



World Energy Markets: Challenges for Leadership and Policy

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Director



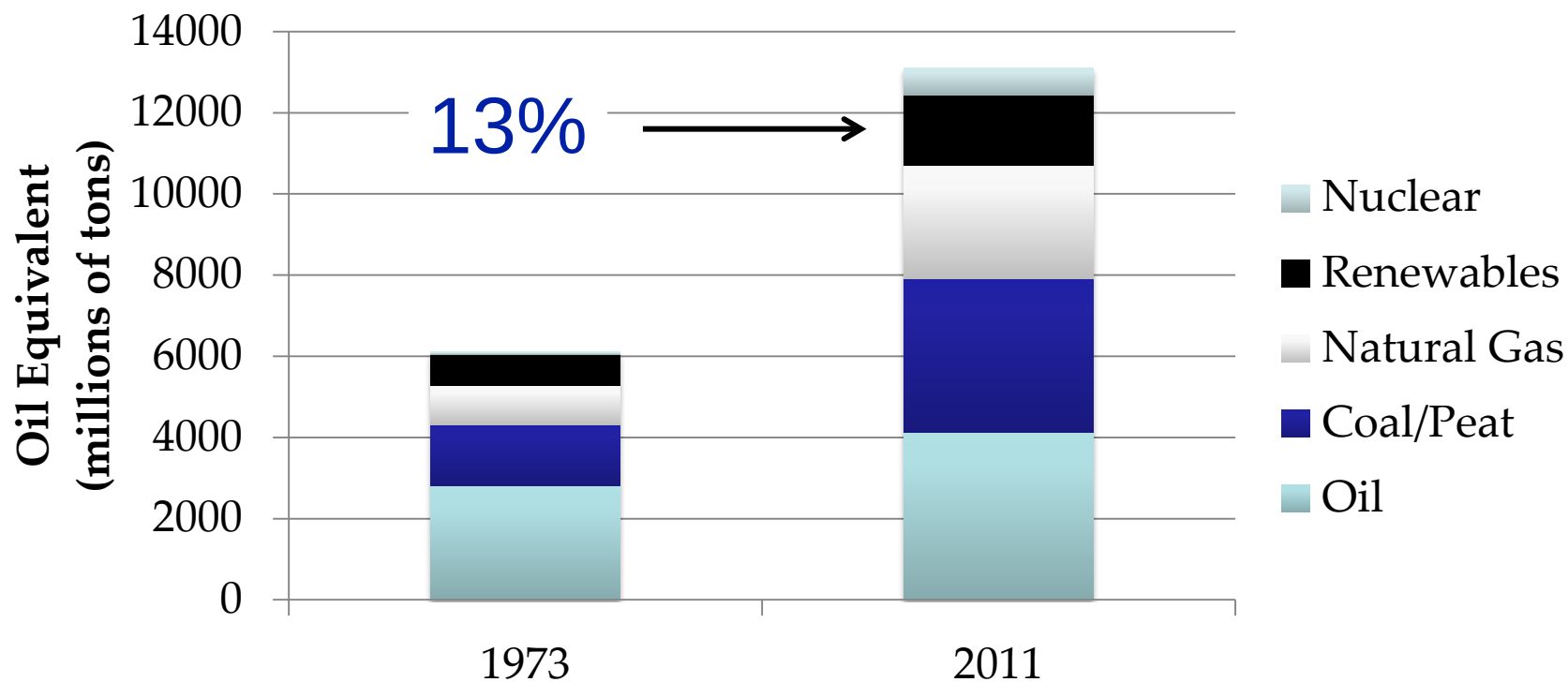
Question 1

What percent of the world's energy supply was from renewable energy in 2011?

- a. 9%**
- b. 13%**
- c. 18%**
- d. 25%**



World total primary energy supply, 1973 and 2011





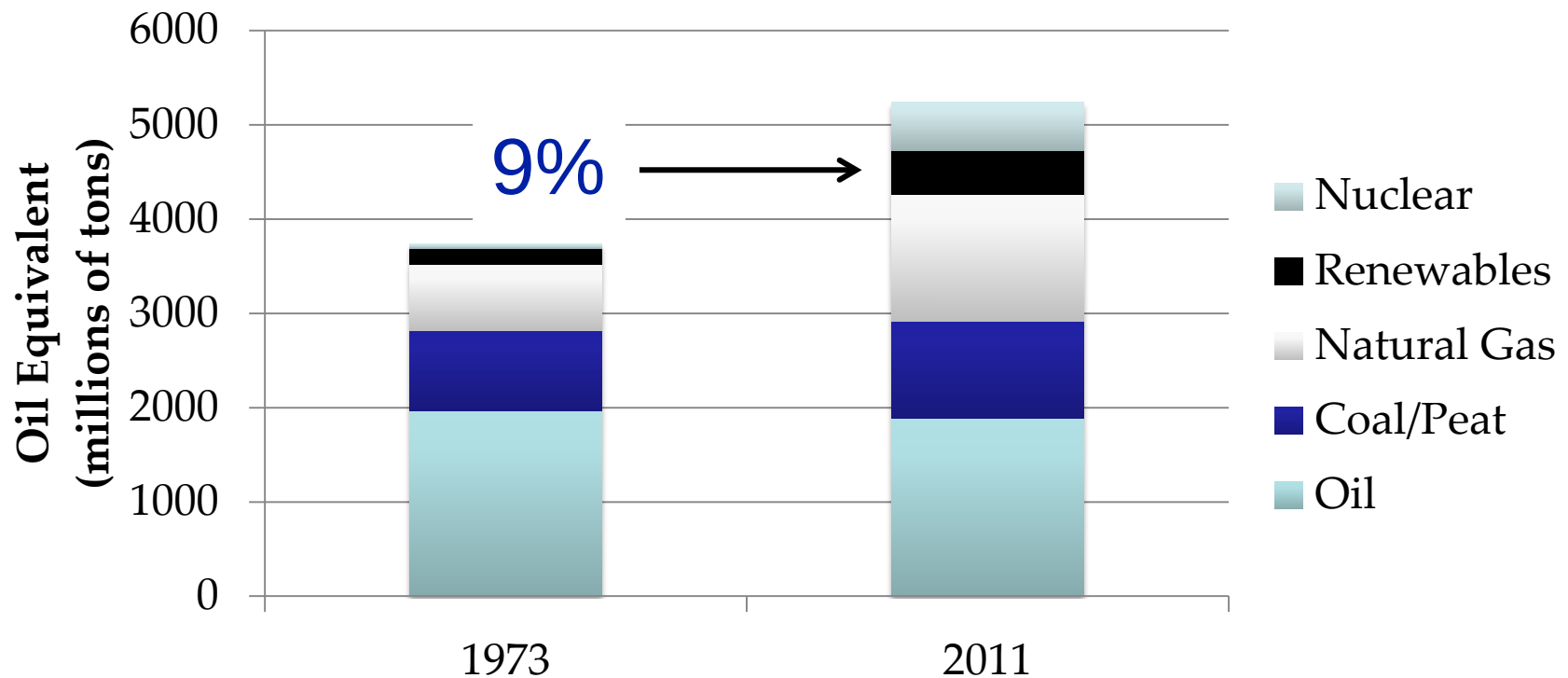
Question 2

What percent of the OECD's energy supply was from renewable energy in 2011?

- a. 9%**
- b. 13%**
- c. 18%**
- d. 25%**



OECD total primary energy supply, 1973 and 2011





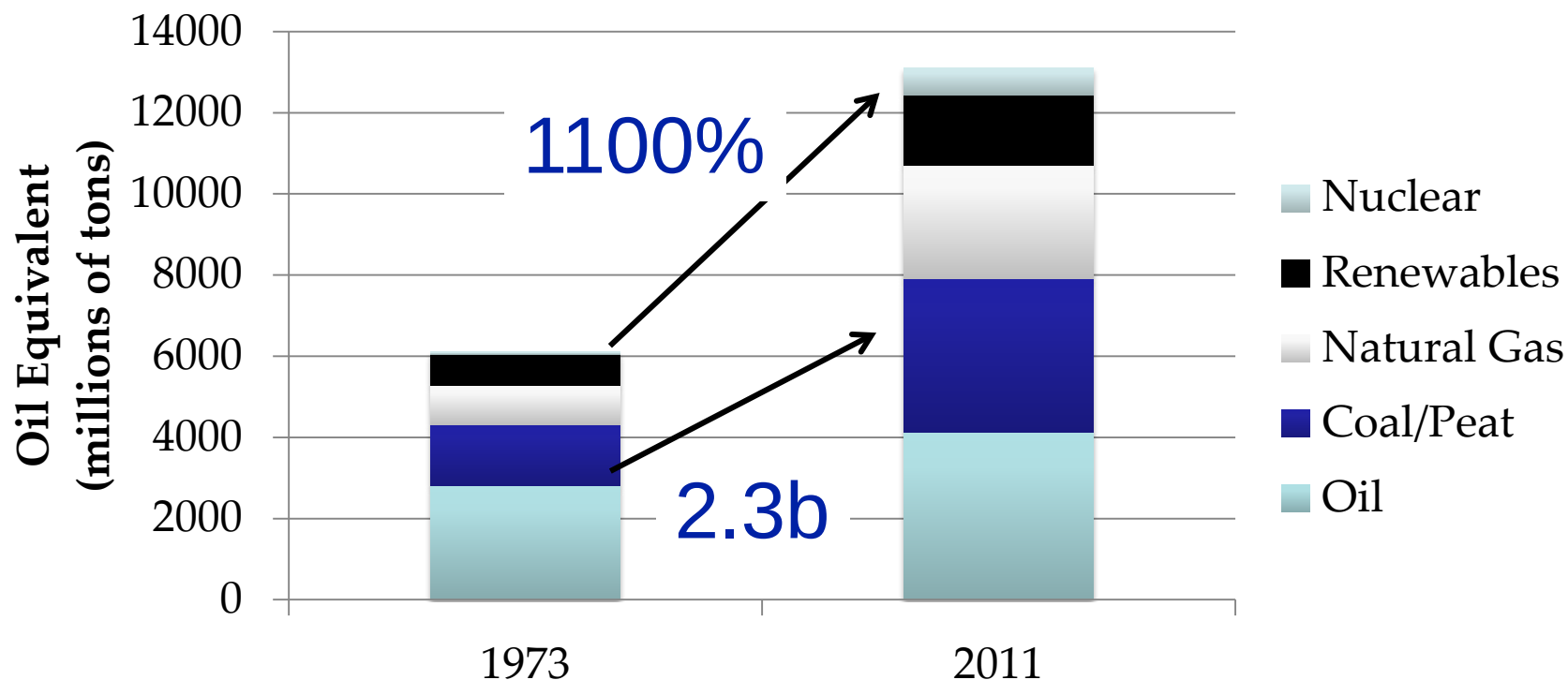
Question 3

In percentage terms, what source of energy has increased more than any other in the world in the past 40 years? In terms of units of energy?

- a. Renewables**
- b. Nuclear**
- c. Natural gas**
- d. Coal**



World total primary energy supply, 1973 and 2011





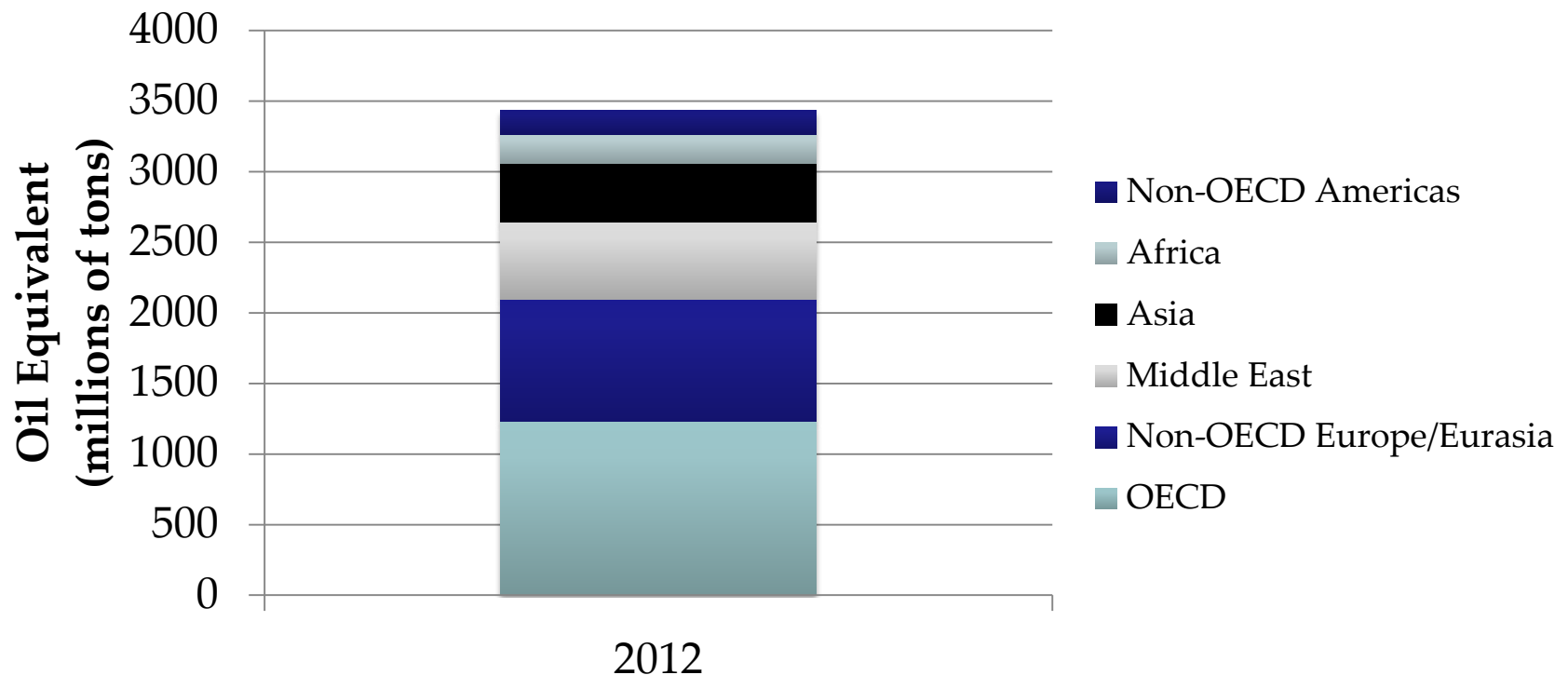
Question 4

Which group of countries produced the most natural gas in 2012?

- a. OECD**
- b. Non-OECD Europe and Eurasia**
- c. Asia**
- d. Middle East**



World natural gas supply, 2012





Question 5

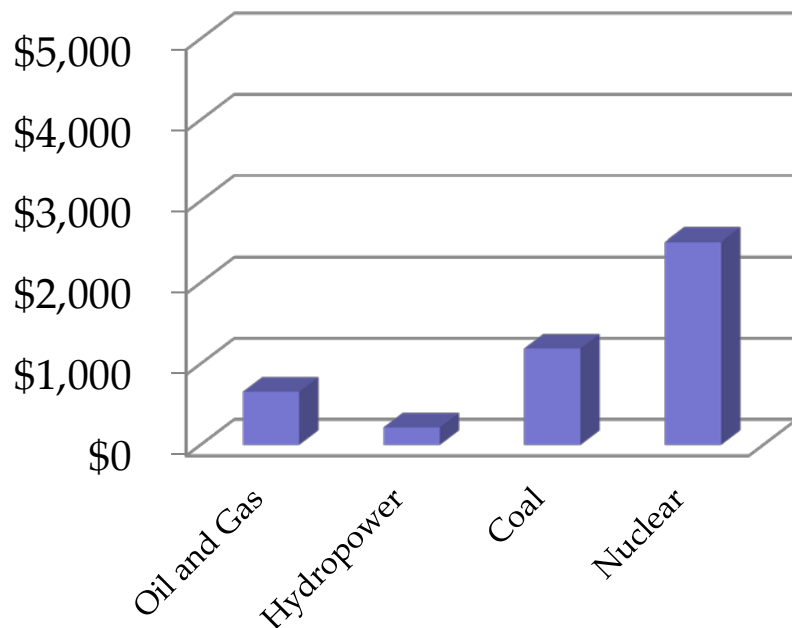
Which is the most subsidized fuel for generating electricity in the U.S.?

- a. Nuclear**
- b. Fossil fuels**
- c. Solar**
- d. Wind**

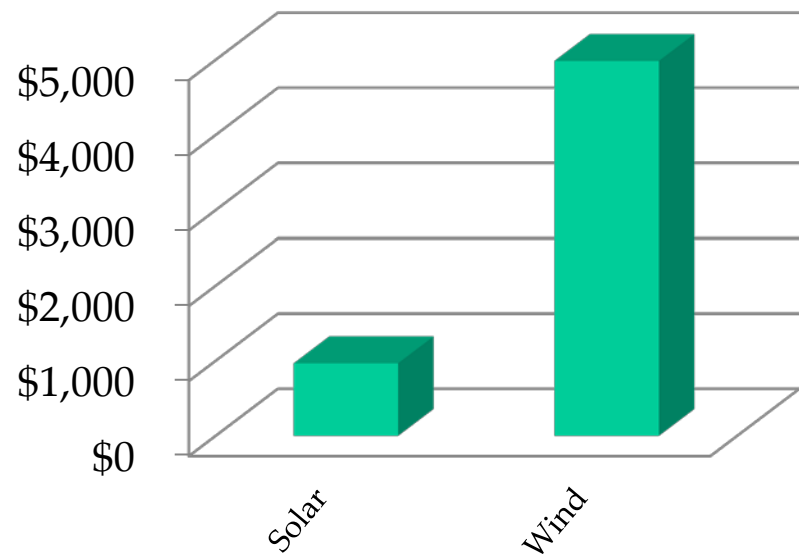


Fuel Subsidies (\$ millions)

Traditional Fuels



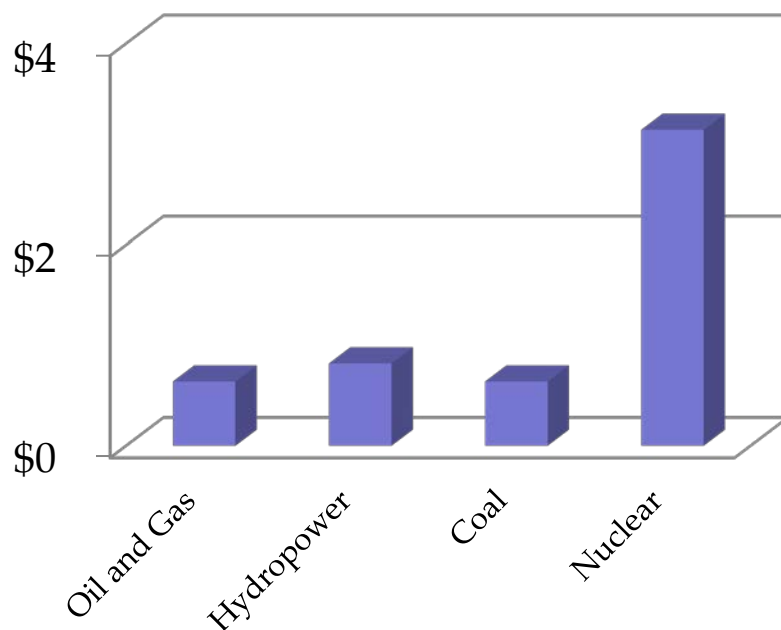
Renewables



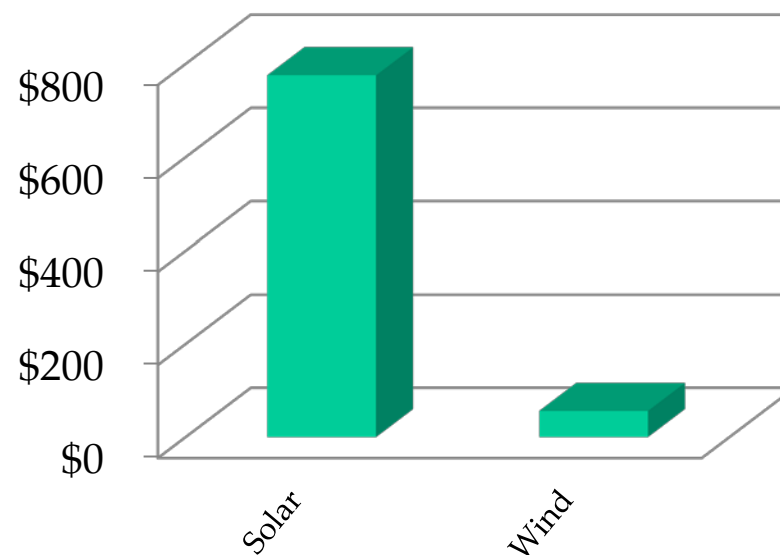


Subsidies per MWh

Traditional Fuels



Renewables





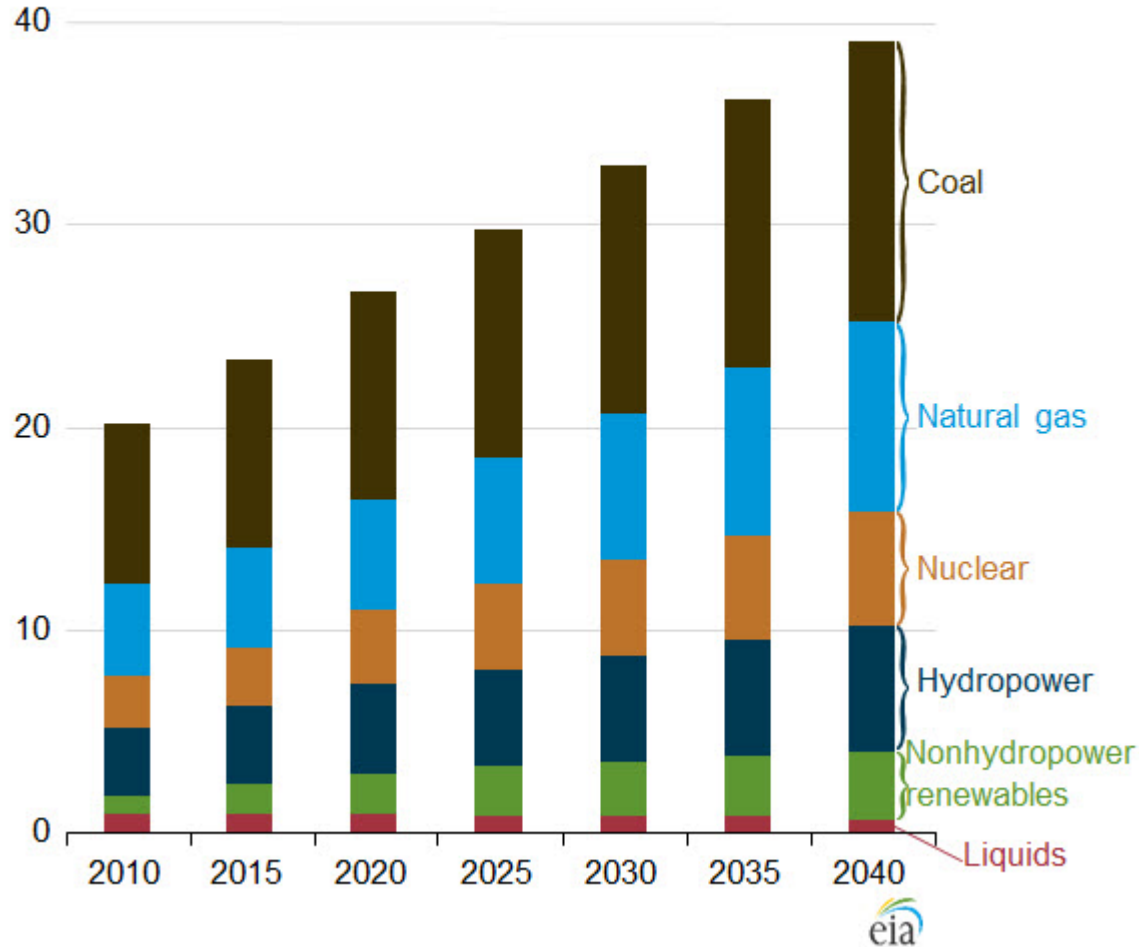
Question 6

What does the U.S. project to be the largest fuel source for electricity supply worldwide in 2040?

- a. Nuclear**
- b. Coal**
- c. Natural gas**
- d. Solar**
- e. Wind**

Figure 18. World net electricity generation by energy source, 2010-2040

trillion kilowatthours





What does this mean for the future?

- Where is the demand?
- What will be consumed?
- What will be the pattern?
- What are the implications?



Energy forecasts often wrong

Perfect
Forecast

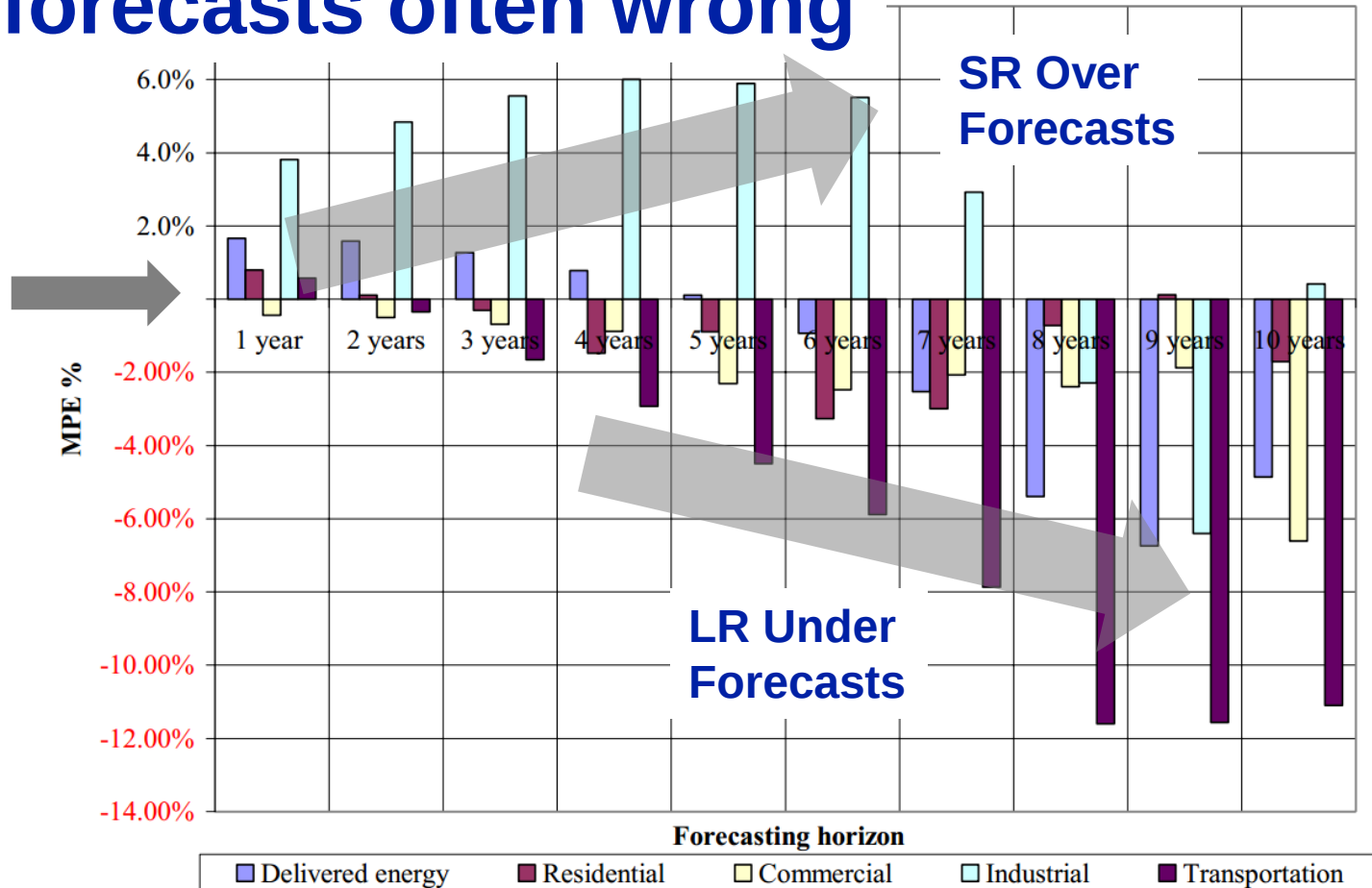
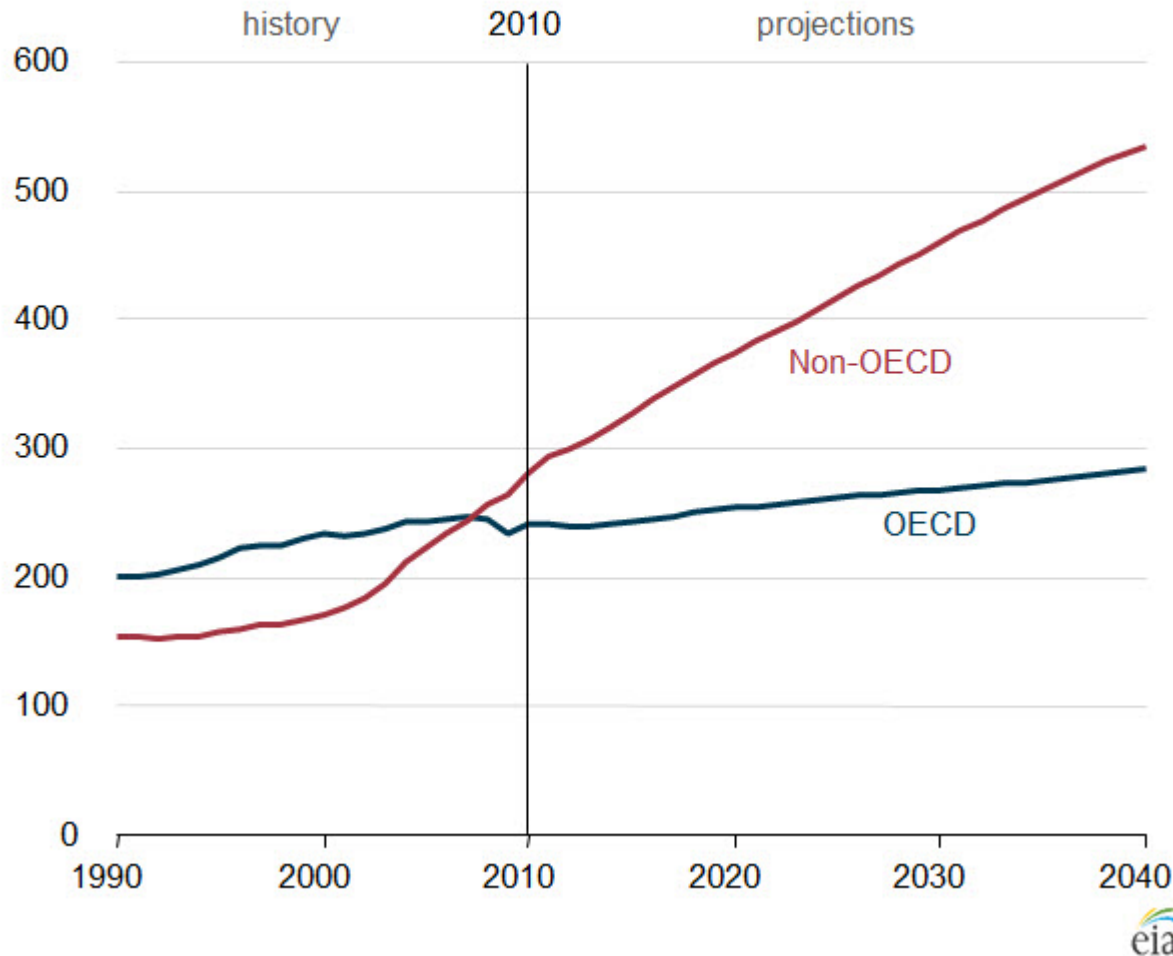


Figure 14. World energy consumption, 2010-2040

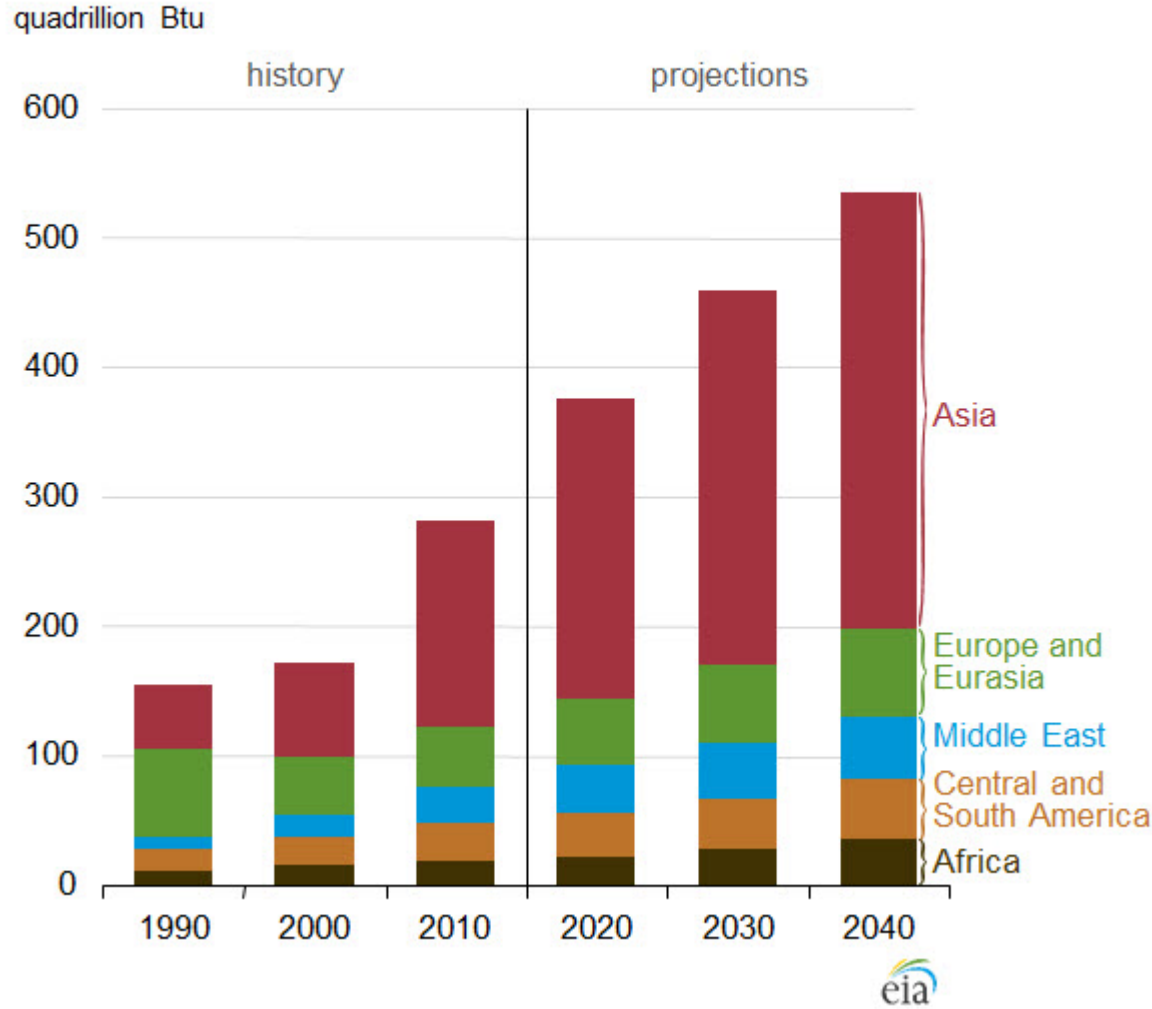
quadrillion Btu



Forecasts
are flat for
OECD and
growth for
non-OECD.

Non-OECD
consumption
exceeds
OECD.

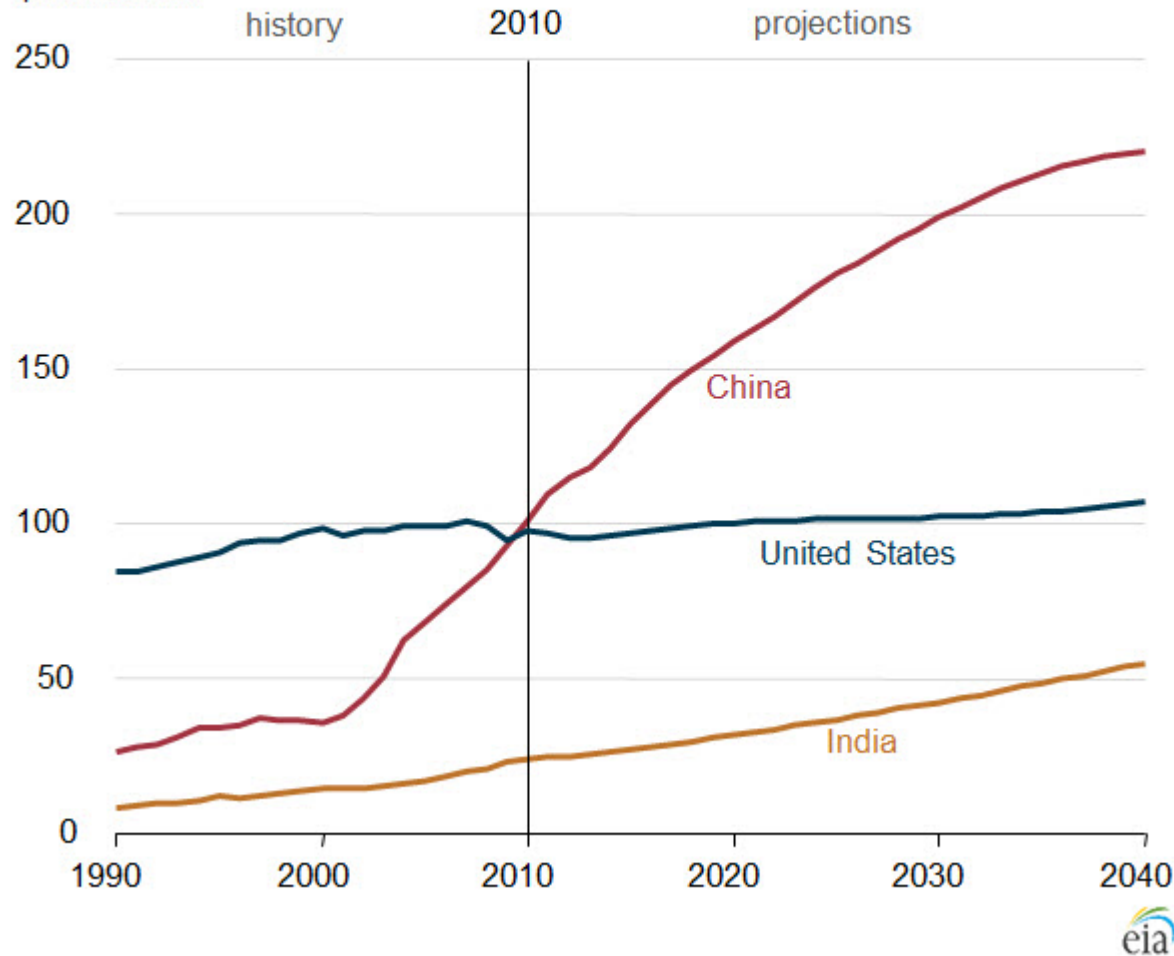
Figure 15. Non-OECD energy consumption by country grouping, 1990-2040



Most of the non-OECD growth is for Asia...

Figure 13. Energy consumption in the United States, China, and India, 1990-2040

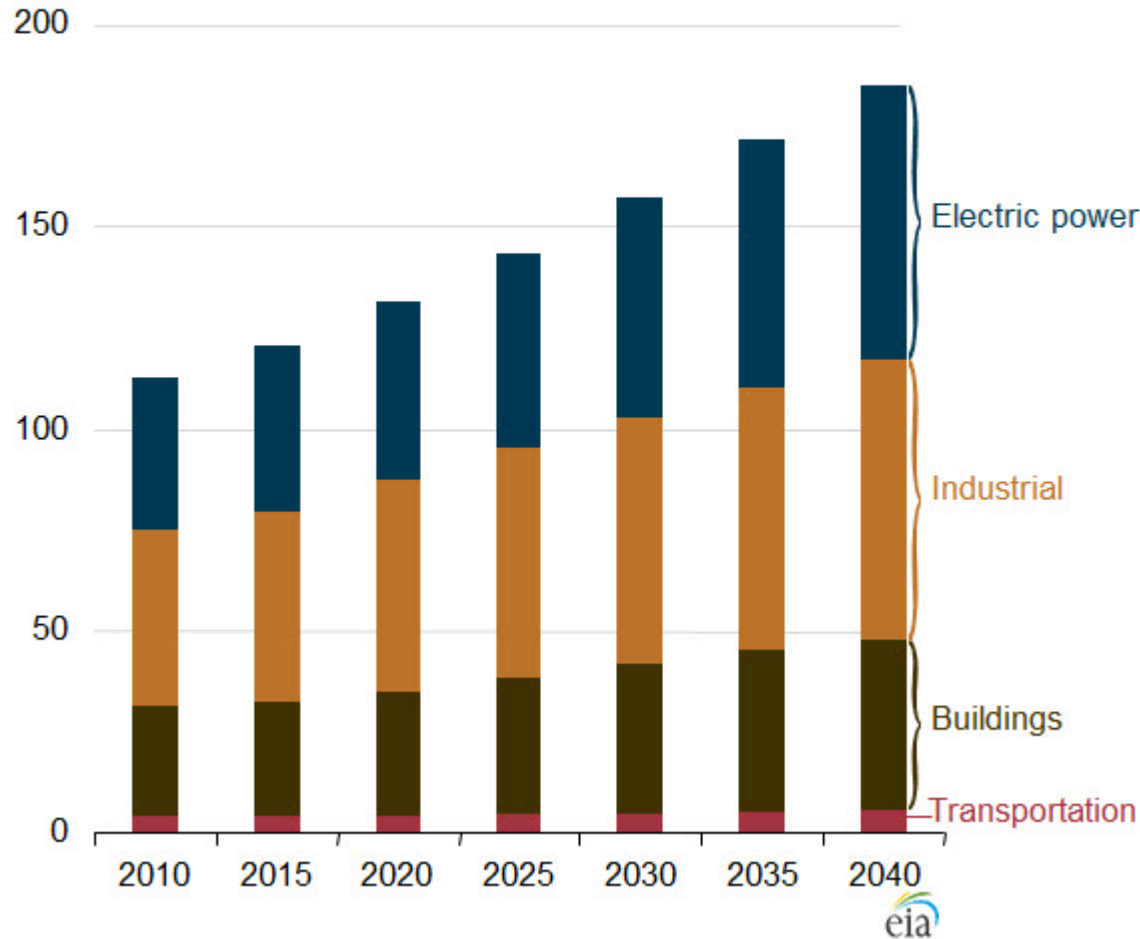
quadrillion Btu



...primarily
China

Figure 17. World natural gas consumption by end-use sector, 2010-2040

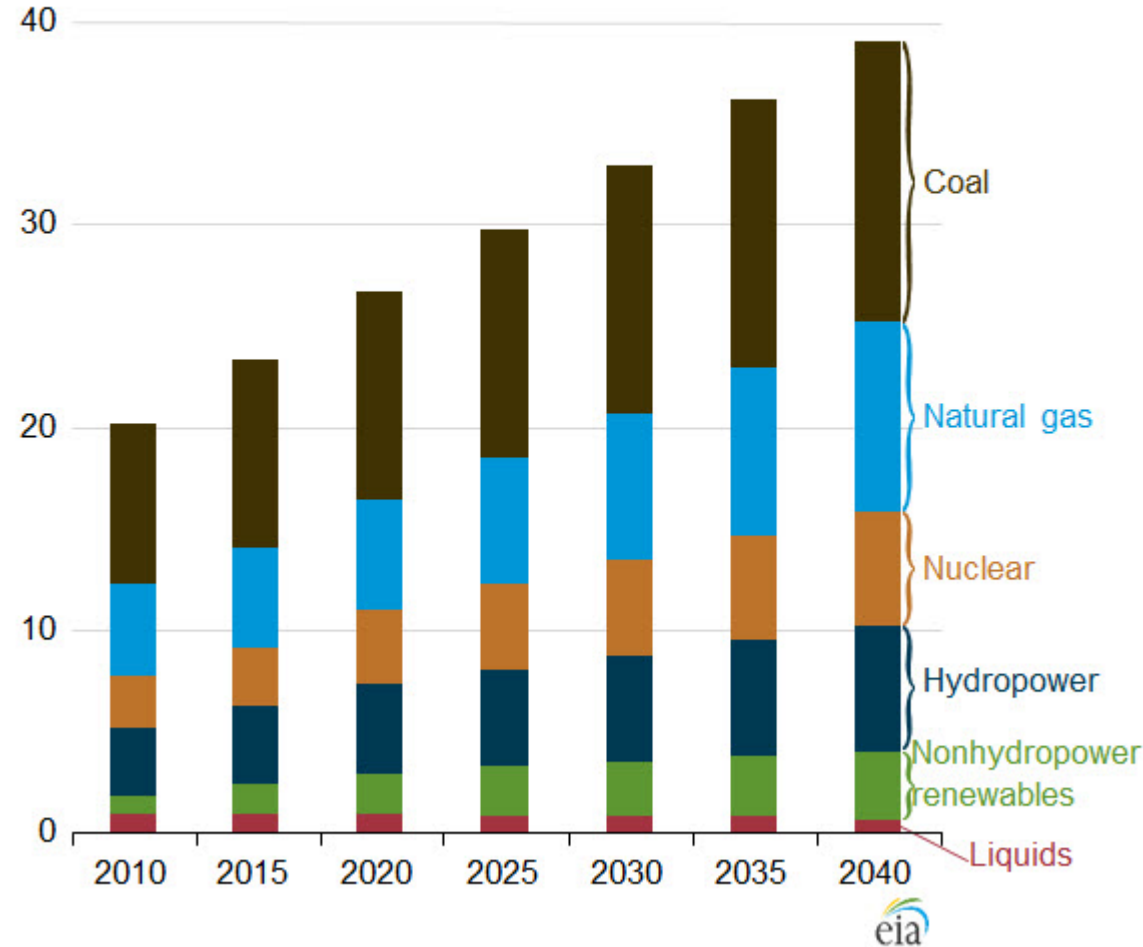
trillion cubic feet



Natural gas growth primarily industrial, but all areas grow

Figure 18. World net electricity generation by energy source, 2010-2040

trillion kilowatthours

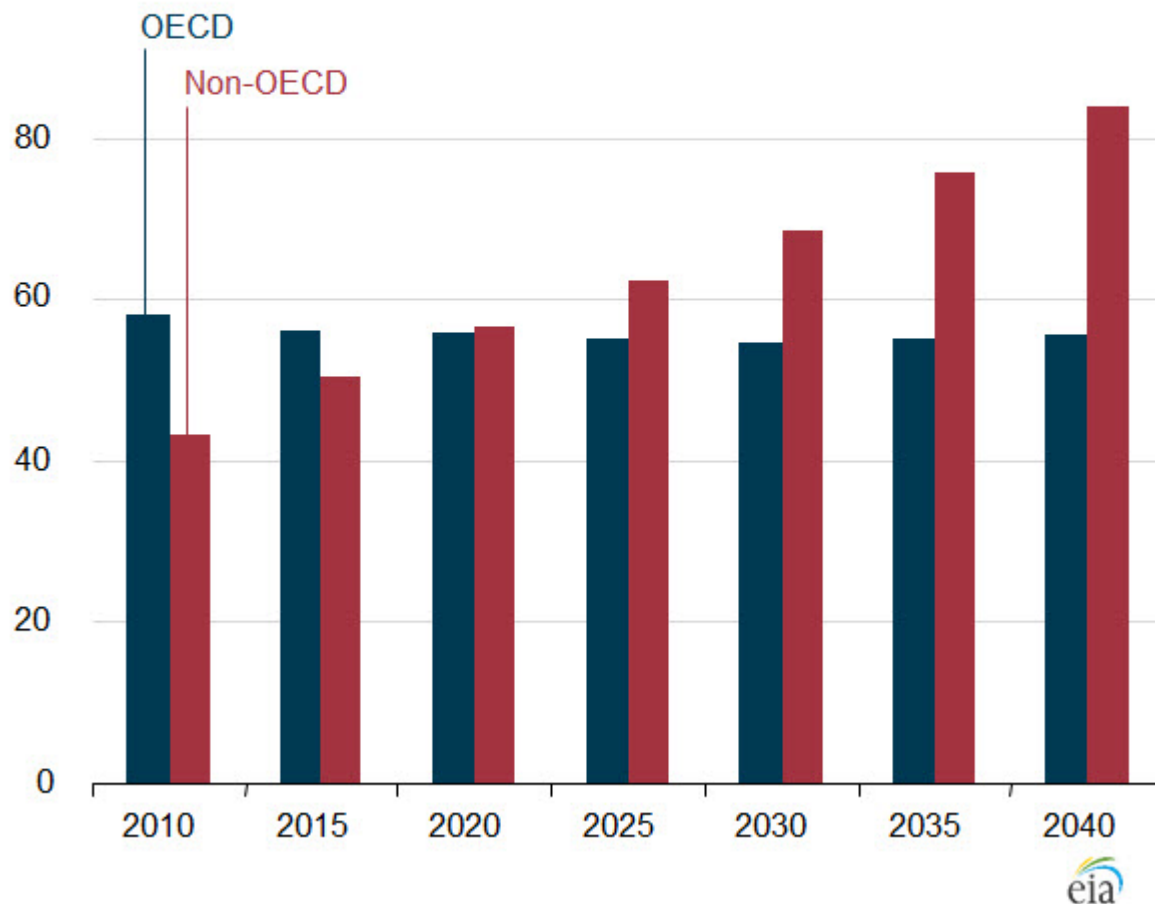


Fossil fuels
will
dominate
electricity
generation

Figure 24. World transportation sector delivered energy consumption, 2010-2040

quadrillion Btu

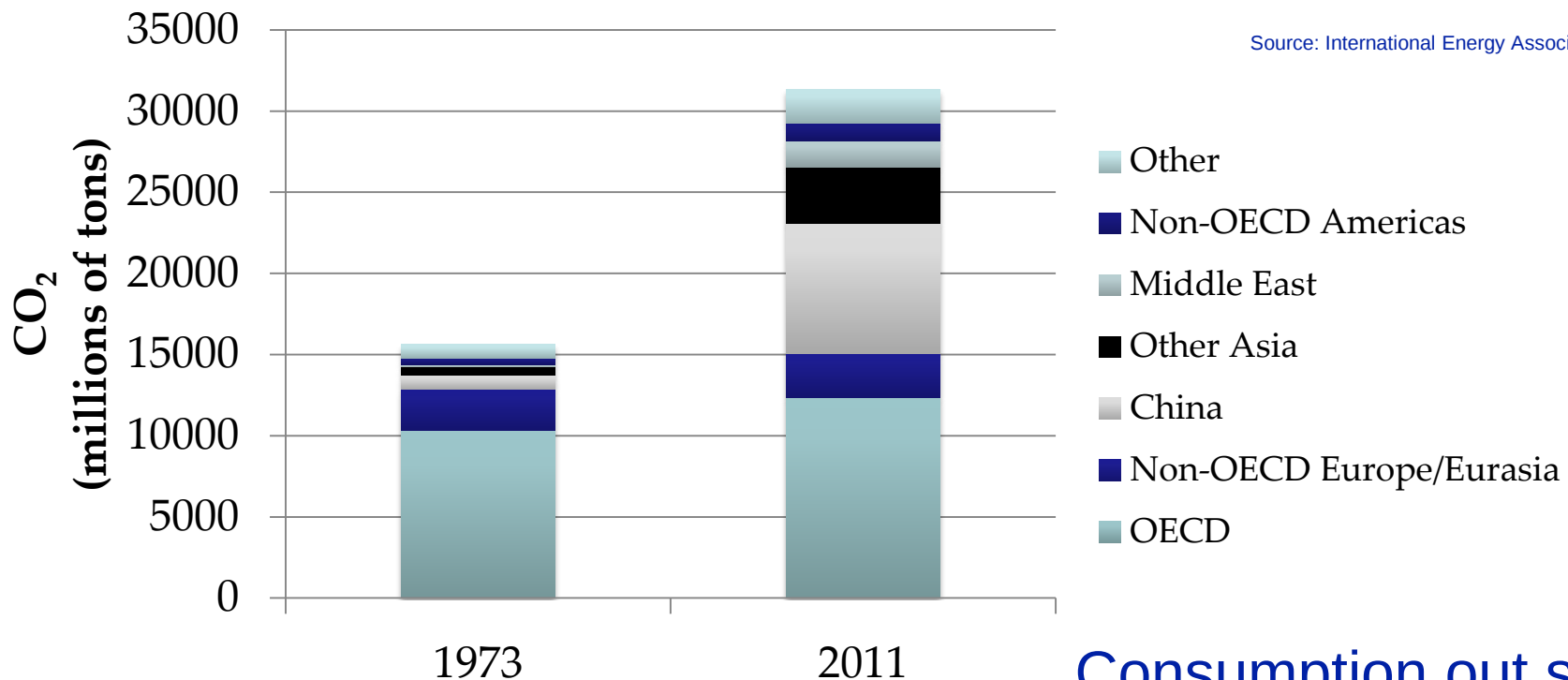
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Trans-
portation
grows in
non-OECD
and flat
in OECD



World carbon emissions from energy, 1973 and 2011

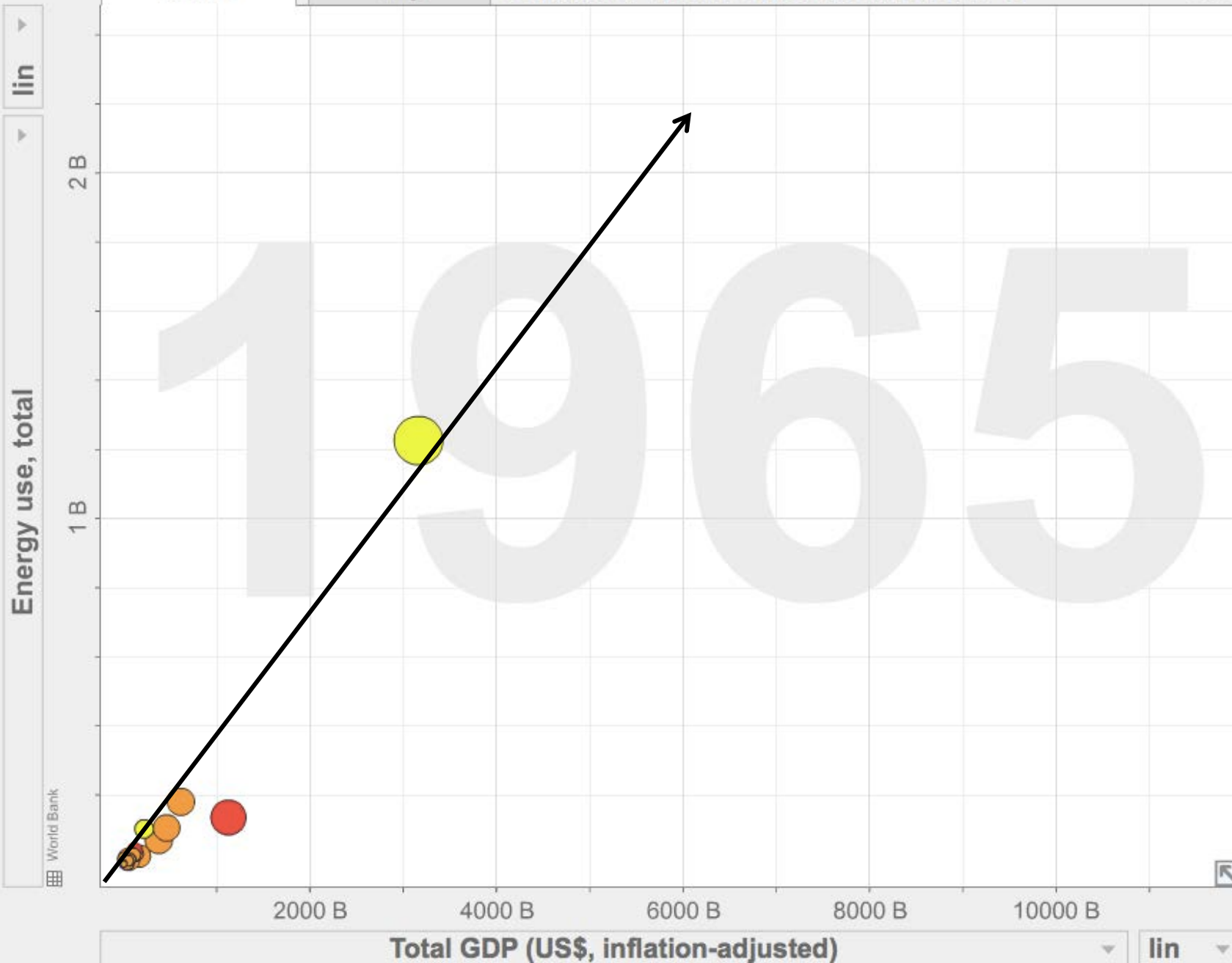


Consumption outstrips emissions OECD, but not non-OECD

Chart

Map

Gapminder World Downloaded: 2013-10-11



World Bank

Chart

Map

Gapminder World Downloaded: 2013-10-11



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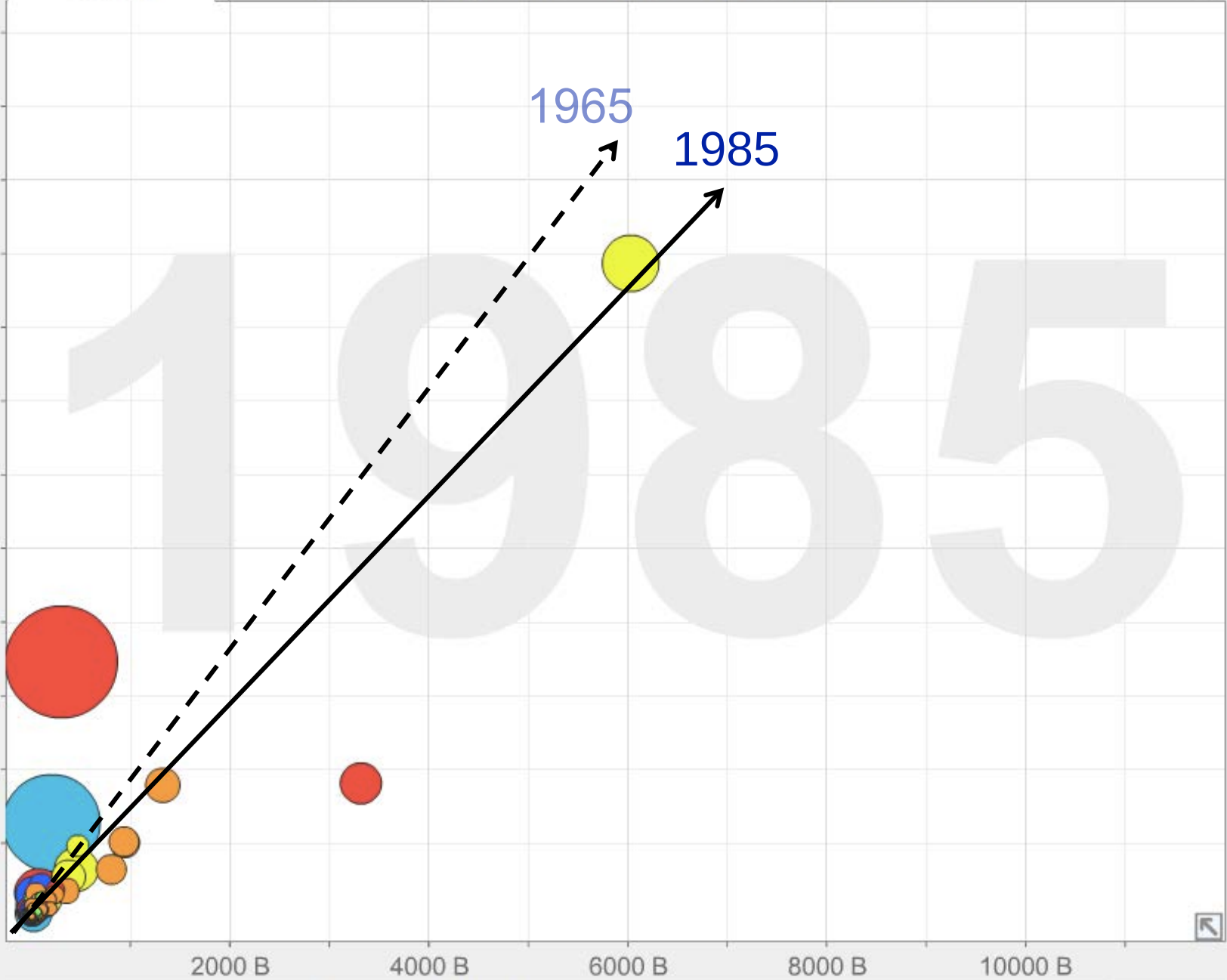
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Energy use, total

2 B

1 B

World Bank



2000 B

4000 B

6000 B

8000 B

10000 B

Total GDP (US\$, inflation-adjusted)

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Chart

Map

Gapminder World Downloaded: 2013-10-11



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Energy use, total

World Bank

2 B

1 B

2000 B

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6000 B

8000 B

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Total GDP (US\$, inflation-adjusted)

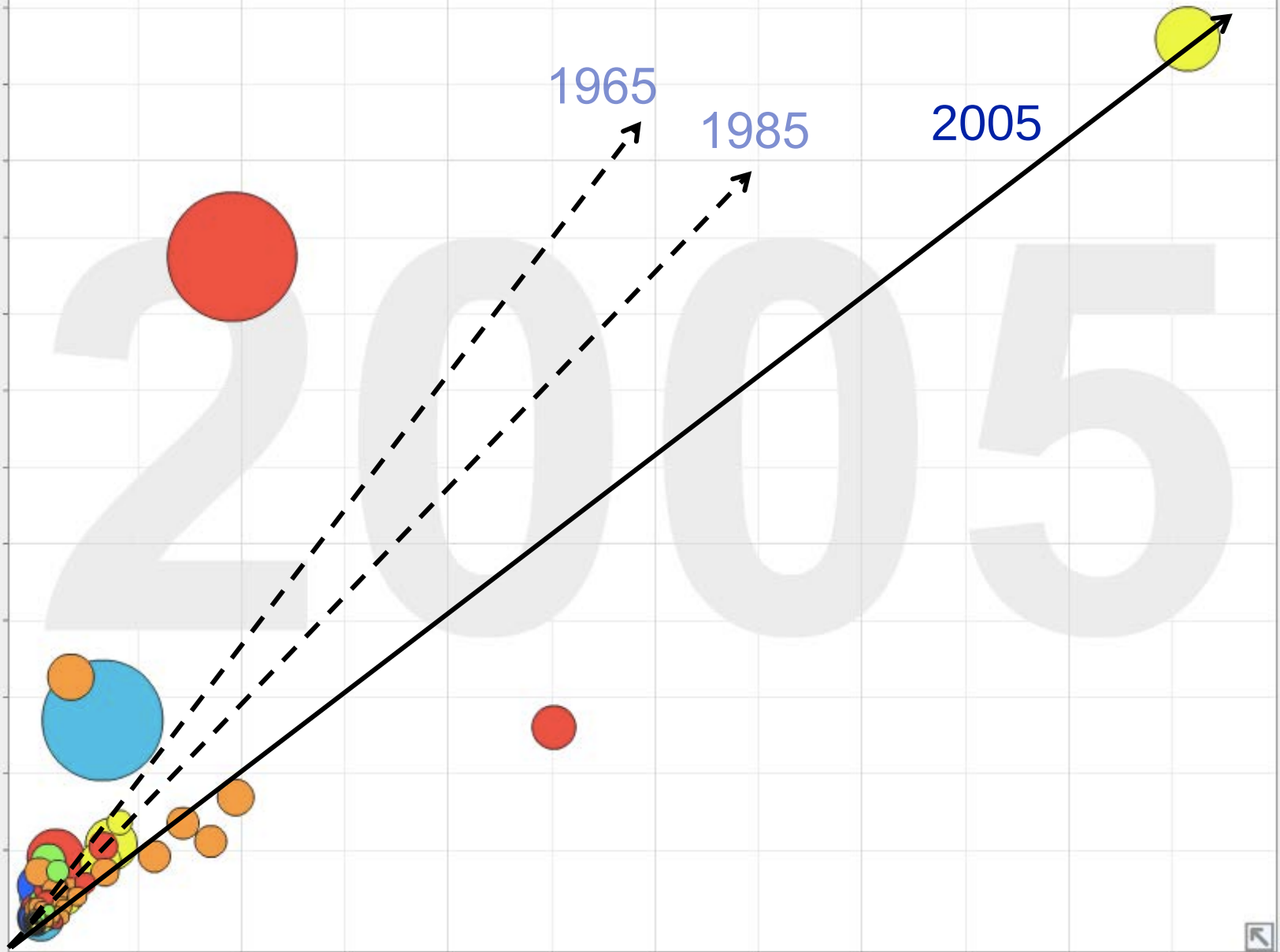
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1965

1985

2005



Chart

Map

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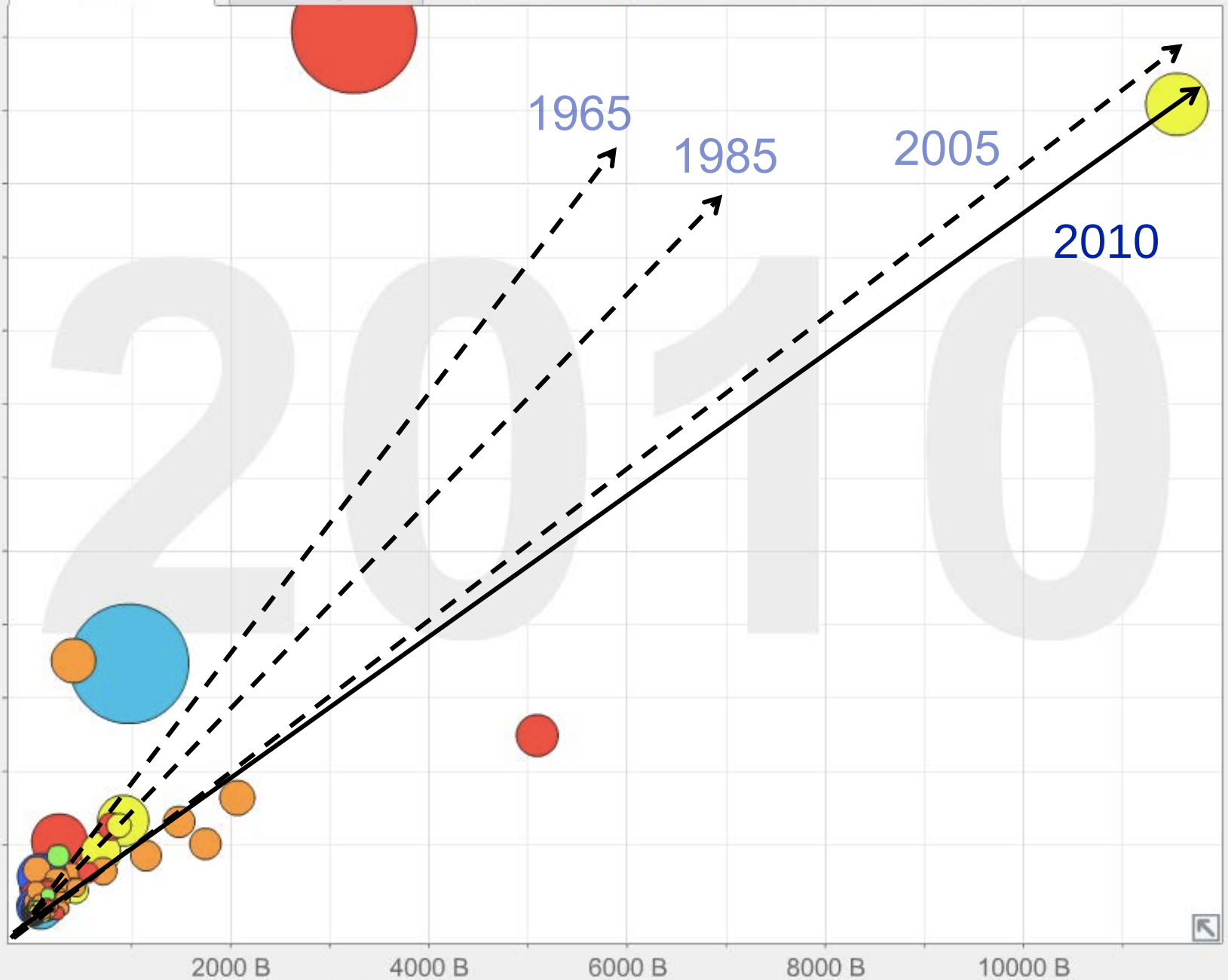
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Energy use, total

2 B

1 B

World Bank



Total GDP (US\$, inflation-adjusted)

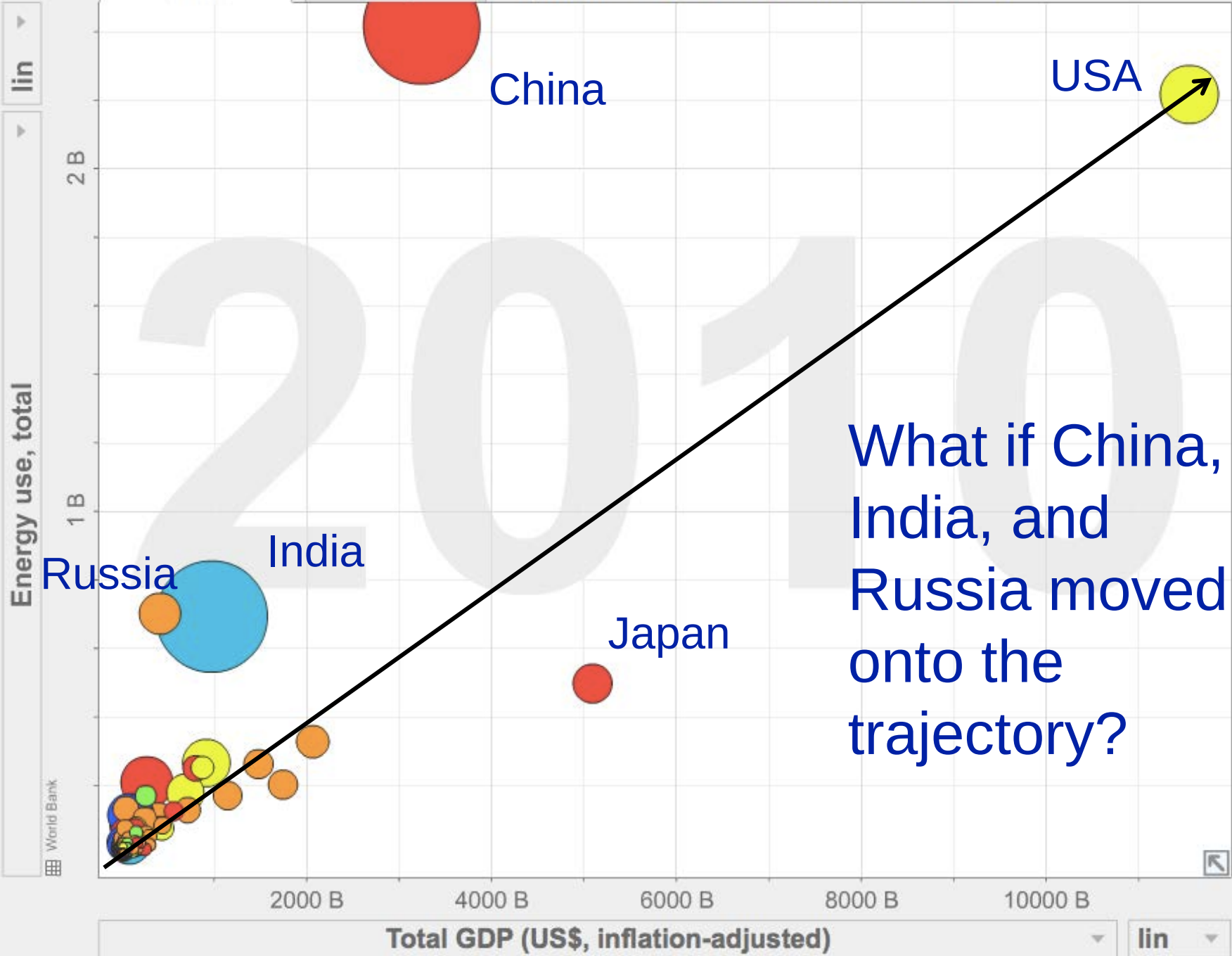
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Chart

Map

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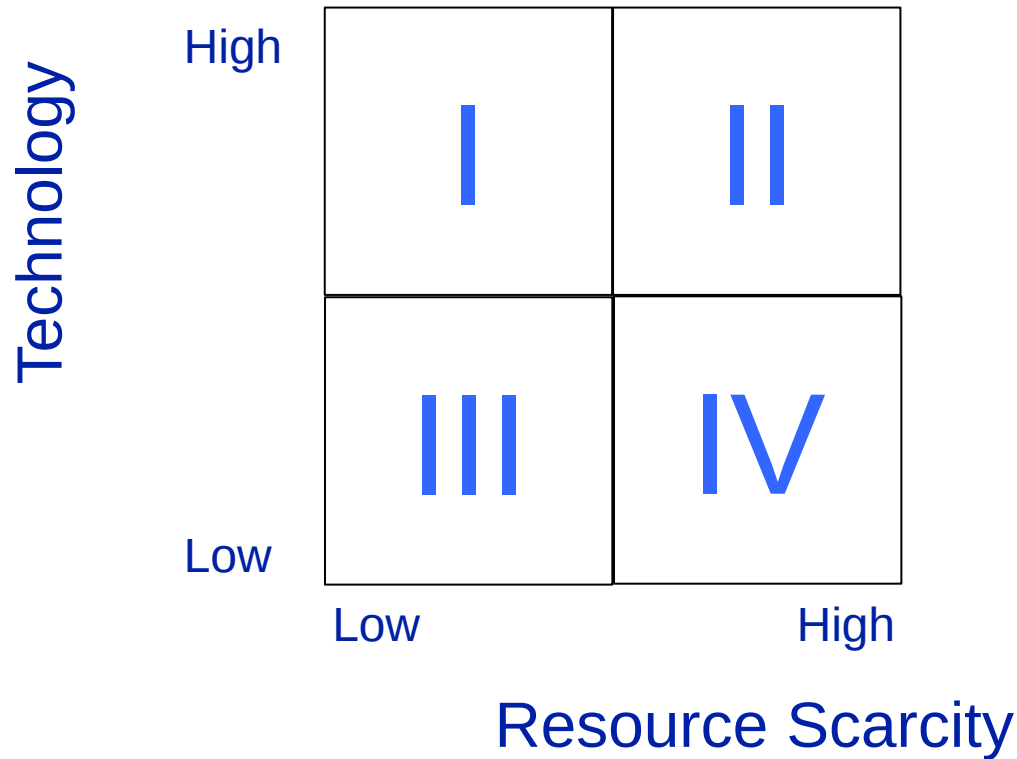
What are the energy drivers?

- Tech change
- Political changes
- Efficiency
- Resource scarcity
- Labor migration
- Climate policy



What are the energy drivers?

- **Climate change policies**
- **Economic production**
- **Income growth**
- **Liberalization**
- **Increases in energy efficiency**
- **Geopolitics**





Losses

- **Every change involves a loss**
- **People resist loss, not change**
- **Identify**
 - Losses
 - Mitigation strategies



Contact

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