

VISTA-day 2018:
Closing the Carbon Window- The Role of
CCS in Meeting the Paris Agreement

Anders Elverhøi
Vista Board

The Emission Challenge

- IPCC 2018:
- 1.5°C,
 - global net anthropogenic CO₂ emissions decline by about **45%** from 2010 levels by **2030** reaching net **zero around 2050**
- 2°C,
 - CO₂ emissions are projected to decline by about **20%** (from 2010) levels by **2030** in most pathways and reach net **zero around 2075**
- Emission Pathways and System Transitions:
 - .. transitions in energy, land, urban and infrastructure including transport and buildings, and industrial systems
 - How to mitigate:
 - **reduce GHG emissions**
 - **increase the share of renewable energy**
 - **improvement in energy efficiency**

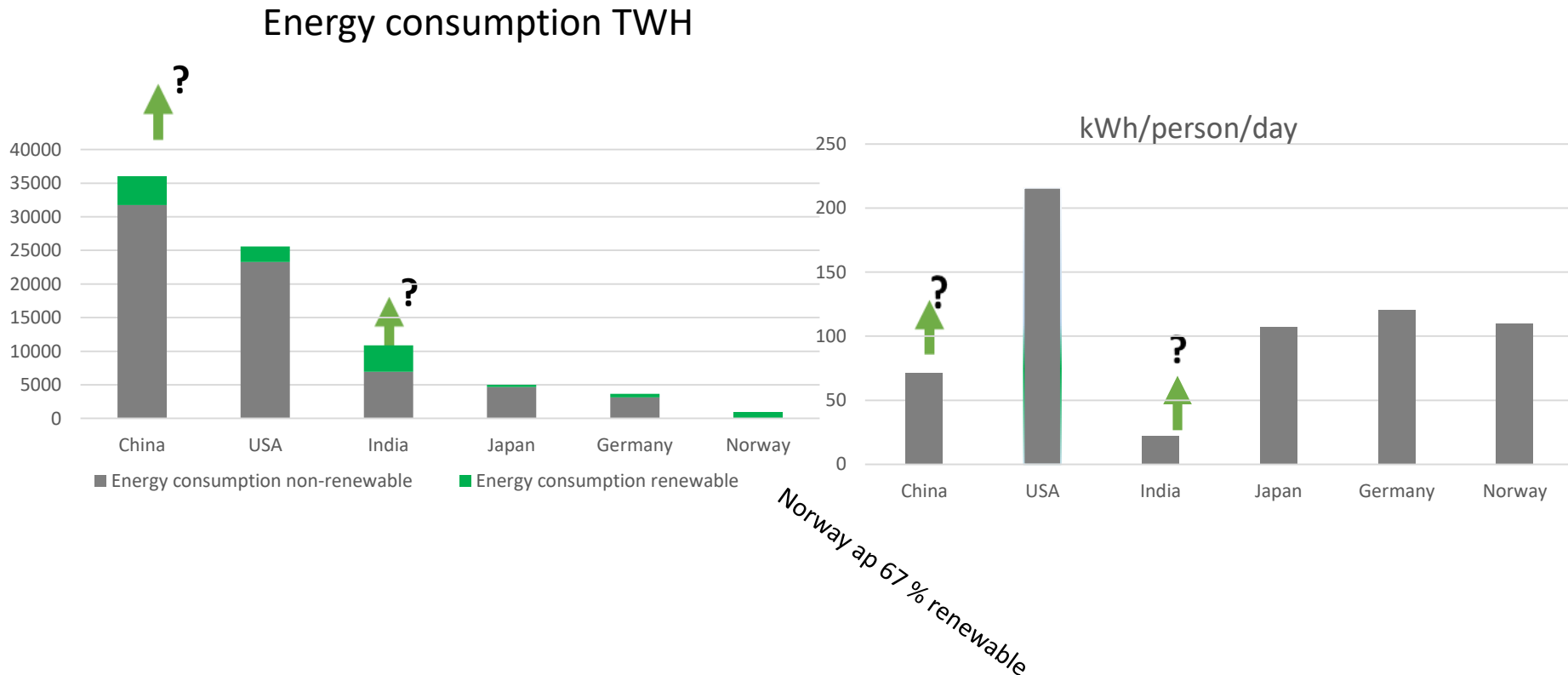
«The hard facts»

- World Economic growth:
 - 2017: +3.7%,
 - 2016: +3.1%
- World energy consumption
 - 2017 +2.1%
 - 2016: +1%
- CO2 emissions from reduction to increasing
 - 2017 +2%
 - 2016 -0,5 %
- **IEA 2017:**
 - Oil demand grew by 1.6%
 - Natural gas consumption grew 3%,
 - Coal demand rose about 1%
 - Renewables had the highest new capacity growth rate
 - Energy efficiency improvements slowed significantly, only 1.7% in 2017
 - Fossil fuels accounted for 81% of total energy

Data Source: Enerdata

Total energy consumption and per/person/day

— what about the future, e.g. China and India

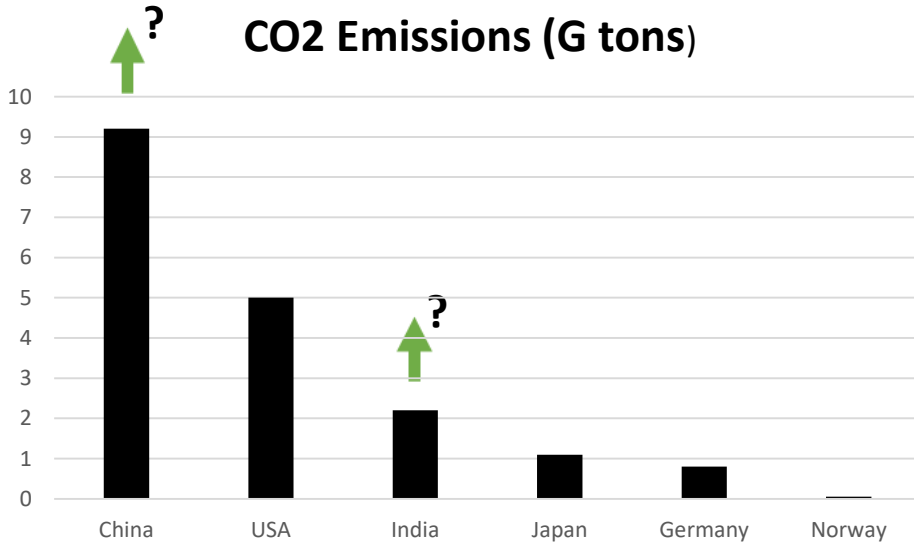


CO2 emissions per country and emissions per capita

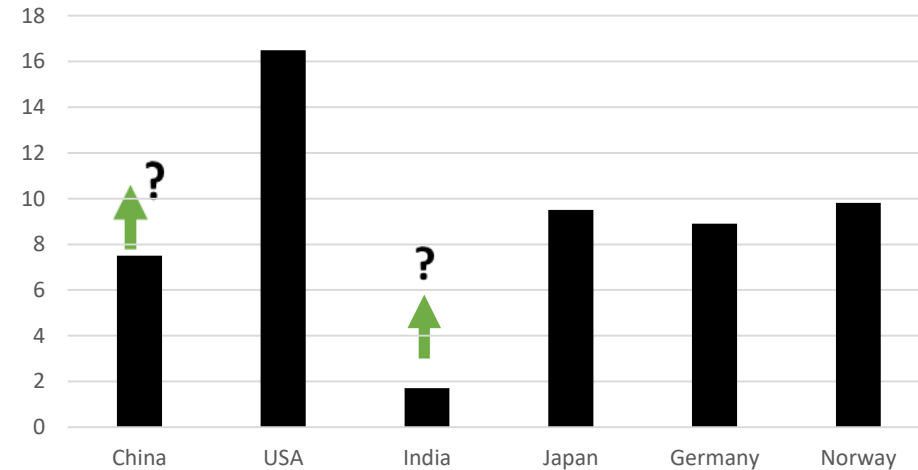
— what about the future, e.g. China and India

China: 46.7 GW of new and restarted coal-fired power construction ?

CO2 Emissions (G tons)

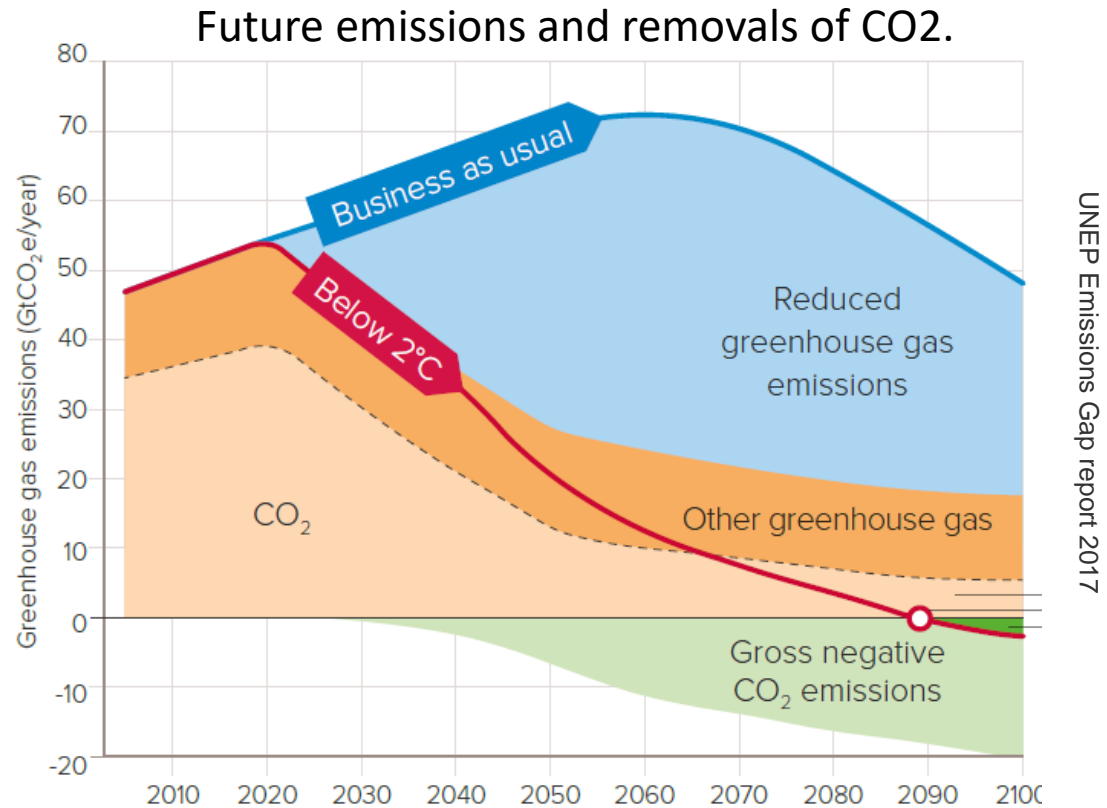


CO2 emissions per capita (metric tons)



How to deal with CO₂ emissions - science knows the answer!
- e.g. Arrhenius 1898 and Nordhaus 2018

- **Norway (and UK)**
– a major hub
for CCS/CCSU??



....a more realistic mantra is:

if everyone does a little, we'll achieve only a little.

Program – overview – key experts

Principal Aspects

- **Roles and challenges for CCUS in Meeting climate targets,**
Professor Robert Armstrong , Director, MIT Energy Initiative
- **Negative emission technologies and the importance of CCS,**
Professor Mike Norton, EASAC
- **Equinor: “Shaping the future of energy - The importance of CCS”.**
Research director Henriette Undrum, Equinor

CCS and its Technical Aspects

- **Assessment of CO2 storage options: technology, capacity, and public safety,**
Professor Ruben Juanes, MIT
- **Perspectives on the energy transition and the role of CCS,**
Research director Marie Bysveen, SINTEF Energy

Closing the carbon window—Economic, Public and Political aspects

- **CO2 reduction pathways: choosing among options,**
Dr. Francis O’Sullivan MIT Energy Initiative
- **Public acceptance of CCS – The key issues,**
Professor Linda Steg, RUG
- **The Paris Agreement – will be able to succeed?,**
Professor Miranda Schreurs, TUM

Summary/concluding remarks,

- Professor Arild Underdal