Bosse Andersson

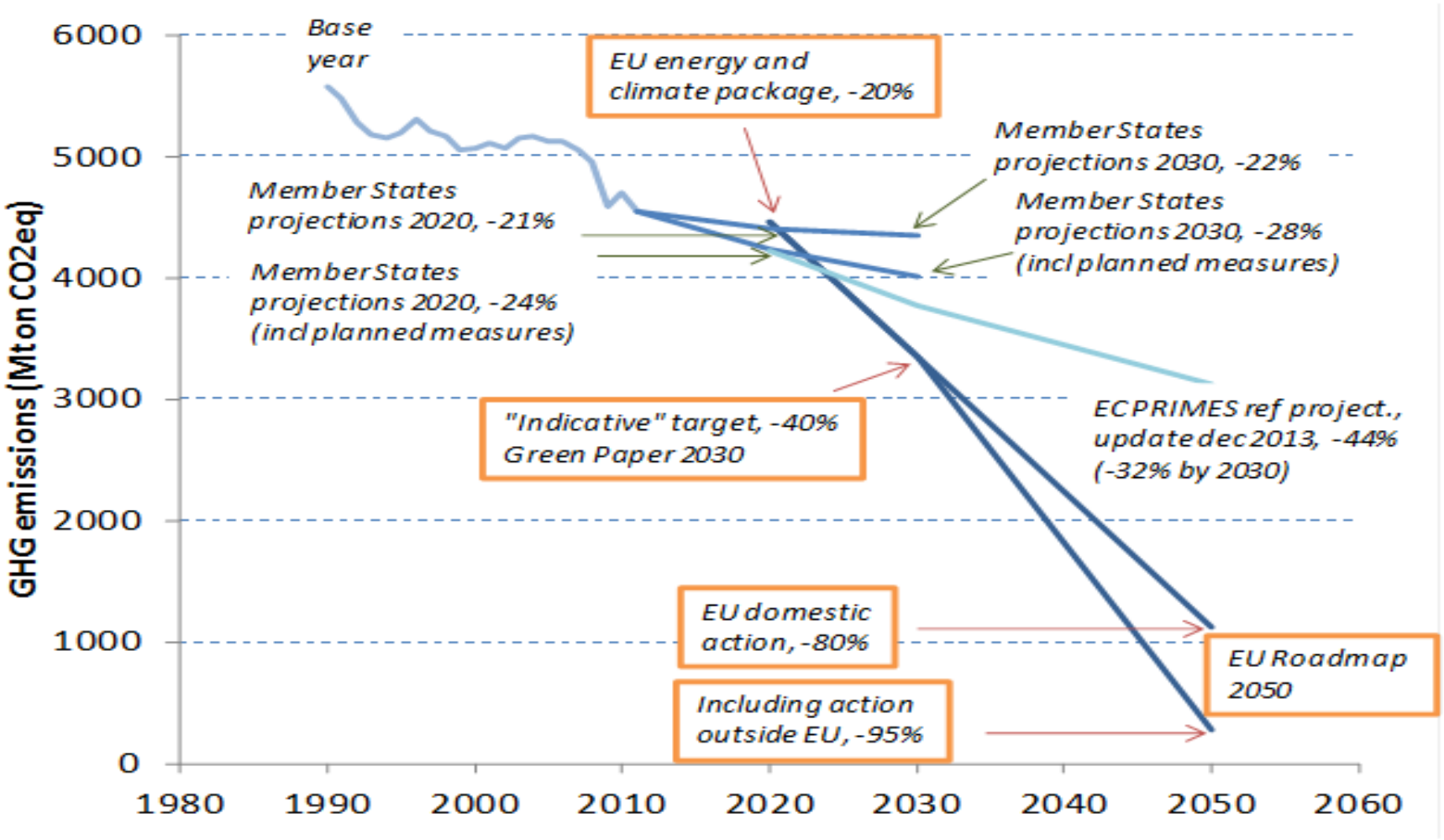
A Challenging Future

What it´s all about

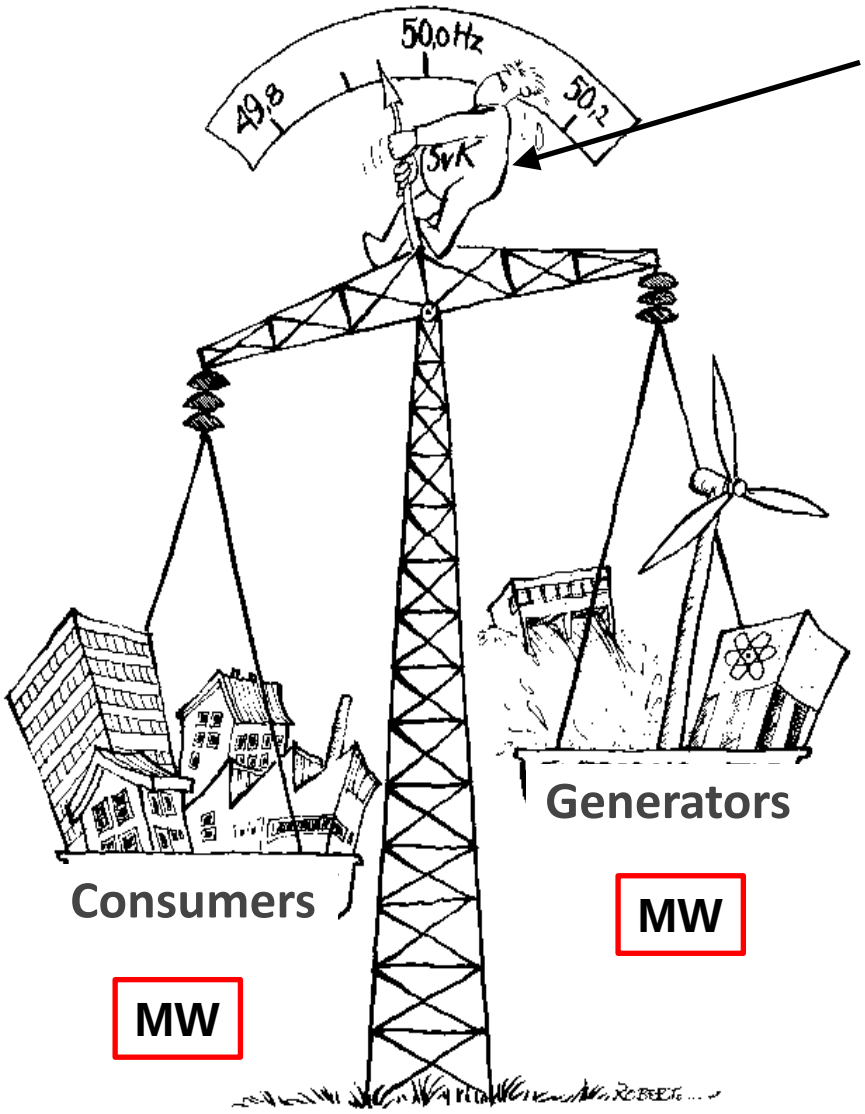
A few years ago, climate change was in the centre of public debate….

...economic crises, unemployment, recession has changed focus

GHG emissions in EU-27: recent trends, projections and targets



The electrical system requires balance - every second



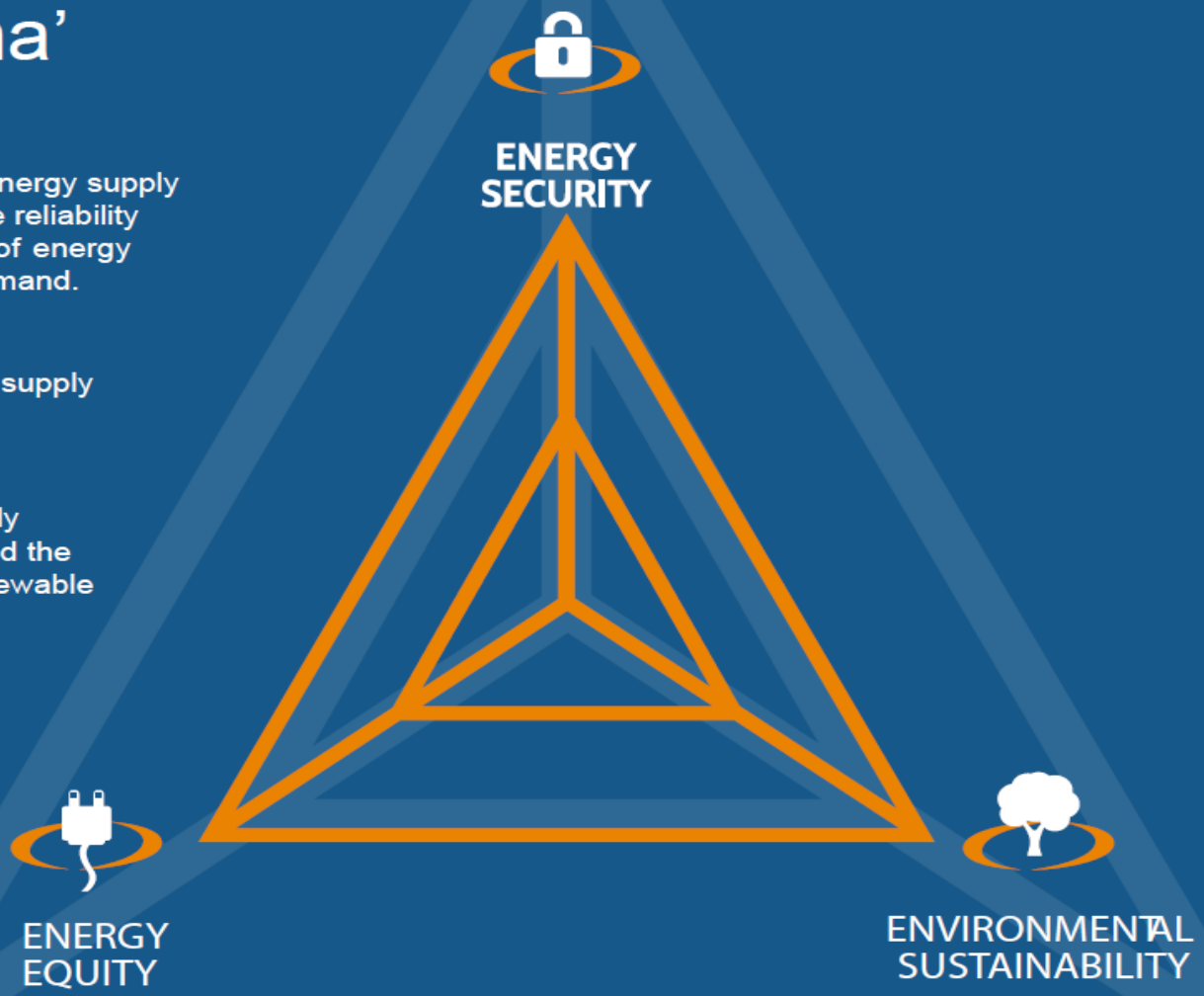
Picture by SvK

Balancing the ‘Energy Trilemma’

Energy Security
The effective management of primary energy supply from domestic and external sources, the reliability of energy infrastructure, and the ability of energy providers to meet current and future demand.

Energy Equity
Accessibility and affordability of energy supply across the population.

Environmental Sustainability
Encompasses the achievement of supply and demand side energy efficiencies and the development of energy supply from renewable and other low-carbon sources.



Electricity generation 2006 and 2010

18 930 TWh

Hydro power
16,0 %

Other
2,3%

Nuclera
14,8 %

Fossil fuels
66,9%

21 431TWh
(+2 501)

Hydro power
16,0 %

Other
3,7%

Nuclear
12,9 %

Fossil fuels
67,4%

Source: IEA, ”Key World Energy Statistics 2008 och 2012”

Game changers

Source: DNV

The Limit Of Oil Production Is Being Reached - Not

- In 1919 the US had produced 4 billion barrels of oil and the US Bureau of Mines though the country would run out of oil by 1930
- By 2012 the US has produced about 205 billion barrels

•**Carl Beal (US Bureau of Mines in 1919):**

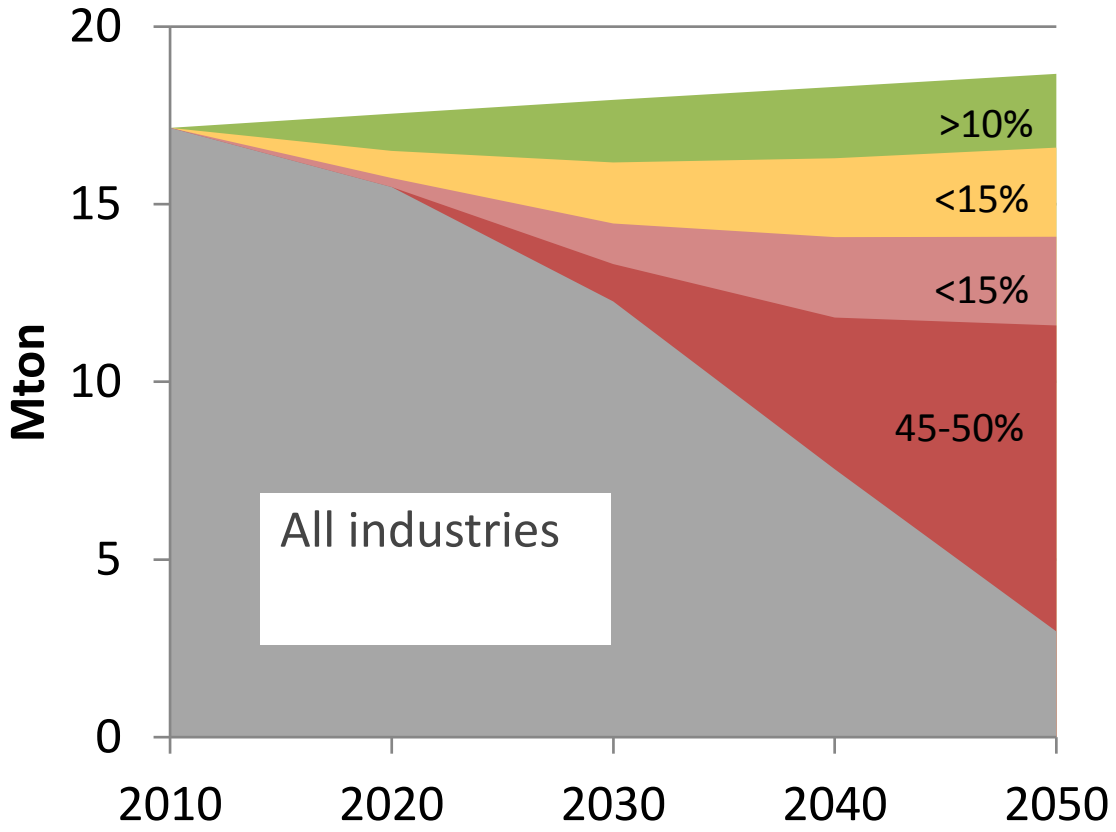
"The limit of production in this country is being reached, and although new fields undoubtedly await discovery, the yearly output must inevitably decline, because the maintenance of output each year necessitates the drilling of an increasing number of wells. Such an increase becomes impossible after a certain point is reached, not only because of a lack of acreage to be drilled, but because of the great number of wells that will ultimately have to be drilled.»

The statement above could have been stated now about sceptics to shale oil production in the US, but it was written in 1919.

•**MIT professor Morris Adelman:**

•"In the United States in **1930, proved reserves were 13 billion** barrels. Over the next 60 years, the United States, without Alaska, produced **130 billion** barrels. The inventory turned over ten times."

Potential for reduction of CO2 emissions in Swedish industry - total



Emission reduction measures

1. Existing technology & operations, with moderate costs

2. Existing technology & operations (BAT), with relatively high costs and / or process changes

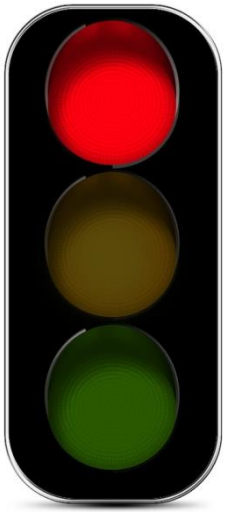
3. Bef. or new measures and technologies near commercialization, involving significant investment and or process changes

4. New measures and new technologies, which currently is on R & D stage

Challenges

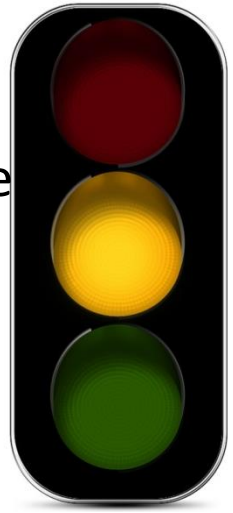
Red – very challenging:

- CCS and CO2 infrastructure establishment
- More than 25% share of wind and solar power into the electricity system
- Very large transmission grid improvments
- Very large structural changes in industry and transport
- Very high efficiency at the user end



Yellow – big challenges:

- New construction and reinvestment in nuclear
- 10-25% share of wind and solar power into the electricity syste
- Big improvement of the transmission grid
- Big structural changes in industry and transport
- Large efficiency improvements in user level



Make electricity investable……..


Thank you!