Towards a flexible future

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content

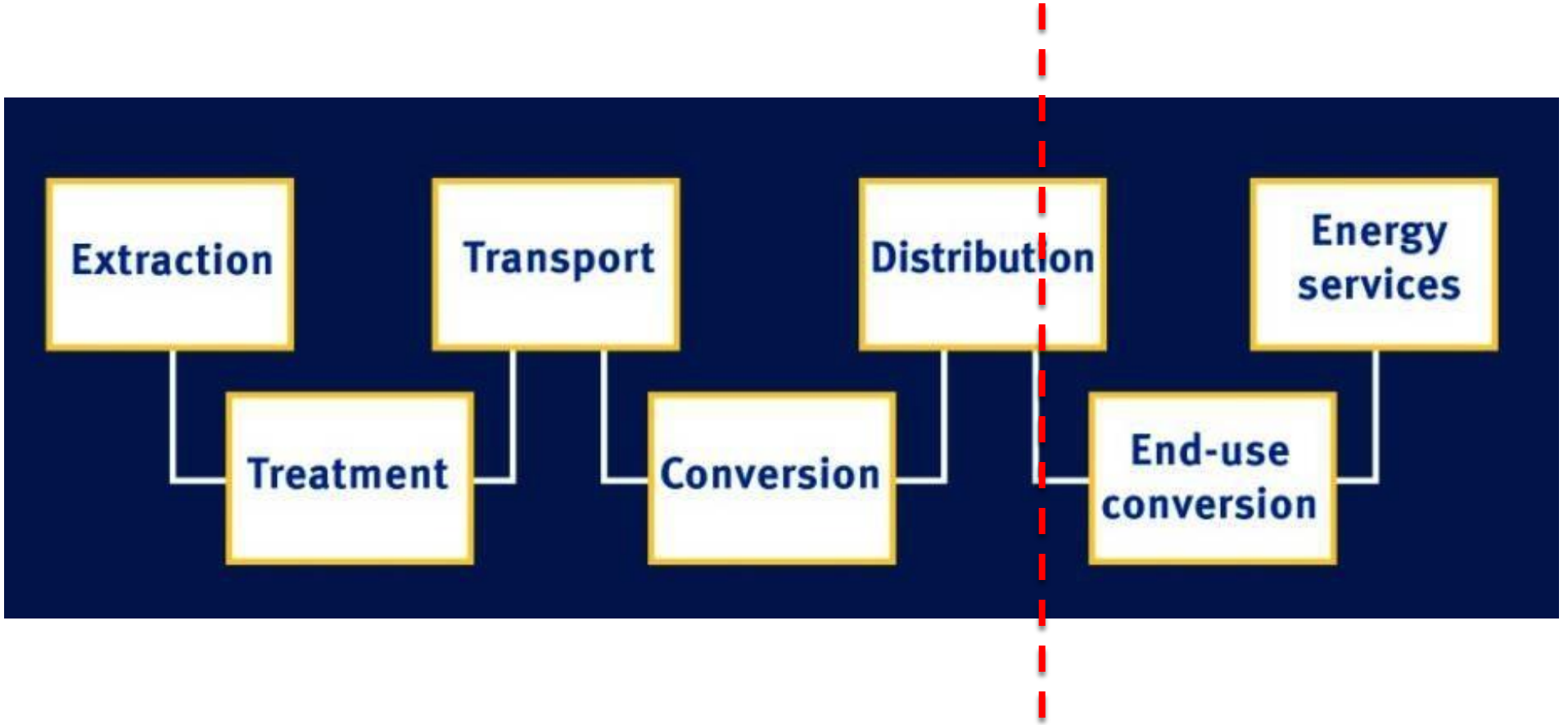
1. The energy crisis
2. Global trends and issues
3. Electricity Sector
4. Flexibility

1 THE ENERGY CRISIS

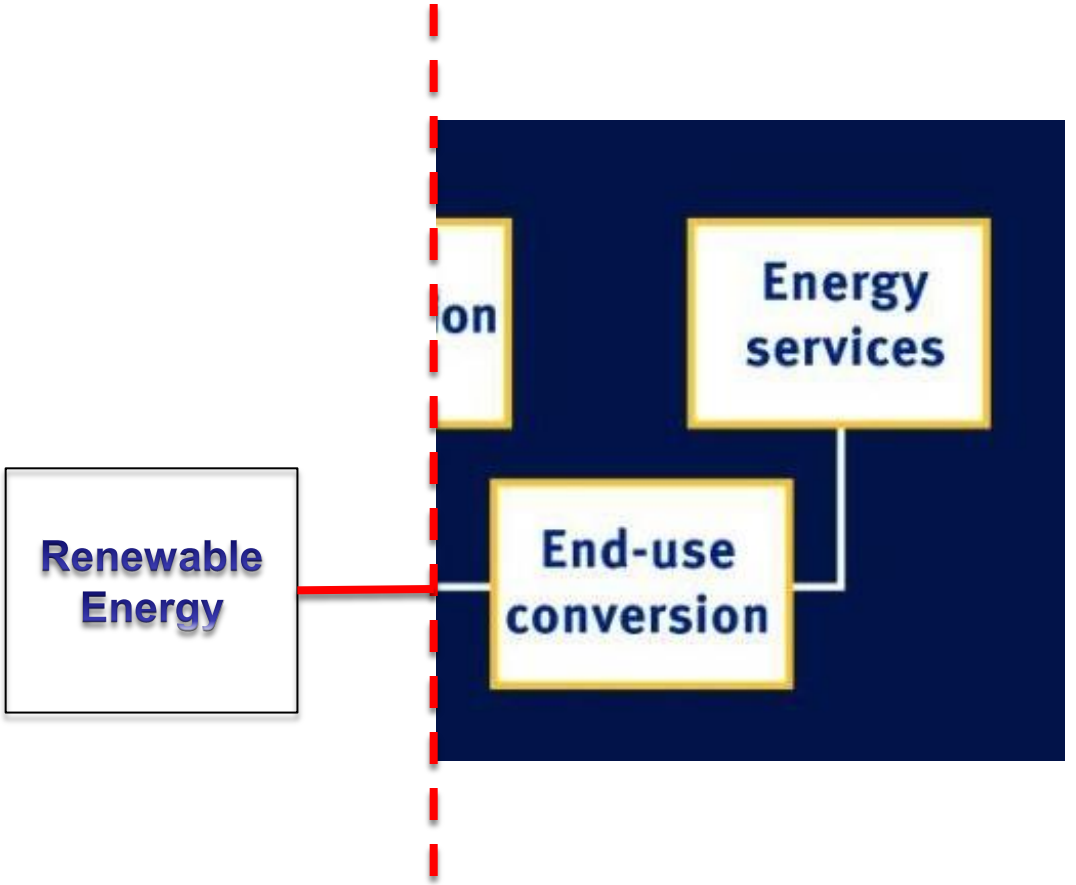
Energy crisis?

- Peak Oil?
- Unstable geographical environment?
- Energy too expensive?
- Is nuclear energy safe?
- Are we destroying our climate?

Traditional energy value chain



Future energy value chain

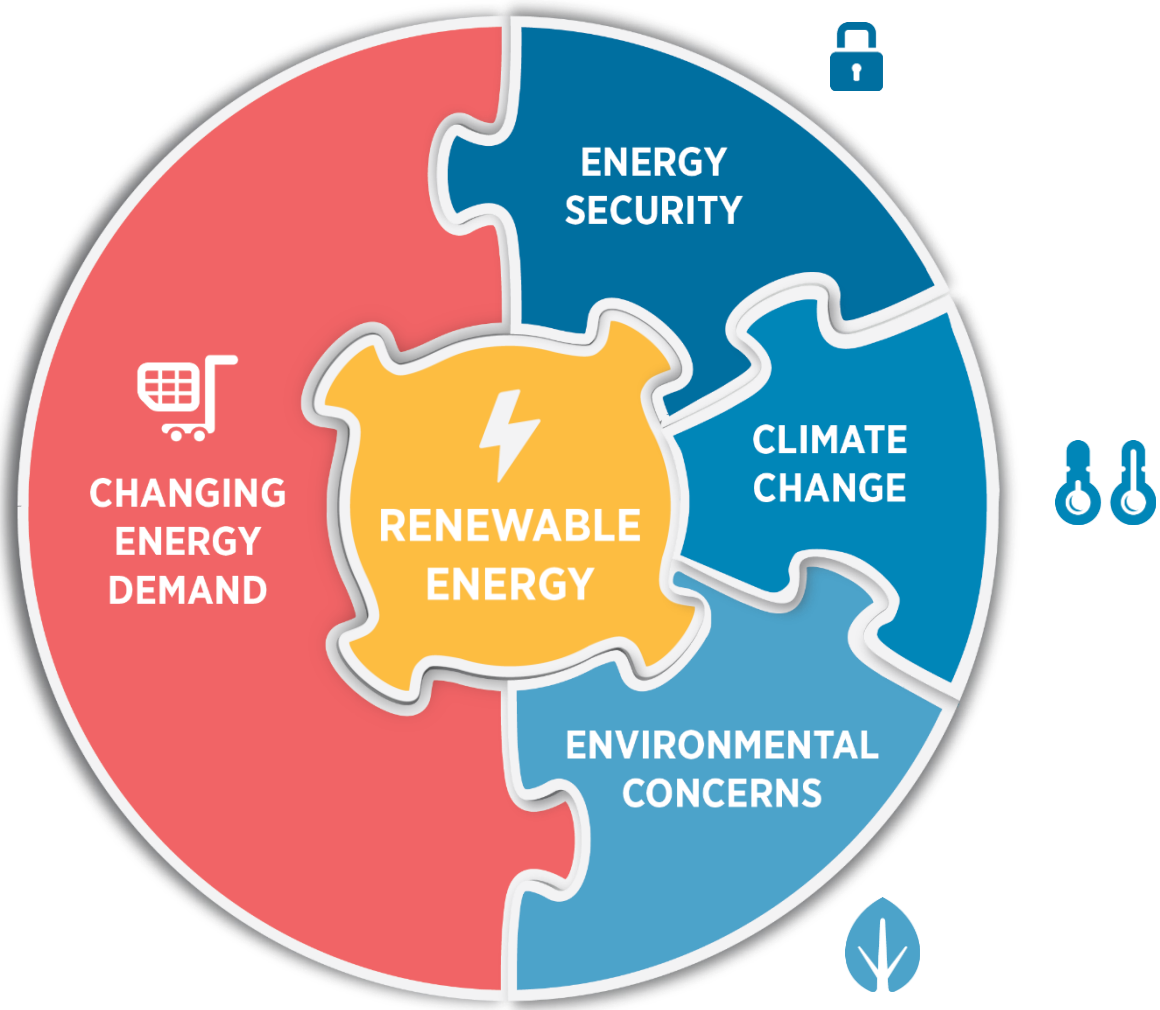


Sun

- The sun is the source of all energy on the planet
- The sun gives us more energy in 1 hour, than we consume in 1 year

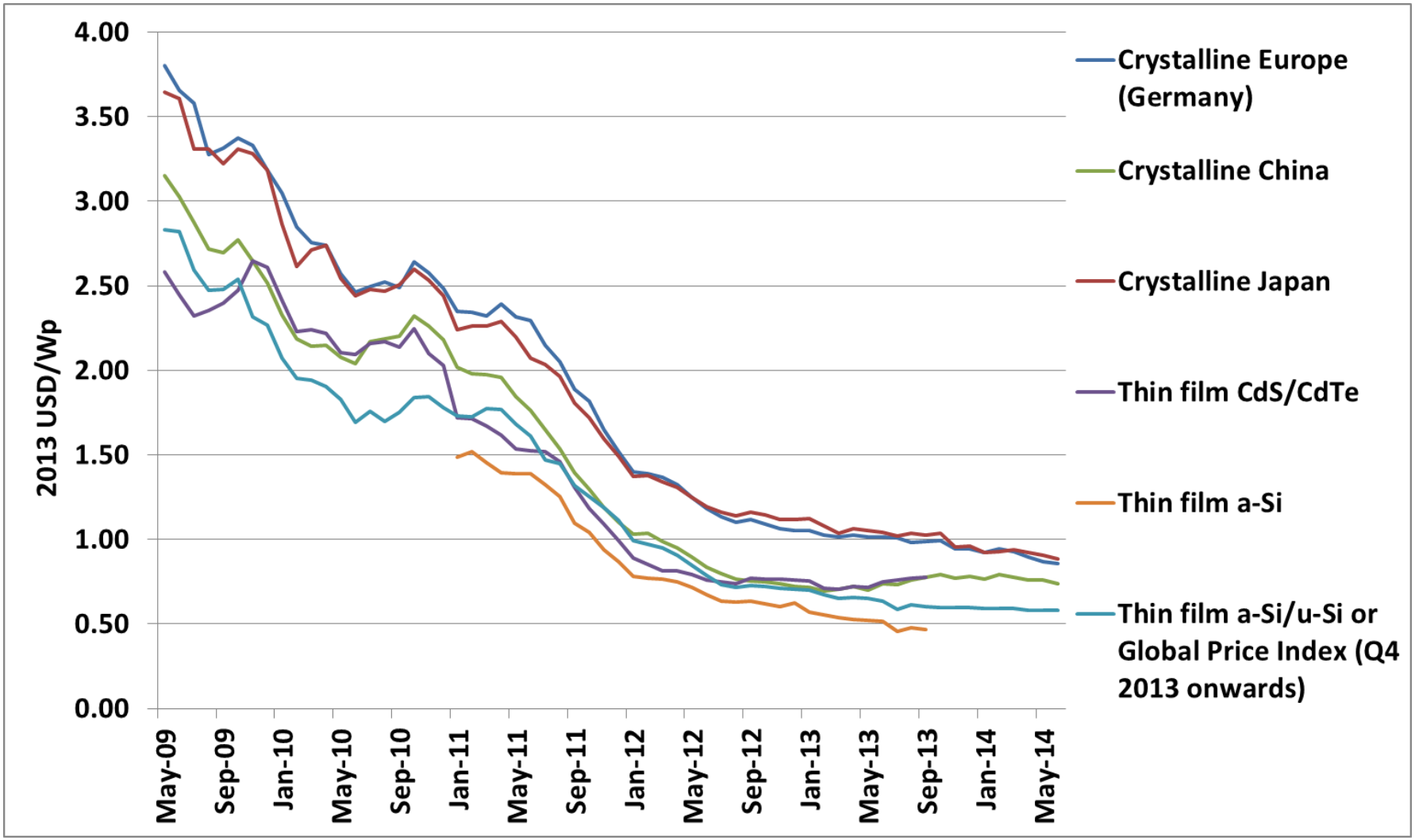
2 TRENDS AND ISSUES

The World of Energy is Transforming

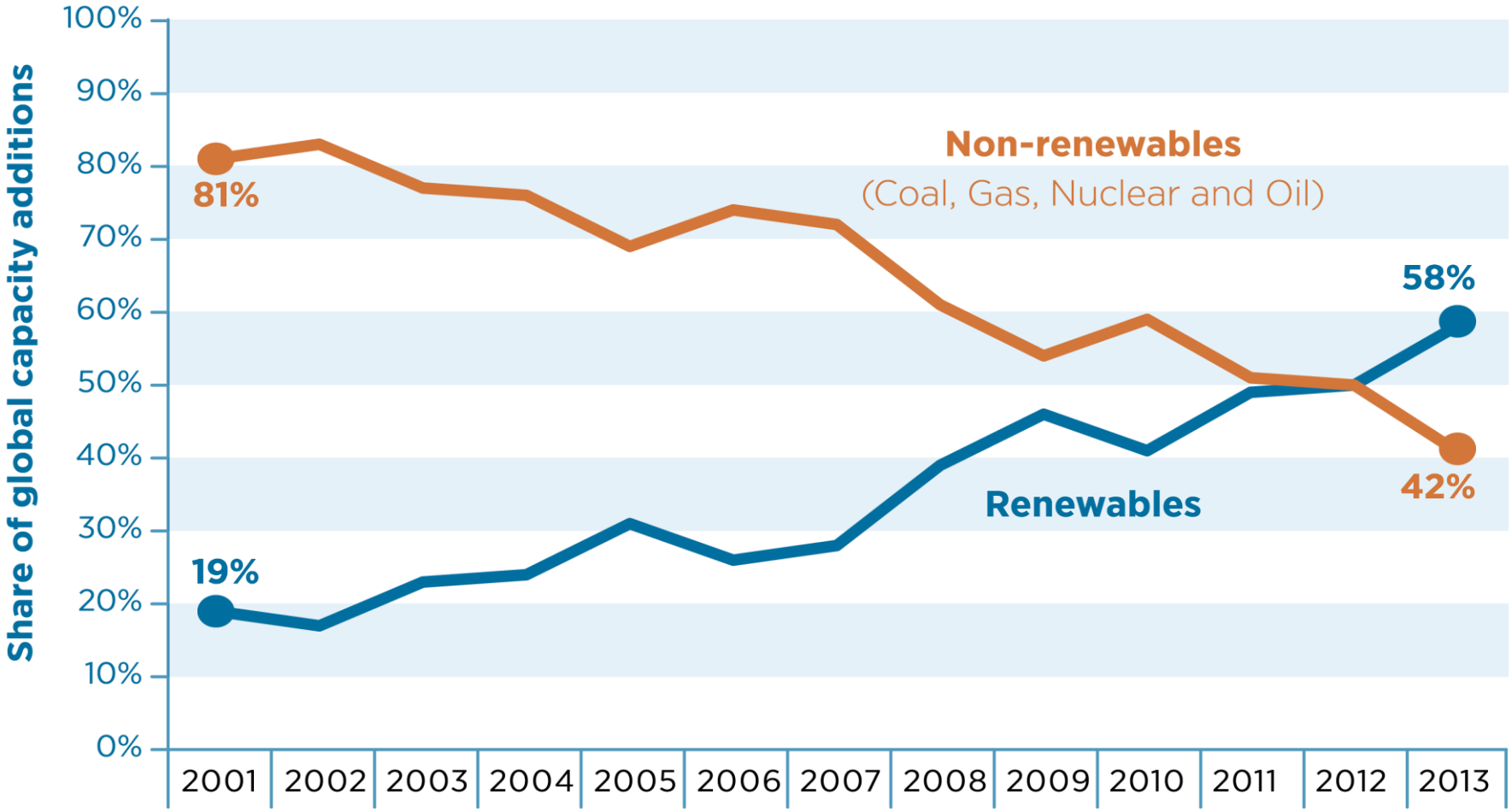


Source: IRENA

Falling prices



Moving to the Majority in New Capacity Additions



Source: IRENA

New Investors, New Owners & New Players

$16 bn

By mid-2014, green bonds had already been issued for over $16bn to finance renewable energy projects

13 hours

Dutch households raised $1.7 million in just 13 hours to buy shares in a cooperatively-owned wind turbine

$1.4 bn

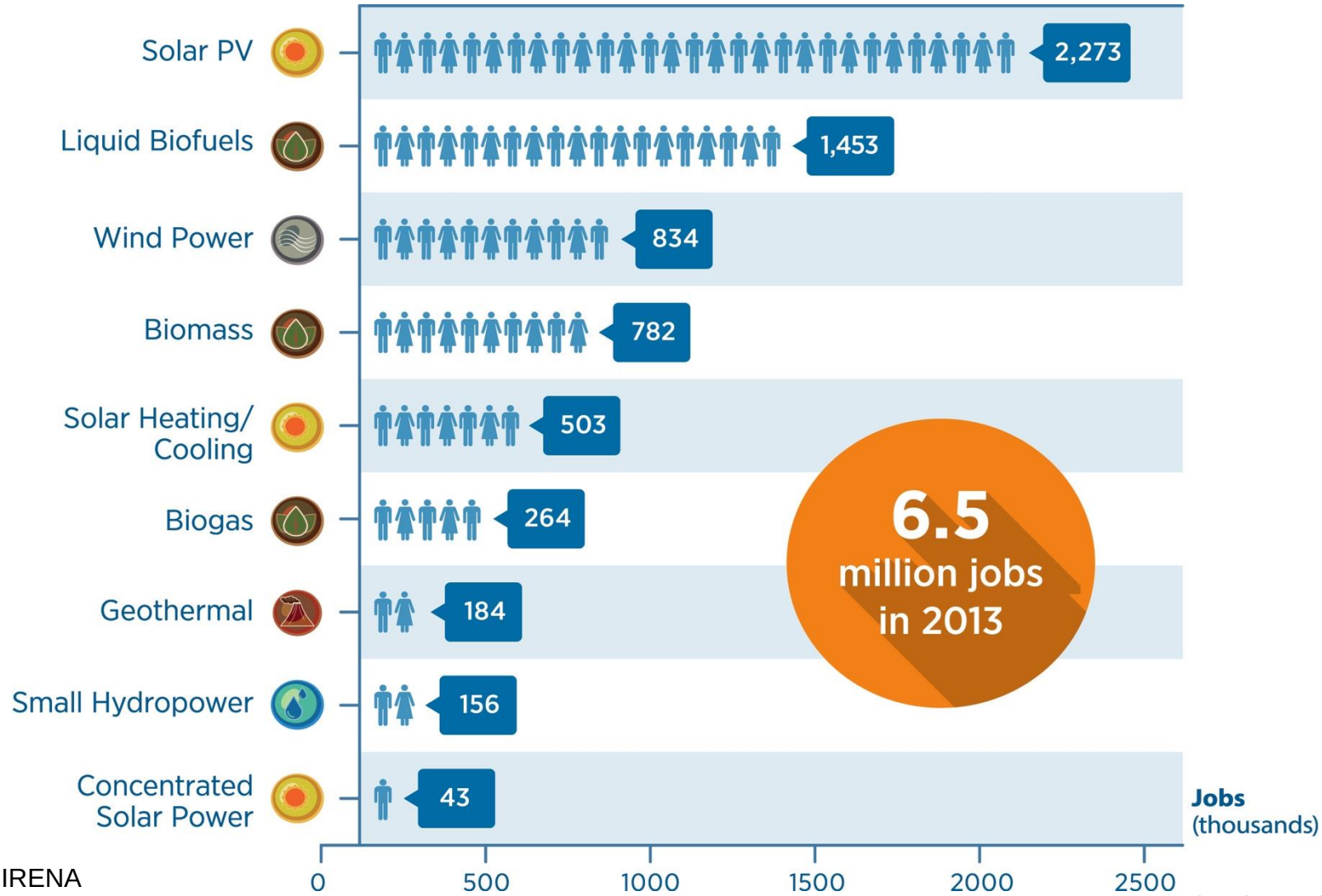
Google has invested over $1.4 billion in wind and solar because it also generates “attractive financial returns”

46%

Nearly half of all renewable energy capacity in Germany is owned by individuals and farmers

Source: IRENA

Renewable Energy Jobs



Source: IRENA

Socio-Economic Benefits of Renewables

6.5 million

In 2013, 6.5 million people worked in renewables worldwide

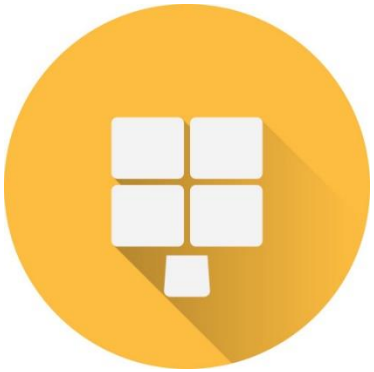
$52 bn

China's PV industry generated $52 billion in income in 2013

$2.8 bn

Spain avoided $2.8 billion in fossil fuel imports in 2010

13 million



In Bangladesh, 13 million people gained energy access through solar PV

Source: IRENA

Environmental Advantage of Renewables

7 million

7 million premature deaths linked to air pollution annually

2020 ban

Beijing announced a ban on coal use beyond 2020 to cut air pollution

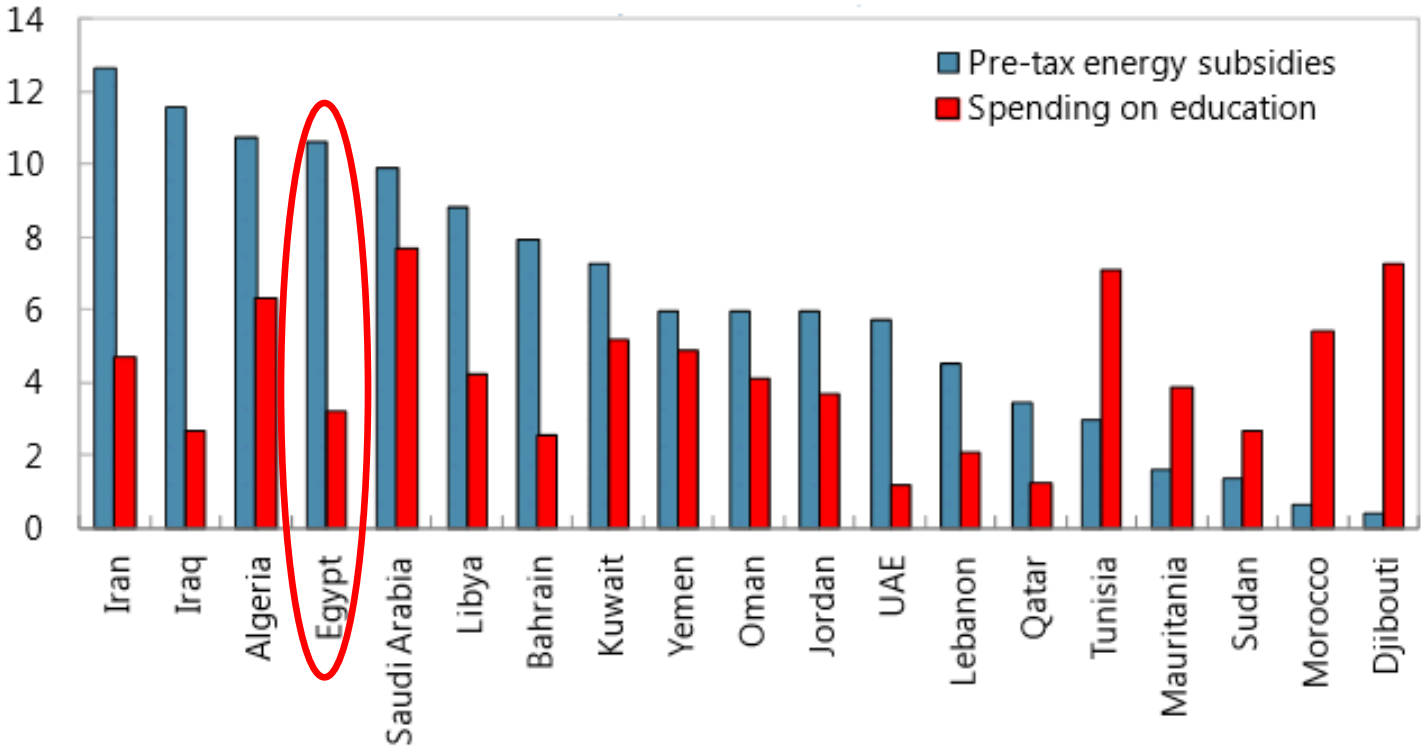
250x

Renewables are up to 250 times less carbon intensive than coal

Source: IRENA

Distorted Energy Pricing

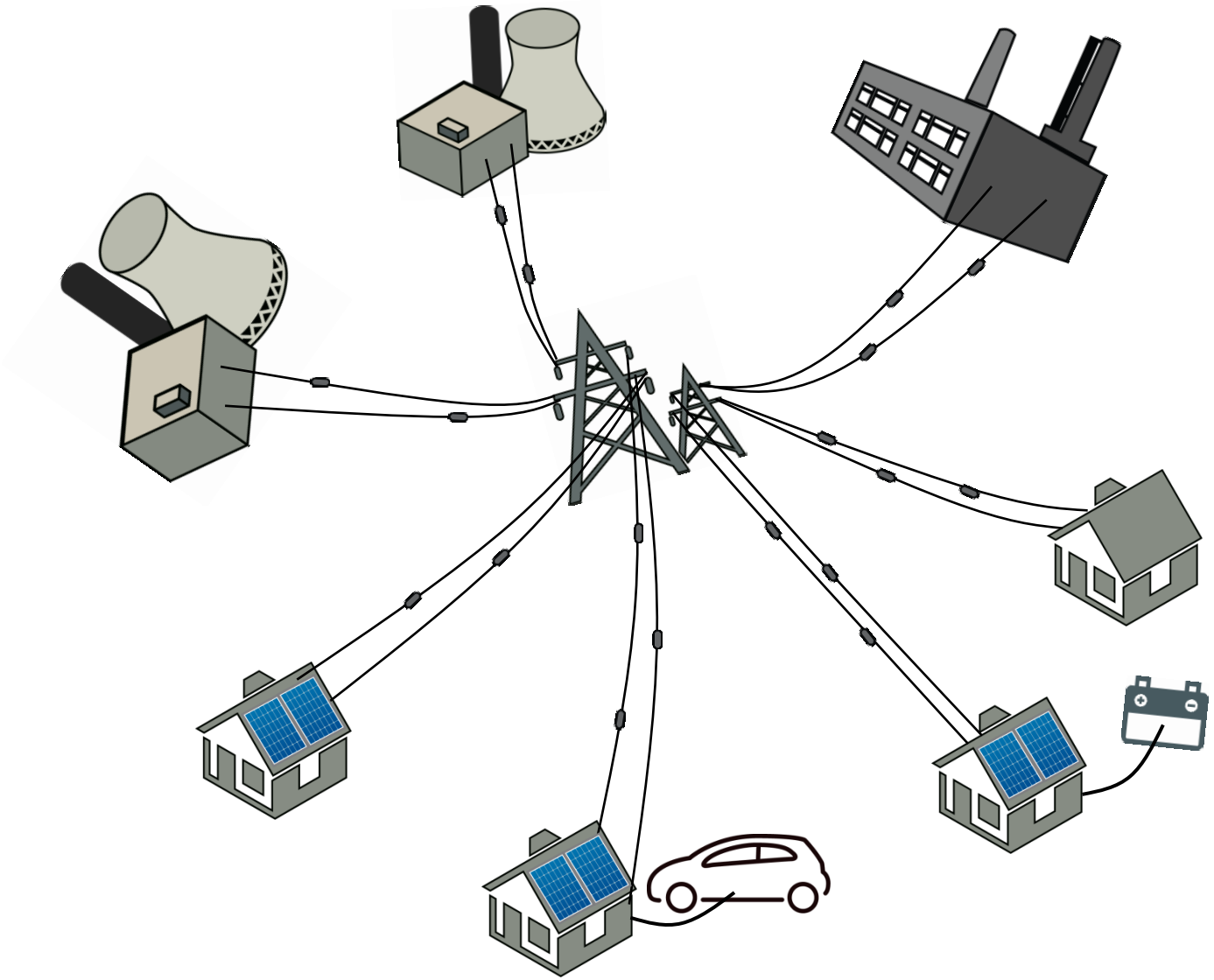
Pre-tax Energy Subsidies and Spending on Education for each percentage point of GDP in MENA countries, 2011



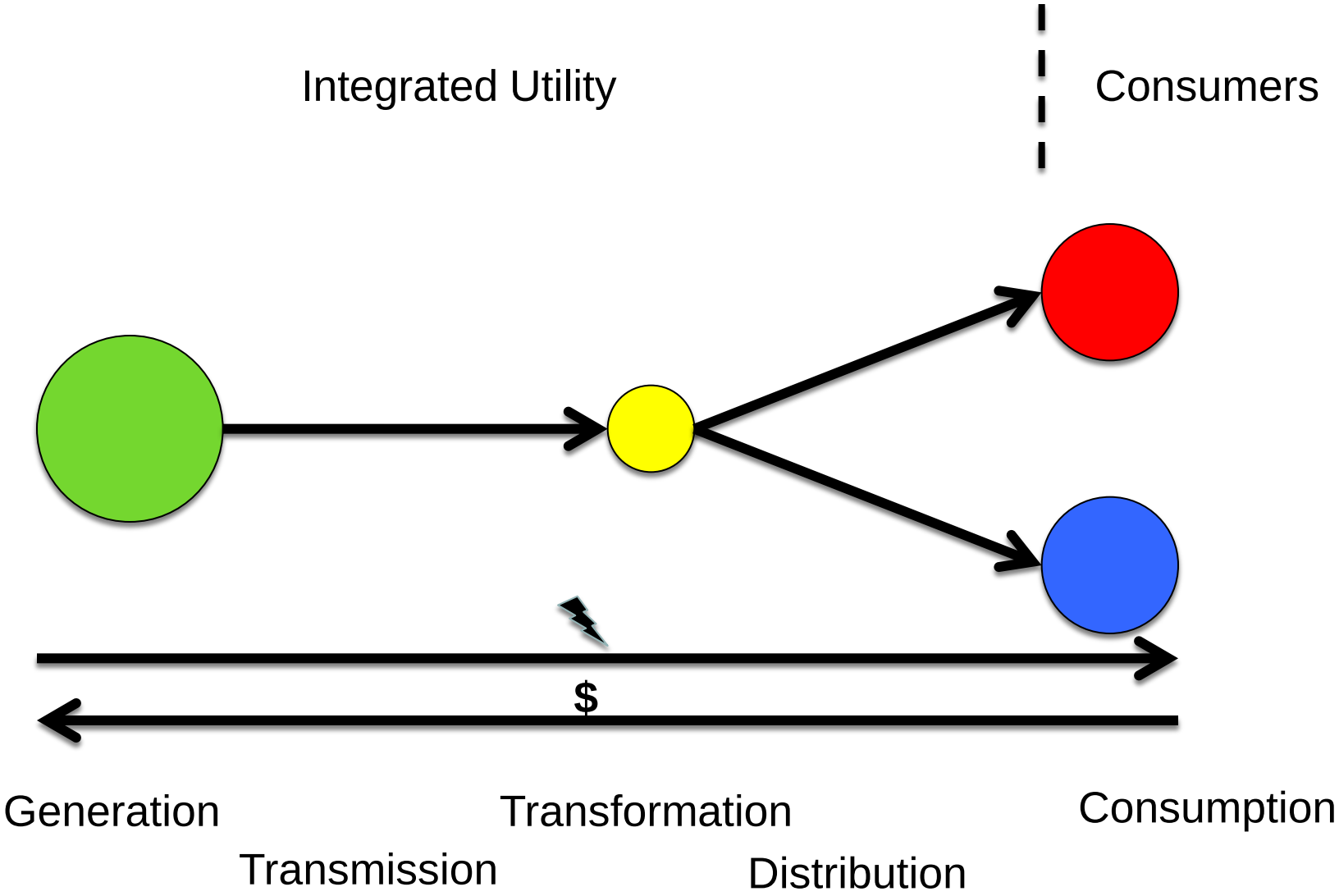
Source: Clements et al. (2013).

1/ Includes petroleum, electricity, natural gas, and coal subsidies.
2/ Pre-tax subsidies refer to 2011, education refers to the latest available data.

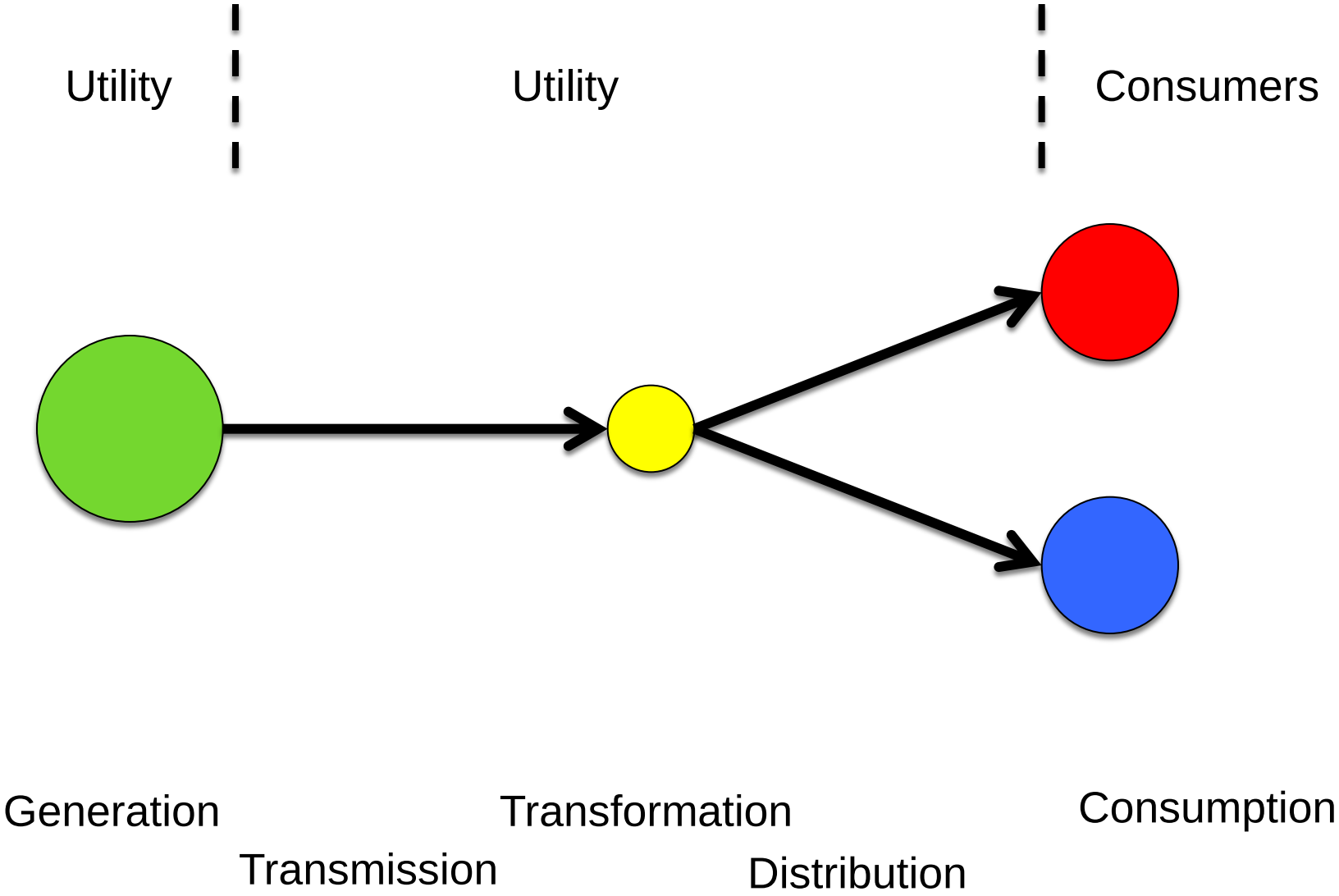
3 ELECTRICITY SECTOR AT A CROSSROADS



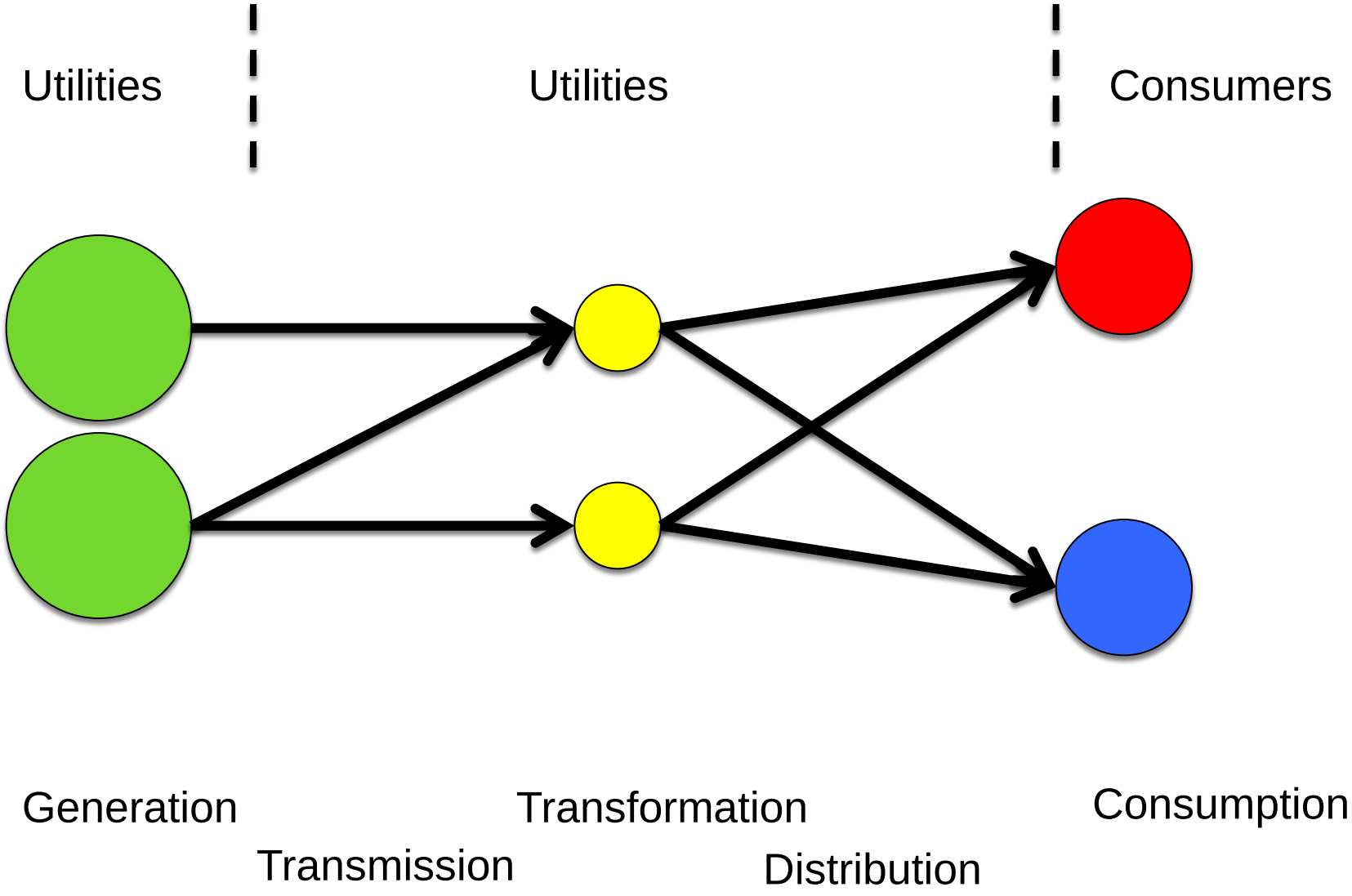
Conventional Set-up



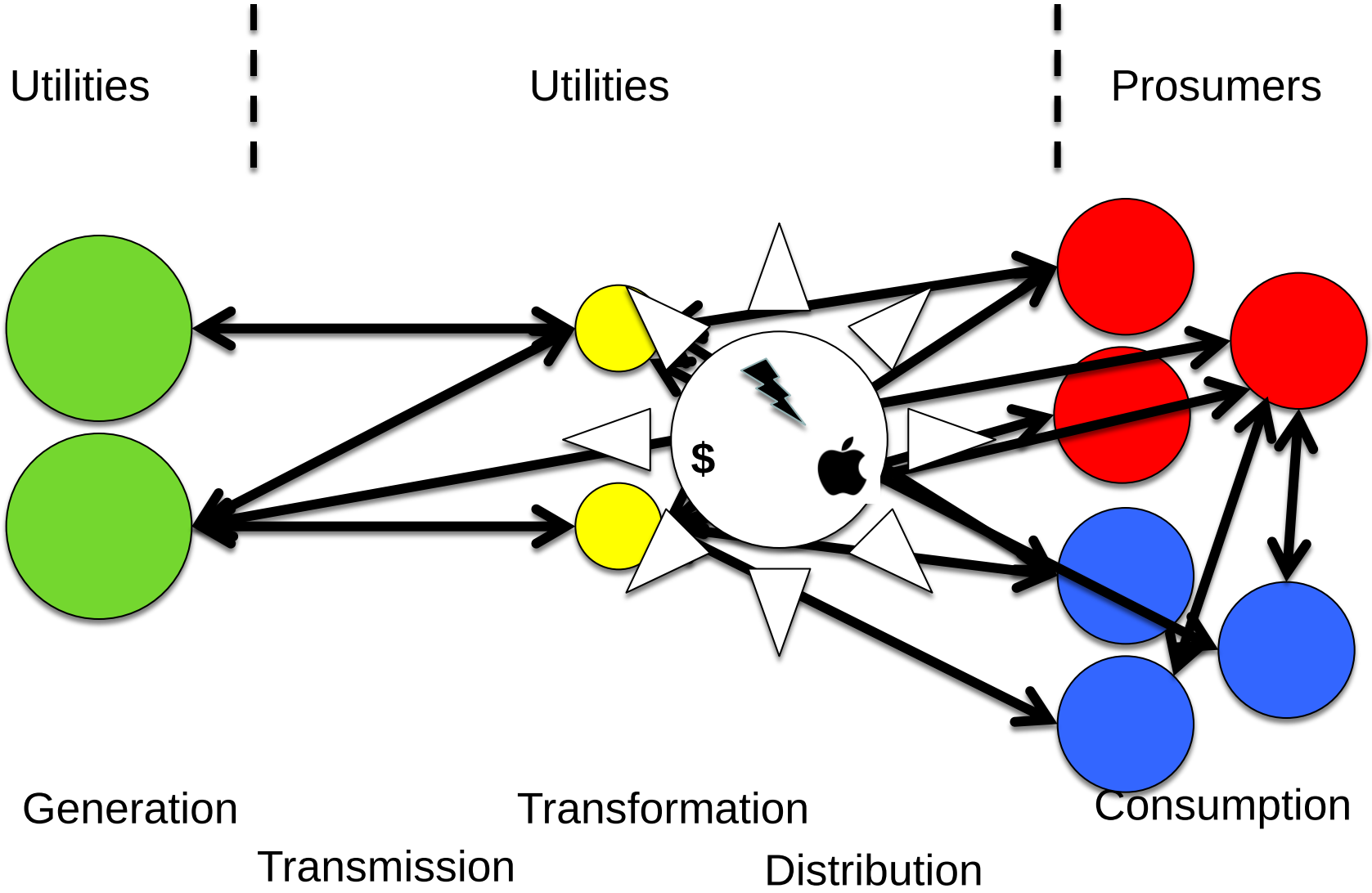
Unbundling


Utility
Utility
Consumers
Generation
Transmission
Transformation
Distribution
Consumption

Privatization



Democratization



4 FLEXIBILITY

The future is flexible

- Inflexible baseload is increasingly problematic in the new paradigm.
- The challenge is to make it work in a new and much more complex system, enriched with non-traditional players and “prosumers”.
- As with other developments such as communication, developing countries can leapfrog straight to a new paradigm, using cost-effective smart grid technologies including renewable energy

Thank You

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