Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

Going for deep decarbonisation: Integrated strategies to strengthen energy efficiency and renewable energies. Lessons learned from planning and implementing Germany's Energiewende

German-Japanese Energy Dialogue

» Energy efficiency first and renewable energies. How energy transition can be made a success «

Dr. Felix Chr. Matthes

Tokyo, 15th November 2016

Reminder

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

A goal without a plan is just a wish.

Antoine de Saint-Exupéry (1900 - 1944), French writer

‘Energiewende’: The German energy transition as a comprehensive and long-term project

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

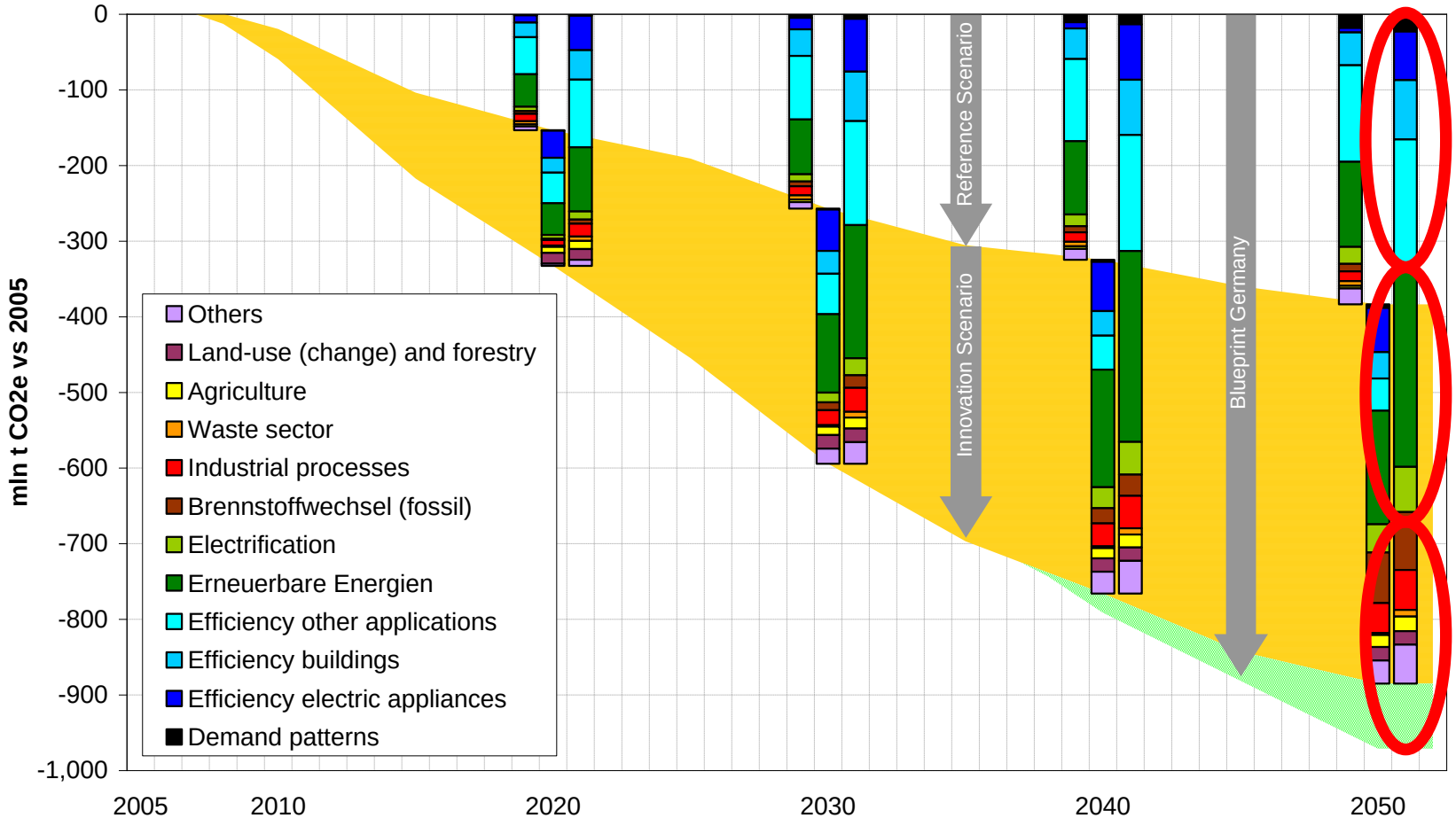
	Targets as of …												
	2010	2016	2016	2016	2016	2016	2010	2014	2010	2010	2010	2010	2011
	Greenhouse gas emissions						Renewable energies		Energy efficiecy				Nuclear energy
	Total	Energy sector	Buildings	Transport	Industry	Agri-culture	Gross final energy	Power gene-ration	Primary energy	Space heating	Final energy ransport	electricity con-sumption	
2011													-41%
2015													-47%
2017													-54%
2019													-60%
2020	-40%						18%	35%	-20%	-20%	-10%	-10%	
2021													-80%
2022													-100%
2025								40 to 45%					
2030	-55%	-61 to -62%	-66 to -67%	-40 to -42%	-49 to -51%	-31 to -34%	30%						
2035								55 to 60%					
2040	-70%						45%	65%					
2050	-80 to -95%						60%	80%	-50%	-80%	-40%	-25%	
Base year	1990	1990	1990	1990	1990	1990	-	-	2008	2008	2005	2008	(2010)

BReg 2010, 2011, 2016, BT 2014

The evidence from modelling: Emission reduction contributions: energy efficiency, renewables & more

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

... are key pillars (each representing 1/3 of the total implemented potential). Aggressive policies are needed for each of these major pillars.

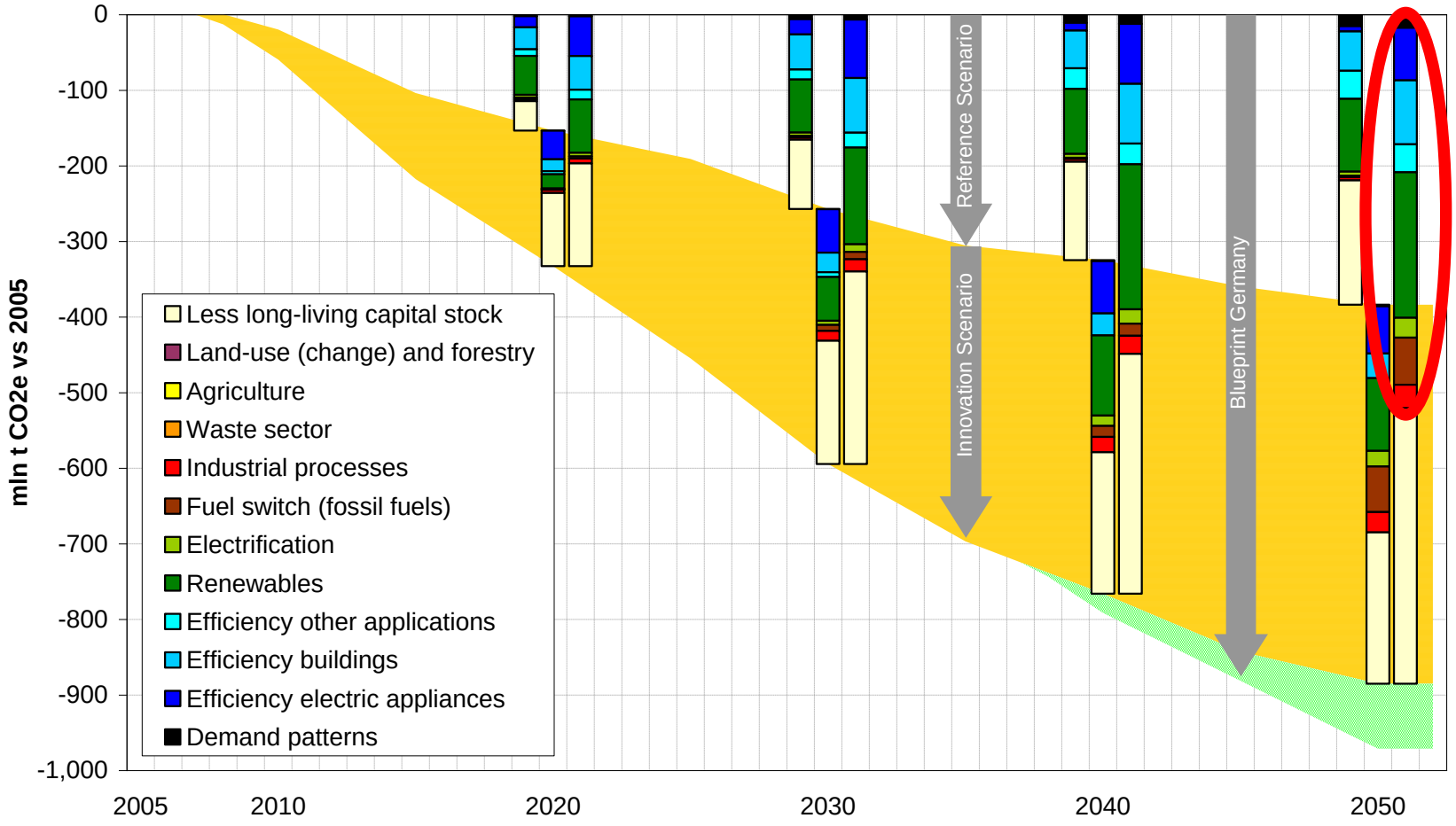


Prognos/Öko-Institut 2009

Emission reduction contributions
A fresh look on priorities …

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

… is needed. The appropriate timing of modernization is key - if one reflects the key role of long-living capital stocks (~60% of potential)

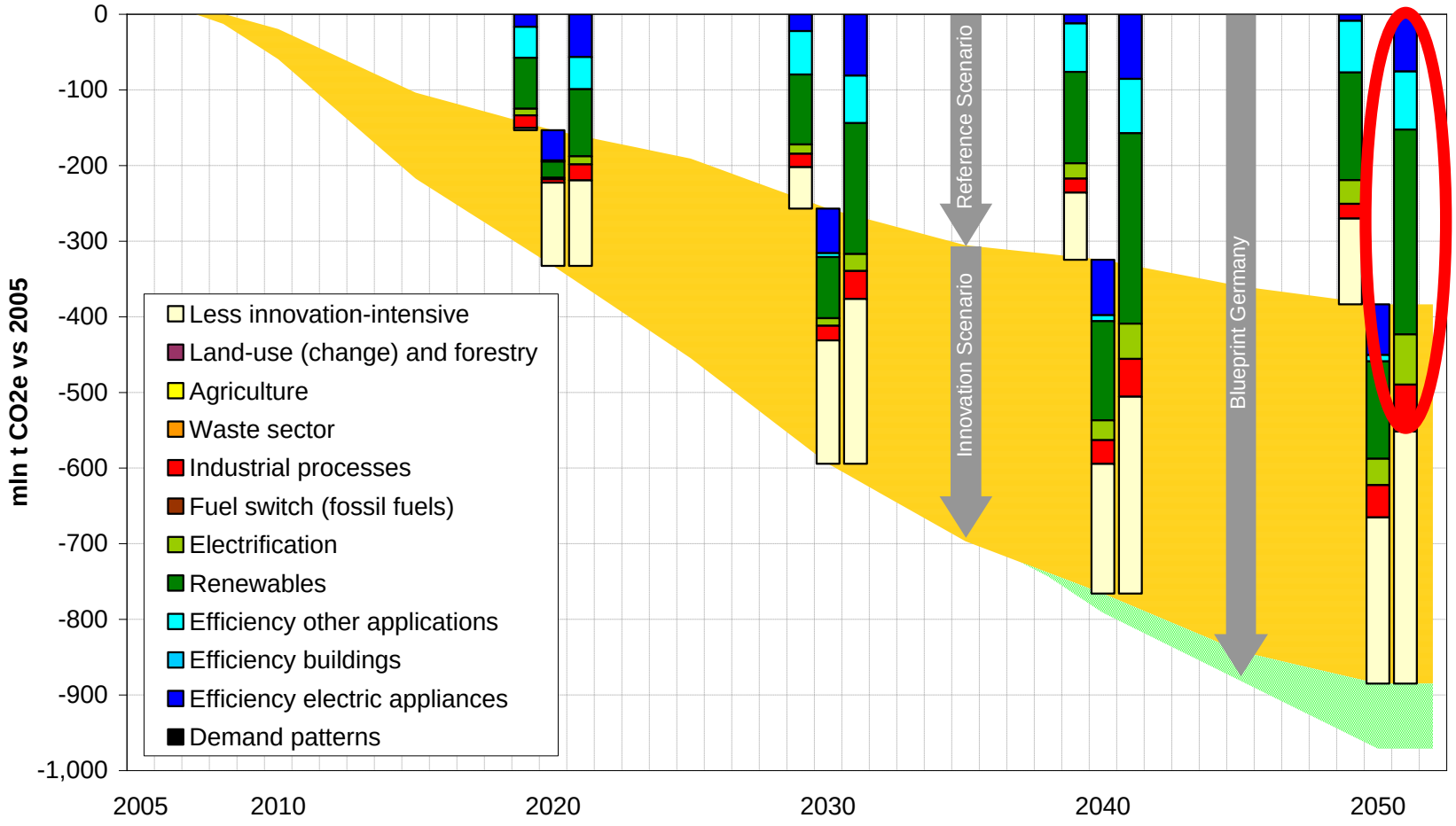


Prognos/Öko-Institut 2009

Emission reduction contributions
A fresh look on priorities …

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

… is needed. Innovation is key, innovative greenhouse gas emission reduction options must deliver in time (representing 60% of potential)



Prognos/Öko-Institut 2009

Designing strategies for sustainable energy systems
Key challenges (The four "A" questions)

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

- **Will the (supply/emission abatement) potentials be <u>available</u>?**
  - Huge technological progress during the last decades and many technological promises
- **Will t be possible to exploit these potentials over time in a way that the targets are <u>achievable</u>?**
  - Lifetime of capital stocks is key
  - Infrastructures are key
  - Innovation is key
- **Will the costs and the related distributional effects emerge at levels that make the transformation <u>affordable</u>?**
  - Many analysis shows: it is affordable (GDP ±1% in 2050, managing transition costs and distributional effects is however crucial)
- **Will it be possible to design the transformation in a robust way that is <u>acceptable</u> for the public?**
  - Interfaces between the energy system and the society will broaden, (economic) participation is key

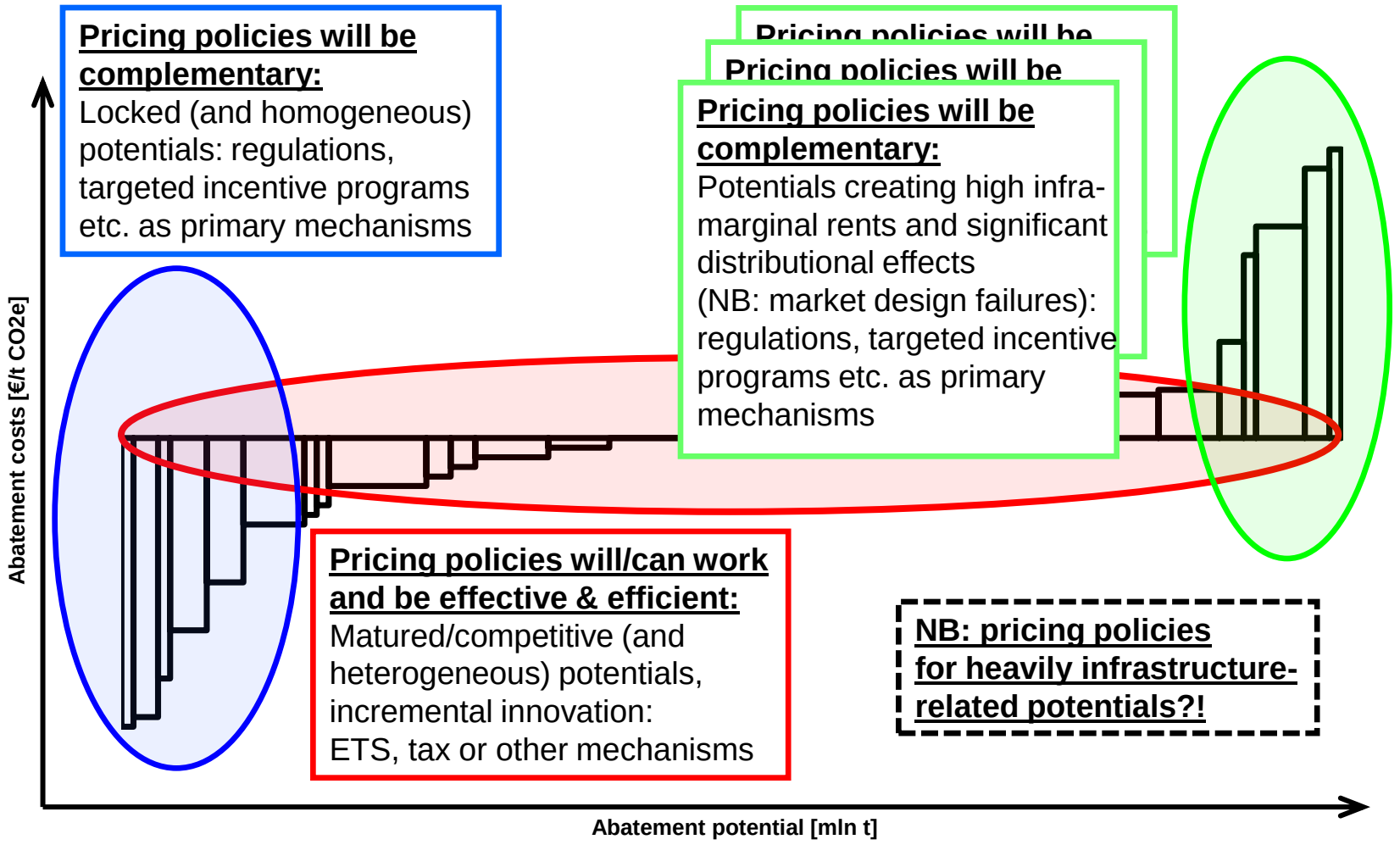
Energy transition
What do we know and what are the challenges?

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

- **Energy transition: a policy-driven structural change of the energy system**
- **The target system is technically feasible and affordable**
  - manifold options at the supply & flexibility side exist already or are in the pipeline
  - total system costs of the target system do not differ significantly from the counter-factual, transition costs and distributional effects could however be significant
- **The real challenges arise from structural changes that needs to be reflected carefully for the design of the transition process**
  - structurally changing technology patterns
  - structurally changing economics (a zero marginal costs system)
  - structurally changing players / market participants
  - structurally changing spatial patterns

A comprehensive and well-designed policy mix needs comprehensive and well-designed analysis

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology



Öko-Institut 2010. IEA 2011+2015

Effective, innovative & efficient strategies
The Four-Pillars Approach

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

- **Paving the way – for energy efficiency, clean generation & flexibility options (renewables & complementary flexibility)**
  - innovation, level playing field & roll-out for renewables (☺) and energy efficiency (😐)
  - sustainable economic basis (coordination & enabling investments) (😐)
- **Designing the exit-Game – for the non-sustainable capital stocks**
  - appropriate mechanisms that address security of supply, flexibility, emission levels and fixed costs (😐) – for nuclear power (☺) and high-carbon assets (☹)
- **Triggering the necessary infrastructure adjustments – with sufficient lead-times** ☹
  - integration of centralized, distributed, storage & DSM/flexibility options
  - reflection of the new geography of the energy system
- **Making the necessary innovation work – in time** ☺
  - for energy efficiency, generation, flexibility, storage and integration

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

Thank you very much

Dr. Felix Chr. Matthes
Energy & Climate Division
Berlin Office
Schicklerstraße 5-7
D-10179 Berlin
f.matthes@oeko.de
www.oeko.de
twitter.com/FelixMatthes