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# Assessment of investment needs and gaps in relation to the 2030 climate and energy targets

Ingmar Juergens and David Rusnok gbr Advisors
in co-operation with Carlotta Piantieri (IKEM)

# OUTCOME

Strengthened skills of the public sector actors and operators of public financial support schemes to address the investment challenge of meeting 2030 energy and climate targets.

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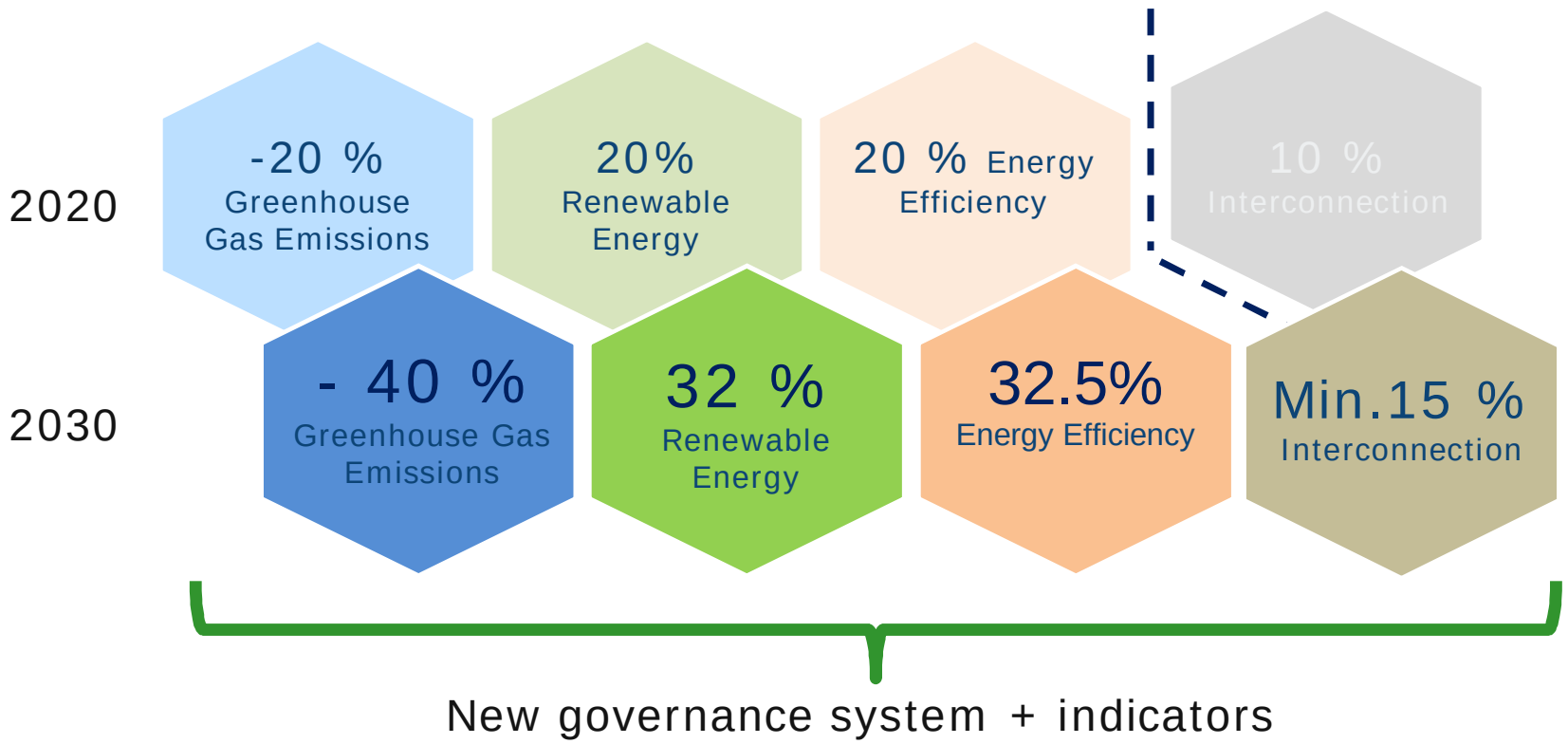
# Energy Union and the 2030 targets (the EU's "NDC")

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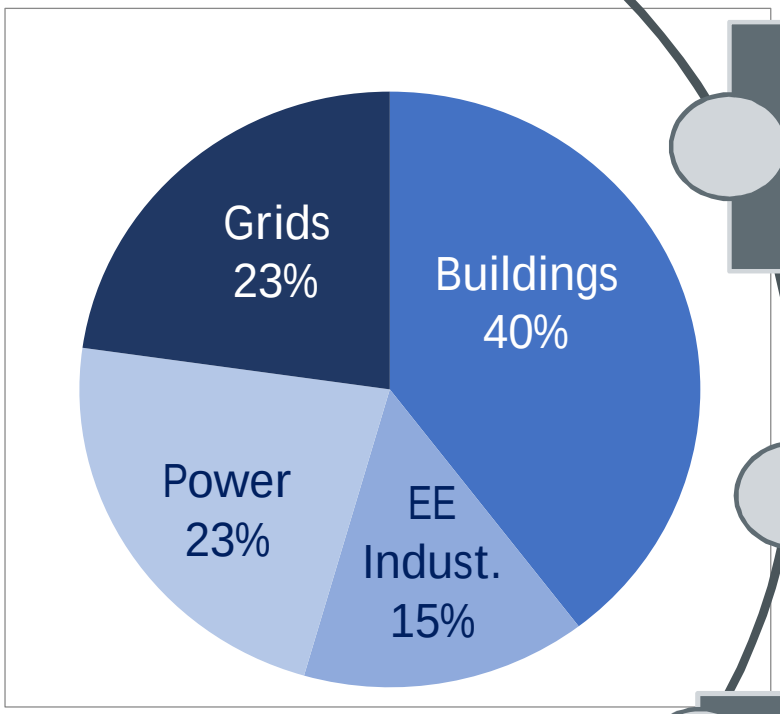
# At EU level: investment challenge of reaching the EU's 2030 targets

EUR 209 bn per year 2021-2030
in key sectors

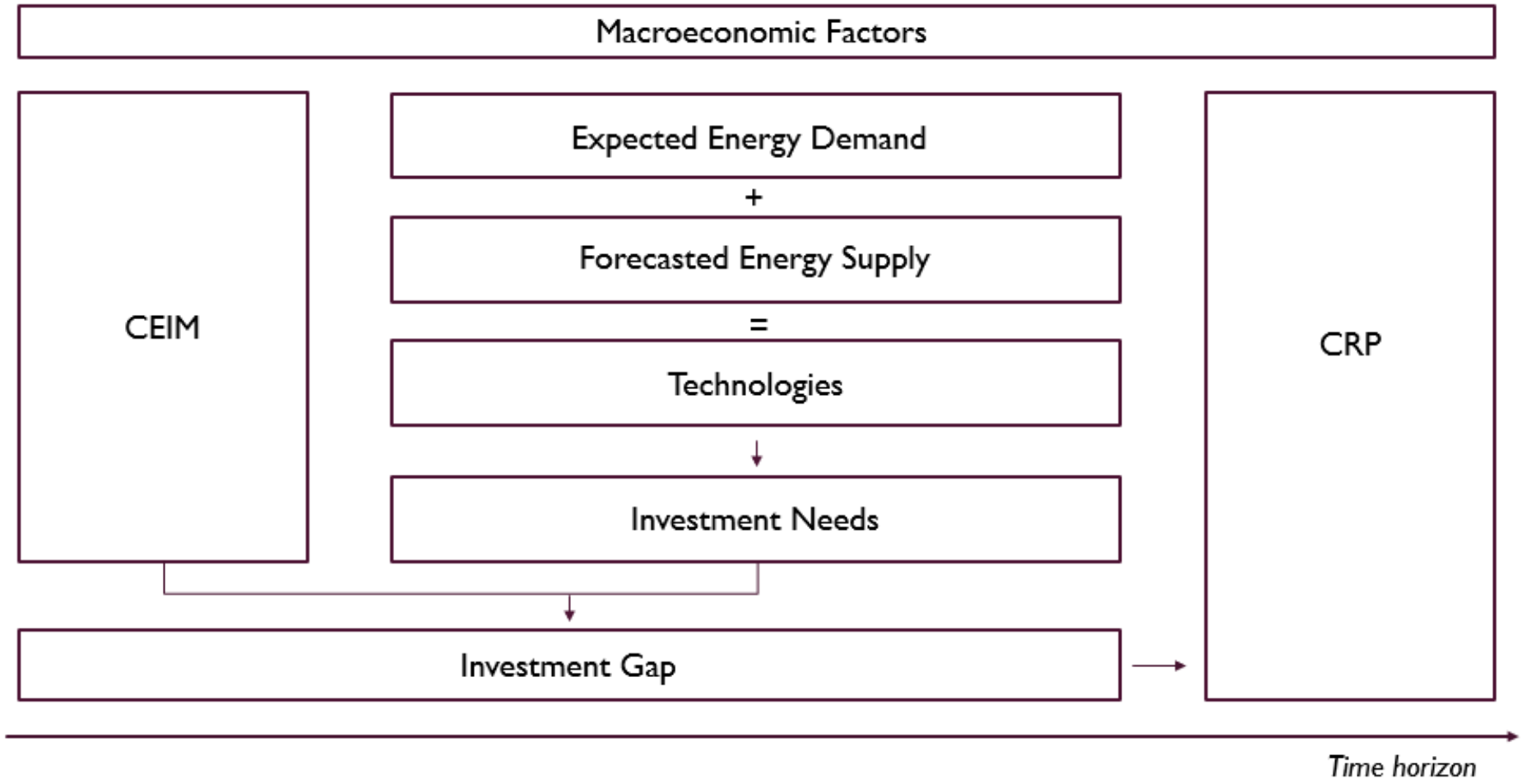



Large investment needs after 2020 in any case due to existing targets. Only about a third related to the new targets of the 2030 framework

Modernisation of the power sector (power generation and grids) remains key. Large impact of 2030 targets on investment needs in the building sector

Need to step-up efforts related to bringing innovative solutions into the market

# Investment Needs and Gap Analysis (INGA) and the project's analytical framework

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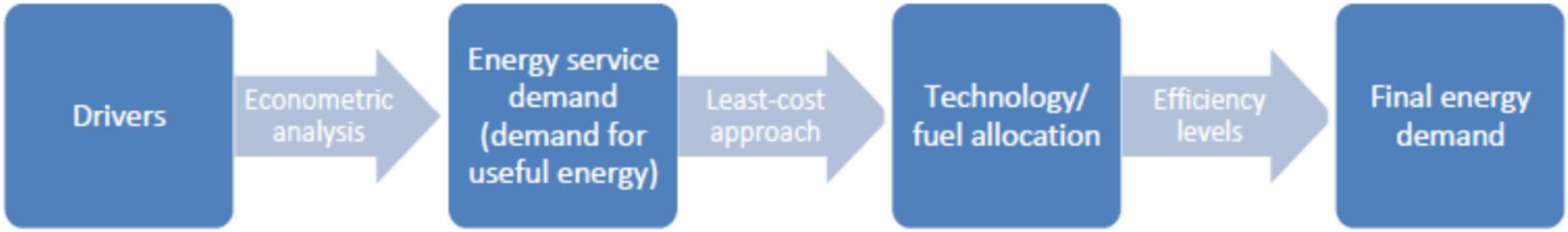
# Investment Gap and Need Analyses: Overview, selected Models

| Study | Building bocks | | | Model-specific output features |
|---|---|---|---|---|
| | Socioeconomic factors | Energy markets | Technologies / Innovation needs | |
| DENA (2018) | Exogenous | DIMENSION+ | Exogenous | GHG emissions per sectors |
| BCG (2018) | VIEW model by Prognos | Different Prognos models | Bottom-up Substitution Cost Curve | Sectorial cost-efficient and low-carbon technologies and investment needs. |
| Frauenhofer (2015) | Exogenous | REMod-D | Exogenous | System composition including cost analysis |
| IEA (2017) | Exogenous | WEM | REmap | Energy flows by fuel, investment needs and costs, carbon dioxide (CO2) and other energy-related GHG emissions, and end-user prices. |
| OECD (2017) | Yoda model + Oxford GE model | Oxford GE model | Exogenous | SR and LR economic growth, potential output. GEM enables sector-level analysis. |
| IRENA (2015) | Exogenous | Exogenous | REmap | Supply substitution cost curve.<br>Current cost of technologies . |
| EC Impact Assessments (2017) | All the economy is modelled endogenously | | | Investment needs figures and detailed assessment of relative economic impacts. |

# IEA World Energy Model

## Determinants of final energy demand




Drivers
- Socio-economic variables
- End-user prices

Activity variables and related energy services

Technologies that satisfy specific energy services

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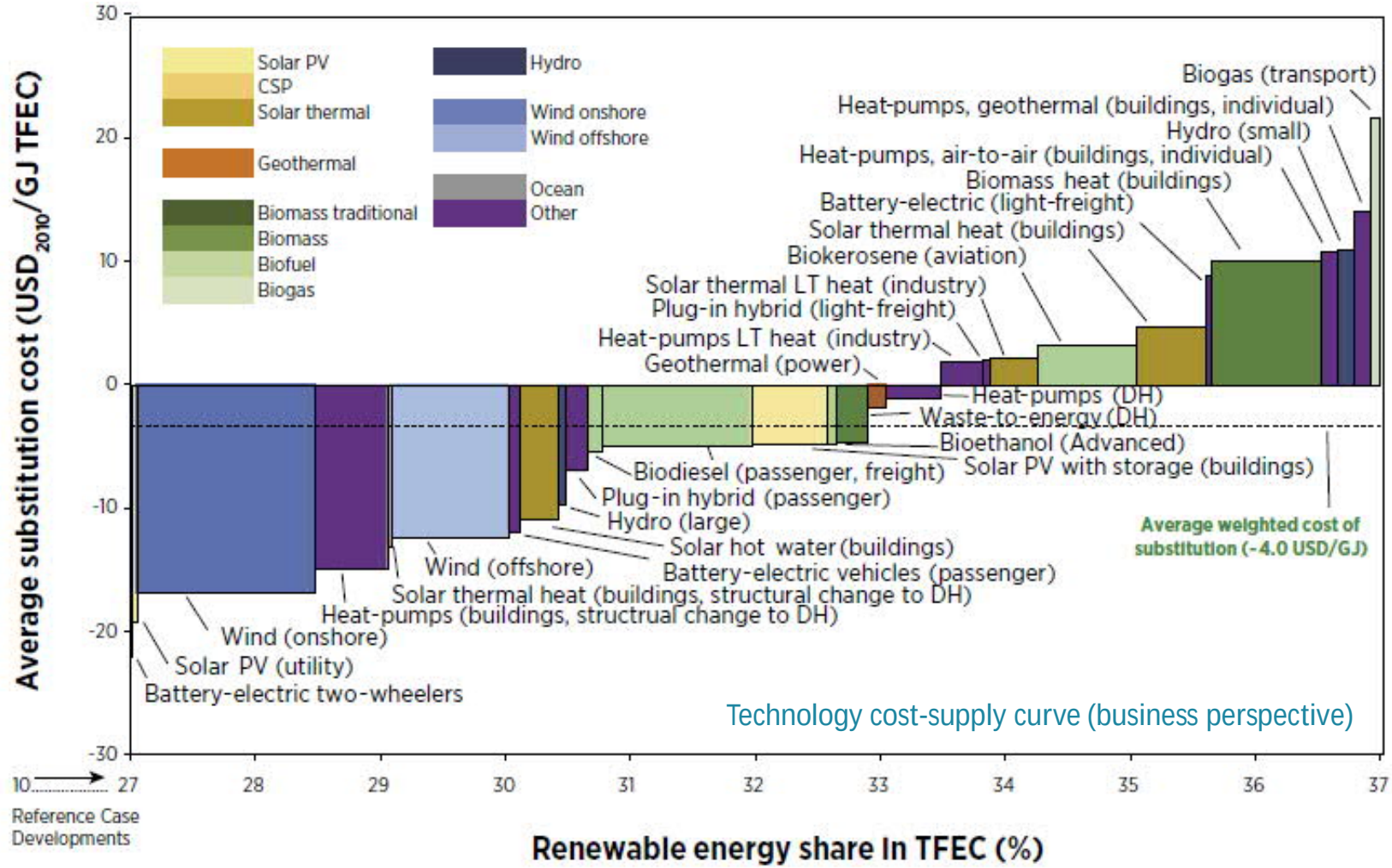
# IRENA 2016 REmap

Technology cost difference per unit of final energy consumed if one replaces conventional energy technologies assumed to be in place in 2030 in the Reference Case with renewable energy (RE) technologies.

## TECHNOLOGY SUBSTITUTION COST MODEL




Technology cost-supply curve (business perspective)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# Investment Gap and Need Analyses: Studies investigating total (additional) costs

Preliminary analysis for illustrative purposes only!

| ID | Study | Scenario | Time Period | P.a. Min Billion€ | P.a. Max Billion€ | Total Min Billion € | Total Max Billion € |
|---|---|---|---|---|---|---|---|
| 2050 - 80 per cent scenario | | | | | | | |
| 1 | DENA | 80% | 2018-50 | 33.3 | 54.6 | 1064 | 1746 |
| 2 | BCG | 80% | 2015-50 | 28.6 | | 1000 | |
| 3 | Frauenhofer | 80% | 2015-50 | 24.9 | 38.4 | 873 | 1343 |
| 2050 – 90/95 per cent scenario | | | | | | | |
| 1 | DENA | 95% | 2018-50 | 34.3 | 58.3 | 1098 | 1866 |
| 2 | BCG | 95% | 2015-50 | 50.6 | | 1770 | |
| 3 | Frauenhofer | 95% | 2015-50 | 49.6 | | 1735 | |
| 2030 targets | | | | | | | |
| 4 | Prognos | 55% | 2018-30 | 20.0 | 22.5 | 240 | 270 |

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# Discussion (I)

## What can we learn from the different models/ tools/approaches?

- How to use these models' outputs for national analysis?
- National models already available? Sector-specific models?
- Are there analysis and modeling gaps?

## Corresponding project deliverables driven by user needs

*Do national institutions **assess investment needs internally or by contracting** studies/assessments?*

- **Model overview and characterisation** seems useful in any case
- **Workshops, webinars and slide decks** to understand which models (etc.) are available and can be put to which specific use or address which specific knowledge gap or policy question
- **Direct Support: Review of and inputs** to national institutions' own analysis

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# DISCUSSION (II)

**Toward capital raising strategies:**

- Where are the challenges? Public, private (households, corporates), in which sectors?
- What are the key barriers and drivers?
- Which barriers and drivers can be addressed by policy?
- Where to focus public financing?

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# Capital Raising Plan - Relevance and definition in the context of the EUKI project

- Is required to develop National Energy and Climate Plans.
- Is a strategy to match financing demand to finance investments to achieve 2030 climate and energy targets in the Czech Republic with national / international financing supply and to mobilise private capital.
- Is necessary, because market imperfections (barriers) prevent matching financing demand and supply.
- Must be embedded in the overall country strategy for reaching the energy and climate goals.

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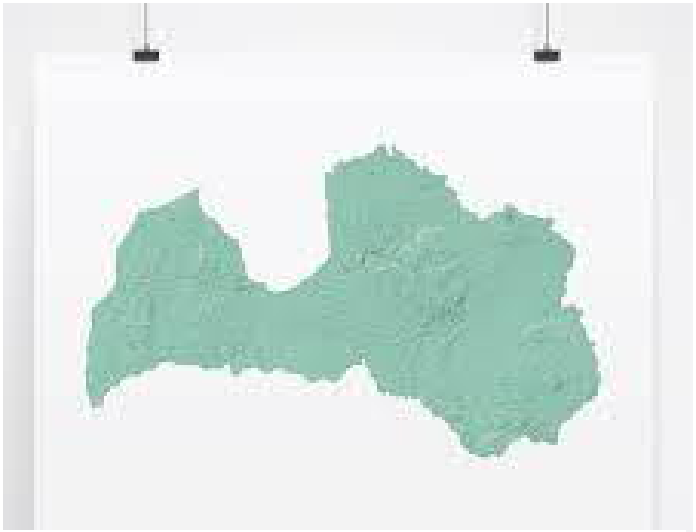
# Capital Raising Plan

## At what level of the economy do we define a strategy for the Latvia?

### Macro approach

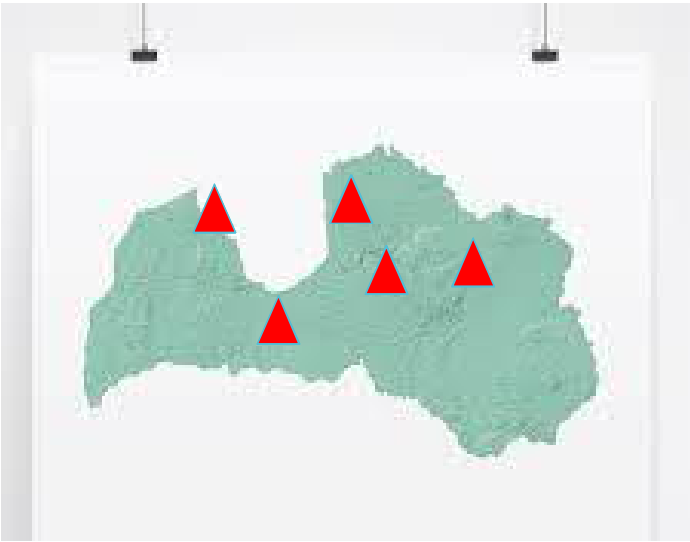


Economy wide CRPs, in order to improve framework conditions e.g. for the private sector

### Meso approach

Sector or technology focus CRPs, in order to improve framework conditions for investments in specific sectors / technology

### Micro approach



Project specific CPs, in order to raise capital for a specific project

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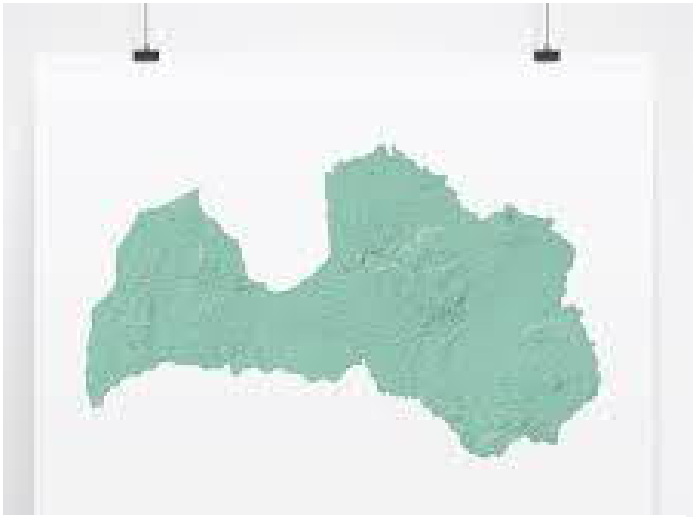
# Capital Raising Plan - Possible Protype CPRs

## Macro approach

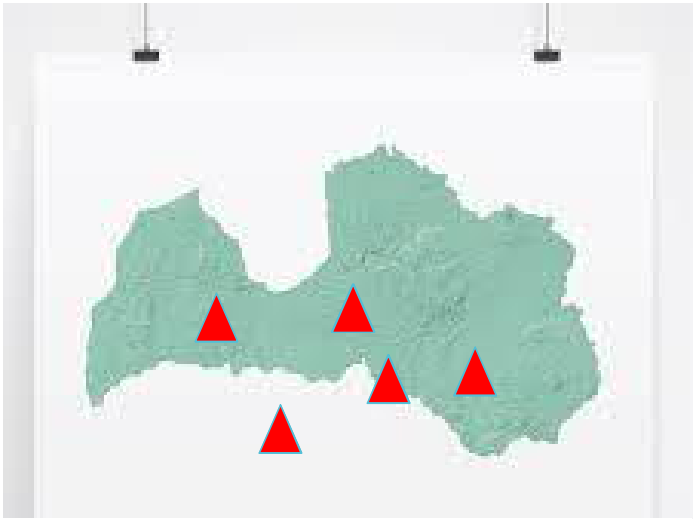


Prototype CPR:
Recommendations for policy makers in Latvia to augment saving and investment rates

## Meso approach

Prototype CPR:
Handbook and tools for policy makers in Latvia to identify relevant barriers and appraise policy instruments to improve framework conditions in selected sectors

## Micro approach



Prototype CPR:
Business-plan and project calculation tool for project developers to present climate friendly project to local / multilateral bank and / or equity investor

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# Capital Raising Plan - First draft Concept for the Meso-CRP

**Step 1**
- Identify barriers that prevent especially private sector to invest in climate friendly technologies in selected sectors

**Step 2**
- Identify Policy Actor & Financial Actor to tackle barrier in sector

**Step 3**
- Define effective policy and financing instruments to tackle barriers and improving framework conditions for (private) investments in selected sectors

**Step 4**
- Gather data, combine information and set-up CRPs for selected sectors taking into consideration overall country strategy

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# Discussion

1. Focus on meso-level?
2. Relative importance of investment needs and capital raising strategy in the context of the NECP
3. Mix of instruments (financial instruments, market-based policies, regulation and standards) for raising capital differs between sectors, as well as relative importance of demand versus supply (of financing)
4. How deep to go in the assessment of policy effectiveness (in terms of private capital mobilisation)?

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# A short excursion to renewable energy policies and financing costs...

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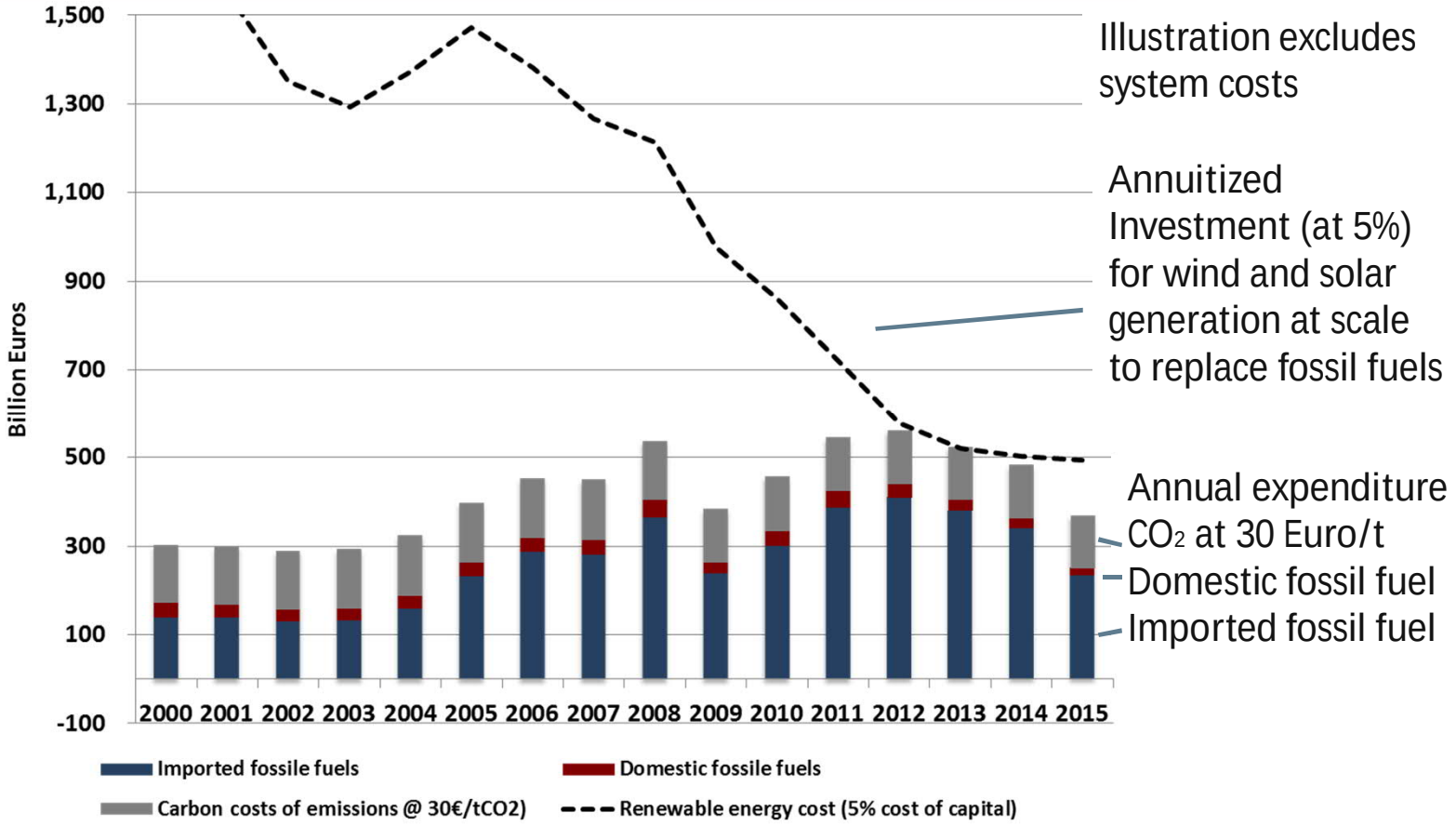
# • Financing costs determine competitiveness of solar&wind




Similar cost level for serving demand with new wind and solar as with fossil fuel:
- Cost of learning investment in wind and solar dominates debate but is sunk.

DIW Berlin Calculations based on BP Statistical Review of World Energy; Energy Statistics for the EU-28; Bundesverband Solarwirtschaft e. V.; IEA; European Wind Energy Association; Bundesamt für Wirtschaft und Ausfuhrkontrolle, first published in Energy Journal (forthcoming)

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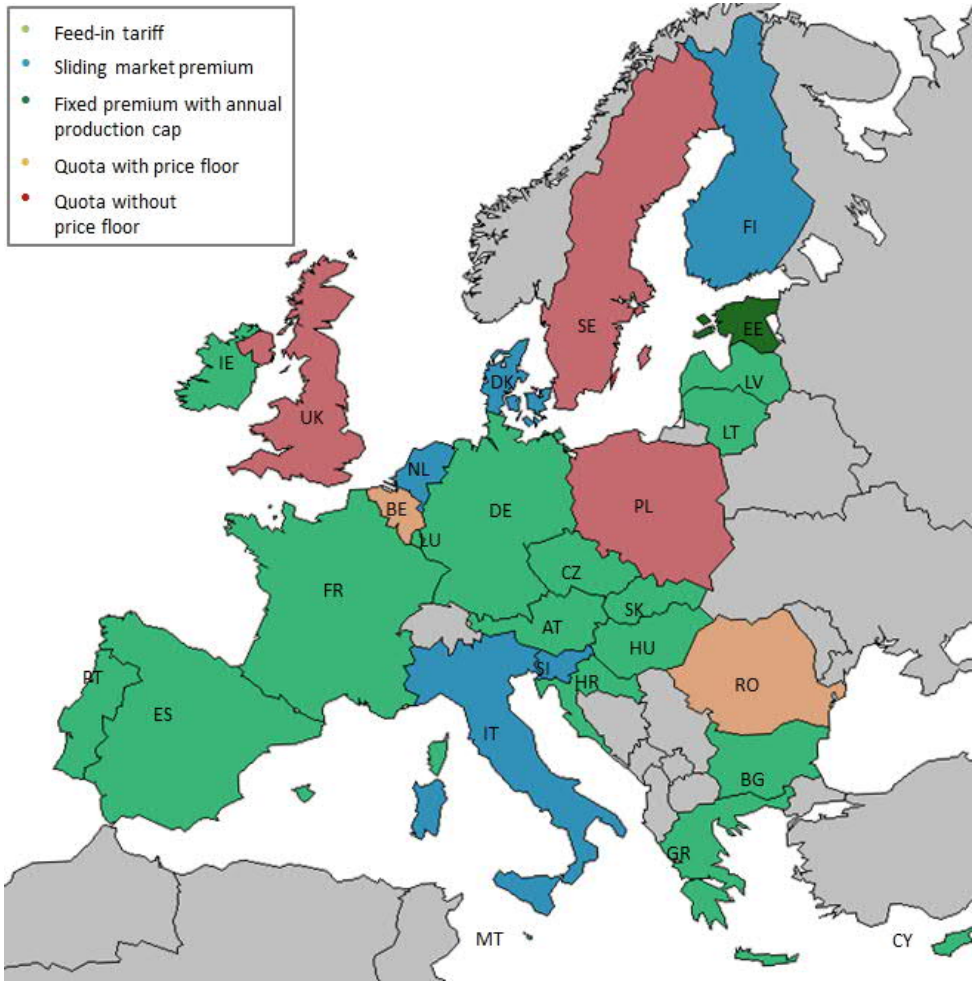
# Wind power policies in the EU in 2014




May and Neuhoff (2017): Financing Power: Impacts of Energy Policies in Changing Regulatory Environments. DIW Discussion Paper

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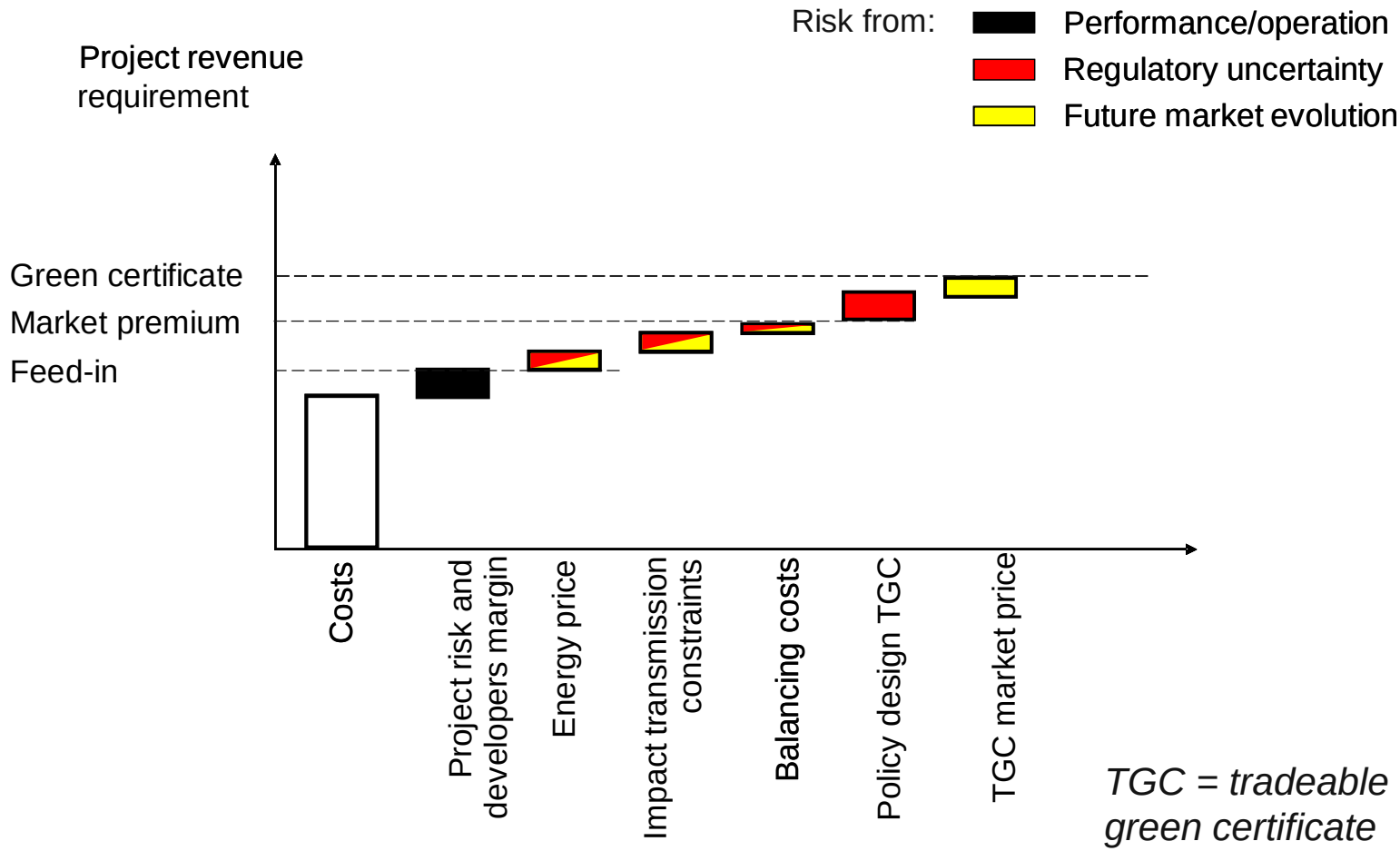
# Policies can (i) reduce and (ii) re-allocate risks



# Estimation results: Impact of policies on financing costs

Table 2: OLS estimation results

| Dep. var: risk premium | (1) Level | (2) Level | (3) Log | (4) Log |
|---|---|---|---|---|
| Sliding feed-in premium | -0.290 | | -0.176 | |
| | (0.501) | | (0.187) | |
| Tradable green certificates | 1.209** | 1.306** | 0.269** | 0.328*** |
| | (0.417) | (0.389) | (0.095) | (0.087) |
| No policy | 2.274*** | 2.341*** | 0.453*** | 0.494*** |
| | (0.438) | (0.421) | (0.097) | (0.087) |
| Retrosp. changes | -0.139 | -0.082 | -0.048 | -0.013 |
| | (0.366) | (0.361) | (0.088) | (0.083) |
| Tenders | 1.030 | 0.887 | 0.304 | 0.217 |
| | (0.608) | (0.575) | (0.156) | (0.130) |
| Equity investor | -0.266 | -0.293 | -0.048 | -0.065 |
| | (0.323) | (0.320) | (0.080) | (0.074) |
| Utility employee | -0.336 | -0.316 | -0.093 | -0.080 |
| | (0.539) | (0.528) | (0.126) | (0.118) |
| Banker | -0.708 | -0.729 | -0.263 | -0.275 |
| | (0.507) | (0.535) | (0.192) | (0.212) |
| *N* | 53 | 53 | 53 | 53 |

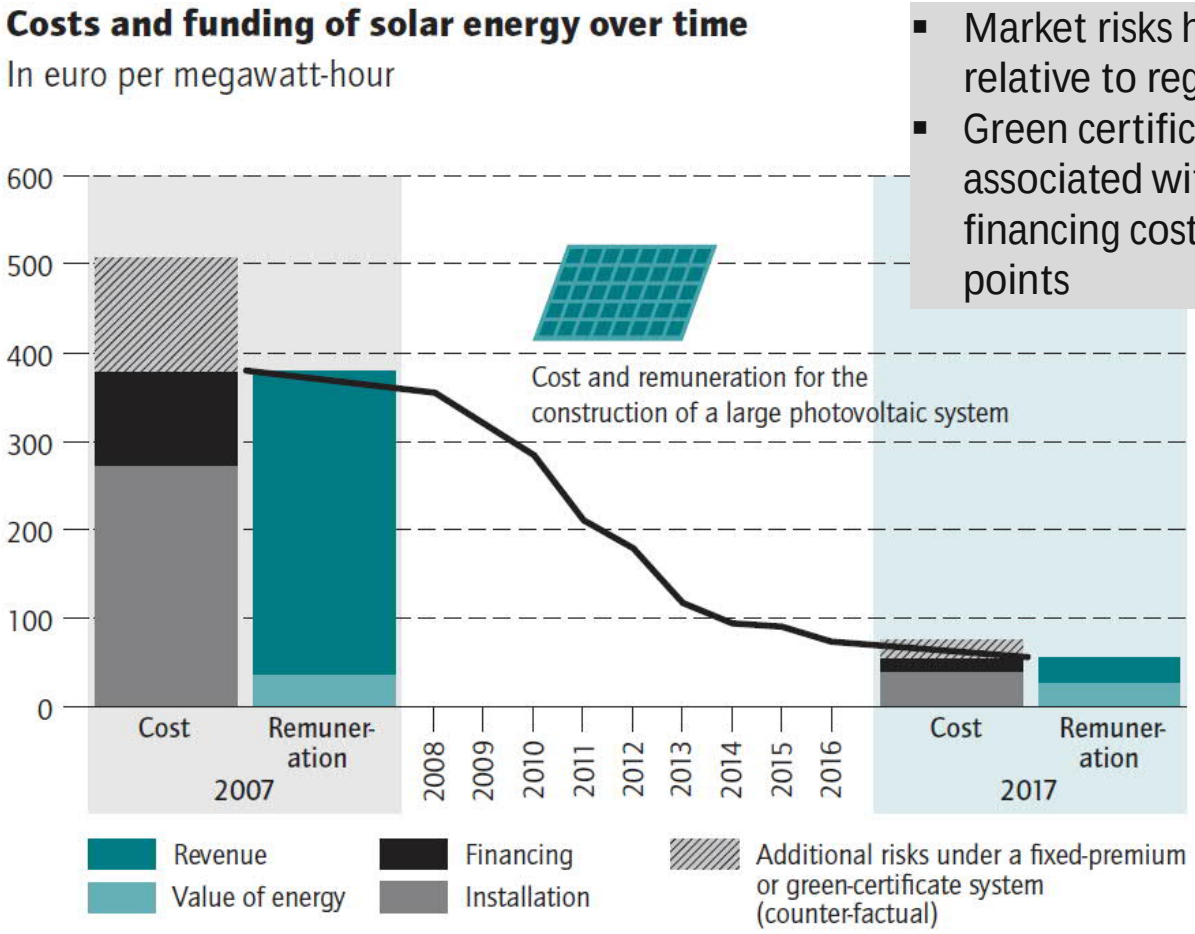
Robust standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Fixed feed-in tariff and the Belgian and Romanian TGC systems with significant price floors are the baseline policy. In columns 2 and 4, also the feed-in premium is in the baseline. Academic/Consultants are the baseline respondent group.

Green certificate schemes are associated with an increase in financing costs by 1.2-1.3 percentage points

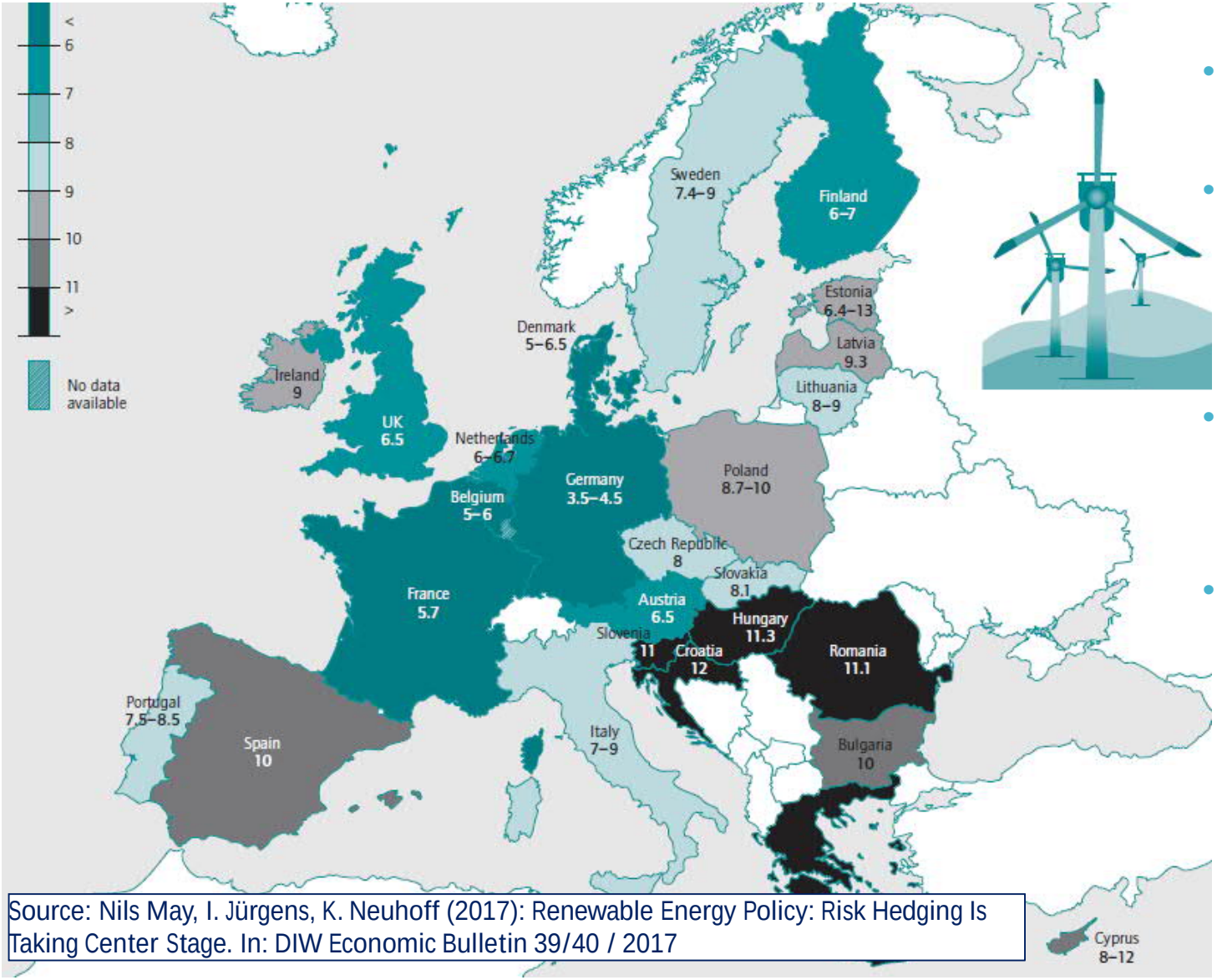
# Cost decline of large scale photovoltaics




- Market risks have gained importance relative to regulatory risks
- Green certificate schemes are associated with an increase in financing costs by 1.2-1.3 percentage points

May, Jürgens and Neuhoff (2017): Renewable energy policy: risk-hedging is taking center-stage

## Example: RE support policies and financing costs of onshore wind energy across the EU (WACC, in %)




Source: Nils May, I. Jürgens, K. Neuhoff (2017): Renewable Energy Policy: Risk Hedging Is Taking Center Stage. In: DIW Economic Bulletin 39/40 / 2017

- Estimation of policy impacts on investors' financing costs
- We estimate the effect of support policies on the risk premium to control for country-specific effects of generally risky investment environments
- Green certificates increase investors' financing costs by about 1.2 percentage points.
- Long-term contracts increase counterparties' re-financing costs; for the average of large EU utilities by 20% of the value of the renewable energy investment.

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# THANK YOU!