

Framtidens energianvändning?



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Om Framtiden...

Allt som kan uppfinnas har redan upfunnits
Charles H. Duell, US Patent Office, 1899



Jag tror det finns en världsmarknad för c:a 5
datorer

Thomas J. Watson, Styrelseordförande, IBM, 1943

Vi gillar inte deras sound. Gitarrgrupper är på väg
ut.

Decca-chef om Beatles, 1962

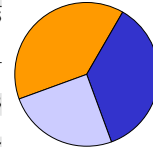
Ingen kvinna kommer att bli premiärminister under
min livstid

Margaret Thatcher, 1969

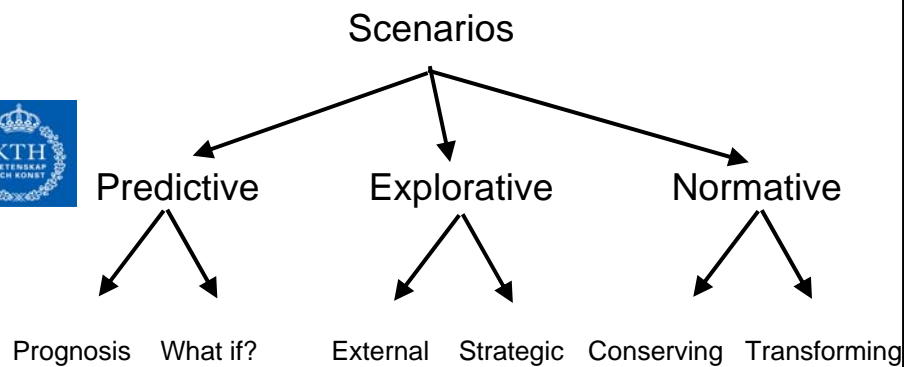
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Energianvändning idag (sektorer)

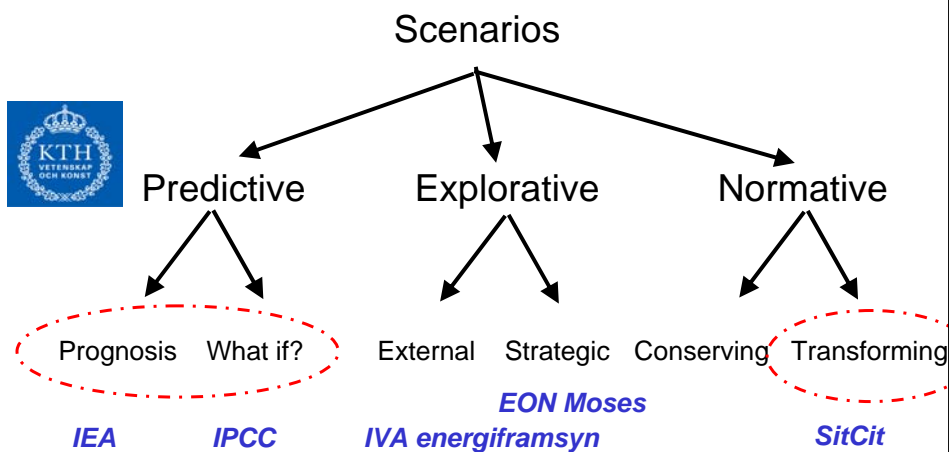
TOTAL FINAL USE PER SECTOR	TWh	PJ
Industri / Industry		
El / Electricity	56	202
Fjärrvärme / District heating	6	20
Oljor / Oil products	20	73
Naturgas, stadsgas / Natural gas, gasworks gas	6	20
Kol, koks / Coal, coke	17	60
Biobränslen, torv, m.m. / Biofuels, peat, etc.	53	190
Totalt / Total	157	565
Transporter / Transports		
El / Electricity	3	11
Oljor / Oil products	96	345
Naturgas / Natural gas	0	1
Etanol / Ethanol	2	7
Totalt / Total	101	363
Bostäder, service m.m. / Residential, services etc.		
El / Electricity	72	260
Fjärrvärme / District heating	42	151
Olja / Oil	15	54
Naturgas, stadsgas / Natural gas, gasworks gas	2	9
Biobränslen / Biofuels	14	50
Totalt / Total	145	523
Total slutlig användning / Total final use	403	1 452



Scenariotekniker

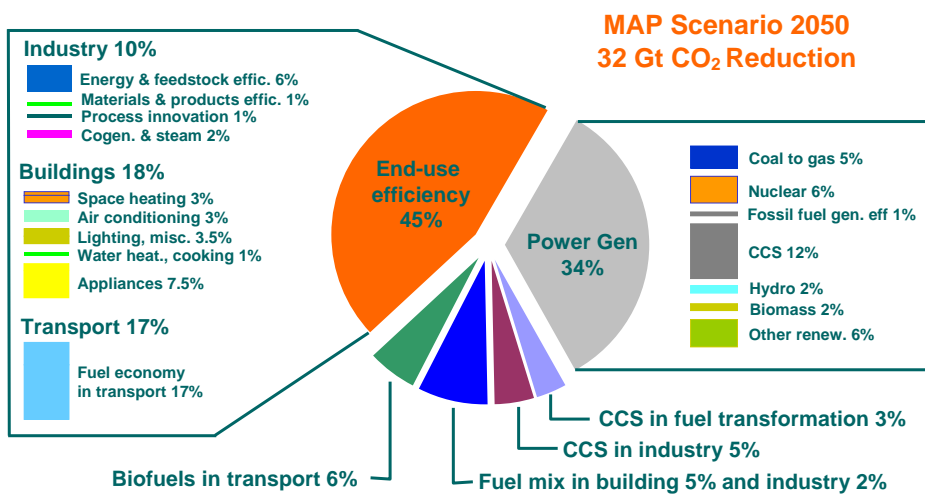


Scenariotekniker



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Resultat från typiskt "predictive" IEA Energy technology futures

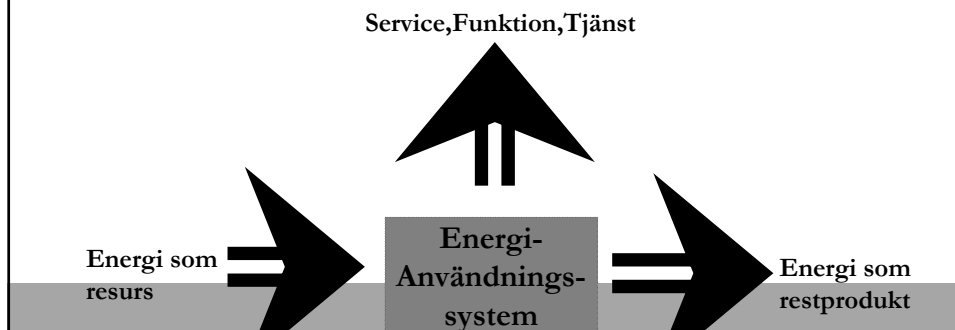


**End-use efficiency offers the largest potential (45%)
Power Gen. 34%, CO₂ Capture & Storage (CCS) 20%**

Människor använder inte energi! Vi konsumerar produkter, funktioner och tjänster... ...som behöver energi



Alltså: Vi måste kartlägga framtidens energianvändning utifrån aktiviteter, livsstilar etc. d.v.s. via framtidsscenarier



2 kW idén (i SitCit):



De flesta aktiviteter kräver energi (upprätthålla inomhusklimat, transporter, kommunikation, odling, förvaring av matvaror, ljus etc)

Dessa aktiviteter ska på årsbasis inte ge upphov till ett större genomsnittligt effektuttag av primärenergi än 2 kW per person (normativt mål).

Detta kommer även att ge ett stort bidrag till minskade CO₂ utsläpp!

Vad är då primäre energi?

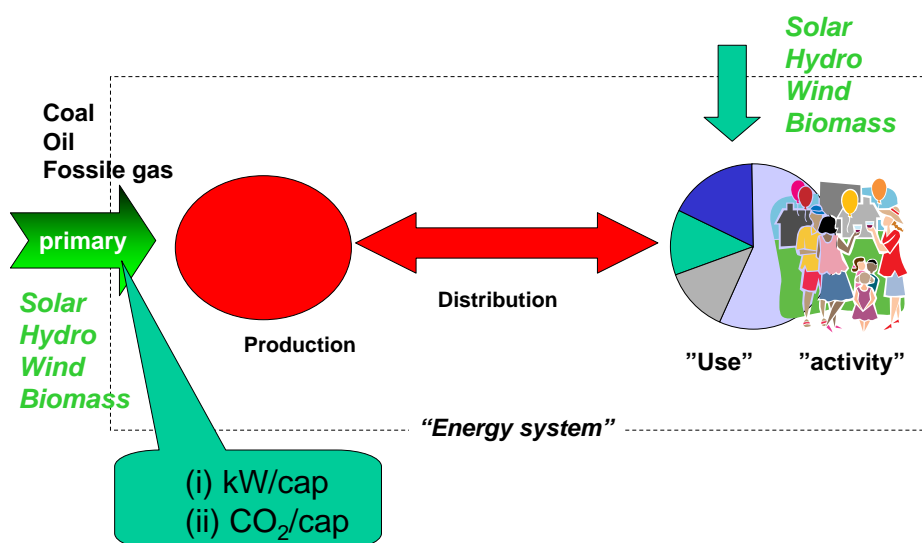


Olja, Kol, naturgas, storskalig vattenkraft, storskaligt uttag av biomassa, etc...

Men inte: passiv solenergi, solvärme via värmepumpar, lokal vindkraft, värmeåtervinning, dvs energi som "skördas" lokalt.

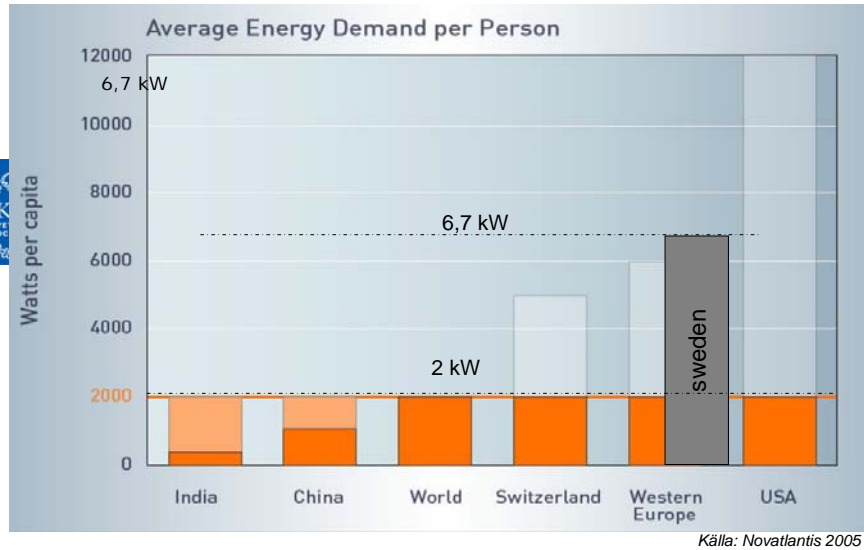
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Primäre energi (kW/cap) + CO₂ emissioner (ton/cap)



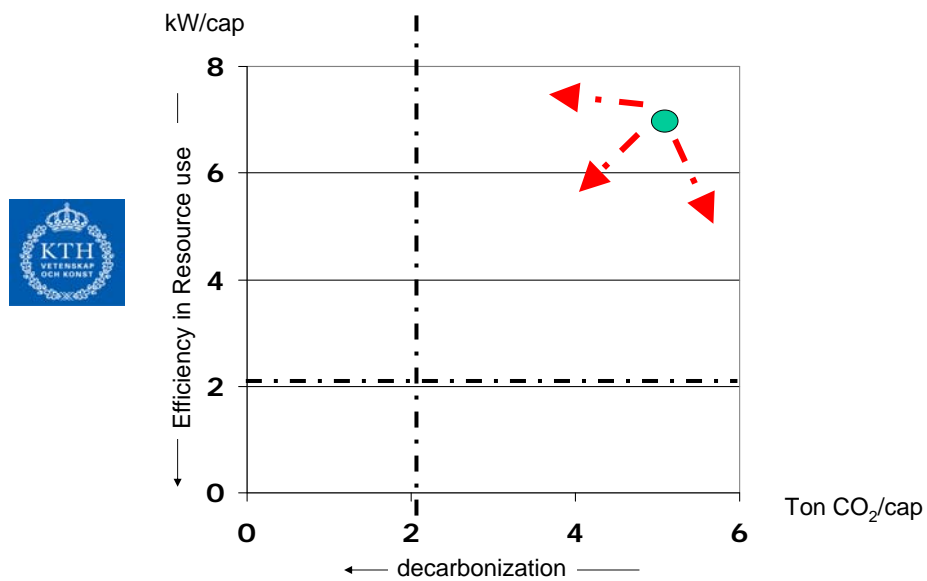
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Så...var ligger vi idag?



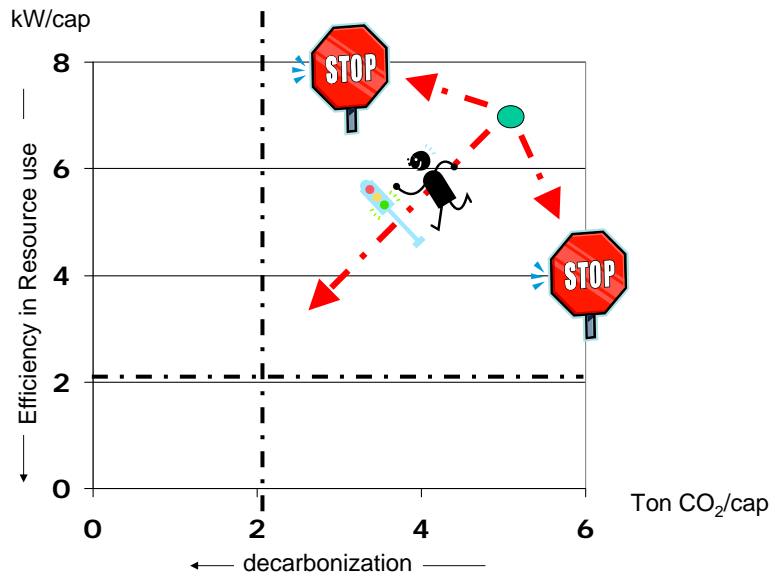
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Två dimensioner: energianvändning och CO₂



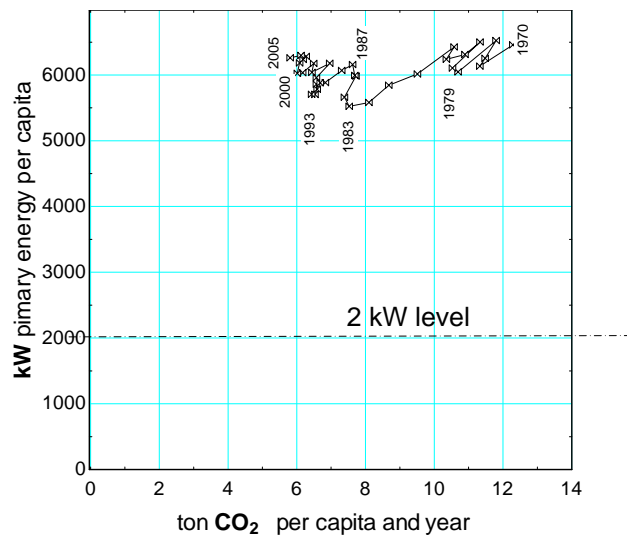
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Minimize energy use and CO₂ emissions

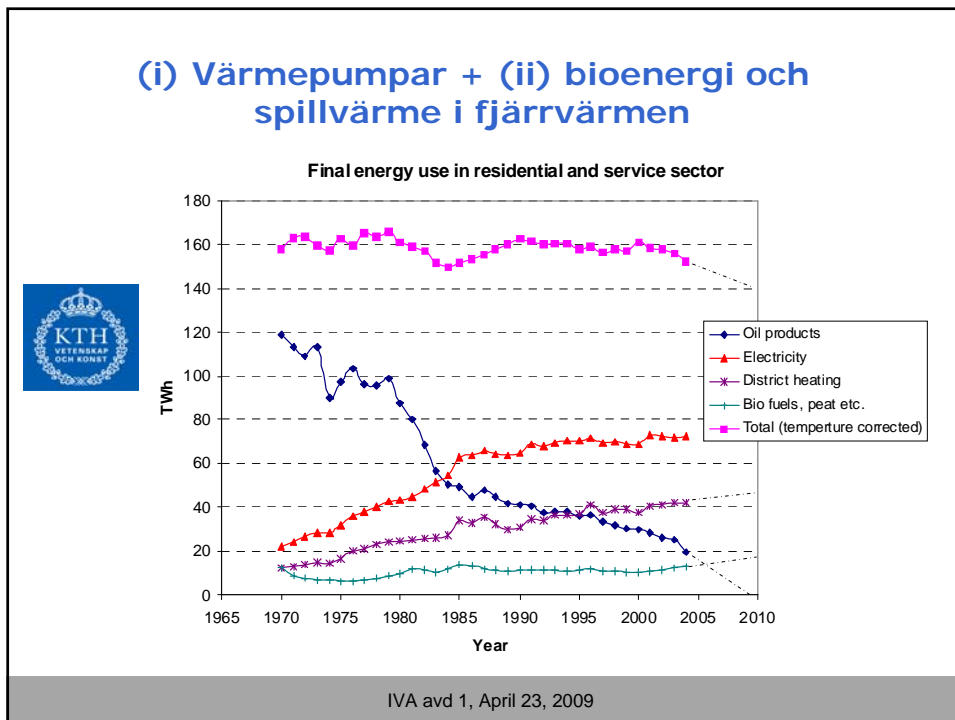
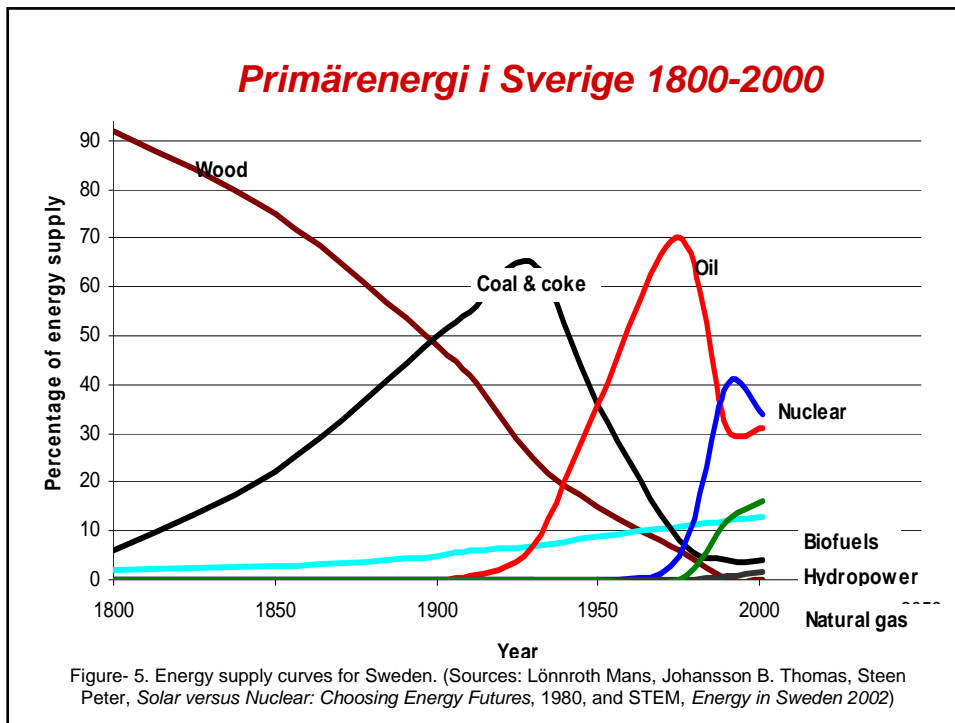


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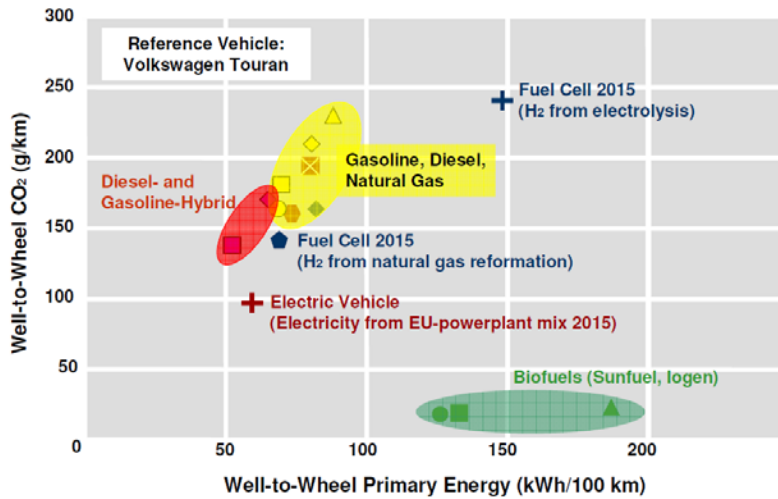
Sverige – i stort sett rörelse i en dimension...



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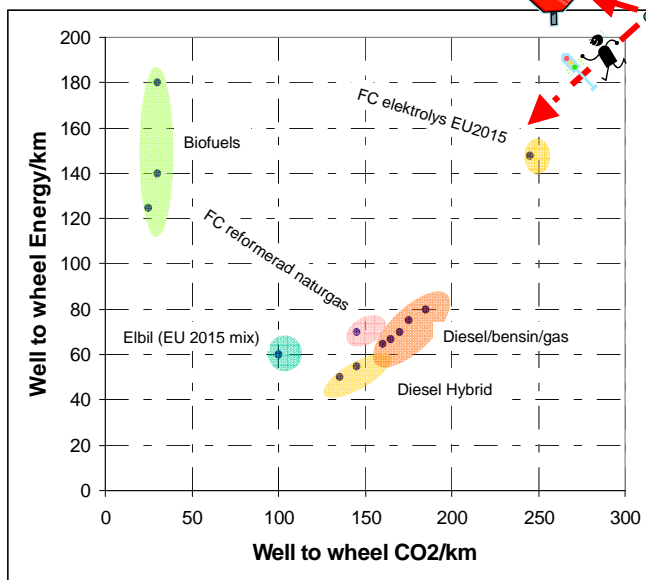
**GHG and Energy Efficiency
 of Different Drivetrain/Fuel Configurations**



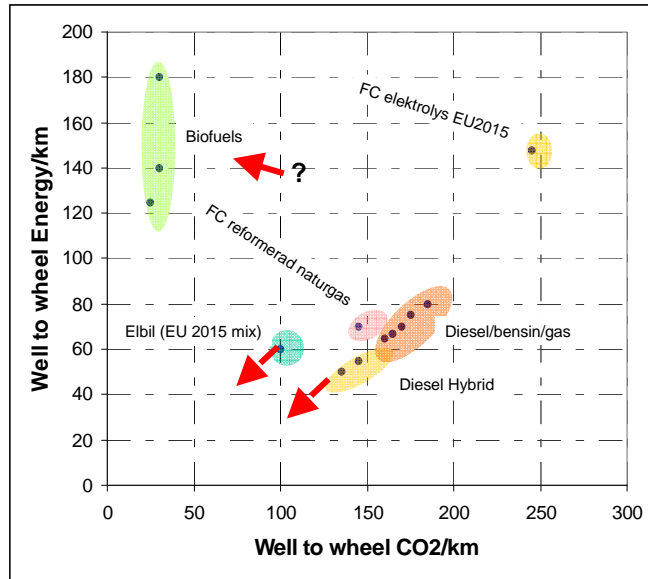
Konzernforschung
 Forschungsleitung

*Data does not include the production and recycling of the drivetrain components

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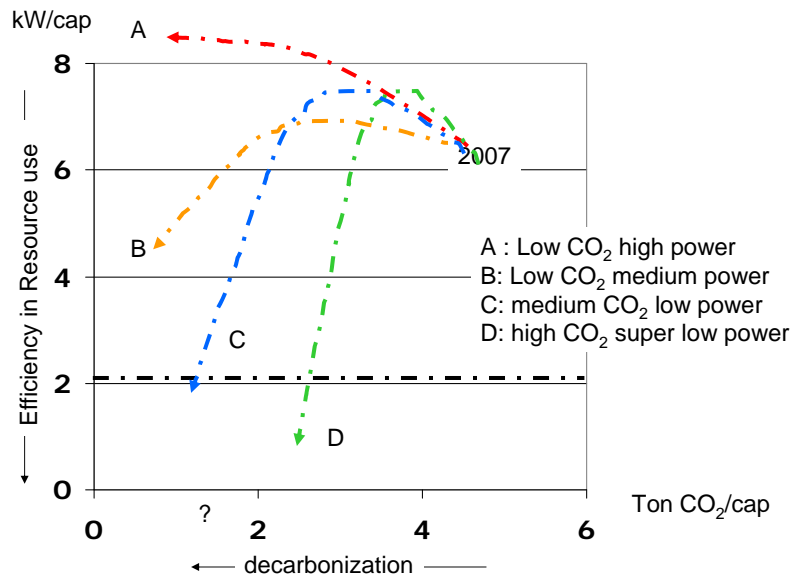
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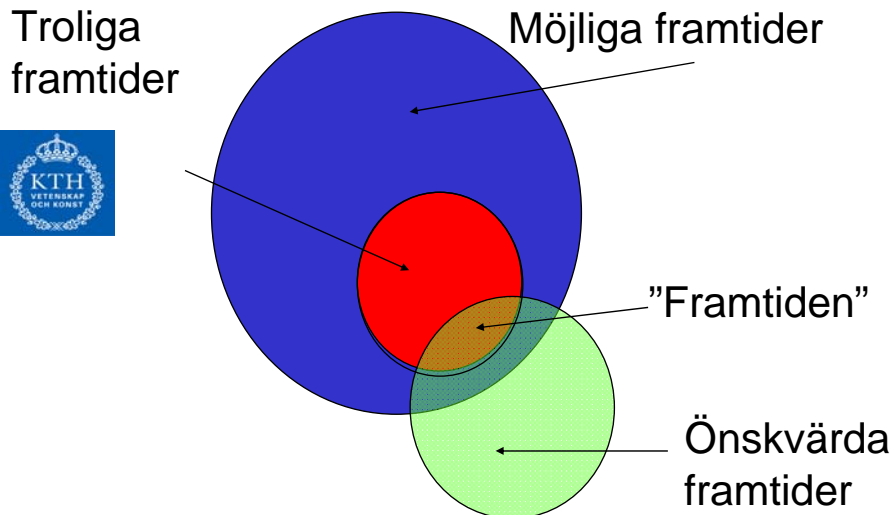


Det finns flera alternativa vägar



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Tre olika framtider




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Cool Earth-Innovative Energy Technology Program, Japan 2008 Critical technologies that needs to be developed

Sector	Innovative Energy Technology
Power generation/ transmission	High-efficiency natural gas fired power generation High-efficiency coal fired power generation Carbon capture and storage (CCS) Innovative photovoltaic power generation Advanced nuclear power generation High-efficiency superconducting power transmission
Transport	Intelligent transport system (ITS) Fuel cell vehicles (FCV) Plug-in hybrid vehicles and Electric vehicles (EV) Transport biofuels
Industry	Innovative materials/ manufacturing/ processing Innovative steel making process

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Cool Earth-Innovative Energy Technology Program, Japan 2008

Sector	Innovative Energy Technology
Private sector 	High-efficiency houses and buildings Next-generation high-efficiency lighting Stationary fuel cells High-efficiency heat pumps High-efficiency information devices and systems House energy management systems (HEMS), Building energy management systems (BEMS) and Regional energy management systems (REBS)
Cross-sectoral technologies	High-performance power storage Power electronics such as inverters using semiconductors for power generation, transmission, storage and electric appliances Hydrogen production, transport and storage

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Key technologies for the future:

[IEA Energy technology perspectives 2008](#)

Supply side	Demand side
<ul style="list-style-type: none"> ■ CCS fossil-fuel power generation ■ Nuclear power plants ■ Onshore and offshore wind ■ Biomass integrated-gasification combined-cycle and co-combustion ■ Photovoltaic systems ■ Concentrating solar power ■ Coal: integrated-gasification combined-cycle ■ Coal: ultra-supercritical ■ Second-generation biofuels 	<ul style="list-style-type: none"> ■ Energy efficiency in buildings and appliances ■ Heat pumps ■ Solar space and water heating ■ Energy efficiency in transport ■ Electric and plug-in vehicles ■ H₂ fuel cell vehicles ■ CCS in industry, H₂ and fuel transformation ■ Industrial motor systems

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