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2019

Based on the Book: "Fundamentals of Global Warming"

Presentations about Global Warming

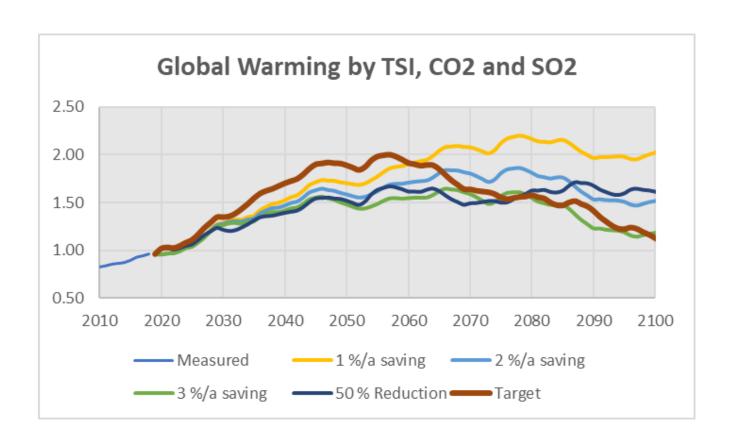
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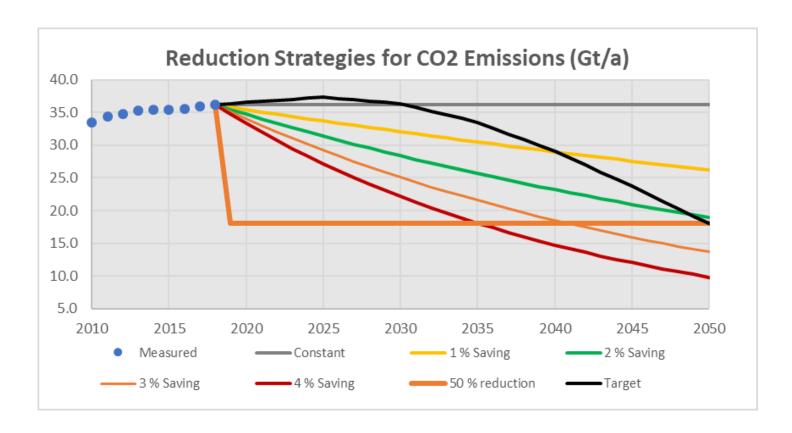
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I GLOBAL ACTIONS

At least 2 %/a or target plan reductions in emissions will limit global warming to 2.0 deg. C

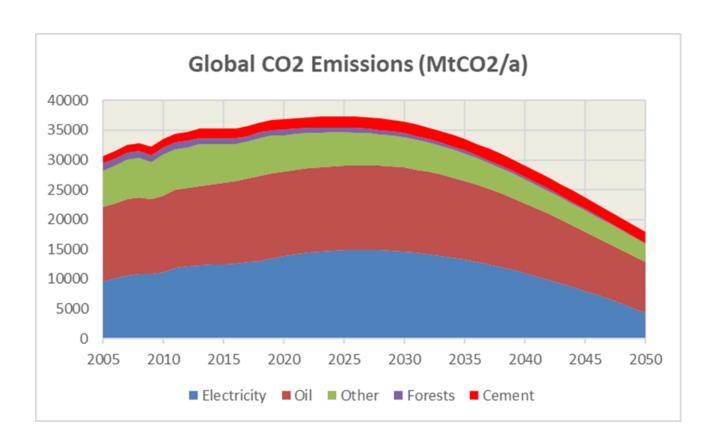


2 %/a reduction or target plan will mean 18 Gt/a emissions in 2050



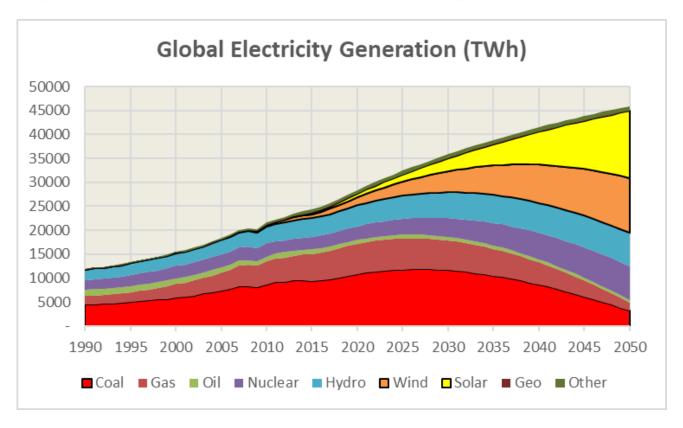
Target should be 18 Gt/a by 2050. This is 1,8 t/capita

CO2 emissions will be reduced to 18 Gt by 2050



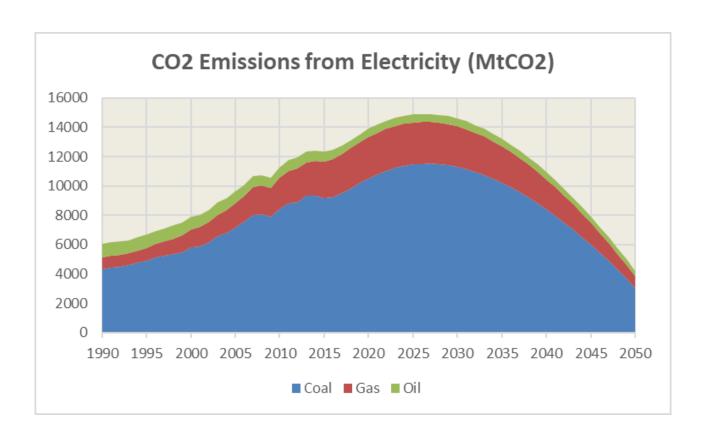
2. DECARBONIZE ELECTRICITY

Electricity should be produced mainly by non-fossil sources by 2050



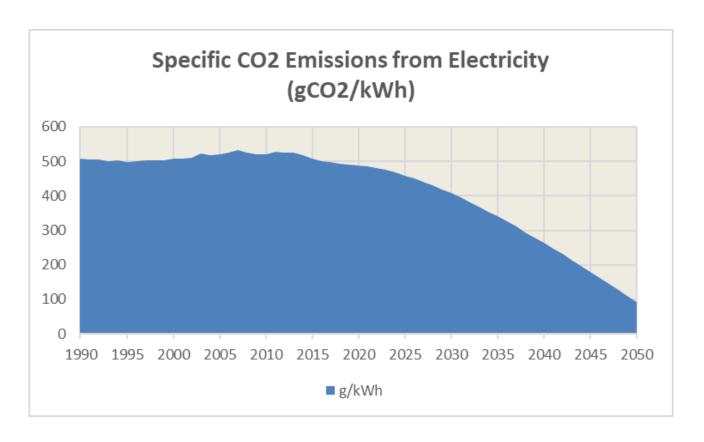
Solar and wind will generate 55 % of electricity in 2050 Fossil share should be decreased from 64 % in 2018 to 10 % by 2050

CO2 emissions from Electricity



CO2 emissions will decrease from 13 Gt in 2018 to less than 4 Gt in 2050

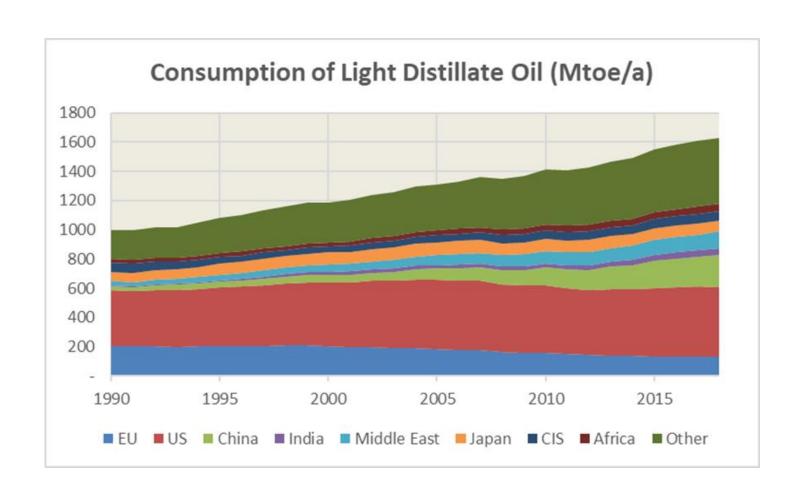
Specific emissions from Electricity



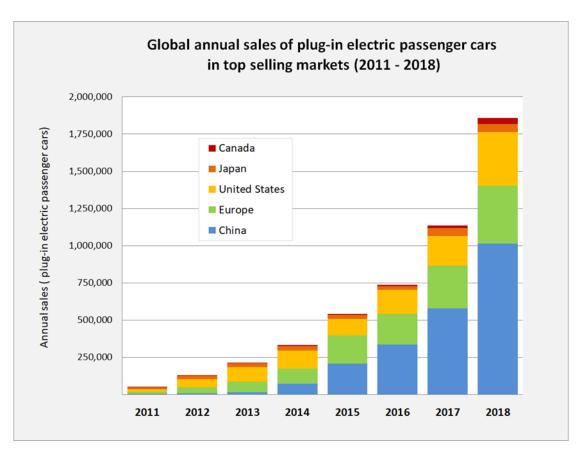
Specific CO2 emissions will decrease from 500 g/kWh in 2017 to 100 g/kWh by 2050

3. DECARBONIZE TRAFFIC

Oil Consumption (Mto/a)

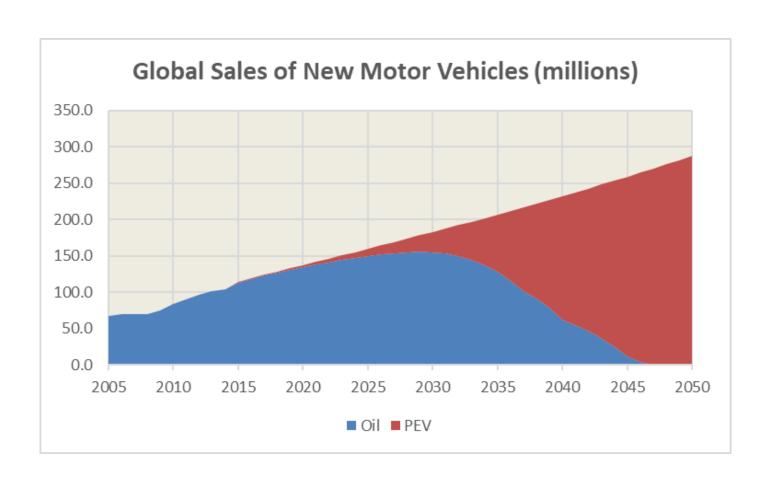


Trafic will powered by electricity

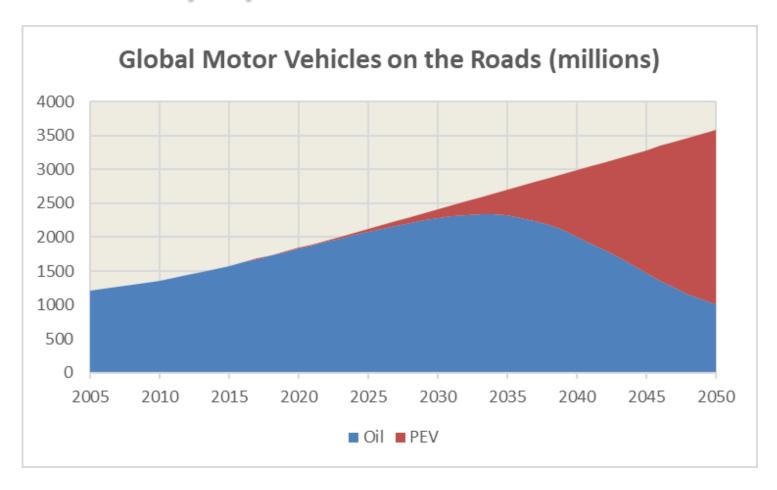


By 2050 most of new cars will be electric

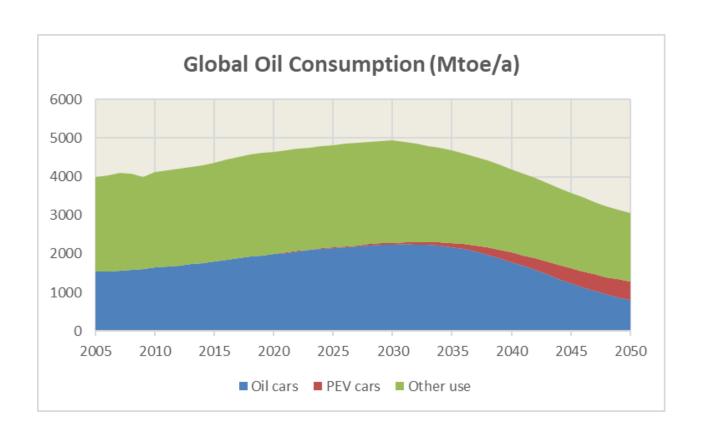
All new cars will be electric by 2045



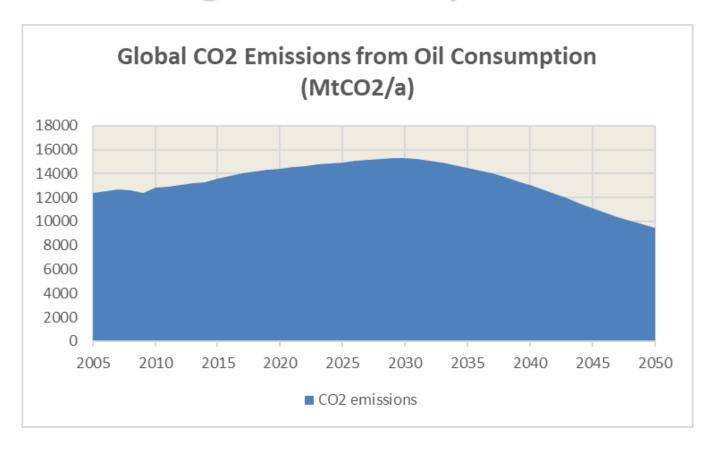
70 % of vehicles will be powered by electricity by 2050



Oil consumption will be peaking in the year 2030 at 5000 Mtoe/a



CO2 emissions from oil will be decreasing to 9.5 Gt by 2050



4. DECARBONIZE HOUSEHOLDS

Zero Emission Log Houses



Log houses store carbon in wooden walls (Source: Honkarakenne)

Zero Emission Log Houses have CO2 Storage in Structures

Log houses	Floors	1	1	2	2
	Logs (mm)	180	270	180	270
Wood content					
Area of walls	m2	90	90	193	193
Volume of walls	m3	38	48	51	70
Otherwood	m3	8	8	13	15
Total wood	m3	46	56	64	85
CO2-emissions	tons	3	4	5	6
CO2-storage	tons	-38	-46	-52	-67
Net CO2 emissions	tons	-35	-42	-47	-61

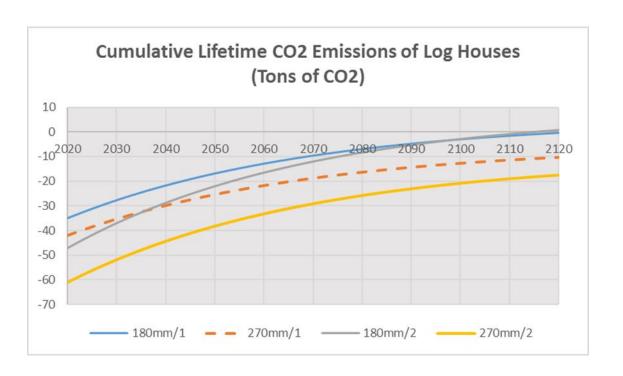
If the house has two floors and it will be constructed using 270 mm logs, it will store 61 tons of CO2

Zero Emission Log Houses Emissions in living

Log houses	Floors	1	1	2	2
	Logs (mm)	180	270	180	270
Heat consumption	MWh	12	10	18	15
Electricity consumption					
Household	MWh	4	4	5	5
Heat pump	MWh	4	3	6	5
Total	MWh	8	7	11	10
CO2 emissions					
CO2 content	kg/MWh	100	100	100	100
CO2 emissions	tons/year	0.80	0.73	1.10	1.00

The carbon sink of the log house will compensate annual emissions for 40 - 60 years. But electricity will be CO2-free within 20 years.

Zero Emission Log Houses



The carbon sink of the log house will compensate annual emissions for 100 years. With two-store log house the net emissions are -20 tons in the year 2120

Housing and traffic do not cause net emissions in the future

Carbon storage of a 270 mm log house are 60 tons CO2

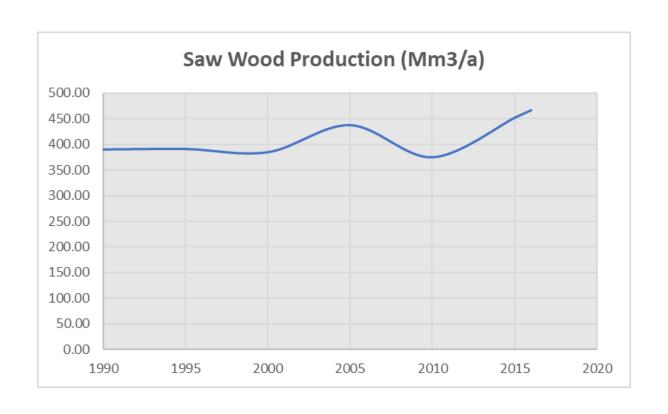
Heat pump emissions for 40 tons for 100 years

CO2 emissions of an electric car are 9 tons for 100 years

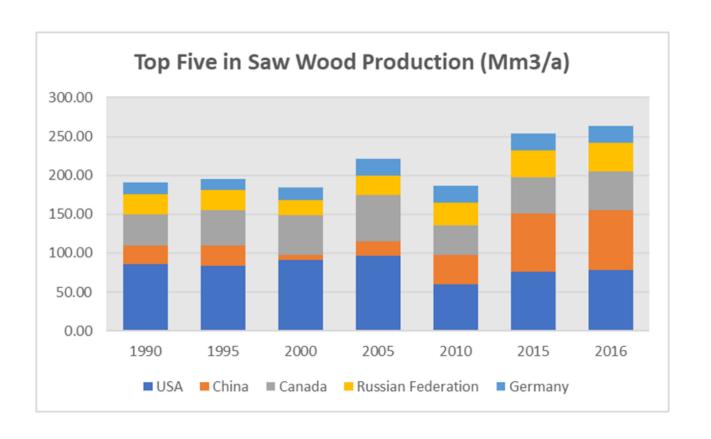
Net CO2 emissions are negative

5. INCREASING CARBON SINKS

Build houses from wood instead from concrete



Saw wood production should be increased



6. ACTIONS IN INDIVIDUAL COUNTRIES

Larger reductions will be needed, if emissions are more than average

- 5 %/a reductions, if emissions are more than 10 tons/capita (USA, Canada, Russia)
- 3 %/a reductions, if emissions are 5 10 tons per capita (EU, China, Finland)
- I %/a reductions, if emissions are 2 5 tons per capita

7. SUMMARY

Summary

It is possible to limit global warming to 2.0 deg. C, if emissions will be reduced at least 2 % annually or with the target plan

This can be achieved by installing zero emission power plants (Wind, Solar, Hydro, Nuclear, Bio) and changing cars from oil to electricity.

Summary

Indicidual countries should limit their emissions below 1.8 tons/capita.

Countries with more than 10 tons/capita, should reduce their emissions 5-10 %/a

Countries with 5 – 10 tons/capita should reduce their emissions 3 - 5 %/a

Countries with 2 – 5 tons/capita could limit their emissions 0 - 3 %/a

Summary

Finland has an energy plan, which has a target to reduce emissions to same level as LULUCF sinks by 2035, but new plan is needed to achive 1.8 tCO2/capita by 2050

Individual persons can start zero emission living today, by building log houses and heat them by heat pumps and by buying electric cars

Reference

The book "Fundamentals of Global Warming" can be downloaded from

www.ekoenergo.fi