

# Energy scenarios

## A review of IEA's World Energy Outlook

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1

# Introduction

## What does methodology and model

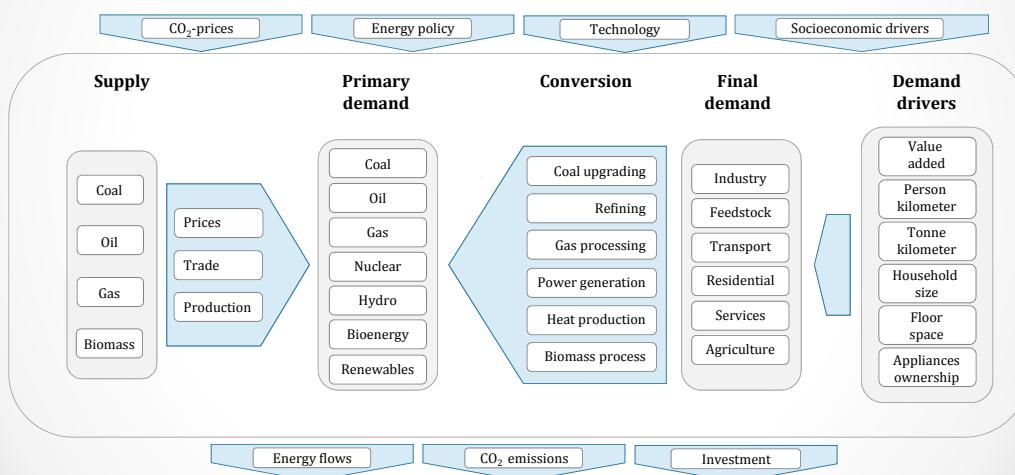
- Authoritative reference document
  - Van de Graaf (2012)
  - Heubaum and Bierman (2015)
- Scenario approach to energy
  - Nielsen and Karlsson (2007)
- Debate and dispute
  - Midttun and Baumgartner (1986)
  - Gaede and Meadowcraft (2016)
  - Metayer et al (2015)
- Methodology and model



2

## Model and methodology

### IEA's World Energy Model (WEM): General overview



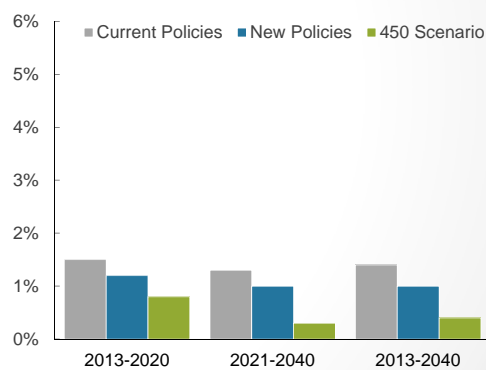
Source: International Energy Agency. 2015. *World Energy Model Documentation*. 2015 version. OECD/IEA 2015.

## Energy and the macro economy

Energy demand allowed to diverge between scenarios,...

- Drivers of energy demand
  - Economic growth
  - Technological change
  - Structural change
  - Prices and policies

Primary energy demand vs GDP  
Average annual growth (per cent)



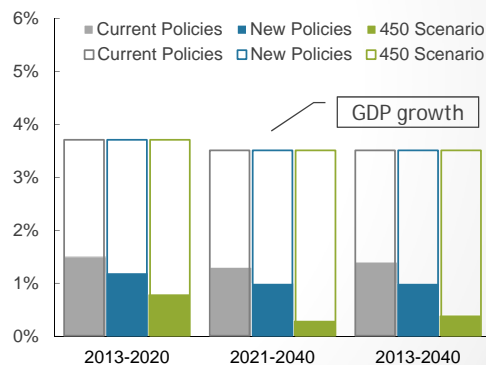
Source: International Energy Agency. 2015. *World Energy Outlook 2015*. IEA, Paris.

## Energy and the macro economy

... but economic growth is the same across scenarios

- Drivers of energy demand
  - Economic growth
  - Technological change
  - Structural change
  - Prices and policies
- Exogenous economic growth
  - No variation across scenarios

Primary energy demand and GDP  
Average annual growth (per cent)



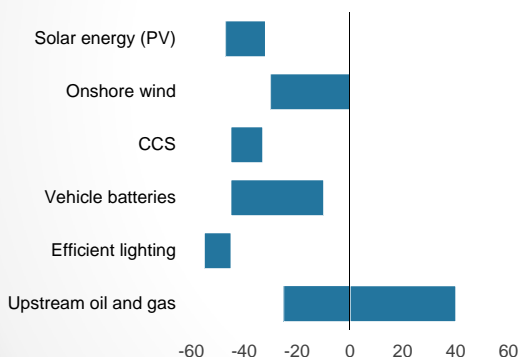
Source: International Energy Agency. 2015. *World Energy Outlook 2015*. IEA, Paris.

5

## Energy technology

“Black swan” - or “Slow train coming”?

Unit cost by technology  
Change 2014-2040 (per cent; New Policies Scenario)



- Means to an end
- Modelling strategy
- Prices and policies
- Economic behaviour
- Role of uncertainty

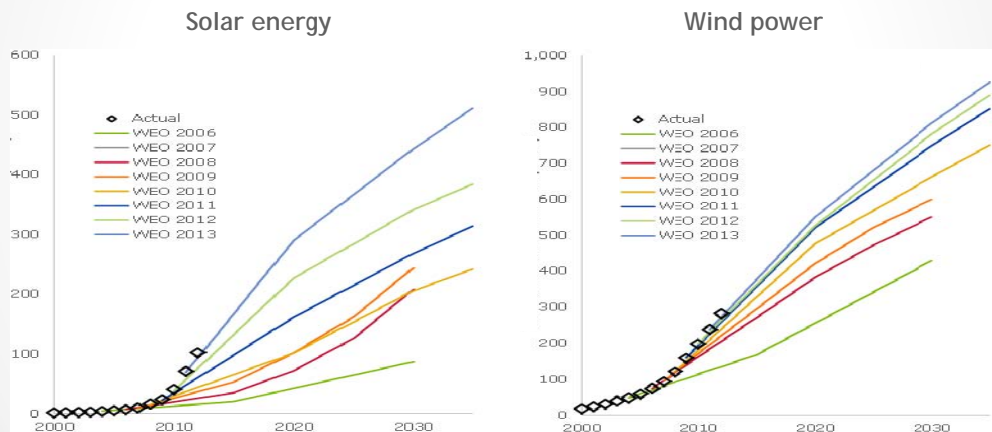


Source: International Energy Agency. 2015. *World Energy Outlook 2015*. IEA, Paris.

6

## New renewable energy

Installed capacity (GW), New Policies Scenario



Source: de Vos og de Jager (2014). Blog-article, Energy Post (<http://www.energypost.eu>), 14 March.

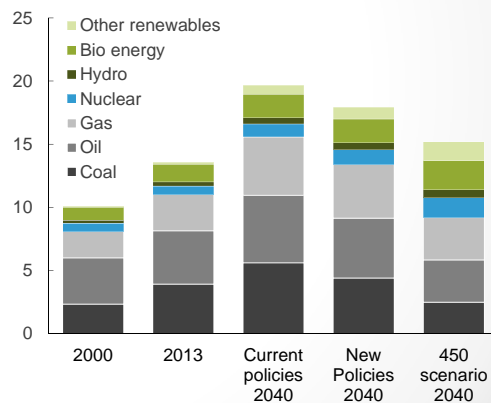
7

## The gravity of status quo

Potential bias in data generation, modelling, and application

- Broadness & detail have a cost
- Model short on flexibility
- Assumptions are crucial
- Stakeholder interests
- Transparency is key

Primary energy demand by carrier  
2000-2040 (bn toe, New Policies Scenario)



Source: International Energy Agency. 2015. *World Energy Outlook 2015*. IEA, Paris.

8