Assessment of investment needs and gaps (INGA) in relation to the 2030 / 2050 climate and energy targets

Discussing results for Germany
Riga, 27.11.2019

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Motivations behind the review of the assessment of the 2030 investment challenge

On the basis of our latest report**** it will be possible to develop a better understanding of:

- **how to capture** the 2030 investment challenge and the related investment needs
- **how to assess** them
- **what to pay attention to** when interpreting the results of such assessments

The review of the "German case" is a concrete **basis for starting the discussions** with decision makers, desk officers, analysts and other stakeholders.

*****download at www.ikem.de

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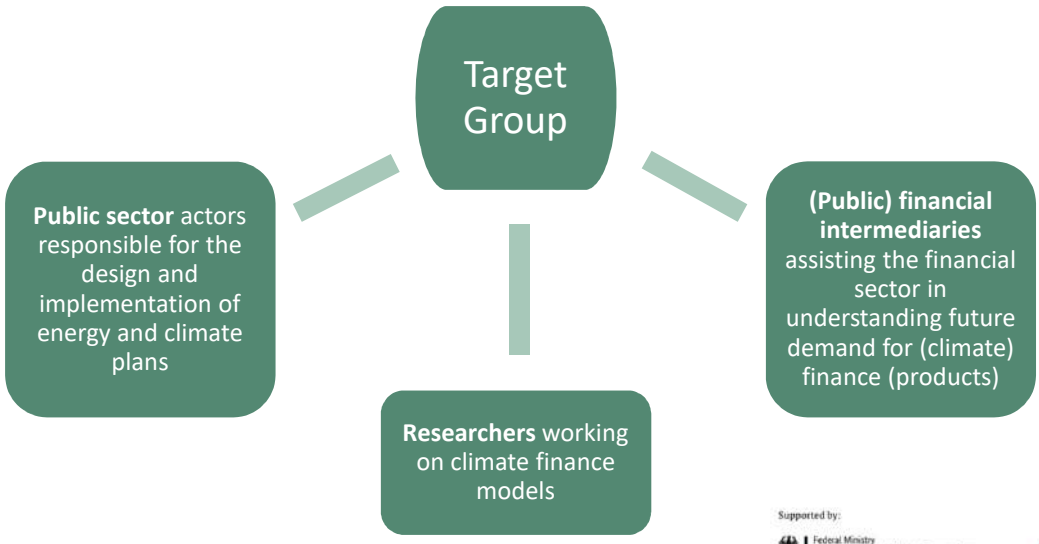
For whom is the report relevant?



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Relevant models considered

Macroeconomic Models	Yoda	Energy System and Market Models	World Energy Model
	Oxford		DIMENSION +
	[...]		[...]
Bottom-Up Models	Remap Model	Integrated Modelling Frameworks	European Commission
	BCG Cost Derivation		[...]
	[...]		[...]

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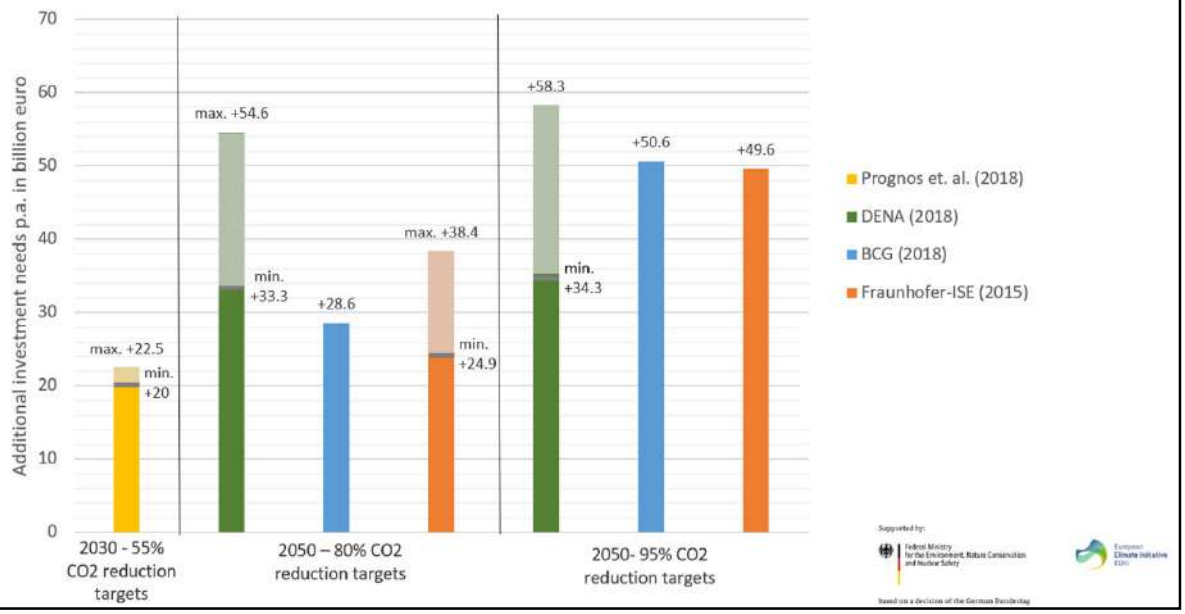
Study	Building bocks			Model-specific output features
	Socioeconomic factors	Energy markets	Technologies/ Innovation needs	
OECD (2017)	Yoda model + Oxford GE model	Oxford GE model	Exogenous	Economic growth, potential output. GEM enables sector-level analysis.
IEA (2017)	Exogenous	WEM	REmap	Energy flows by fuel, investment needs and costs, carbon dioxide (CO2) and other energy-related GHG emissions, and end-user prices.
IRENA (2015)	Exogenous	Exogenous	REmap	Supply substitution cost curve. Current cost of technologies (no learning).
DENA (2018)	Exogenous	DIMENSION +	Exogenous	GHG emissions per sector.
BCG (2018)	VIEW Model by Prognos	Different models by Prognos	Bottom Up Substitution Cost Curve	Sectoral cost-efficient and low carbon technologies related investment needs.
Frauenhofer-ISE (2015)	Exogenous	REMod-D	Exogenous (e.g. expansion capacities of technologies)	System composition including cost analysis.
Prognos et. al. (2018)	ISI_Macro Model	Exogenous	Cost-Benefit Tool (UBA)	Primary effects (direct economic and environmental impacts, investment); Secondary effects (e.g. employment)
European Commission (2017)	All the economy is modelled endogenously			Investment needs figures and detailed assessment of relative economic impacts.

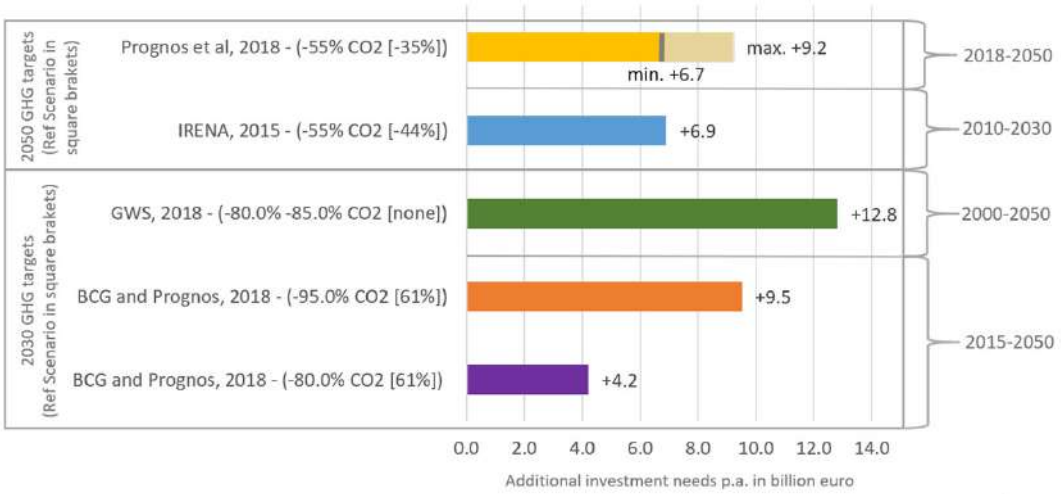
Annual Investment Needs (billion €)

for climate targets



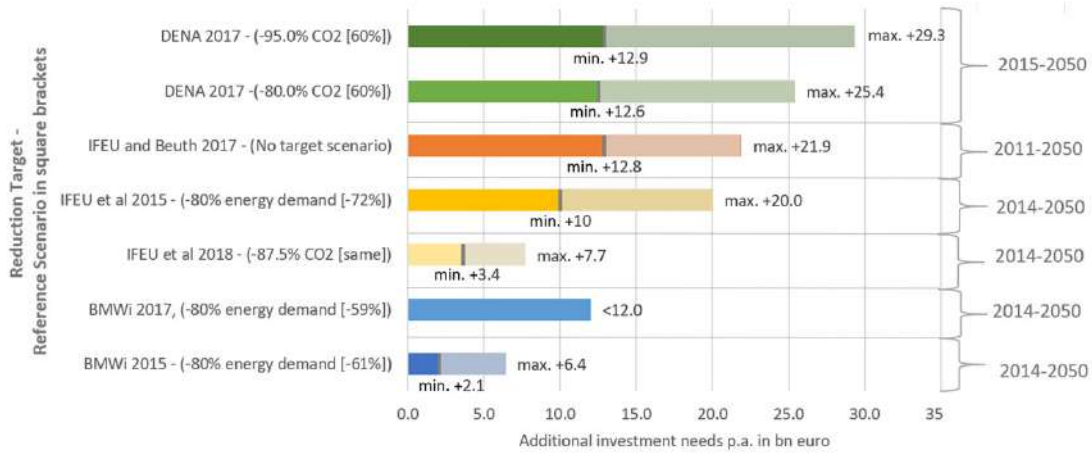
INGA for Renewable Energy

What do we know today? Selected studies in the renewable energy sector, Germany



INGA for Building Sector

What do we know today? Selected studies in the building sector, Germany



Conclusions - Understand what lies behind the numbers

1. **Estimates of investment needs depend on assumptions** that are taken at different places in the analytical/modeling framework: some are more important than others, some are more controversial than others and some may not be obvious.
2. **Crucial to understand the scenarios** used for the analysis and in particular what is and what is not included in the baseline. When comparing different modelling results (investment need figures), it is important to understand conclusion 3 & 4:
3. **Investment needs to reach climate targets in 2050 for Germany range from EUR 24.9 billion to EUR 58.3 billion.** The wide range represented by the numbers is determined by the scenarios assumed in the different studies and models adopted. This illustrates how important it is for the users of investment needs assessment studies to understand the underlying models, frameworks and limitations.
4. **Sectoral and bottom-up view important to understand specific barriers, drivers and solutions.**

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Discussion (i)

What can we learn from the different models, tools, and approaches?

- How to use these models' outputs for national analysis?
- National models already available? Sector-specific models?
- Are there analysis and modeling gaps?
- Do national institutions **assess investment needs internally or by contracting** studies/assessments?

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Discussion (ii)

How can we support the work of institutions tasked with tackling and understanding the investment challenge?

1. **Model overview and characterization**
2. **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
3. **Direct Support: Review of and inputs** to national institutions' own analysis
4. **Organize/facilitate direct exchange** across countries and institutions

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Looking forward - toward capital raising strategies:

- Where are the challenges (public, private, households, corporates)?
- 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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Ingmar Juergens and David Rusnok, Advisors

Thank you!

An EUKI project coordinated by IKEM

Implementing partners:
Czech Technical University in Prague
Riga Technical University

Results for Germany

Studies investigating total (additional) investment costs in relation to different GHG emission reduction targets

ID	Study	Time	Investment needs p.a.		GHG reduction target
	Authors	Period	Min. Bn €	Max. Bn €	Reference in square brackets
2050 – 80 per cent targets					
1	DENA (2018)	2018-50	+33.3	+54.6	-80% CO2 [-62%]
2	BCG (2018)	2015-50	+28.6		-80% CO2 [-61%]
3	Fraunhofer-ISE (2015)	2015-50	+24.9	+38.4	-80% CO2 [not stated]
2050 – 90/95 per cent targets					
1	DENA (2018)	2018-50	+34.3	+58.3	-95% CO2 [-62%]
2	BCG (2018)	2015-50	+50.6		-95% CO2 [-61%]
3	Fraunhofer-ISE (2015)	2015-50	+49.6		-90% CO2 [not stated]
2030 – 55 per cent targets					
4	Prognos et. al. (2018)	2018-30	+20.0.	+22.5	-55% CO2 [-35%]

INGA for Renewable Energy

What do we know today? Selected studies in the renewable energy sector, Germany

ID	Study	Time	Investment needs p.a.		Reduction target
	Authors	Period	Min. bn €	Max. bn €	Ref Scenario in square brackets
	2050 GHG targets				
1	BCG and Prognos (2018)	2015-50	**+4.2**		-80.0% CO2 [61%]
2	BCG and Prognos (2018)	2015-50	**+9.5**		-95.0% CO2 [61%]
2	GWS (2018)	2000-50	**+12.8**		-80.0% -85.0% CO2 [none]
4	**2030 GHG targets**				
5	IRENA (2015)	2010-30	**+6.9**		-55% CO2 [-44%]
6	Prognos et al (2018)	2018-30	**+6.7**	**+9.2**	-55% CO2 [-35%]

INGA for Building Sector

What do we know today? Selected studies in the building sector, Germany

ID	Study	Time	Investment needs p.a.		Reduction target
	Authors	Period	Min. bn €	Max. bn €	Ref Scenario in square brackets
1	IFEU et al (2018)	2017-50	**+3.4**	**+7.7**	-87.5% CO2 [same]
2	DENA (2017)	2015-50	**+12.6**	**+25.4**	-80.0% CO2 [60%]
2	DENA (2017)	2015-50	**+12.9**	**+29.3**	-95.0% CO2 [60%]
3	IFEU and Beuth (2017)	2011-50	**+12.8**	**+21.9**	No target scenario
4	IFEU et al (2015)	2014-50	**+10**[b]	**+20**[b]	-80% energy demand [-72%][C]
5	BMWi (2017)	2014-50	**<12**[a]		-80% energy demand [-59%][C]
6	BMWi (2015)	2008-50	**+2.1**	**+6.4**	-80% energy demand [-61%][C]