

# Energy Technology Perspectives 2014

## Energy Technology Perspectives

**International Energy Systems Integration Workshop**

**Arlington, VA**

**18-19 February, 2014**

## Founded in 1974

- **Formed in wake of 1973 oil embargo with mission to promote member country energy security - autonomous agency of the Organisation for Economic Cooperation and Development (OECD)**

## 28 member countries

- **Asia Pacific**: Australia, Japan, Republic of Korea and New Zealand
- **North America**: United States, Canada
- **Europe**: Austria, Belgium, Czech Rep, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey and United Kingdom
- **European Commission** also participates in the work of the IEA
- **Chile and Estonia** are in the process of accession to become members of the IEA

## Decision-making body: Governing Board

- Consists of member country representatives
- Under the Governing Board, several committees are focusing on each area

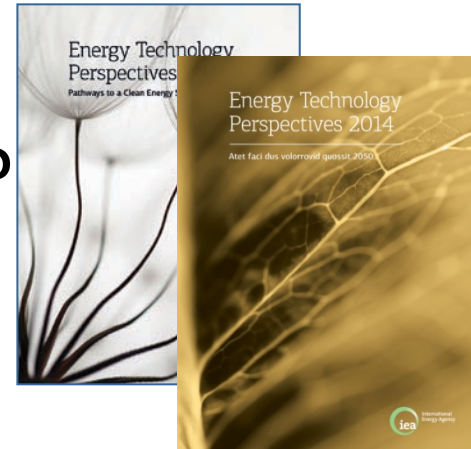
## Secretariat:

- **Staff of around 230**, mainly energy experts and statisticians from member countries

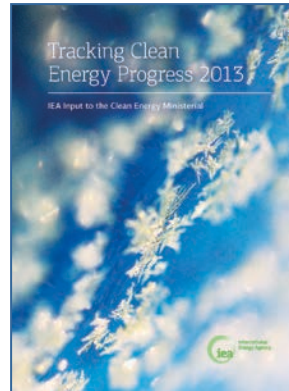
# IEA's programme of work in energy technology

## ETP 2014

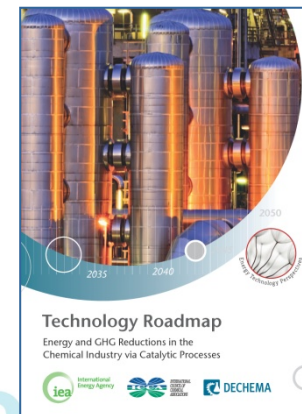
- Where do we need to go?



- Where are we today?



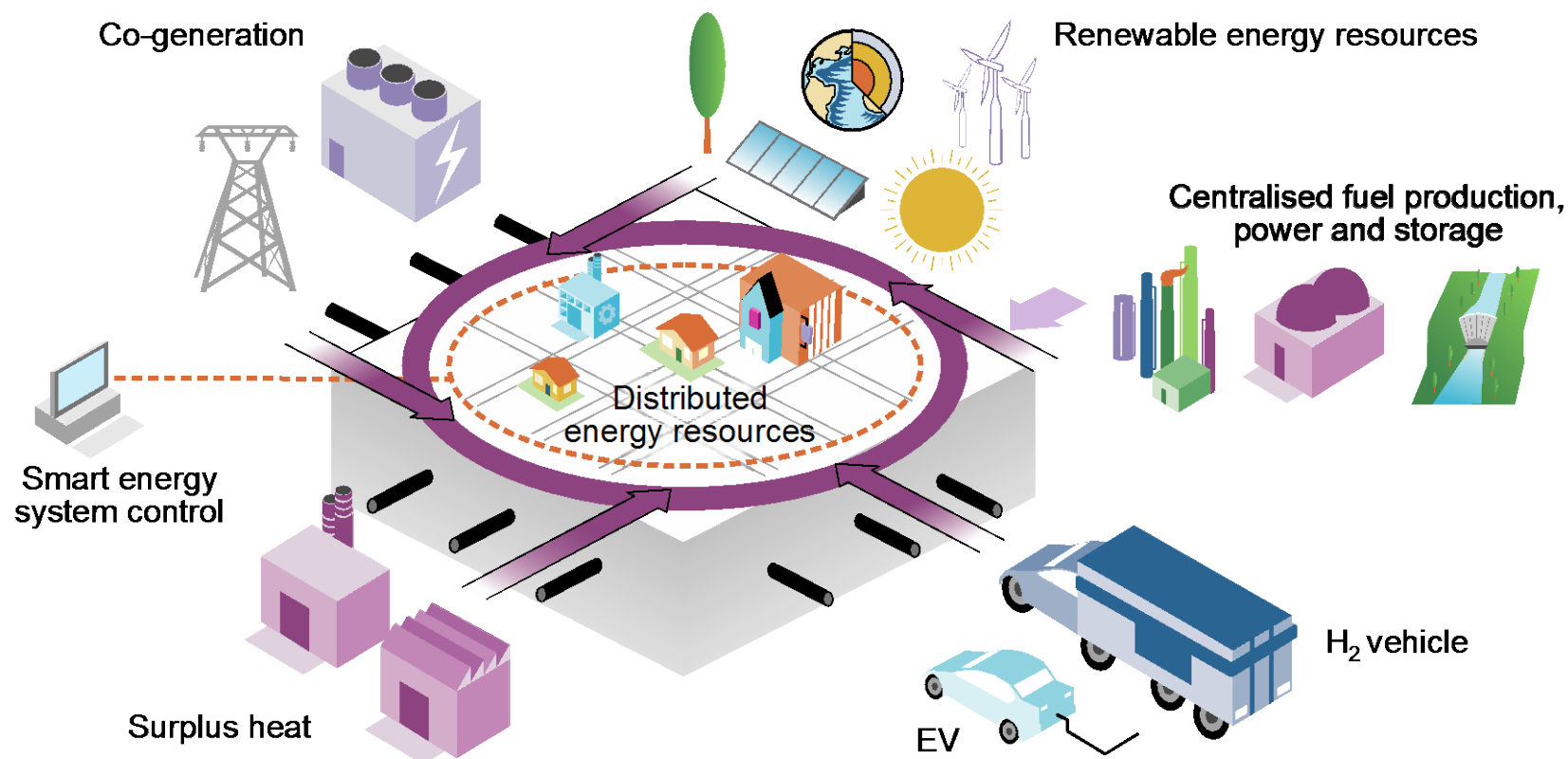
- How do we get there?





# Systems thinking and integration

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*A sustainable energy system is a smarter, multidirectional and integrated energy system that requires long-term planning for services delivery*

# ETP 2012 – Choice of 3 Futures

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## 2DS

a vision of a **sustainable** energy system of reduced Greenhouse Gas (GHG) and CO<sub>2</sub> emissions

**The 2°C Scenario**

## 4DS

reflecting pledges by countries to cut emissions and boost energy efficiency

**The 4°C Scenario**

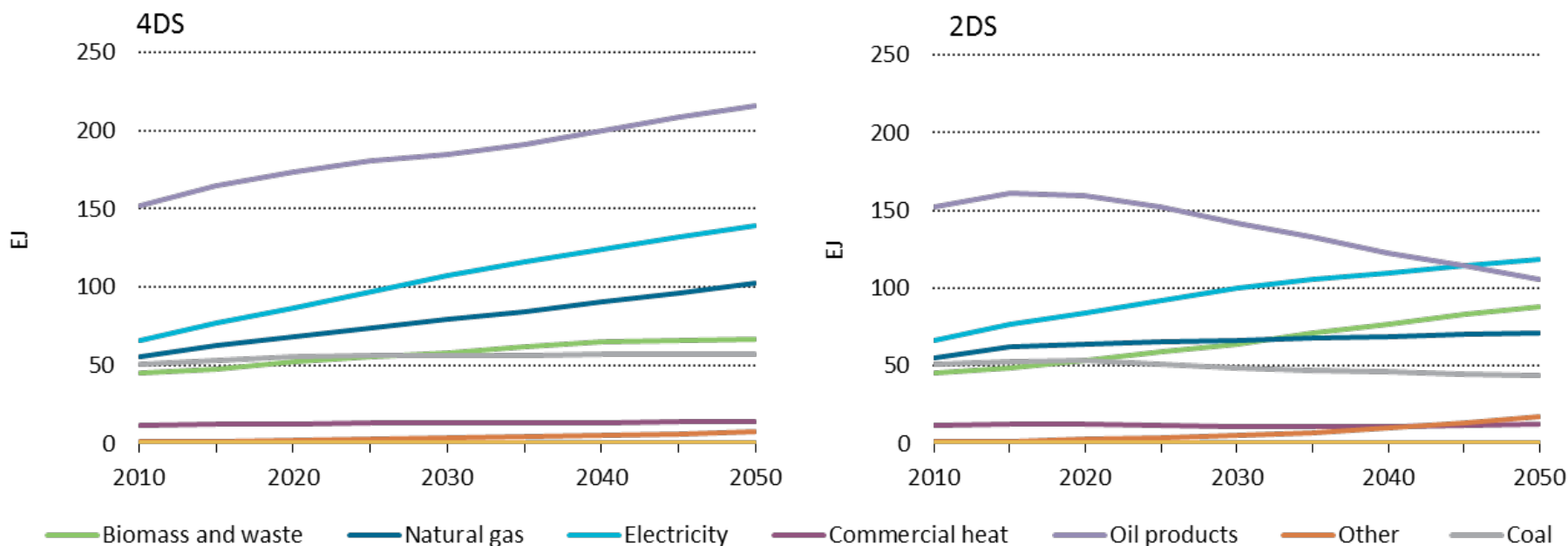
## 6DS

where the world is now heading with potentially **devastating** results

**The 6°C Scenario**

# ETP 2014 – Harnessing electricity's potential

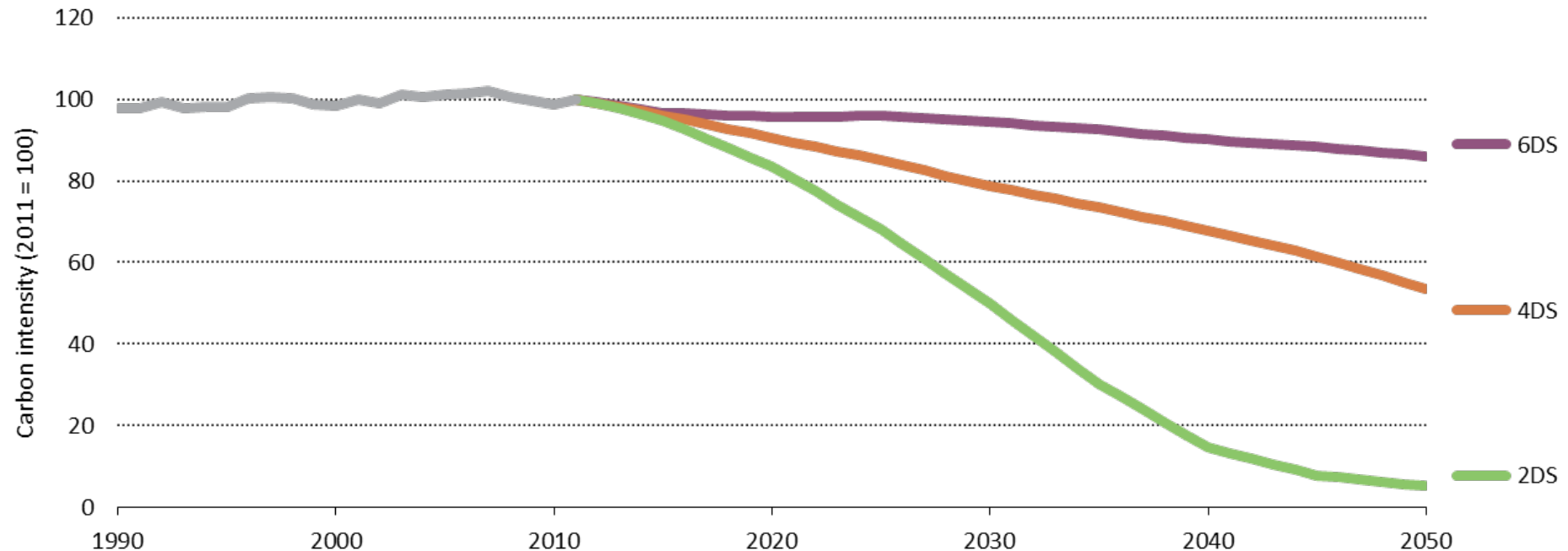
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2014



- Electricity demand grows in all scenarios to 2050 (80-130%)
- The share of electricity grows in all scenarios
  - 2011: 17%, 2050: 25%
- In our decarbonised scenario, electricity overtakes oil and becomes the largest energy carrier 2050

# Implications: Environment

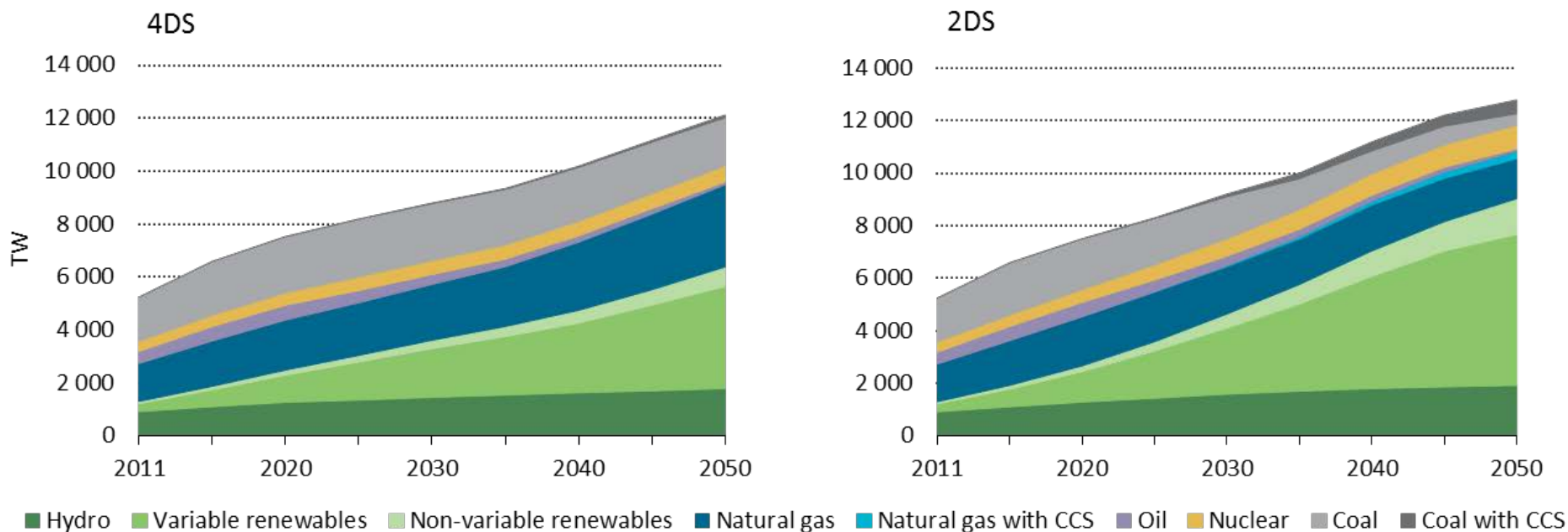
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- Intensity of emissions from electricity generation has been stable; production growth results in 75% emissions increase between 1990 and 2011.
- E-ESCII must decrease 95 points to meet 2DS

# Electricity Capacity: a share reversal

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## ■ Capacity today:

- Fossil fuels: 68%
- Renewables: 25%

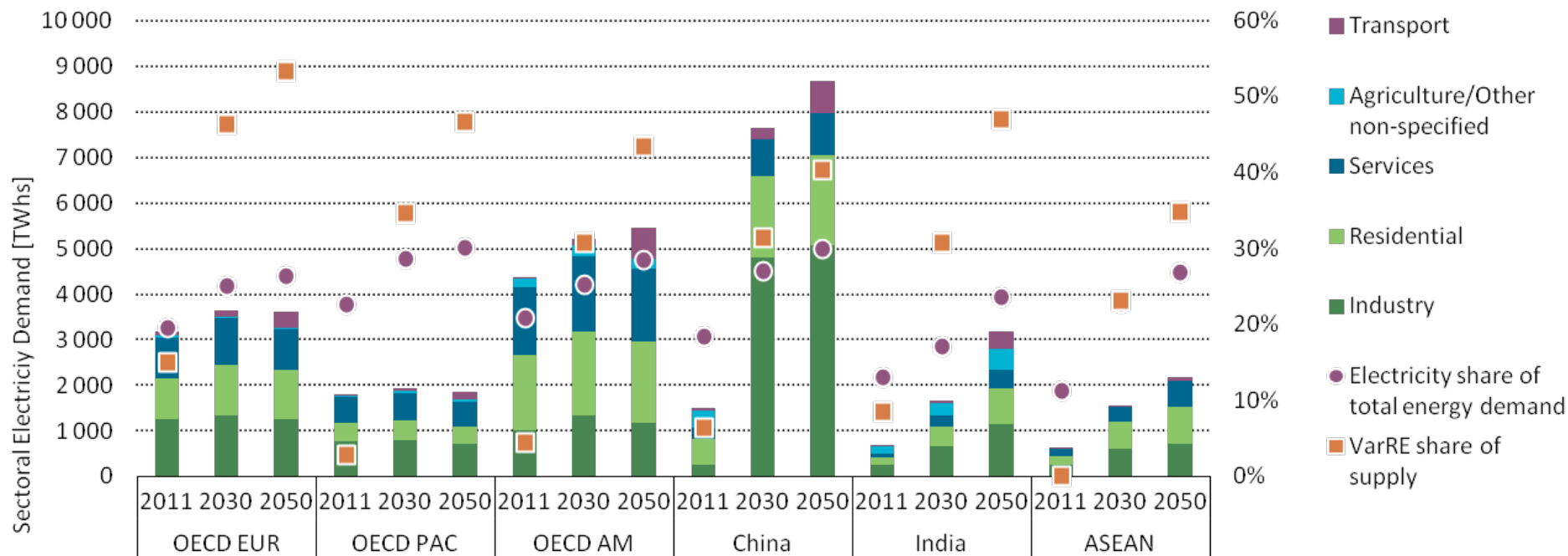
## ■ Capacity 2DS 2050:

- Renewables: 70%
- Fossil fuels: 20%



# Understanding the regional context

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Differences in growth of electricity demand and sectoral distribution require targeted systems development plans. All regions show high growth in varRE deployment



# What is electricity Security?

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## ■ **Fuel security:**

- focuses on issues associated with maintaining access to reliable fuel supplies for power generation

## ■ **Adequacy:**

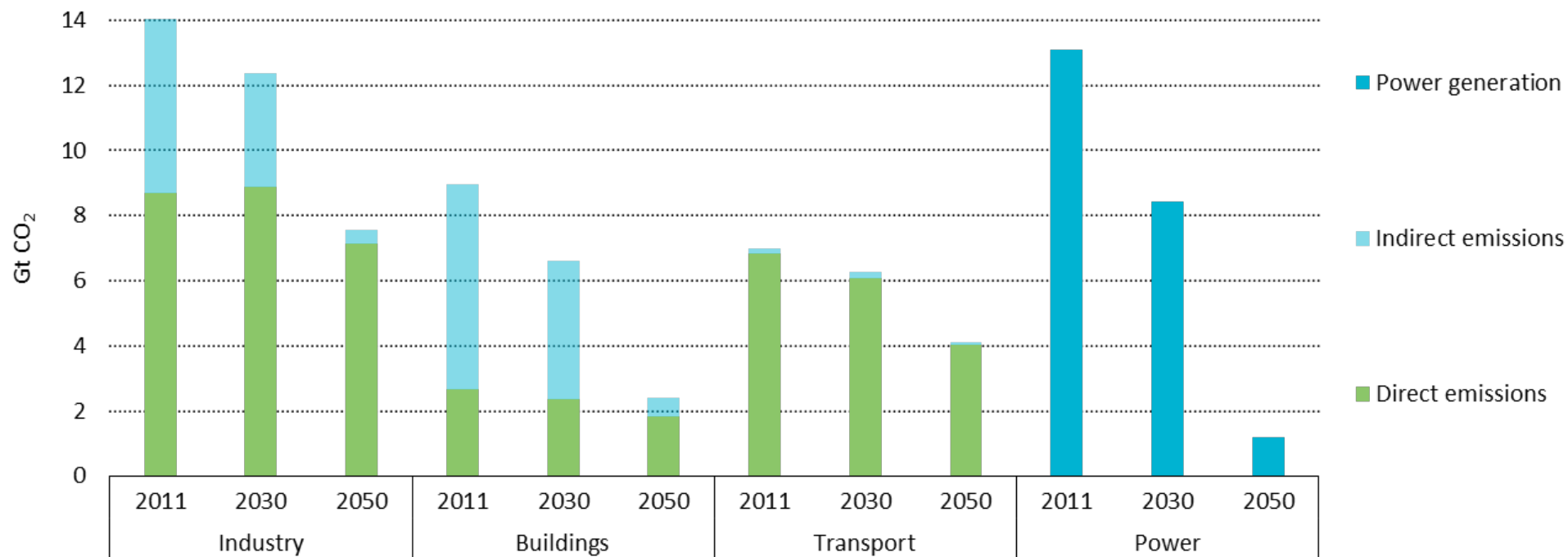
- the capability of the power system to meet changes to aggregate power requirements in the present and future, using existing and new resources

## ■ **System security:**

- the capability of the power system, using existing resources, to maintain reliable supplies in the face of unexpected shocks and sudden disruptions

# Spillover effect of decarbonising electricity in the 2DS

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Electricity decarbonisation reduces emissions from sectors already electrified, without the need for further end-use investments.



# ETP 2014: The age of electrification?

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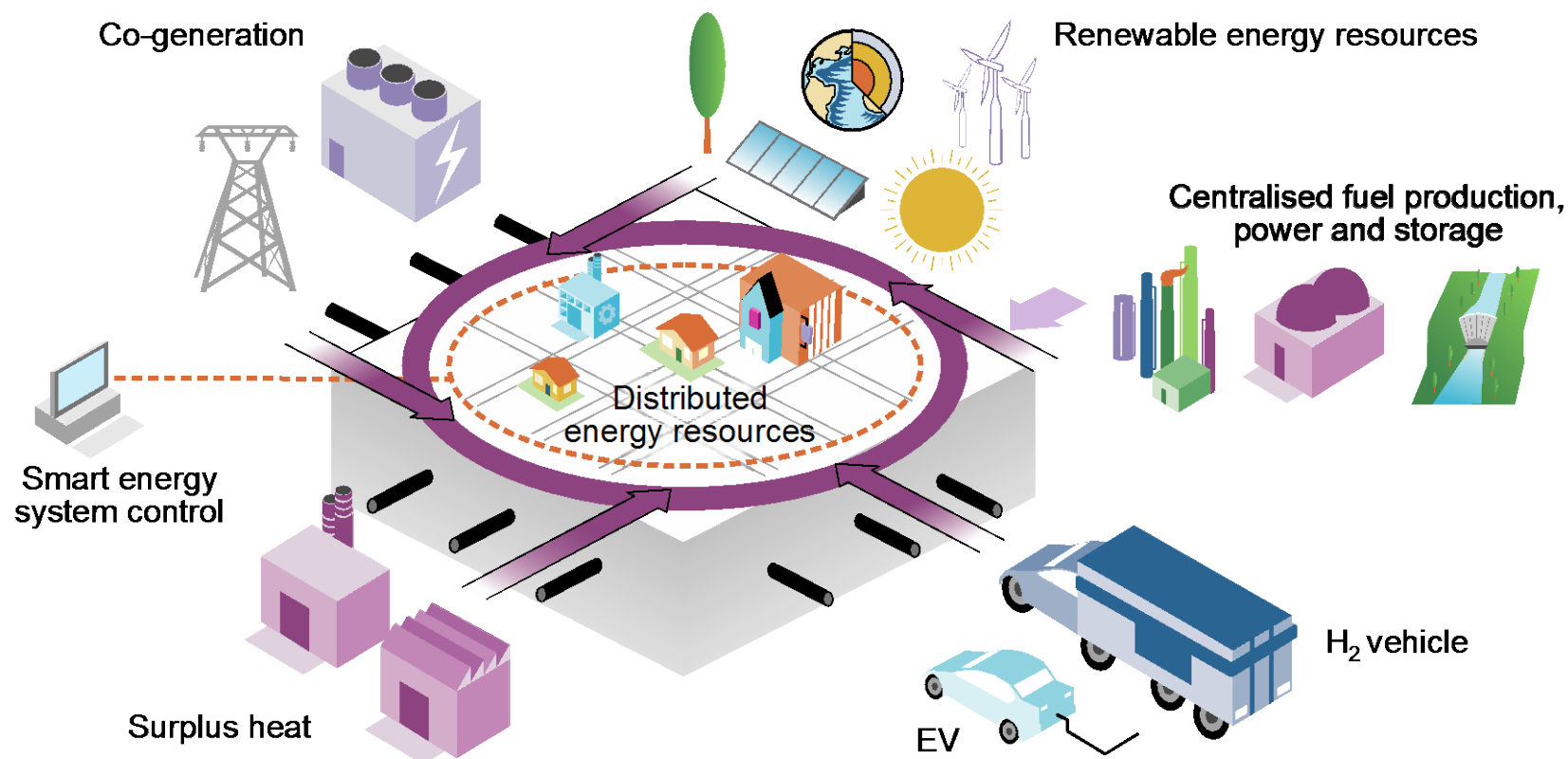
## ■ Part 2. Driving the Change

1. Introducing the theme: **An age of electrification?**
2. Decarbonising supply: **Solar-The possible first resource by 2050?**
3. **The evolving role of Natural Gas in Low-C electricity systems:** Flexibility vs. Base load
4. Electrified transport – **How Can e-mobility replace oil?**
5. Systems integration - **Electricity storage: Do we need a game changer?**
6. **Financing low carbon electricity generation during the transition**
7. Partner country focus: **high efficiency power generation in India**



# Systems thinking and integration

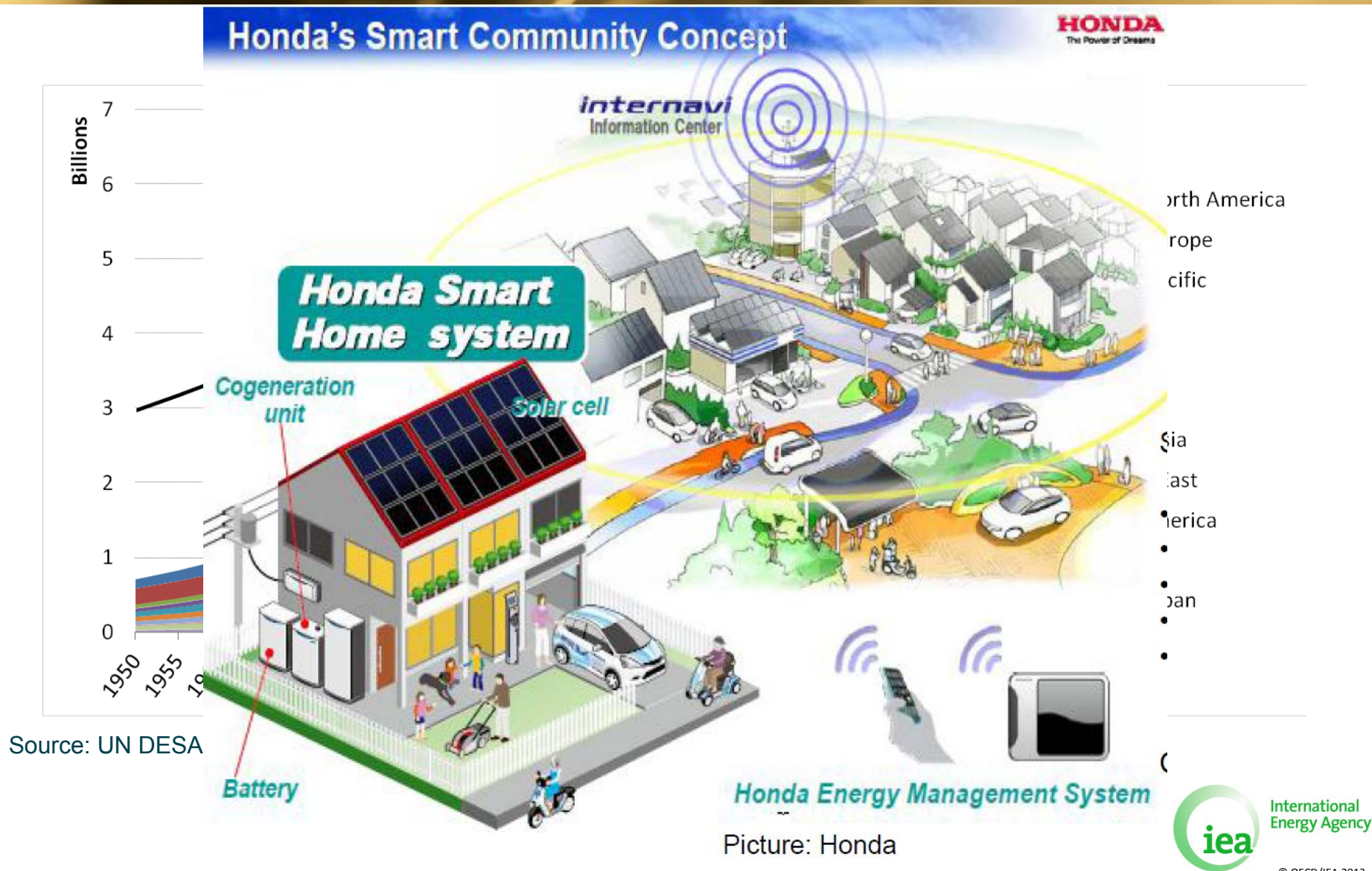
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*A sustainable energy system is a smarter, multidirectional and integrated energy system that requires long-term planning for services delivery*

# ETP 2016: A Tale of Renewed Cities

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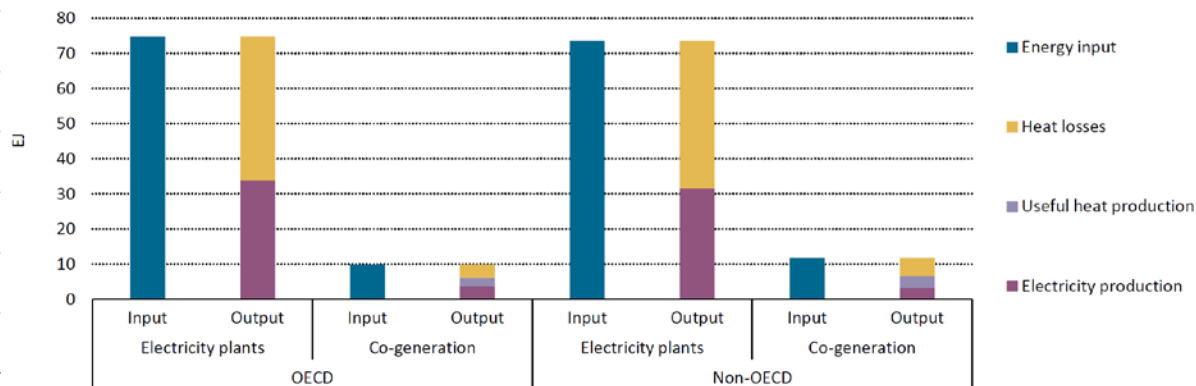
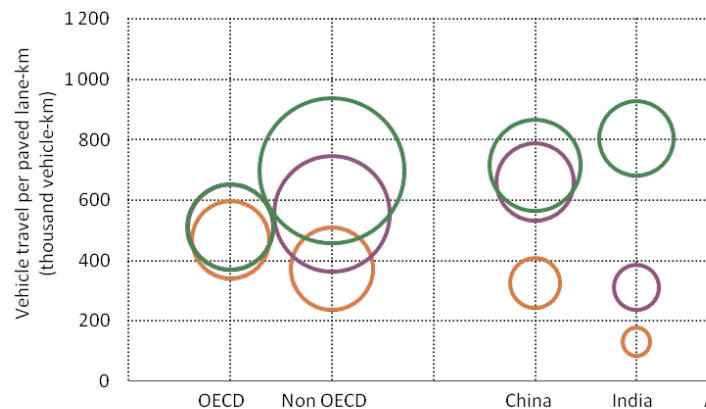


# Linking Local and National Policy Objectives

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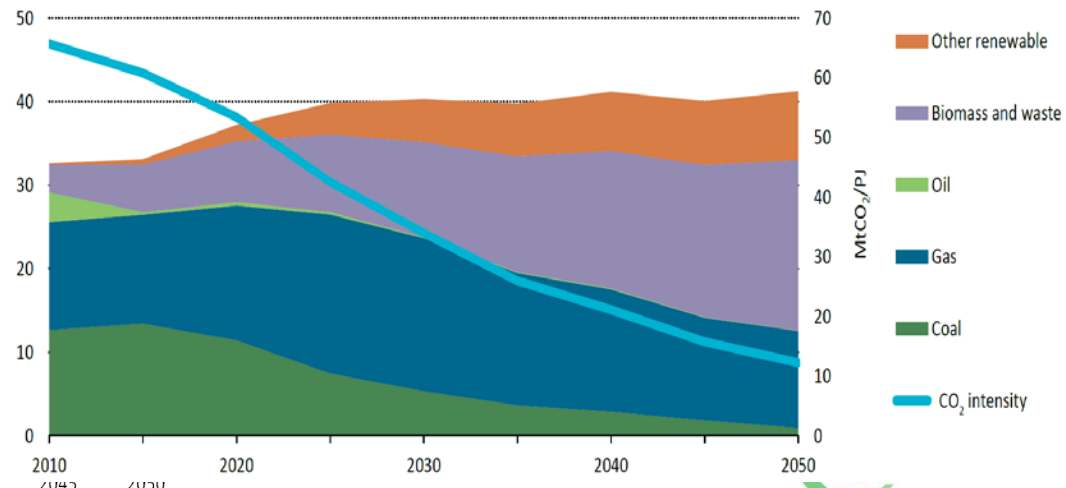
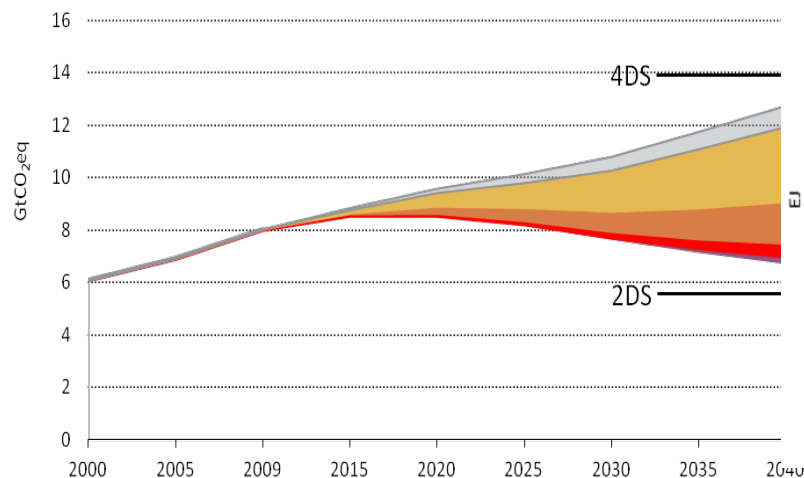
## Roadway Occupancy

## Heat, Cooling and Power



## Transportation Energy

## Primary Energy Supply

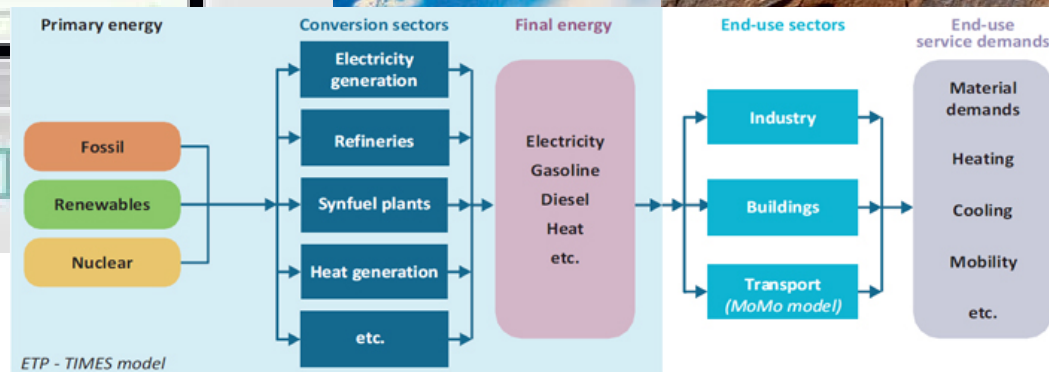
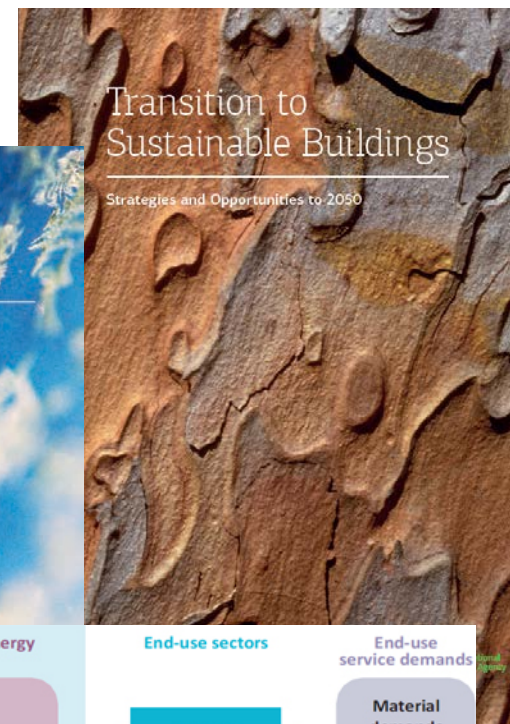




# What is ETP?

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## It's not just a book!



Analysis and modelling framework



# Energy Technology Perspectives 2014

Thank you!