JÜLICH
FORSCHUNGSZENTRUM

9th International Scientific Conference on
Energy and Climate Change

Assessment of the acceptance of energy systems transformation

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Athens, Greece, October 12-14, 2016

Outline of the talk

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Point of departure

- Energy systems transformation (or energy transition) = long-term fundamental changes in energy systems
- Main aims of energy transition in Germany ("Energiewende"): decarbonization of energy supply and reduction of energy demand
- Preconditions for energy transition: technical, economic and **societal** feasibility of transformation strategies
- The reliable assessment of public perception of energy systems transformation is essential for the successful transition management

⇨ **Technology monitoring**

Technology monitoring

Aim and general research questions

Aim

Contribution to the assessment of the acceptance of the German energy system's transformation by surveying the awareness, knowledge and attitudes among the public regarding technologies, instruments and impacts of the energy transition

General research questions

Public perception of energy transition in Germany:

1. What is the status quo?
2. Which dynamics does it have?
3. What are the determinants?

Methods

(1) IEK-STE Panel Survey = representative survey of the German public carried out annually since 2011/12 and including at least 1000 respondents

(2) Specific representative surveys of the German public performed only once in order to investigate research questions related to research projects focussing on specific energy technologies (e.g. energy storage, vehicle to grid) or other aspects of energy transition, such as energy consumption

Assessment of public perception: the examples of CO_2 capture and storage (CCS) and the extraction of shale gas

Approach of the study

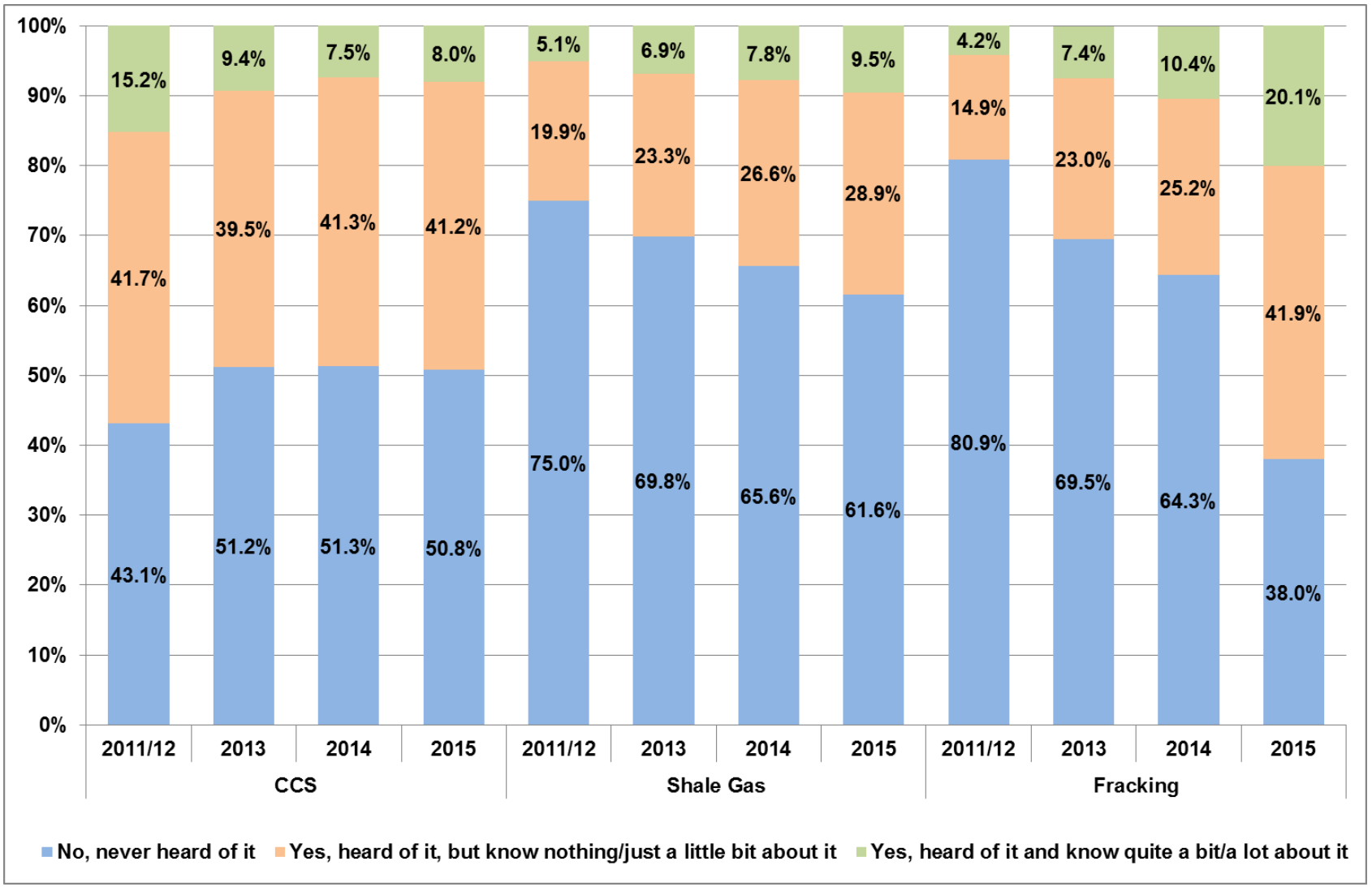
(1) Comparison of the public perception of CCS and shale gas extraction in Germany along the indicators self-reported awareness, factual knowledge, risk perceptions, benefit perceptions and general attitudes by applying descriptive statistics

(2) Identification of the determinants of the general attitudes towards CO_2 pipelines, CO_2 onshore storage, CO_2 offshore storage and the extraction of shale gas by performing linear regressions

Results

Self-reported awareness of CCS, shale gas and fracking over time

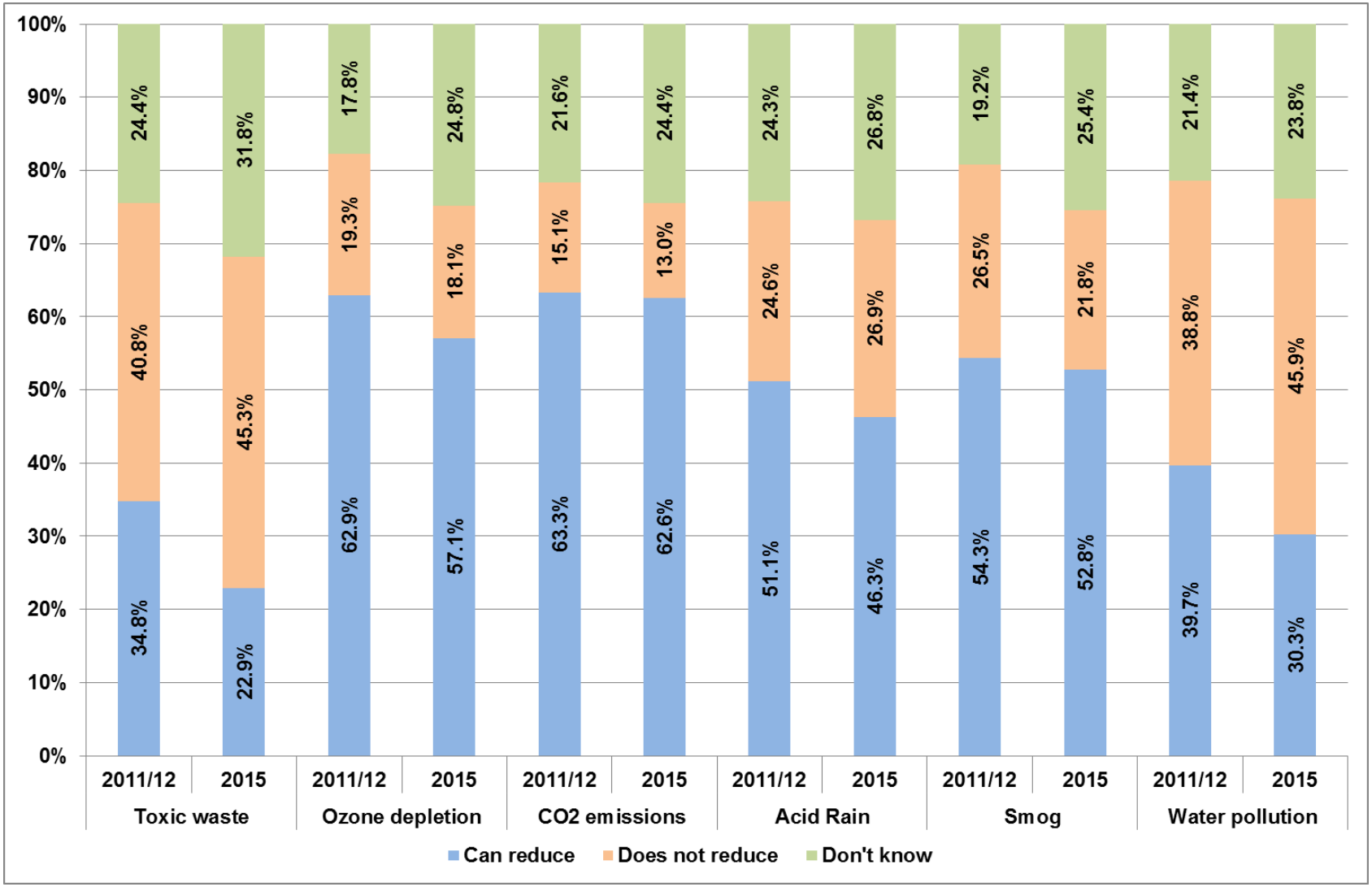
Have you heard about the following topics?



Data sources: IEK-STE Panel Survey 2011/12 (n=1000), 2013 (n=1034), 2014 (n=1006), 2015 (n=1000)

Factual knowledge about CCS

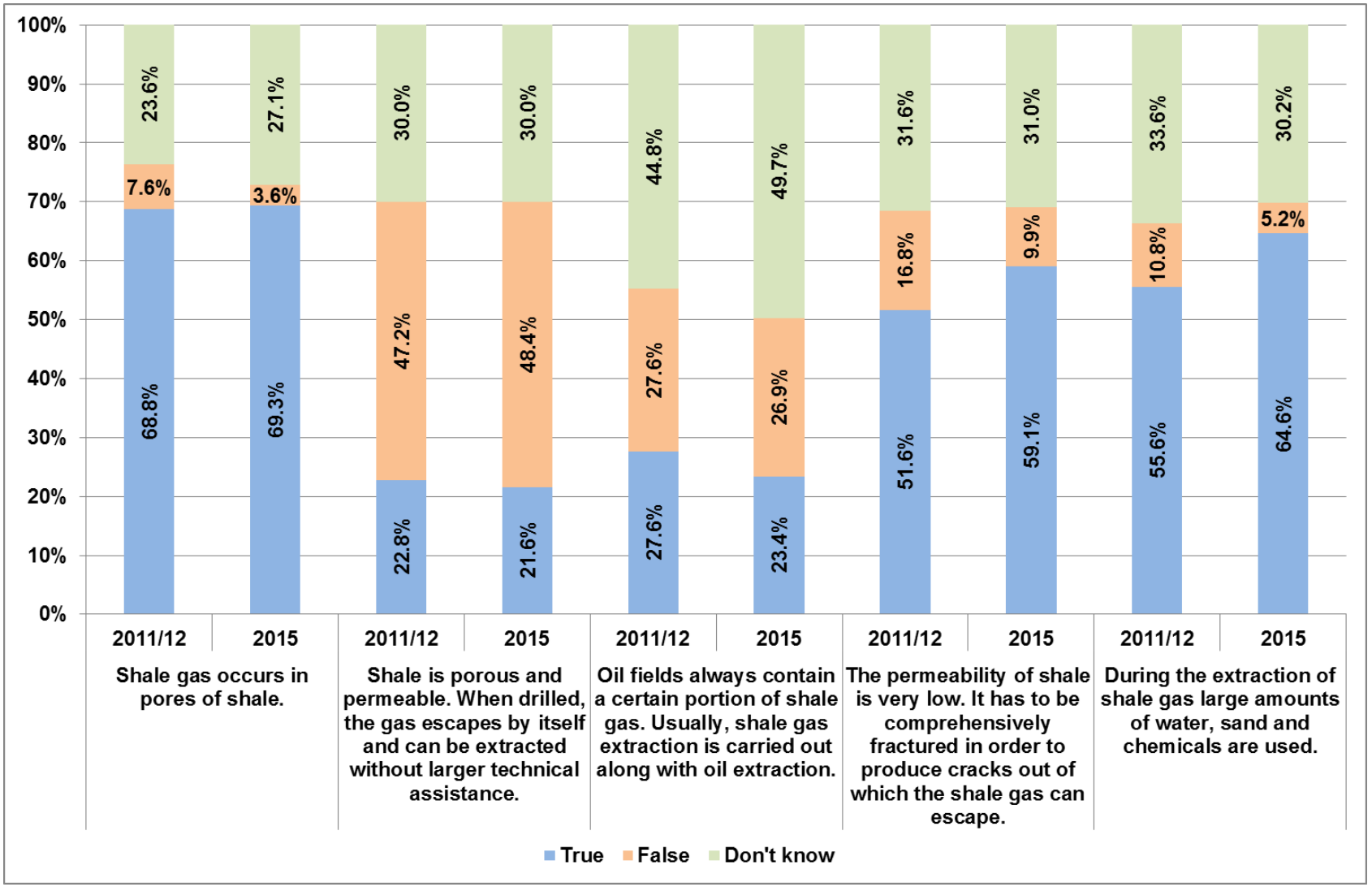
CCS can reduce which of the following environmental concerns?



Only respondents who had heard about CCS. Data sources: IEK-STE Panel Survey 2011/12 (n=569), 2015 (n=492)

Factual knowledge about shale gas

Please tell me to the best of your knowledge whether each statement is true or false.



Only respondents who had heard about shale gas. Data sources: IEK-STE Panel Survey 2011/12 (n=250), 2015 (n=384)

Risk perceptions

How risky do you think CO_2 transport via pipeline/CO_2 onshore storage/CO_2 offshore storage/the extraction of shale gas would be to you and your family/to society in general?"

	Personal risk		Societal risk	
	Mean[1]	SD[2]	Mean[1]	SD[2]
CO_2 transport via pipeline	3.7	1.8	4.1	1.6
CO_2 onshore storage	4.3	1.6	4.5	1.6
CO_2 offshore storage	3.9	1.8	4.2	1.7
Extraction of shale gas	4.2	1.7	4.7	1.6

[1] Scale from 1 (= very low) to 7 (= very high). [2] SD = Standard deviation. Data sources: Survey "CCS Chances" 2013 (n= 1000); IEK-STE Panel Survey 2015 (n=1000)

Benefit perceptions

To what extent do you think CCS/the extraction of shale gas would benefit you and your family/society in general?

	Personal benefit		Societal benefit	
	Mean[1]	SD[2]	Mean[1]	SD[2]
CCS	3.4	1.6	3.9	1.7
Extraction of shale gas	2.8	1.4	3.4	1.5

[1] Scale from 1 (= very low) to 7 (= very high). [2] SD = Standard deviation. Data sources: Survey "CCS Chances" 2013 (n= 1000); IEK-STE Panel Survey 2015 (n=1000)

General attitudes

Overall, how do you assess the idea of CO_2 transport via pipeline/CO_2 onshore storage/CO_2 offshore storage/CCS/the extraction of shale gas?

	General attitude	
	Mean[1]	SD[2]
CO_2 transport via pipeline	3.9	1.6
CO_2 onshore storage	3.3	1.7
CO_2 offshore storage	3.6	1.8
CCS	3.8	1,7
Extraction of shale gas	2.9	1.6

[1] Scale from 1 (= very negative) to 7 (= very positive). [2] SD = Standard deviation. Data sources: Survey "CCS Chances" 2013 (n= 1000); IEK-STE Panel Survey 2015 (n=1000)

Determinants of general attitudes

Most important direct determinants of general attitudes:

- **The perceptions of societal and personal risks**
  - ⇨ the higher the perceived societal or personal risk, the more **negative** the general attitudes towards CO_2 pipelines, CO_2 onshore storage, CO_2 offshore storage or the extraction of shale gas
- **The perception of societal benefit**
  - ⇨ the higher the assessed societal benefit, the more **positive** the general attitudes towards CO_2 pipelines, CO_2 onshore storage, CO_2 offshore storage or the extraction of shale gas
- **The perception of personal benefit**
  - ⇨ the higher the assessed societal benefit, the more **positive** the general attitudes towards CO_2 onshore storage, CO_2 offshore storage or the extraction of shale gas

Conclusions

Three different functions of technology monitoring with regard to the assessment of the acceptance of energy systems transformation:

(1) Descriptive function
(2) Comparative function
(3) Explanatory function

- ⇨ All three functions provide information which can be used for assessing the public acceptance of different energy transition paths
- ⇨ This can be done for example by integrating indicators of public perception as input parameters or as output parameters in energy scenario construction processes
- ⇨ Integrating acceptance factors in energy scenarios would be valuable in order to assess the societal feasibility of future energy systems and delivering information which could facilitate the management of energy transition

Acknowledgements

Parts of the data used in this study were collected within the project “Chances for and limitations of public acceptance of CCS in Germany (CCS chances)”, for which we gratefully acknowledge funding from the Federal Ministry of Education and Research.

Thank you very much for your attention!

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