

Decoupling of economic growth from conventional energy consumption and GHG emissions

**Brussels,
22 October 2015**

Introduction

Relationship between economic growth and GHG emissions

- Conventional view: strong growth translates into higher energy consumption and thus, GHG emissions

versus

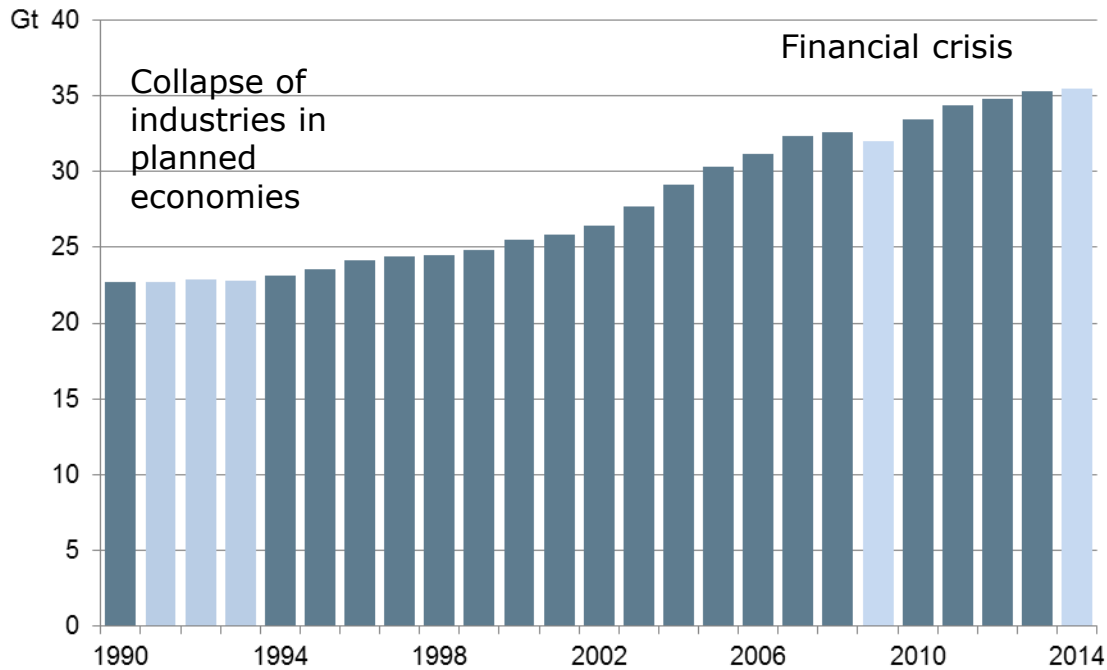
- Decoupling view: energy consumption and GHG emissions increasingly decouple from economic growth

Potential drivers for decoupling

- Increasing relevance of energy from renewable sources
- Increasing energy efficiency (supply and/or demand side)
- Structural change (replacement of energy-intensive by energy-extensive industries)

➤ Empirical evidence?

Global energy-related CO2 emissions [Gigatonnes]



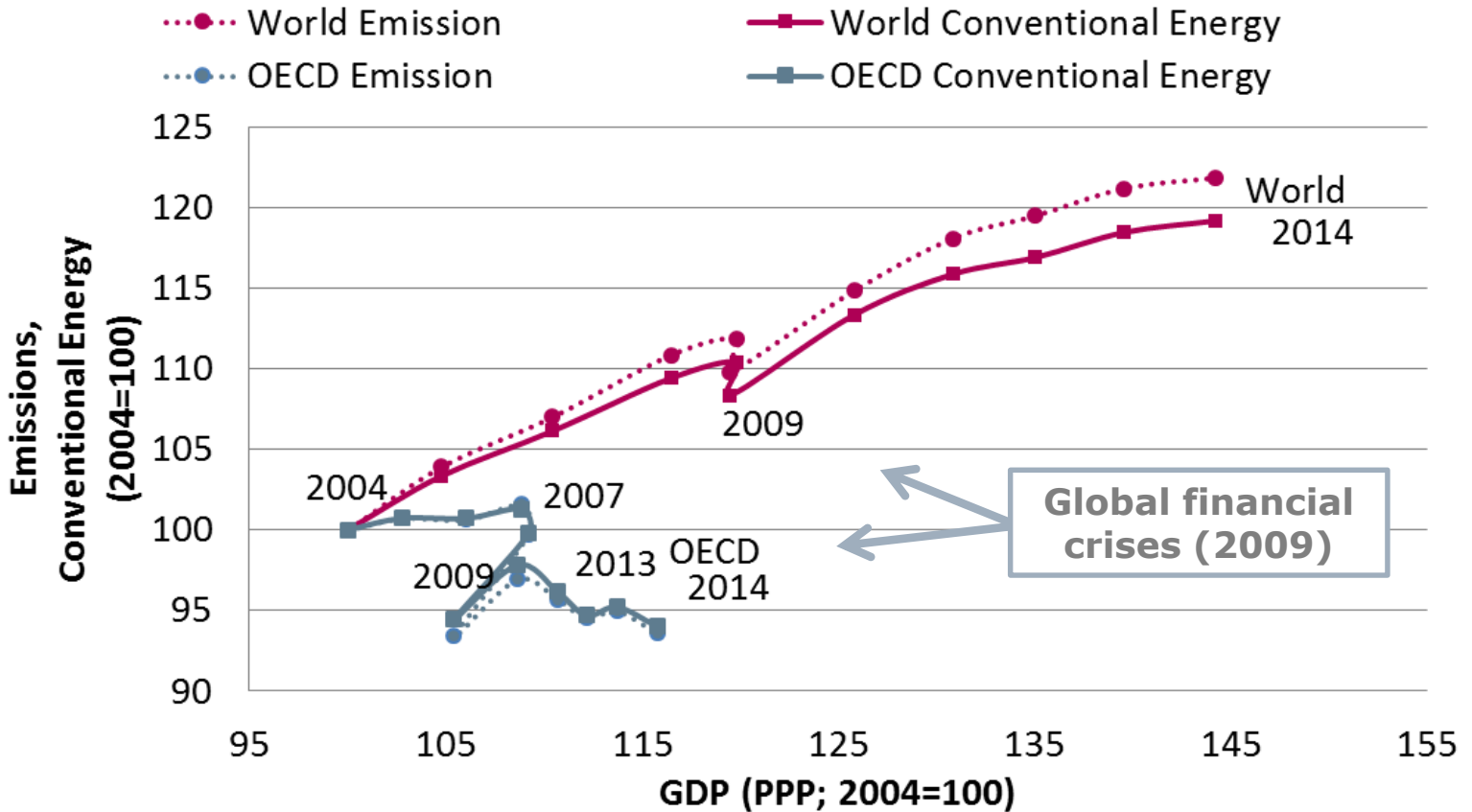
Quantitative Analysis

Defining *Decoupling*:

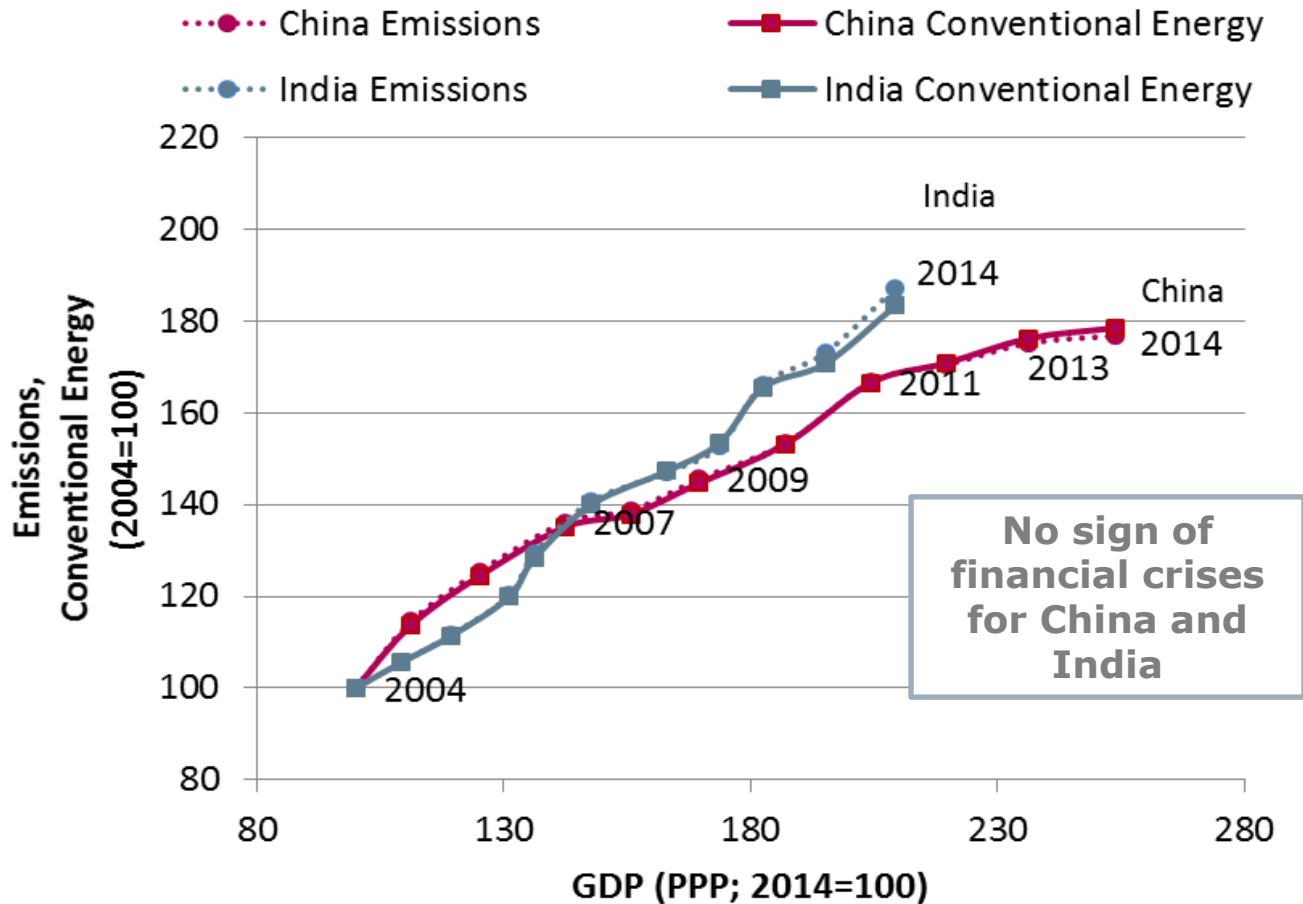
- **Weak:** GDP growth with declining energy intensity
(*defined as energy consumption per GDP*)
- **Strong:** GDP growth with declining energy consumption

- Focus on OECD (EU, USA, Australia, Canada, etc.) and selected non-OECD countries (China, India, Malaysia, Vietnam)
- Conventional (oil, coal, gas, nuclear) and Renewable Energy (hydro, solar, wind, biomass)
- Data sources: BP Statistical Review of World Energy & World bank indicators: time series 2004 – 2014

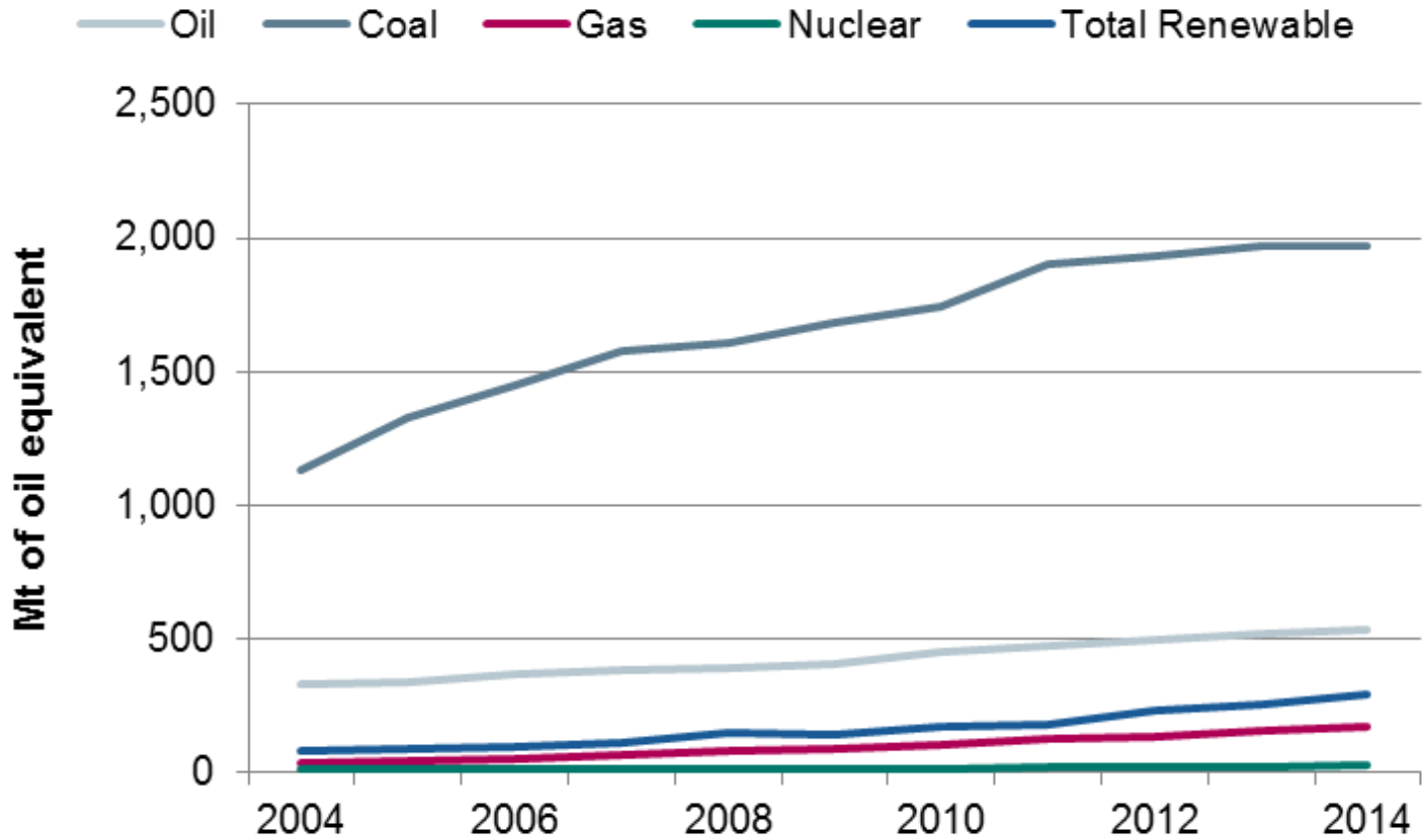
Weak decoupling from economic growth at world level and even strong decoupling within OECD!



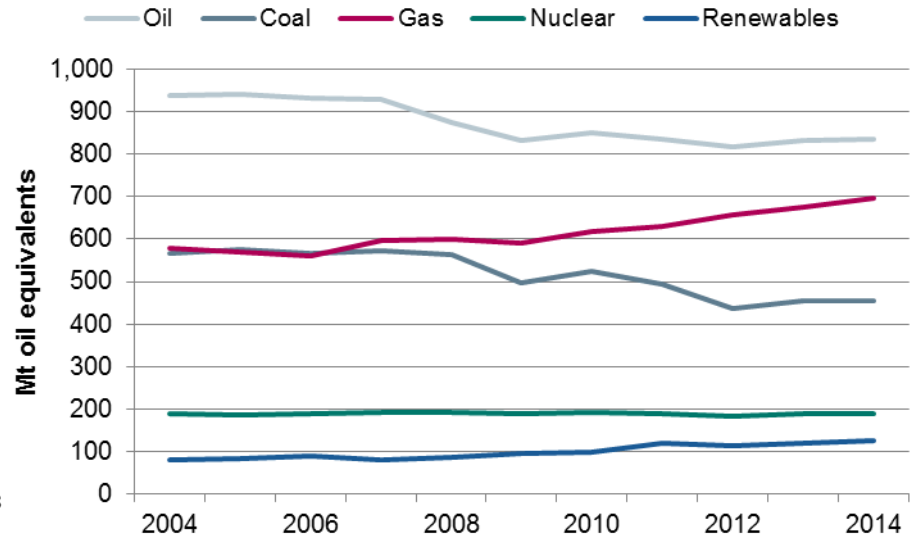
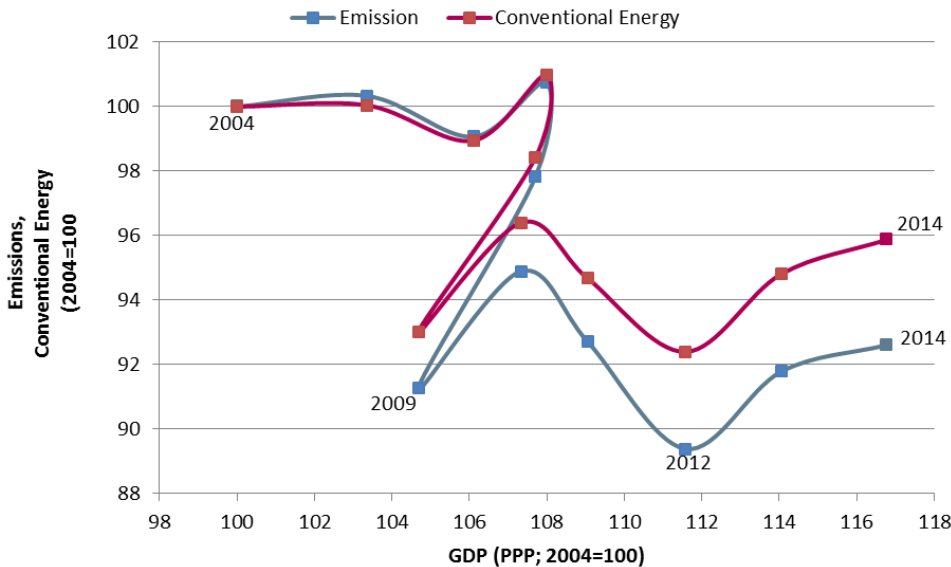
No real decoupling trend in India, weak decoupling in China (and even turning towards strong decoupling)



Oil and coal consumption in China to reach capacity limits, to be replaced by either gas or renewables



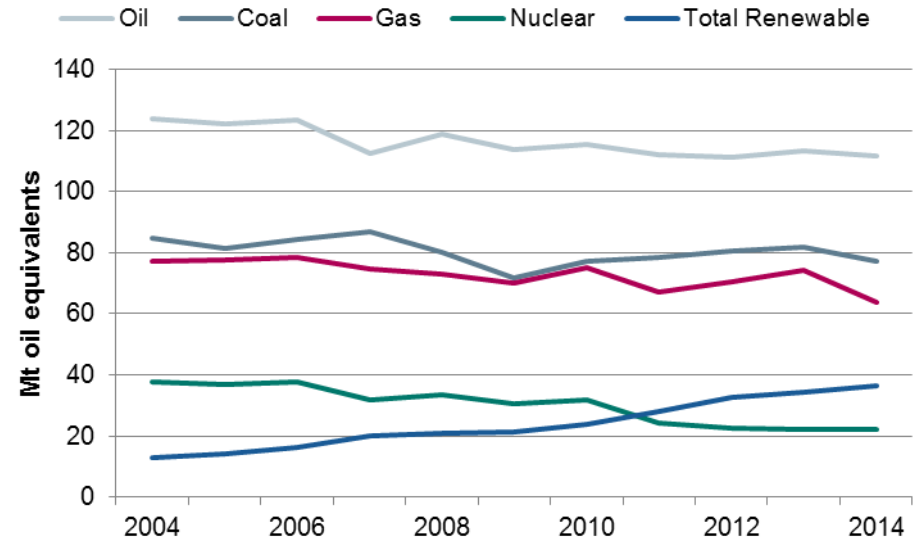
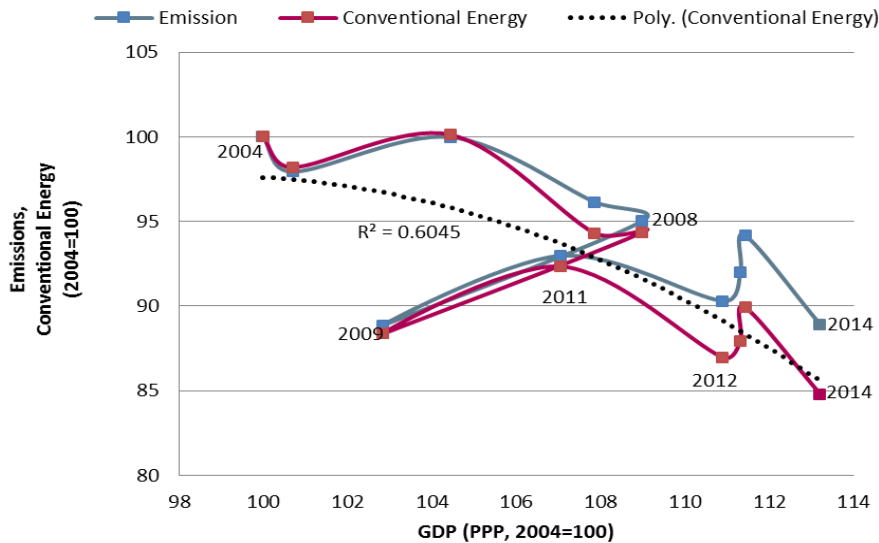
US: no apparent link between growth and energy consumption, coal and oil consumption decline



Stagnation of primary energy
 Reduction of emissions by 7%
 Latest: Bounce back?

Gas +20%, Coal -20%
 Oil increase since 2012
 Renewables gained 53%

Strong decoupling in Germany driven by substitution of conventional fuels by renewable energies



Primary energy: - 8%
Emissions: - 11%

Nuclear: - 42%
Gas: - 17%
Coal: - 9%
Oil: - 10%
Renewables: +185%

Conclusions

- **World level:** conventional energy consumption and GHG emissions increase with economic growth, but energy intensity declines (→ weak decoupling)
- **But different pattern by regions and countries:**
 - OECD countries → strong decoupling
 - India → no decoupling (constant linear relationship)
 - China → weak decoupling, strong decoupling seems possible in future
 - USA → no apparent link (but substitution of coal by gas reduces emissions)
 - Germany → strong decoupling
- **Decoupling of energy consumption and GHG emissions from economic growth can be found in developed and emerging markets**
- **Expected to continue in future (→ China)!**

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