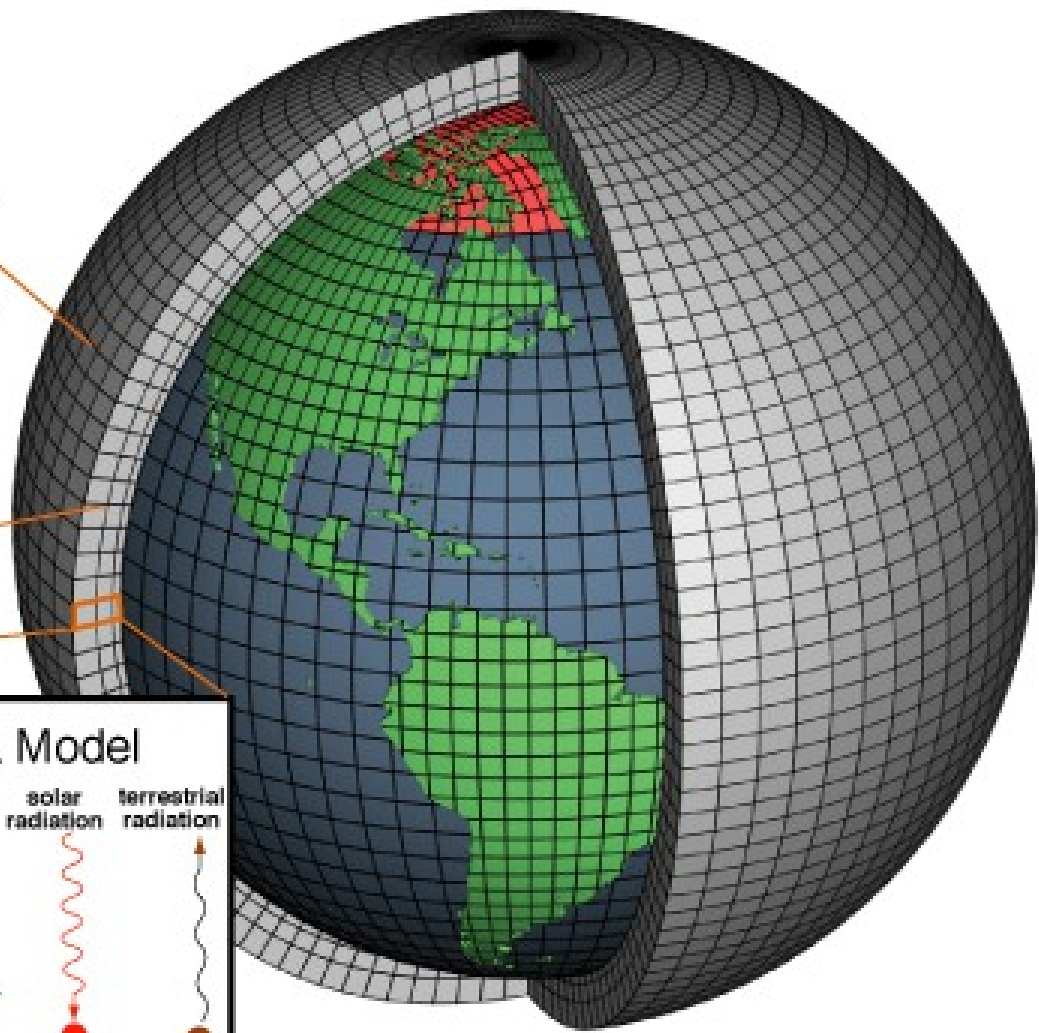
SOMEONE IS WRONG
ON THE INTERNET.



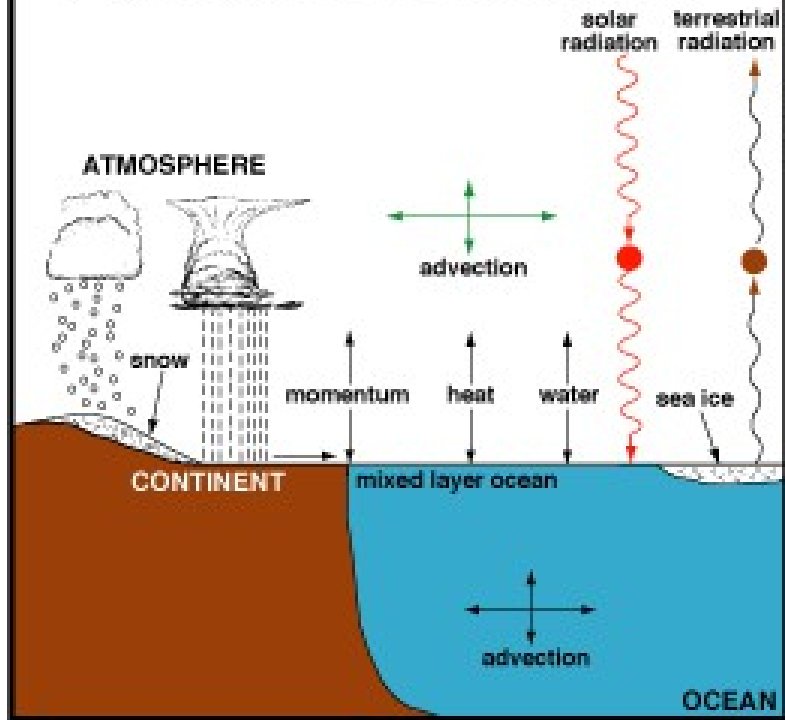


Horizontal Grid
(Latitude-Longitude)

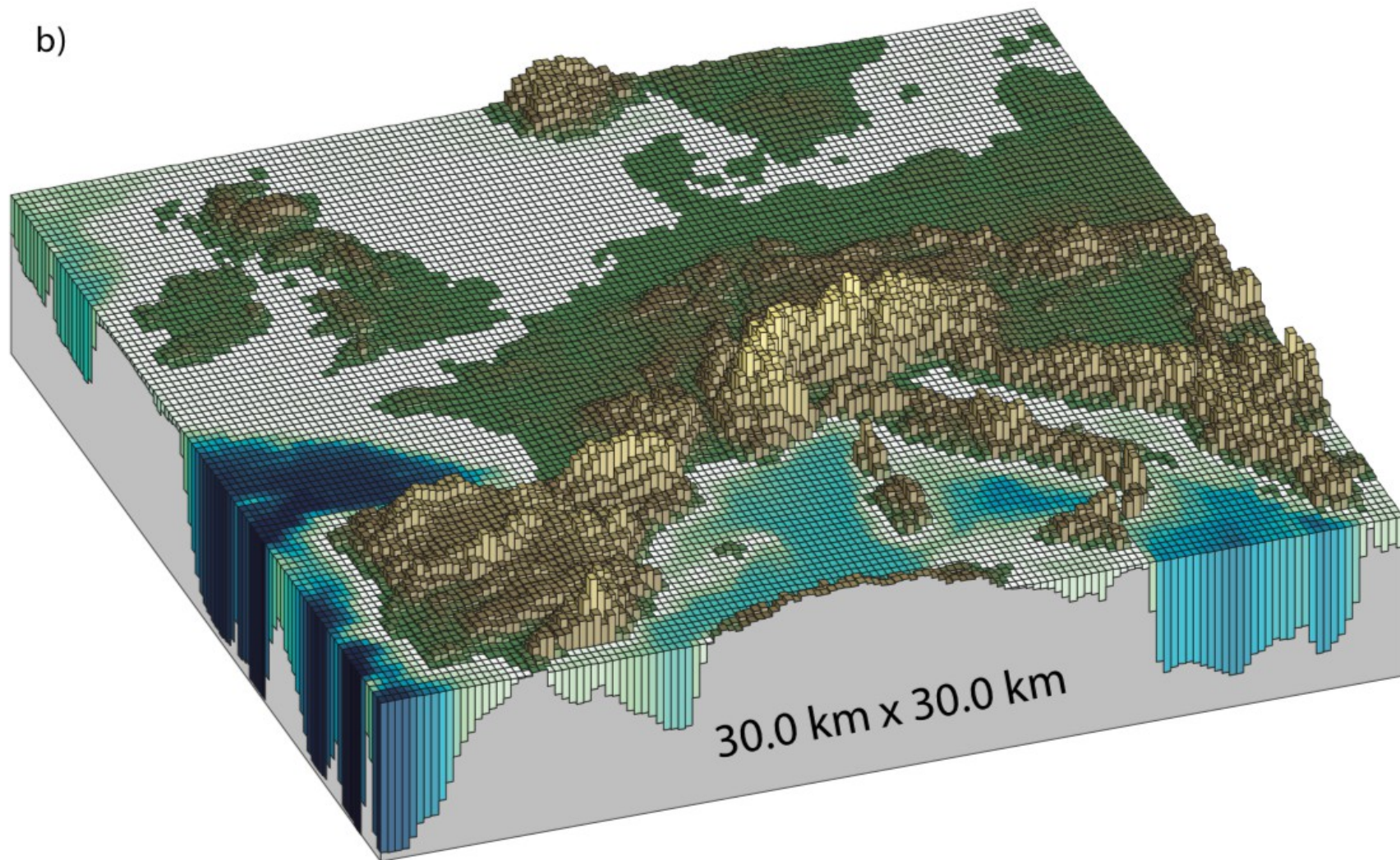
Vertical Grid
(Height or Pressure)



Physical Processes in a Model



b)



70-talet:

28000 celler

150000 obekanta? →

8 tidssteg/dygn?

11 miljoner celler

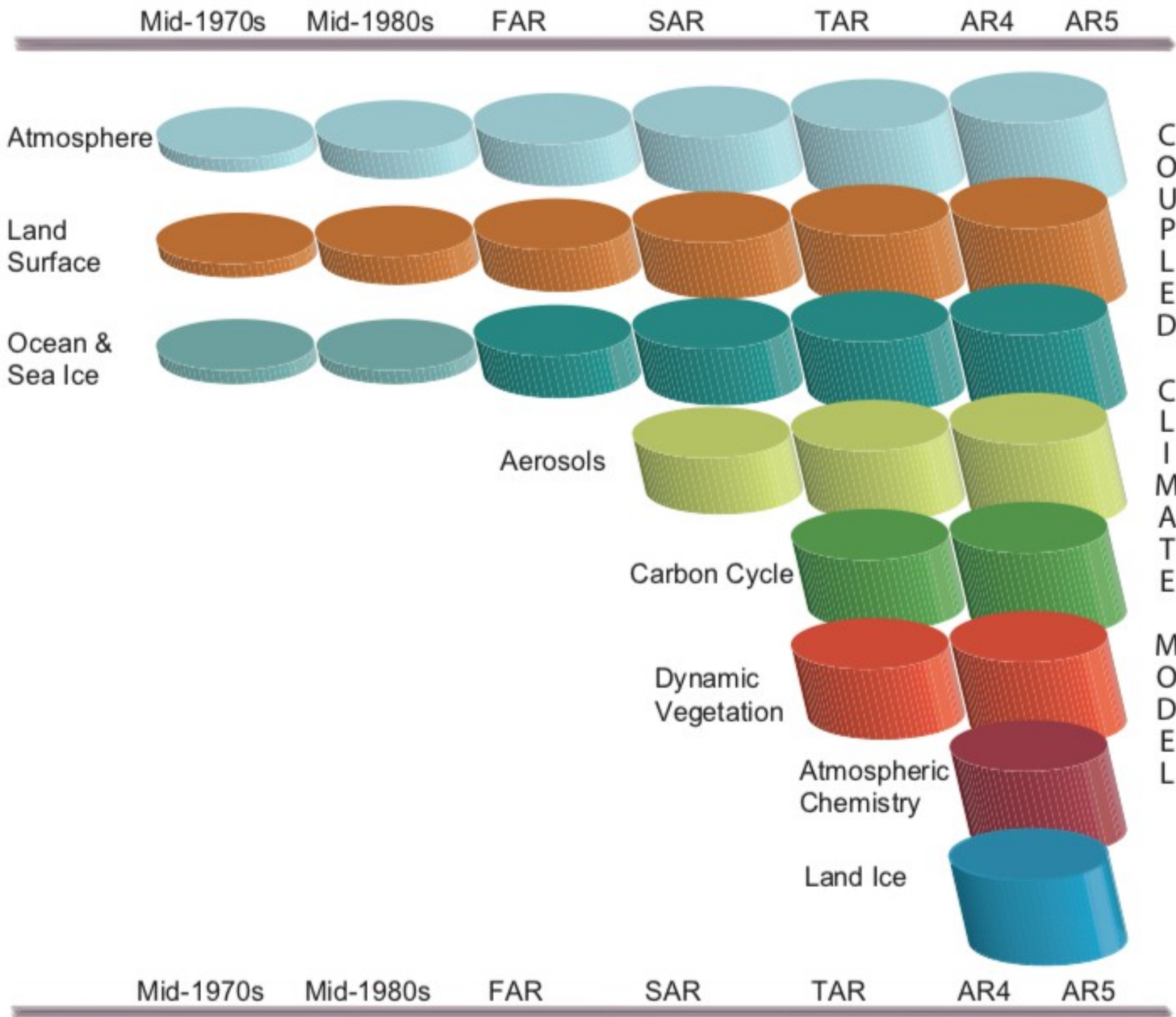
110 miljoner obekanta →

24 tidssteg/dygn?

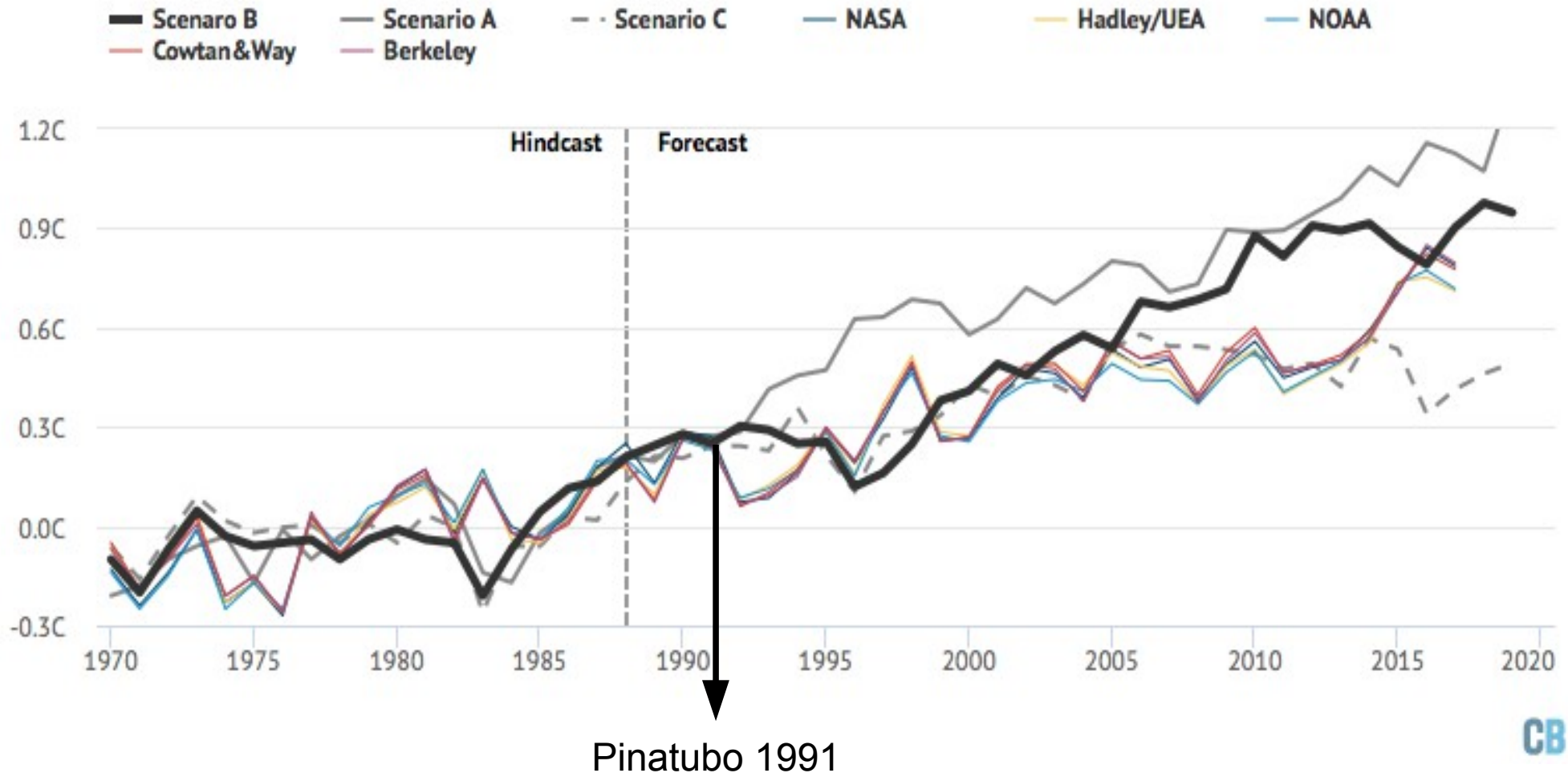
175 miljoner celler

1,75 miljarder obekanta

48 tidssteg/dygn?



1988: Hansen et al



~~Solcykler~~

~~Dåliga modeller~~

~~400ppm är så lite~~

~~Inget att säga
något all~~

~~Inte så fel~~

~~IPCC korrupta~~

~~Ingen
uppvärmning
senaste 18 åren~~

~~Climategate~~

~~Milankovitchcykler~~

~~Det har varit
varmare~~

~~Fejlade
mätningar~~

~~Ingen
vetenskaplig
konsensus~~

~~Fouriertransform~~

~~Vetenskaparen X
säger Y~~













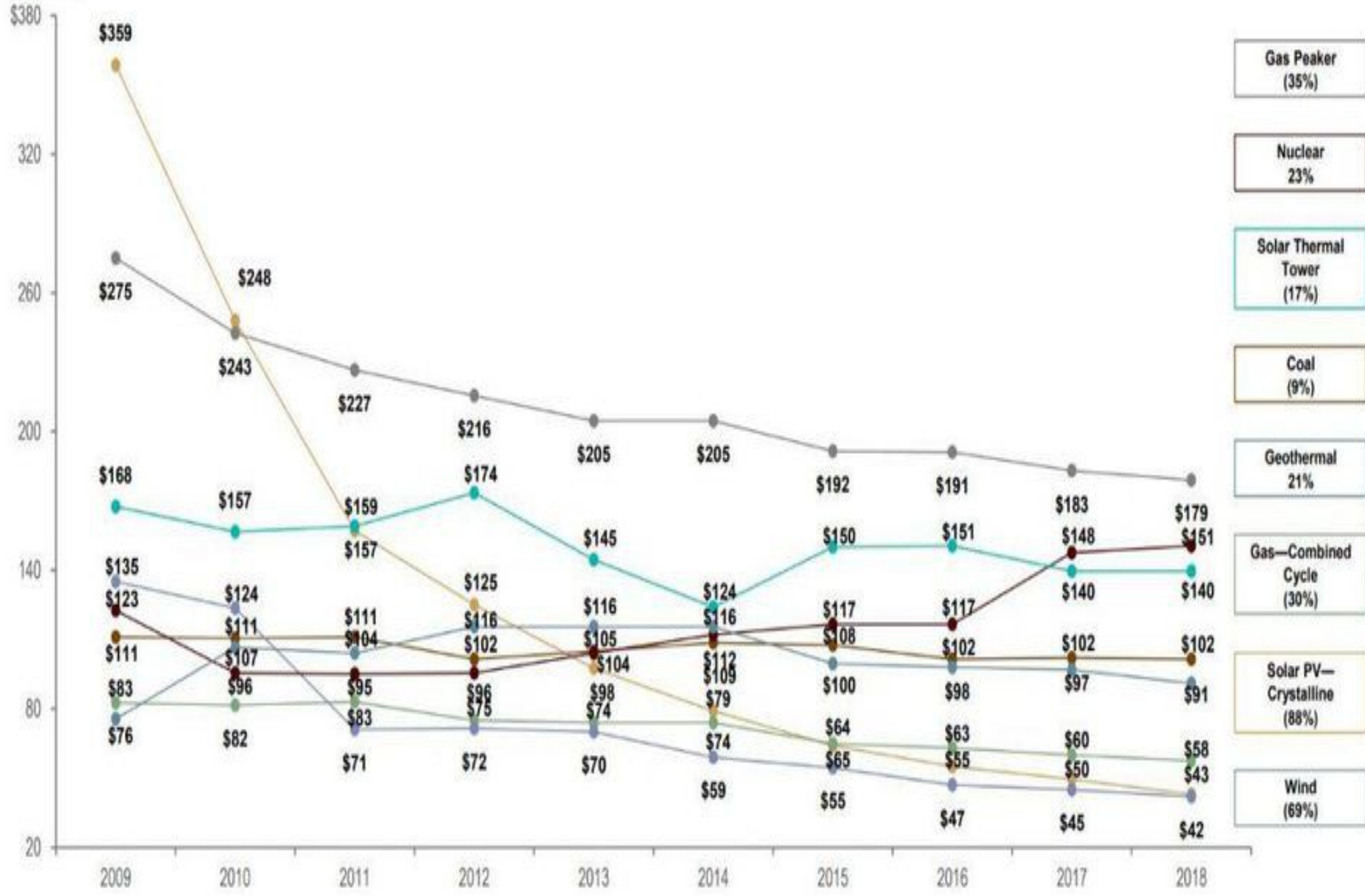
The Resource Curse







Mean LCOE
\$/MWh



LCOE Version

3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0

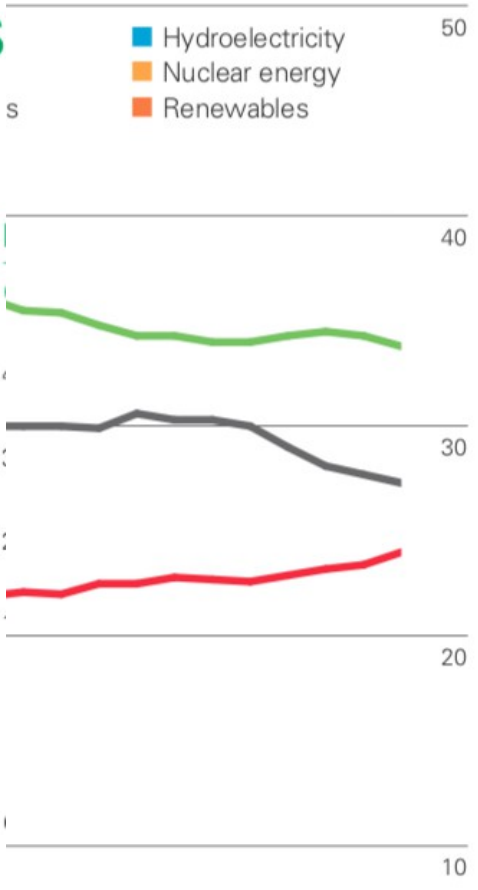
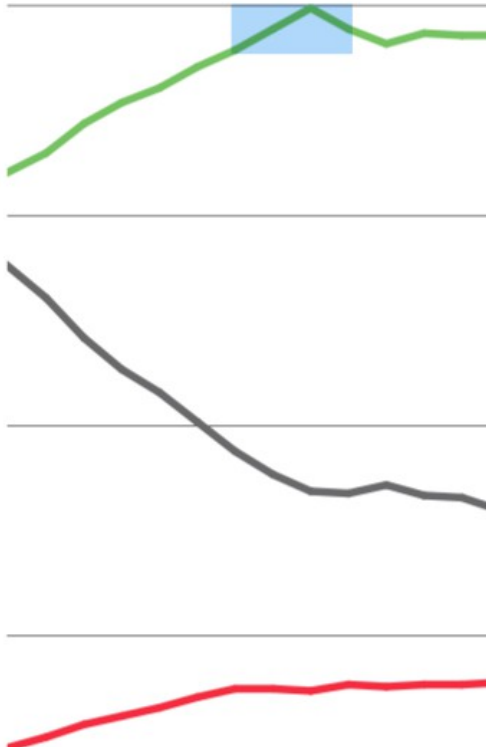
***Murray Energy Is 8th Coal Company
in a Year to Seek Bankruptcy***



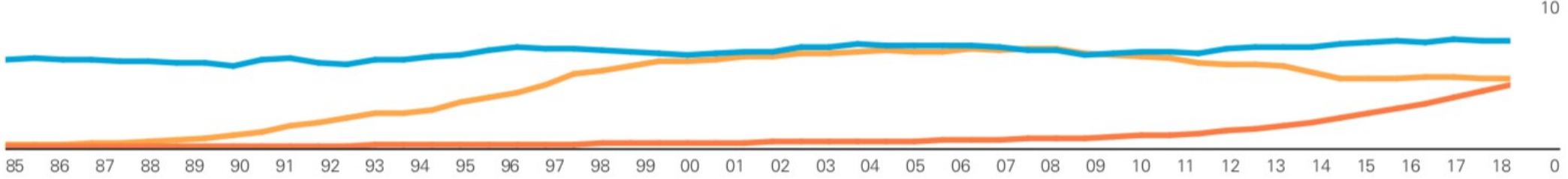
Shares of global primary energy consumption by fuel

Percentage

Group chief economist's analysis



Energy in 2018: an unsustainable path

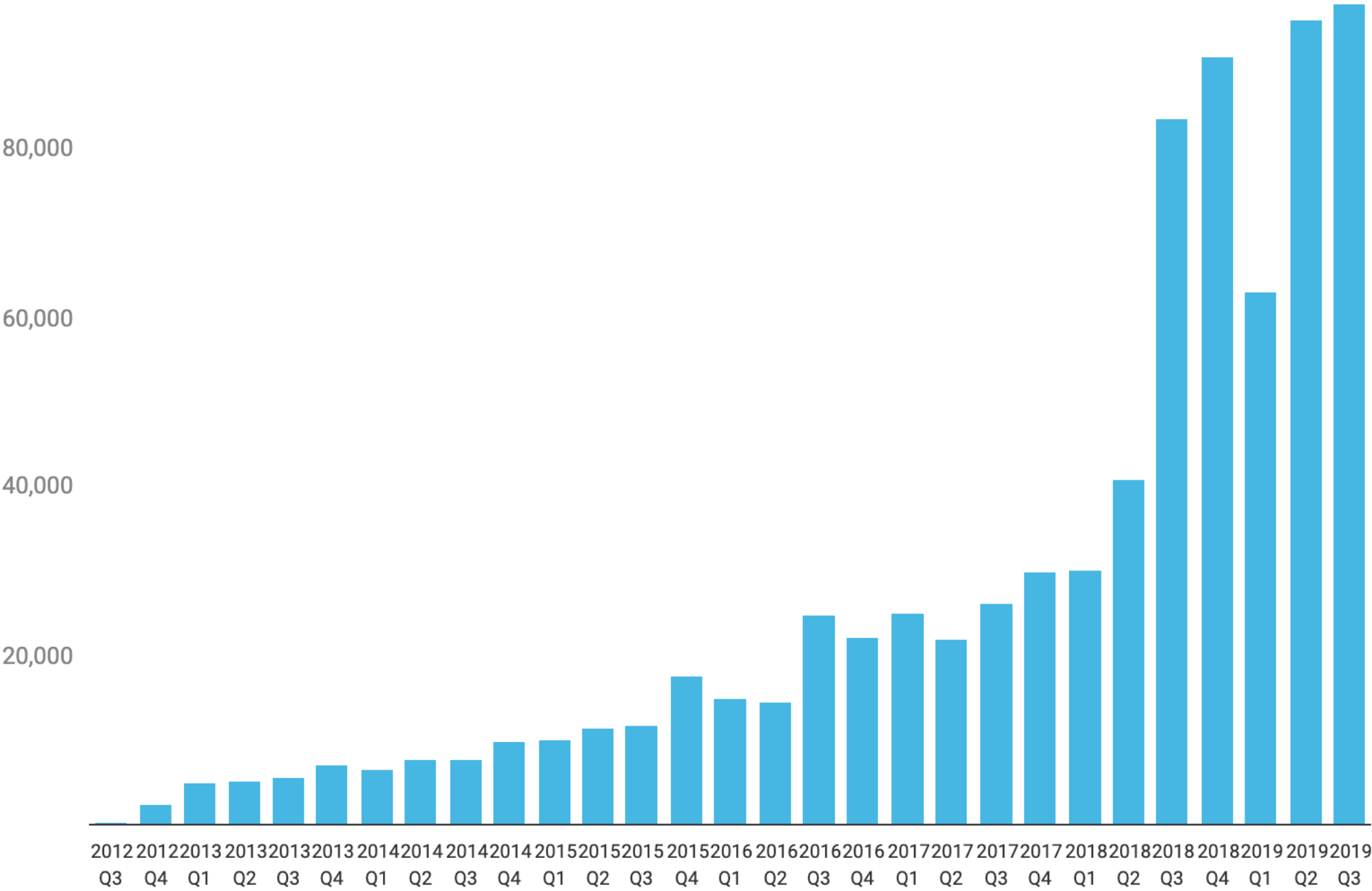


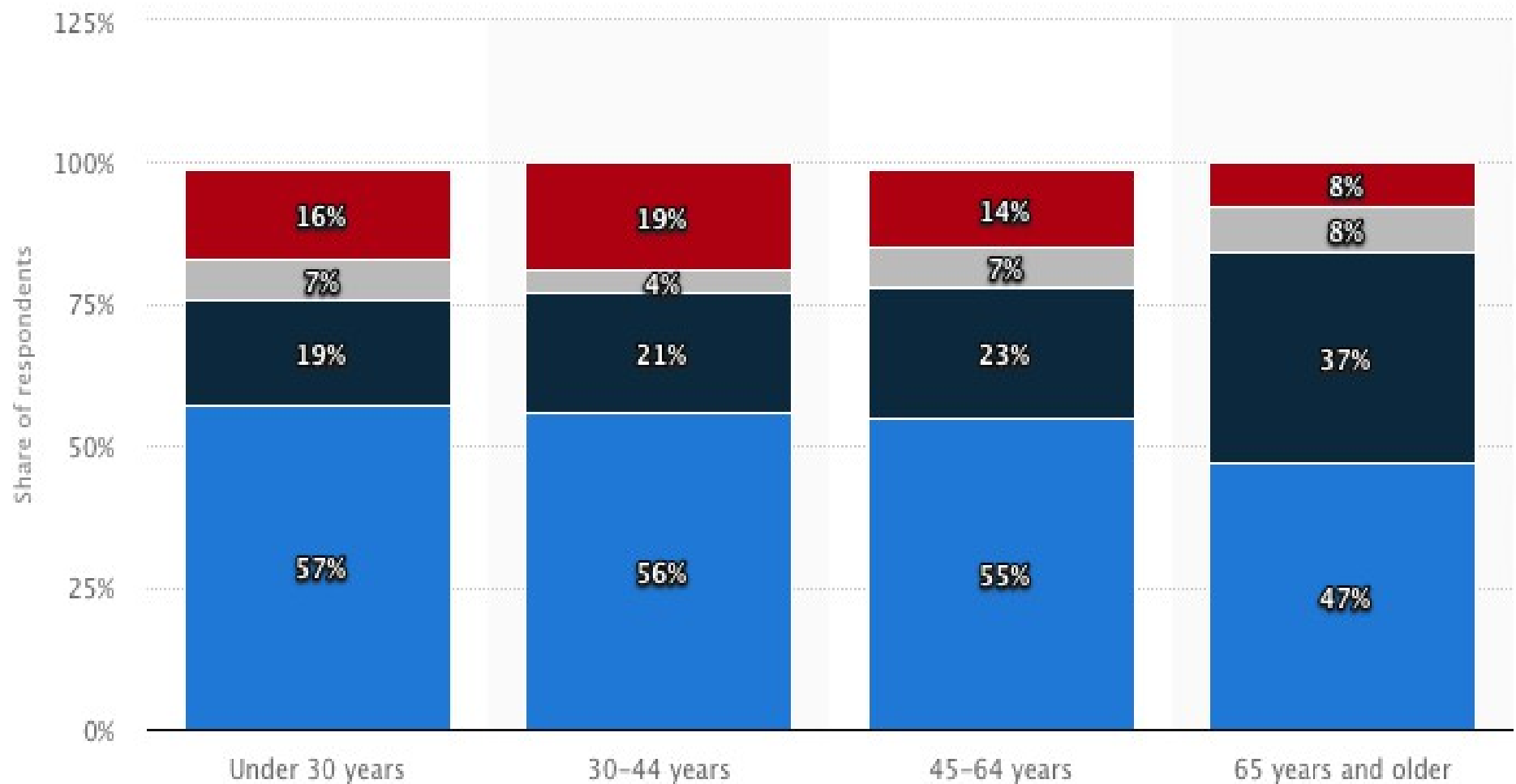
Oil remains the most used fuel in the energy mix. Coal is the second largest fuel but lost share in 2018 to account for 27%, its lowest level in 15 years. The share of natural gas increased to 24% such that the gap between coal and gas has narrowed to three percentage points. The contribution of hydro and nuclear remained relatively flat in 2018 at 7% and 4%, respectively. Strong growth pushed up renewables share to 4%, just behind nuclear.



Tesla's giant battery saved \$40 million during its first year

Tesla Vehicle Sales (Deliveries)





- The world's climate is changing as a result of human activity
- The world's climate is changing but not because of human activity
- The world's climate is not changing ● Not sure

In most surveyed countries, majorities see climate change as a major threat

Global climate change is a ___ to our country



Source: Spring 2018 Global Attitudes Survey, Q22d.

- Vetenskaplig konsensus om klimatet
- Konsekvenserna av fortsatt värmning allvarliga
- Opinionsen oroad för klimatet, yngre mer så
- Parisavtalet: 197 stater undertecknat, 187 ratificerat.
- "Peak cheap oil", miljöpåverkan blir värre
- "Resource curse" samt ca 10 milj döda/år
- Förnybar energi billigare än fossil
- Batterier snart \$100/kWh och blir bättre
- Primär energi = elektricitet (som i hemmet)
- Städer och hela länder förbjuder fossilbilar 10-20 år, frenetisk utveckling av elbilar

Vad göra?

Förnybara bränslen:

Dyrare soppa
Effektivare plan, motor
Fortsatt buller
Tankanläggning
Olja
Mekaniker

Eldrift:

Elbogserare eller
Elvinsch eller
Elvinsch+FES/turbo
Batterihantering
Grövre sladd
Mindre buller
Progressivt

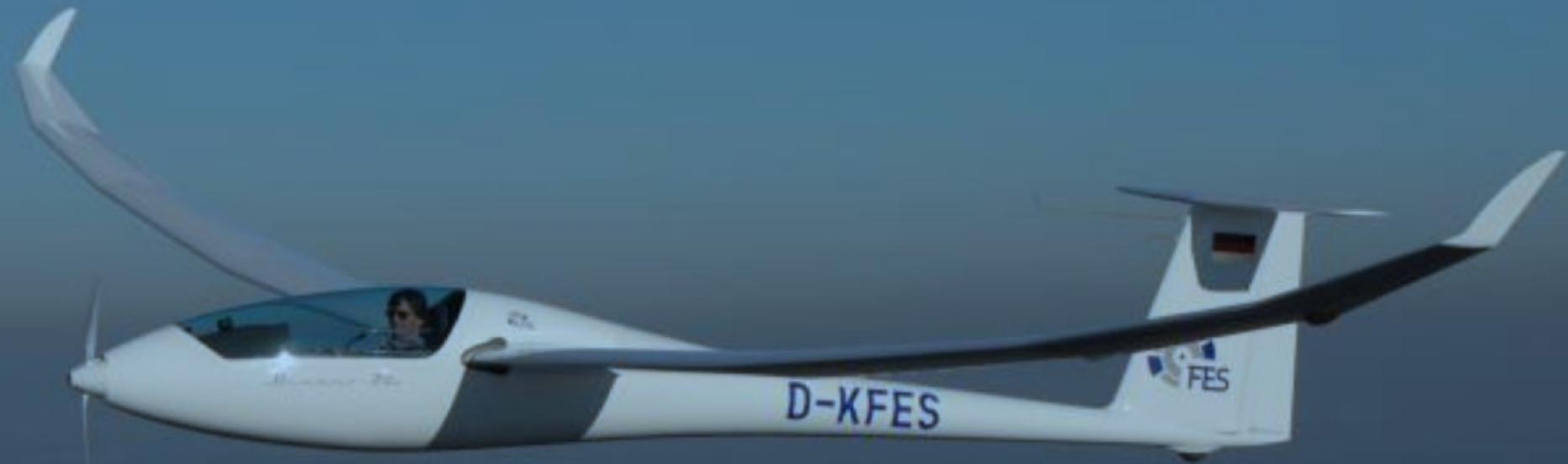


Mehr Höhe durch Technik.

För korta fält, vinsch + turbo.

FES

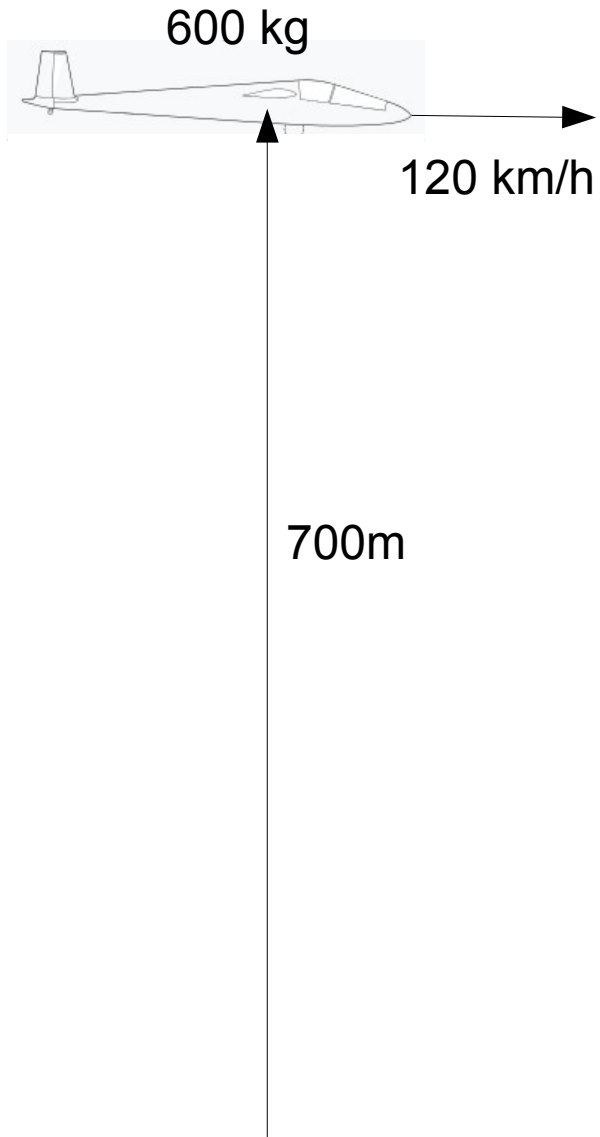
front-electric-sustainer



Det finns även andra hemflygningsmotorlösningar.







Pawnee:

$$E_{\text{segel}} = 1,24 \text{ kWh}$$

$$E_{\text{bränsle}} = 62,1 \text{ kWh}$$

Relativ nytta = 2%

Kostnad: 122 kr

Hypotetisk eTMG:

$$\text{TOW} = 600$$

$$L/D = 25$$

$$P = 100 \text{ kW}$$

$$C = 36 \text{ kWh}$$

$$n_{\text{prop}} = 0,8$$

$$n_{\text{drivning}} = 0,9$$

$$\text{Regen} = 0,2$$

$$\text{TOW}_{\text{segel}} = 600$$

$$L/D_{\text{segel}} = 35$$

Ger:

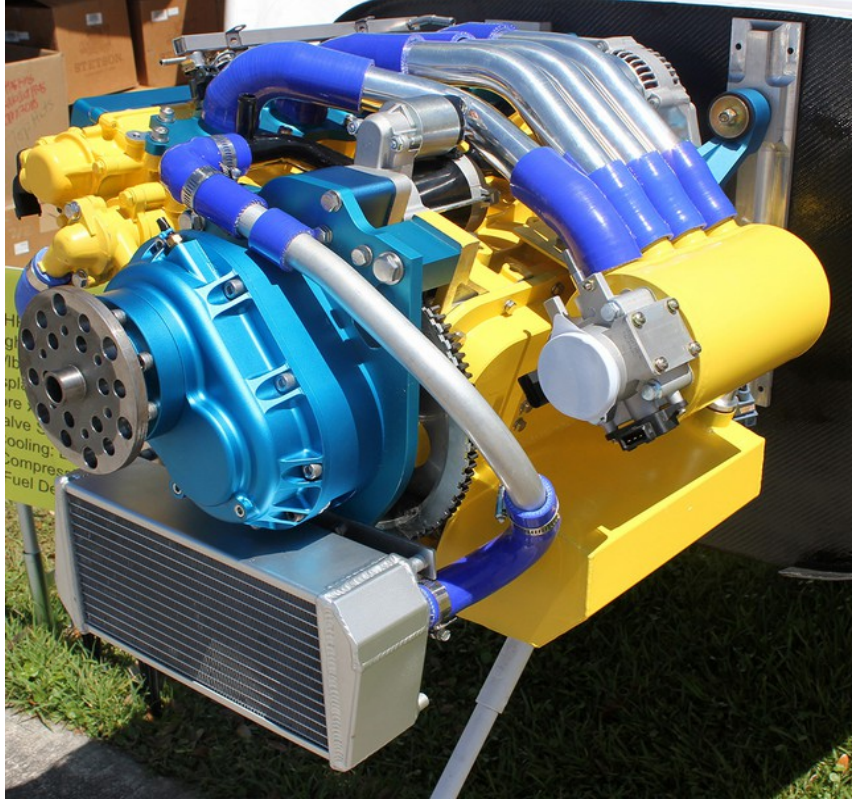
$$\text{Stig} = 4,9 \text{ m/s}$$

$$T_{700} = 143 \text{ s}$$

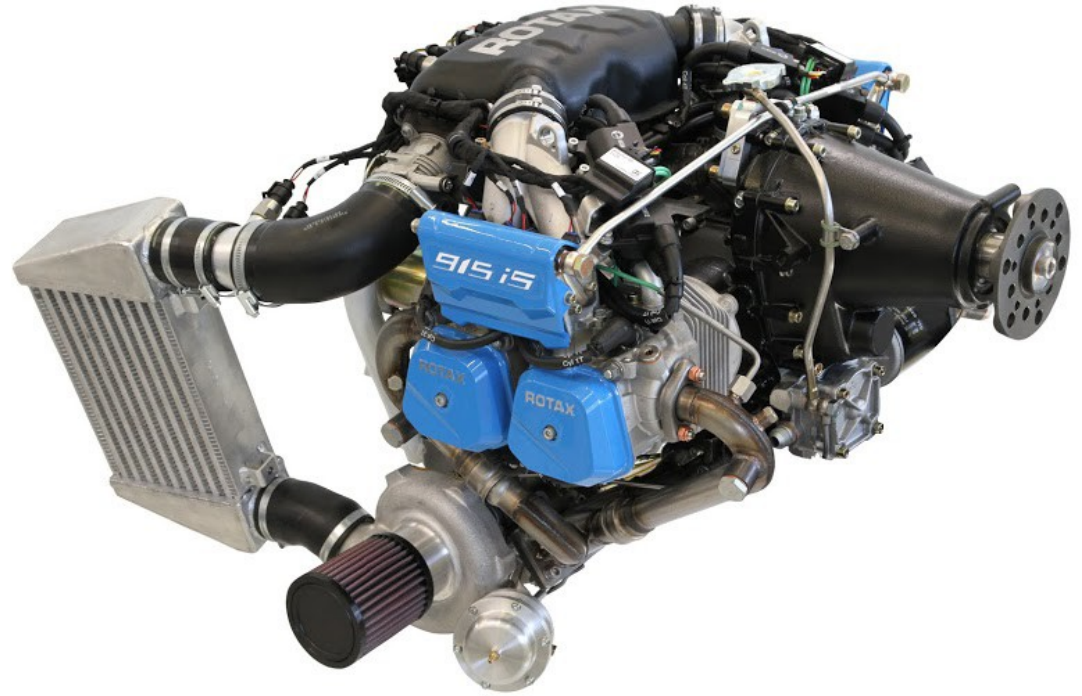
$$E_{700} = 4,0 \text{ kWh}$$

$$E_{700\text{regen}} = 3.2 \text{ kWh}$$

Kostnad: 1,6 kr



Ca \$17000, 147 hp



Ca \$40000, 140 hp



150 kW
Ca 45 kg
\$5800 på Ebay



75 kWh
Ca 480 kg
\$11500 på Ebay

Tack för mig!

