

# Financing the energy transition – global needs and trends

Kapitalmarktforum Schweiz, 30. 05. 2018

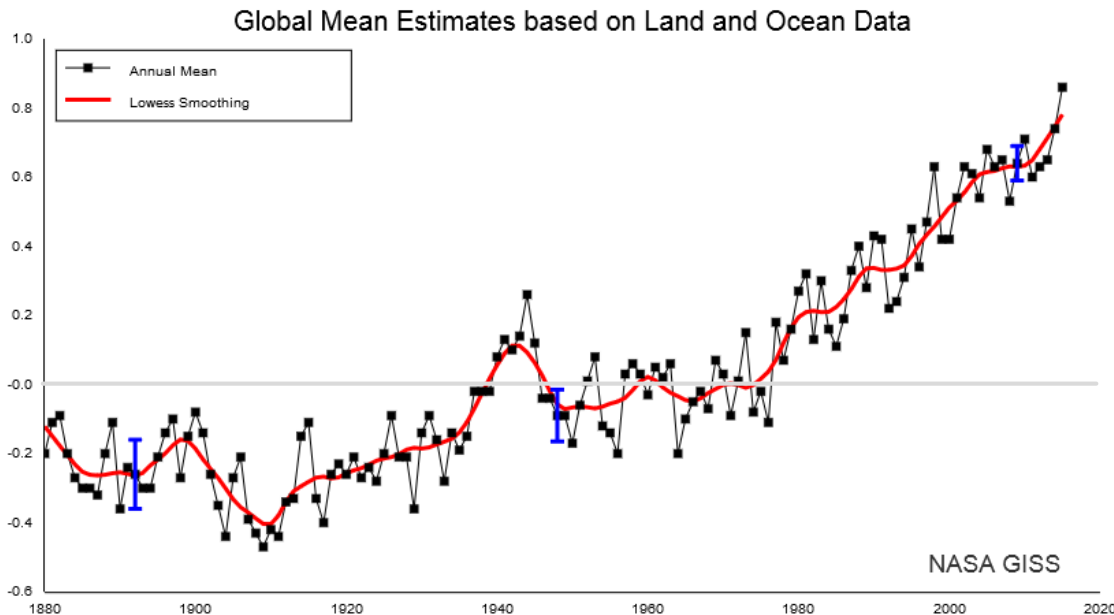
Prof. Dr. Tobias Schmidt, Energy Politics Group, ETH Zürich

# Agenda

- 1 Climate Change and Climate Finance
- 2 Renewable Energy Finance
- 3 Trends in OECD-countries
- 4 Going beyond the OECD

# Climate change is real – with measurable and severe impact

## Global temperature rise (anomalies in °C)



## Further effects

### Sea

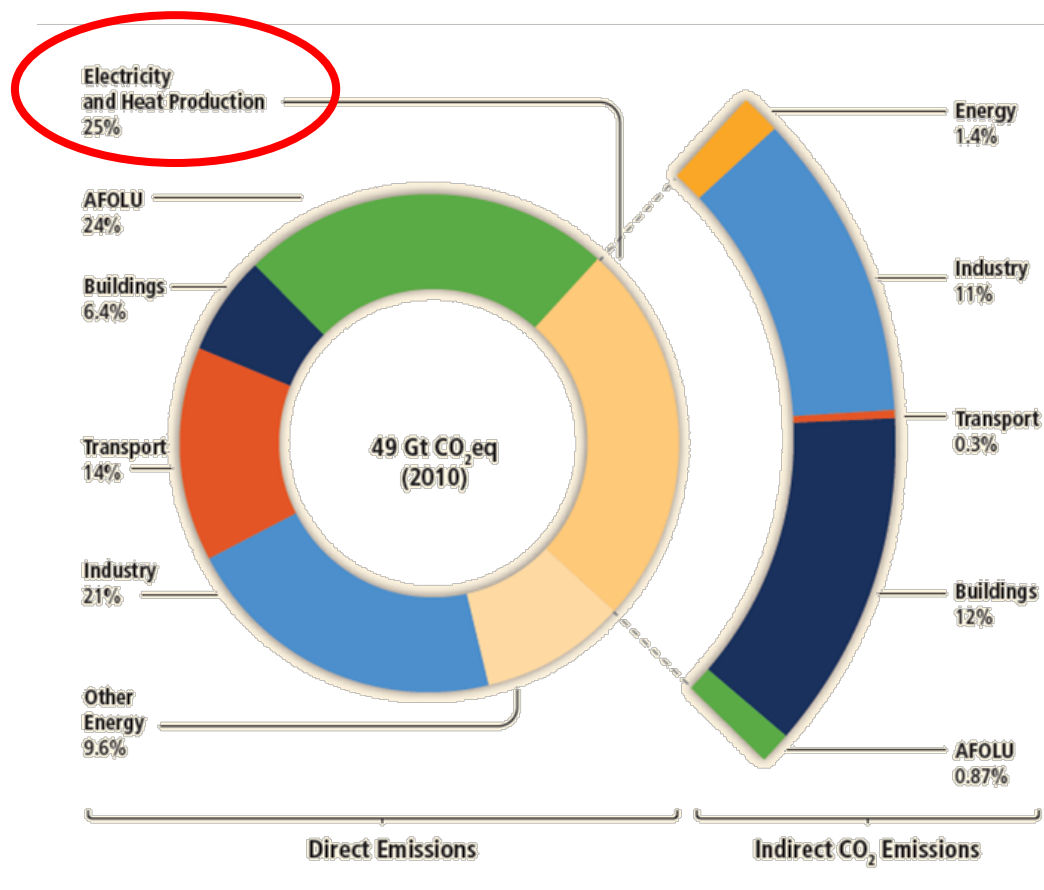
- Rising sea level
- Warming oceans
- Ocean acidification
- Declining Arctic sea ice

### Land

- Increasing frequency of extreme temperature events
- Decreasing snow covers
- Retreat of glaciers

*à All effects with strong scientific evidence*

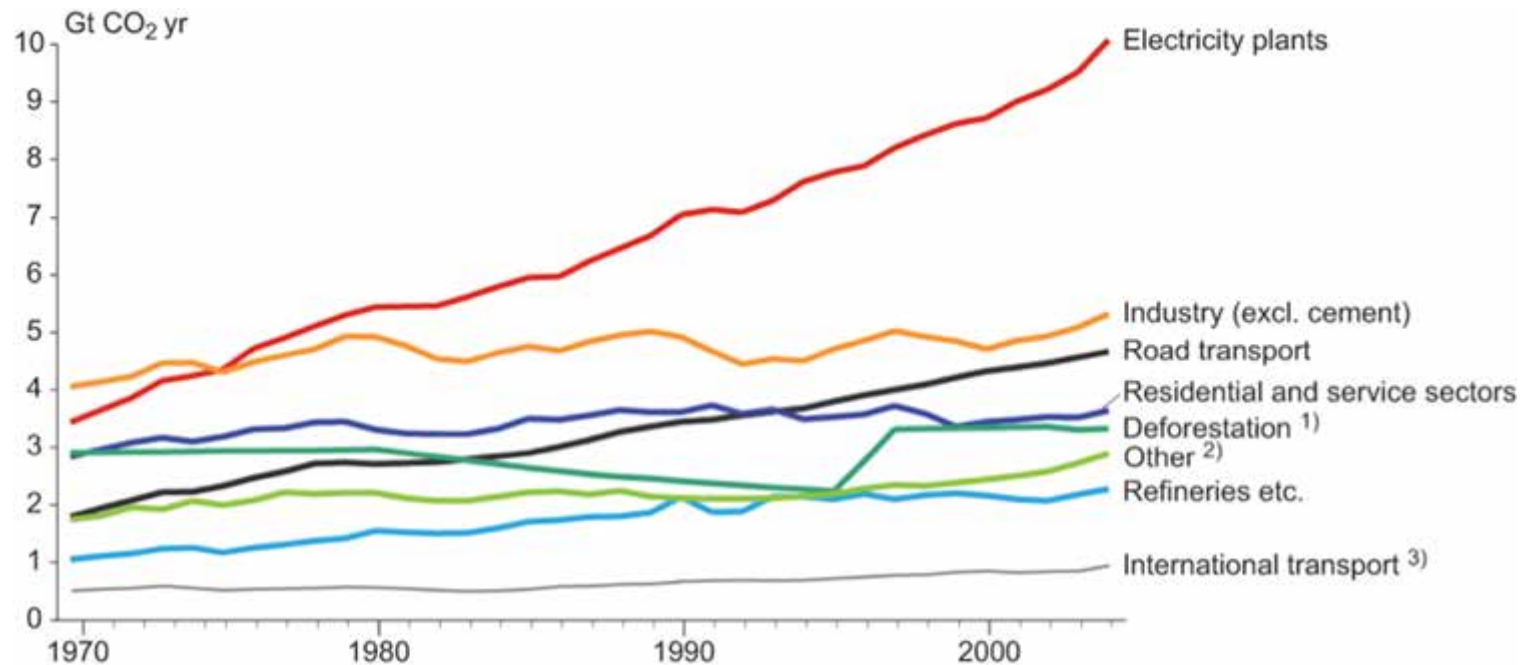
# Burning fossil fuels for electricity & heat is the largest contributor to anthropogenic GHG emissions



Source: IPCC (2014), "Summary for Policymakers" In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change

**Figure SPM.2** Total anthropogenic GHG emissions (GtCO<sub>2</sub>eq/yr) by economic sectors. Inner circle shows direct GHG emission shares (in % of total anthropogenic GHG emissions) of five economic sectors in 2010. Pull-out shows how indirect CO<sub>2</sub> emission shares (in % of total anthropogenic GHG emissions) from electricity and heat production are attributed to sectors of final energy use. "Other Energy" refers to all GHG emission sources in the energy sector as defined in Annex II other than electricity and heat production (A.II.9.1). The emissions data from Agriculture, Forestry and Other Land Use (AFOLU) includes land-based CO<sub>2</sub> emissions from forest fires, peat fires and peat decay that approximate to net CO<sub>2</sub> flux from the Forestry and Other Land Use (FOLU) sub-sector as described in Chapter 11 of this report. Emissions are converted into CO<sub>2</sub>-equivalents based on GWP<sub>100</sub> from the IPCC Second Assessment Report. Sector definitions are provided in Annex II.9. [Figure 1.3a, Figure TS.3 upper panel]

# Electricity and transport with highest emissions growth rates



Keep in mind: also industry and the residential sector can be de-carbonized to large extents by electrifying thermal processes (but only if electricity is emission free)



# LANDSCAPE OF CLIMATE FINANCE IN 2015/2016

Global climate finance flows along their life cycle in 2015 and 2016. Values are average of two years' data, in USD billions.

**410** BN USD ANNUAL AVERAGE



## SOURCES AND INTERMEDIARIES

Which type of organizations are sources or intermediaries of capital for climate finance?

## INSTRUMENTS

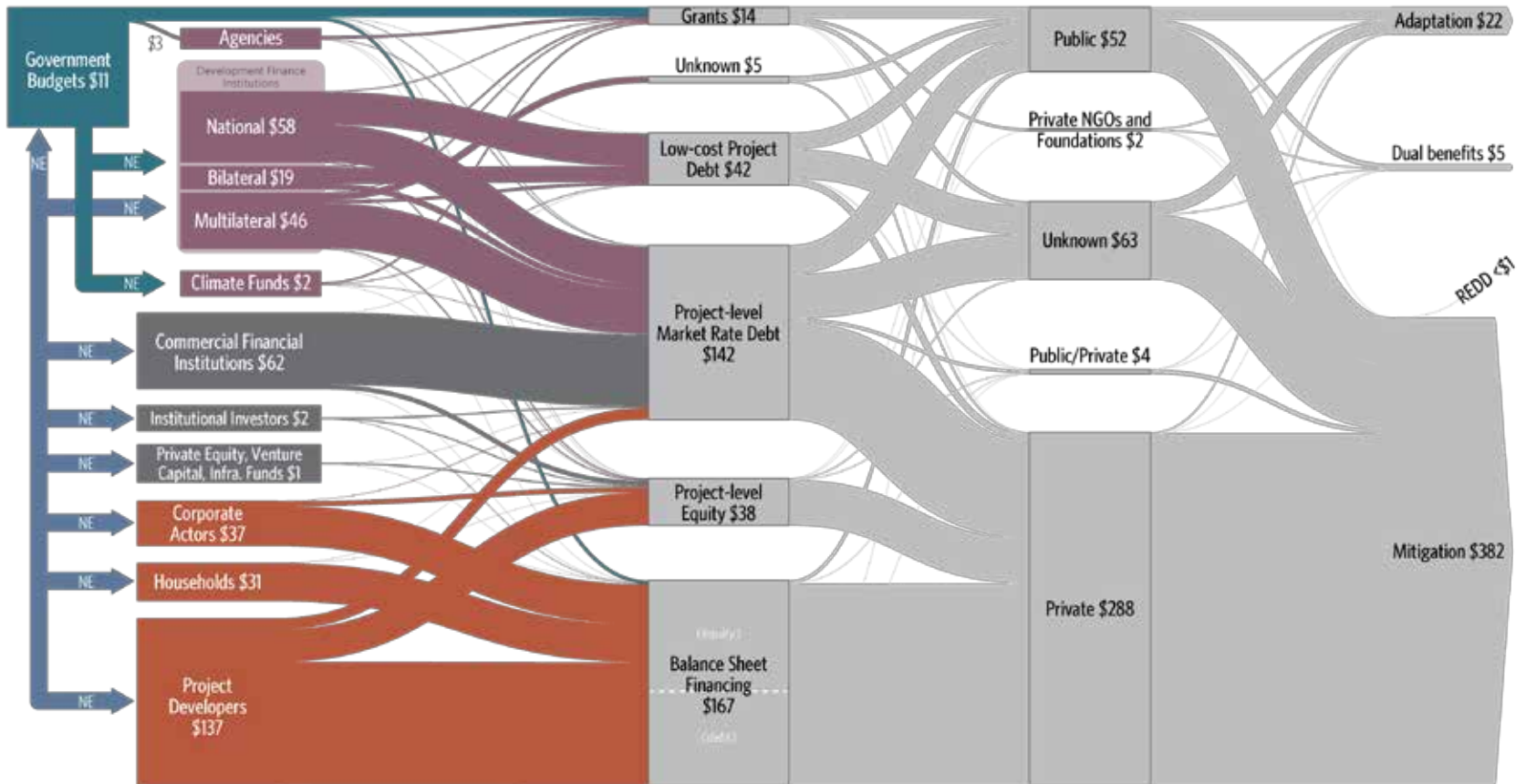
What mix of financial instruments are used?

## RECIPIENTS

Does climate finance go through public or private channels?

## USES

What types of activities are financed?



**KEY**

- PUBLIC MONEY
- PRIVATE MONEY
- PUBLIC FINANCIAL INTERMEDIARIES
- PRIVATE FINANCIAL INTERMEDIARIES
- FINANCE FOR INVESTORS & LENDERS
- NE: NOT ESTIMATED

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2 Renewable Energy Finance

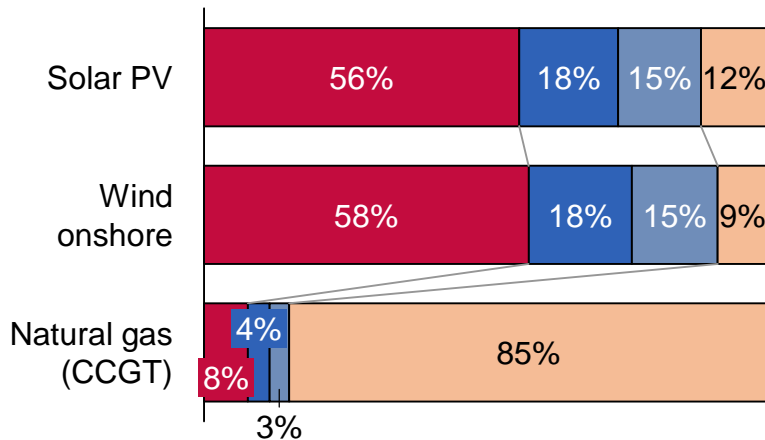
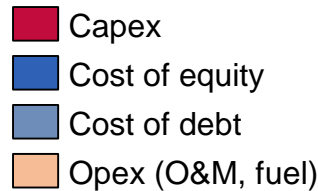
3 Trends in OECD-countries

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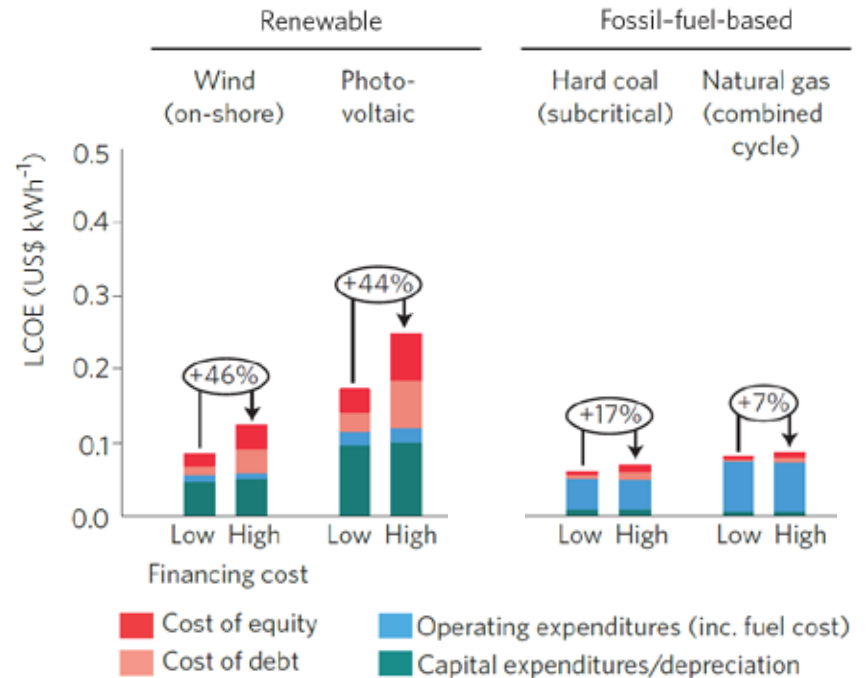
# Why financing matters for renewable energy assets

## Relative importance of Capex and Opex

Typical cost split of power generation projects (2014)



## Impact of change in cost of capital



Notes:

1. "Low" financing cost referring to 5% debt/10% equity, "High" financing cost referring to 10% debt/18% equity

2. LCOE chosen to illustrate dependency on WACC, not most recent estimate for renewables

Source: Schmidt, T.S. (2014), 'Low-carbon investment risks and de-risking', Nature Climate Change, 4, 237-239.



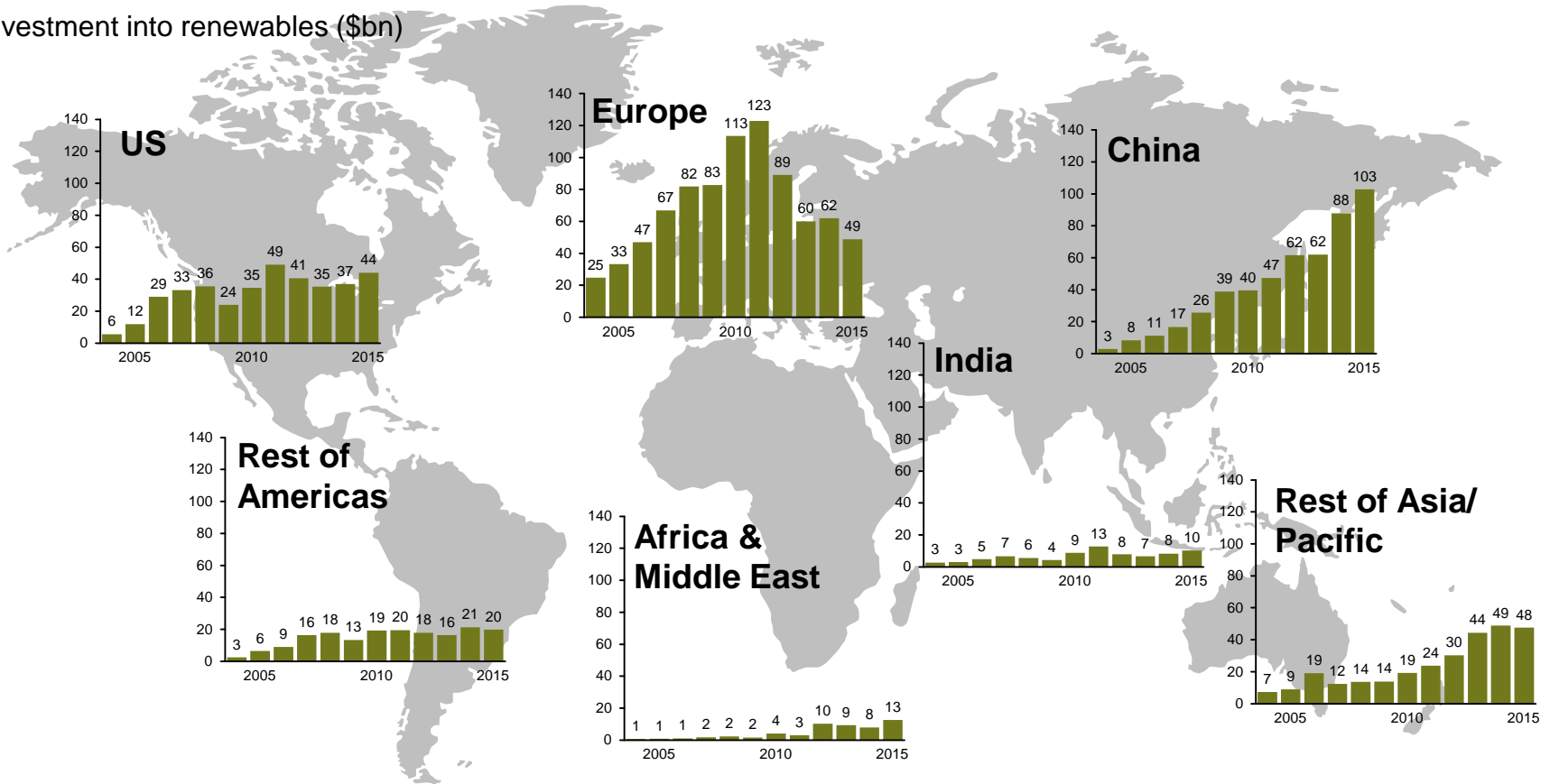
## A massive scale-up is needed to reach 2°C goal

*Annual investments in renewables:*



# Recently, growth in China making up for lower invest in EUR

Investment into renewables (\$bn)



Sources: Bloomberg New Energy Finance

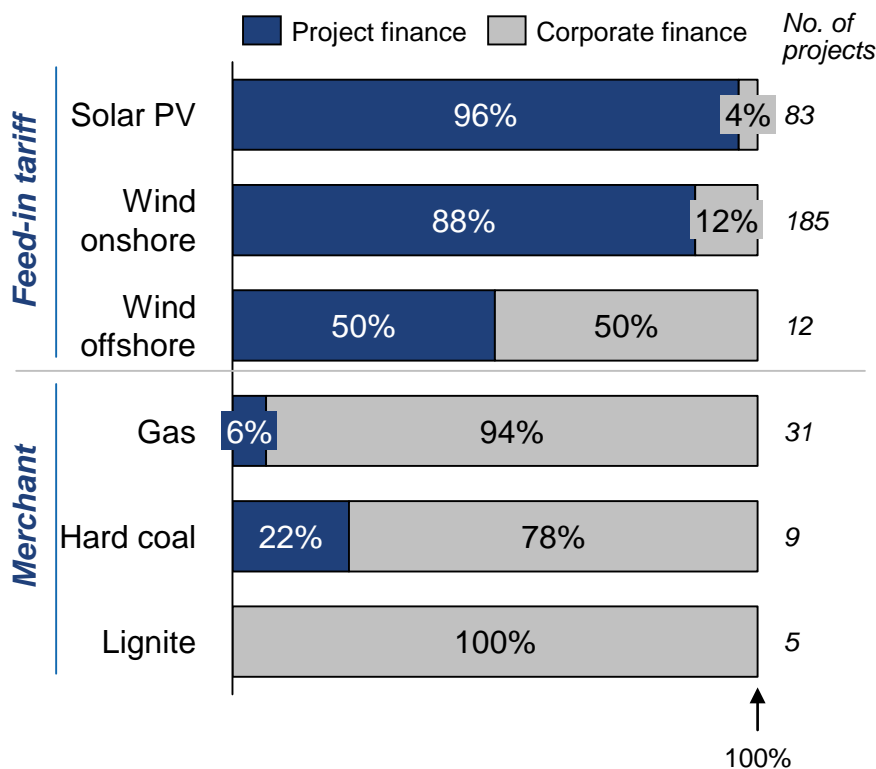
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- 3 Trends in OECD-countries
  - § The role of project finance
  - § Financing cost trends
  - § The role of state investment banks (SIB)
- 4 Going beyond the OECD

# 1. Renewable energy investments depend on project finance

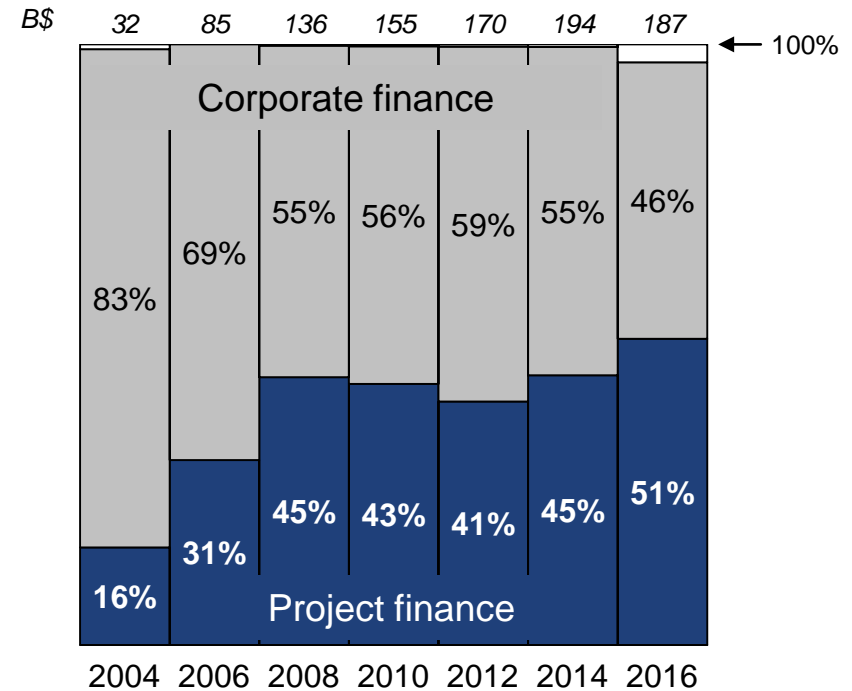
Renewables in DE w/ much lower risk than fossil fuels – still, use more project finance

German power generation projects 2010–2015



Growing use of project finance a global trend

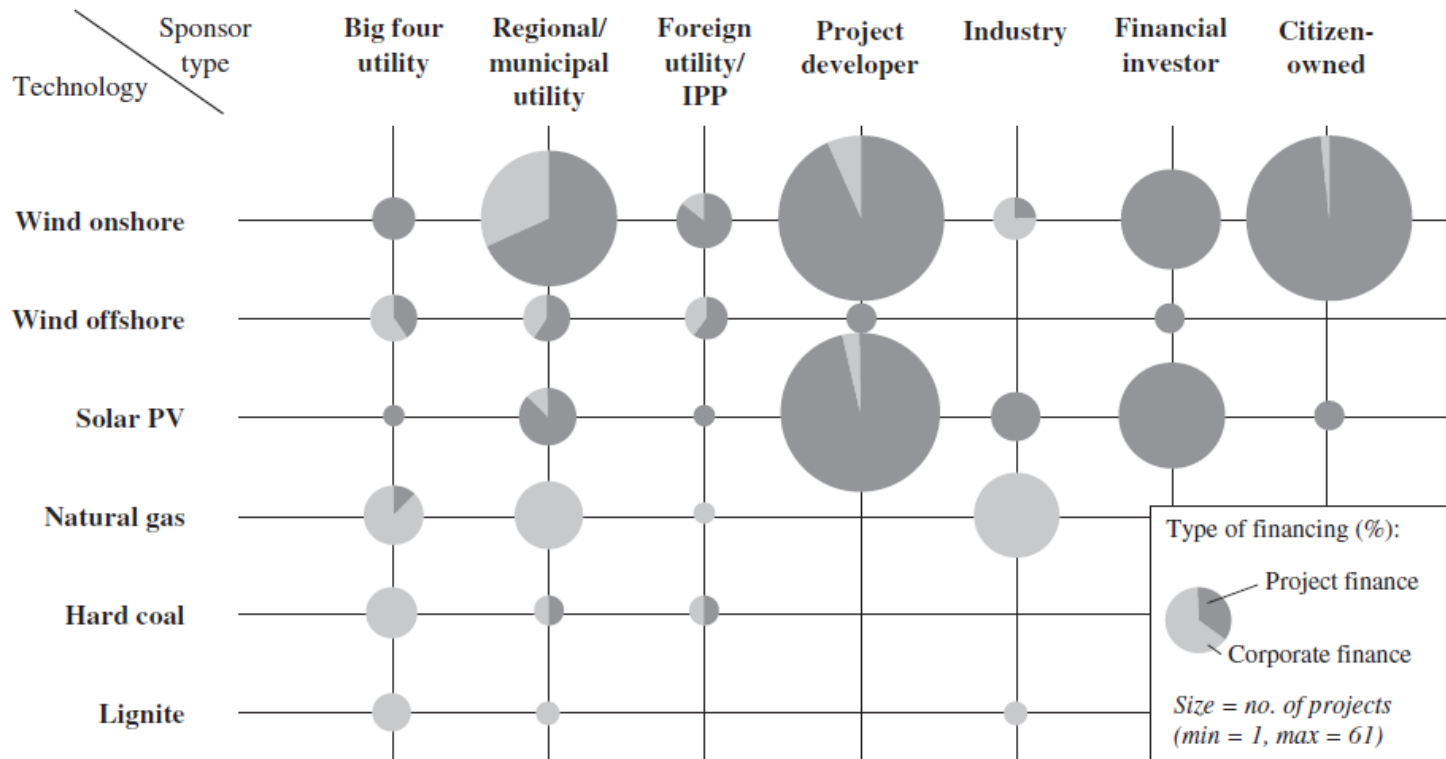
Global renewable energy asset finance



Source: Steffen, B. (2018), The importance of project finance for renewable energy, *Energy Economics*, forthcoming (doi: 10.1016/j.eneco.2017.11.006)

# Key reason: It is not utilities that invest, but new players

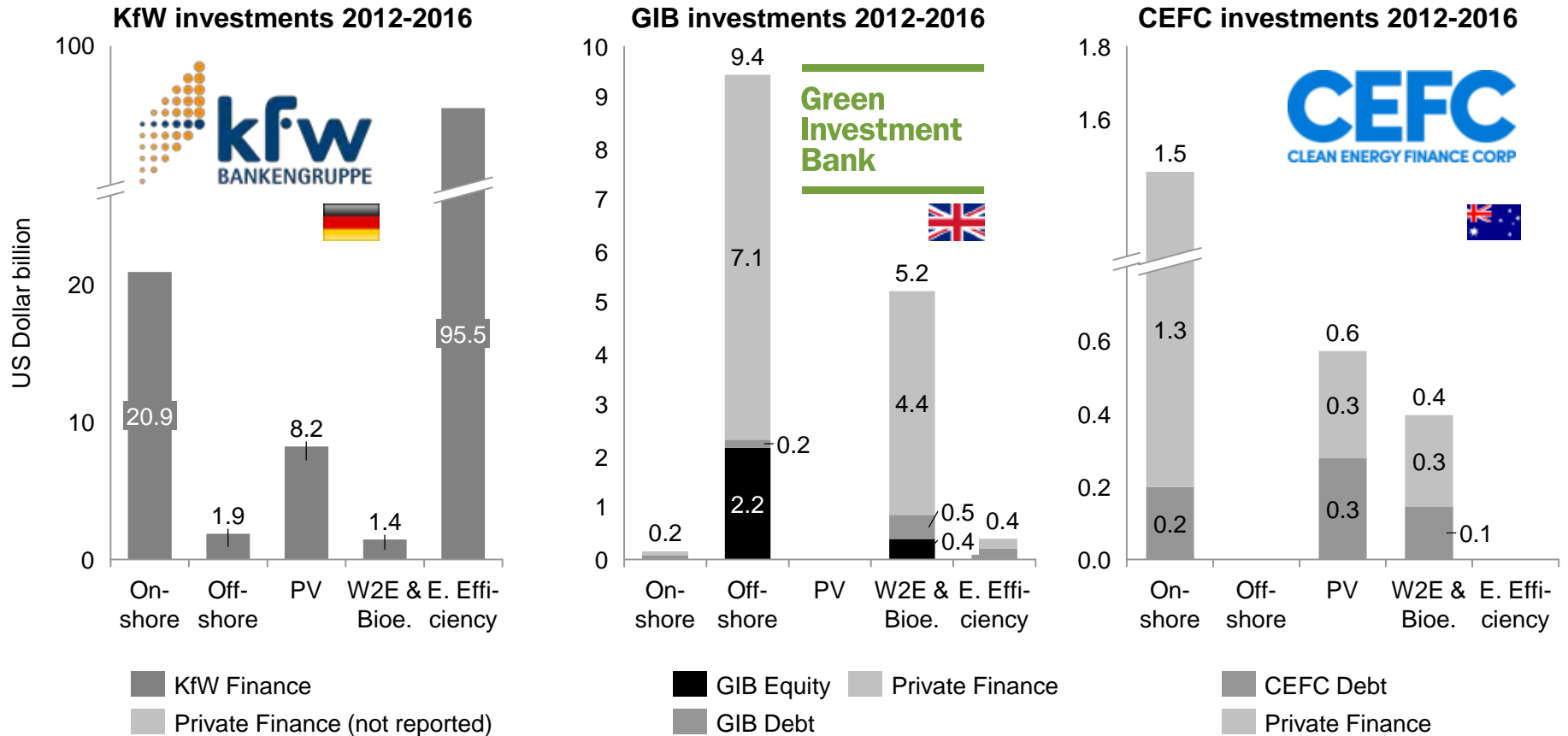
## New power plants commissioned in Germany 2010 – 2015



Note: Ca. 11% of projects involve sponsors from two or more different types, these projects are shown in the column of each involved sponsor type. Chart excludes other technologies (biomass, hydro run-of-river, petroleum products, furnace gas, waste-to-energy).

Source: Steffen, B. (2018), The importance of project finance for renewable energy projects, *Energy Economics* 69, 280-294.

### 3. Green SIB have been crucial for new asset class



Geddes, A., Schmidt, T.S., Steffen, B. (2018), The multiple roles of state investment banks in low-carbon energy finance: An analysis of Australia, the UK and Germany, Energy Policy 115, 158–170.



# SIB take four key roles, well beyond capital provision

## A. Capital Provision and De-risking Roles

- § Direct funding for crucial gaps, concessional or commercial terms
- § De-risking instruments (e.g., guarantees)



## C. Signaling Role

- § SIB reputation crowding-in private equity and debt
- § “SIB participation signal” with effect on financing cost



## B. Educational Role

- § Specialist internal expertise (e.g. accurately assessing risks)
- § Financial innovation and standardization



## D. First or Early Mover

- § Early movers with respect to new technologies (in the country), new deal structures, new manufacturers and developers

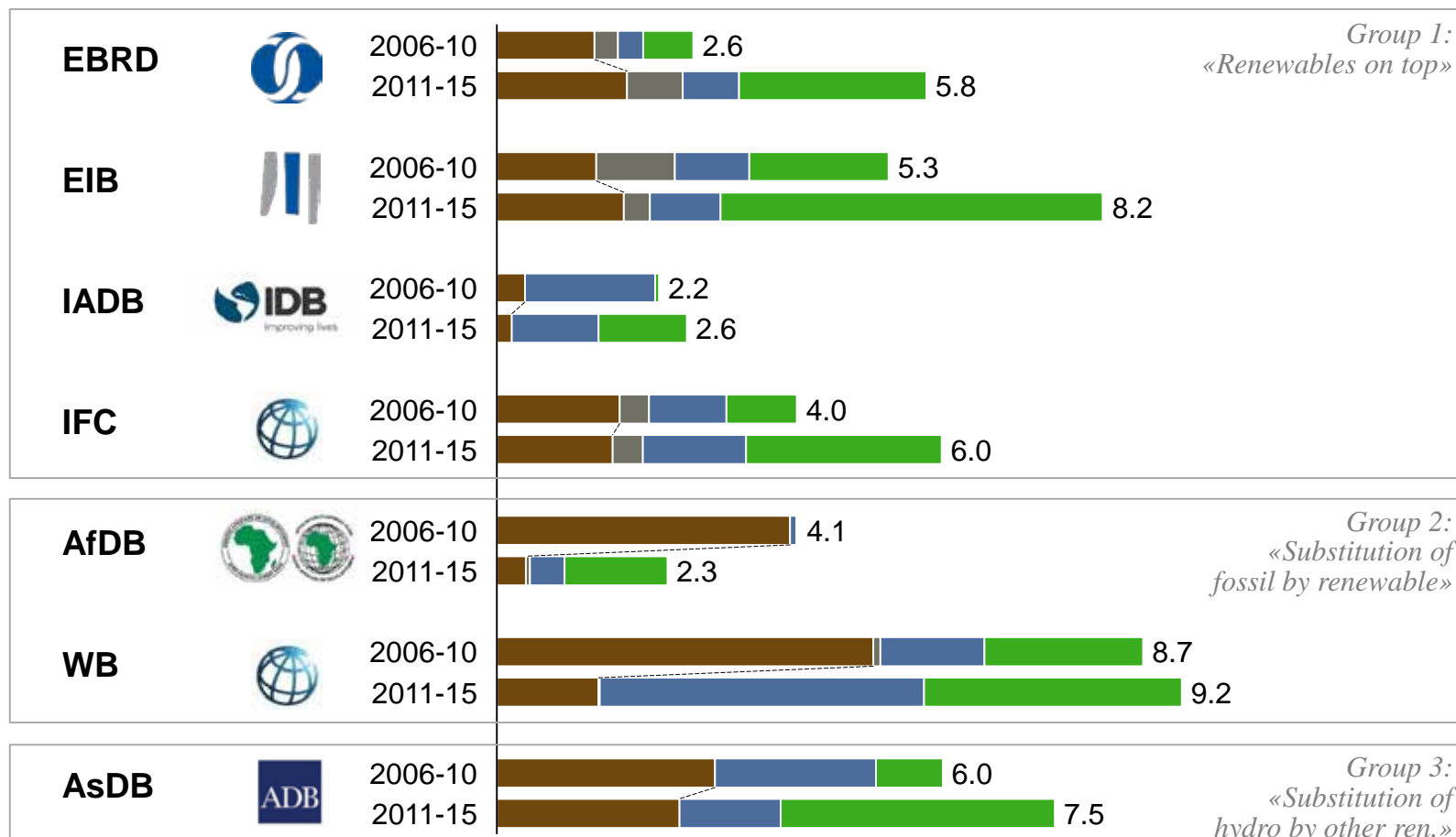


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§ How do multi-lateral development banks invest?

# Multilateral development banks: Invest in power generation

Total investment (USD billion)



■ non-renewable ■ unspecified ■ hydro ■ renewable excl. hydro

Source: Steffen, B.; Schmidt, T.S. (2017). The role of public investment & development banks in enabling or constraining new power generation technologies, IEEE Conference Proceedings, 14th International Conference on the European Energy Market (EEM), 2017. doi: 10.1109/EEM.2017.7981949

## Translating these findings to Switzerland – some questions

- § Who is mostly likely to finance (which parts of) the Swiss Energy Transition?
- § Which type of finance (balance sheet vs project finance)?
- § How can financial sector learning (on new technologies, business models, deal structures etc) be accelerated?
- § What is the role of the Swiss financial sector in accelerating the *global* energy transition?

# Thank you for your attention!

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