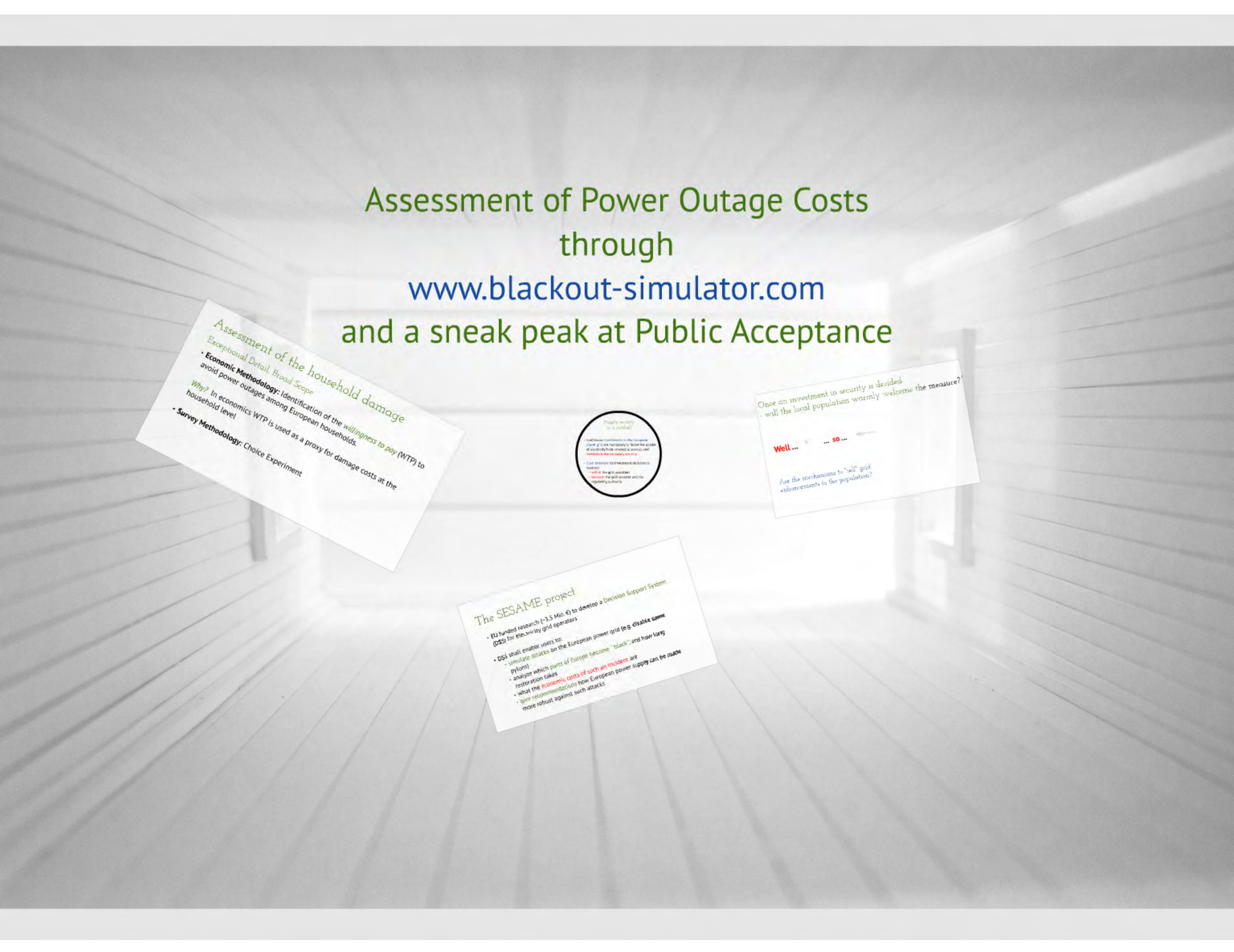
Assessment of Power Outage Costs through www.blackout-simulator.com and a sneak peak at Public Acceptance



The European Electricity System:
ad hoc *Power Outage Costs Assessment*
and
the issue of *Social Acceptance*

Output from the European research
project SESAME as Input for the
European Grid Operators

OSCE July 2014

Johannes Reichl
Michael Schmidthaler

ENERGIE INSTITUT
an der Johannes Kepler Universität Linz

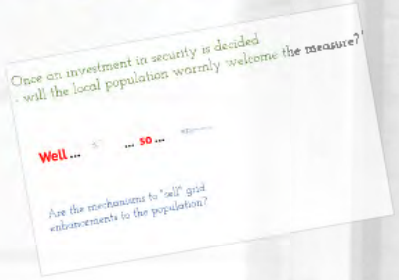
JKU
JOHANNES KEPLER
UNIVERSITÄT LINZ

Supply security in a nutshell

- Continuous investments in the European power grid are mandatory to foster the uptake of electricity from renewable sources and maintain/enhance supply security

- Clear rationale for investment decisions is required
  - within the grid operation
  - between the grid operator and the regulating authority

Assessment of Power Outage Costs through www.blackout-simulator.com and a sneak peak at Public Acceptance



The SESAME project

- EU funded research (~3.5 Mio. €) to develop a Decision Support System (DSS) for electricity grid operators

- DSS shall enable users to:
  - simulate attacks on the European power grid (e.g. disable some pylons)
  - analyze which parts of Europe become ``black'', and how long restoration takes
  - what the economic costs of such an incident are
  - give recommendations how European power supply can be made more robust against such attacks

Damage costs of blackout scenarios:

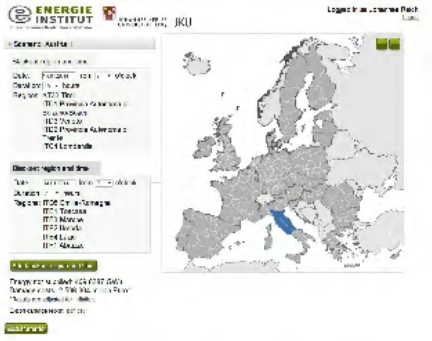
Economic simulation tool:

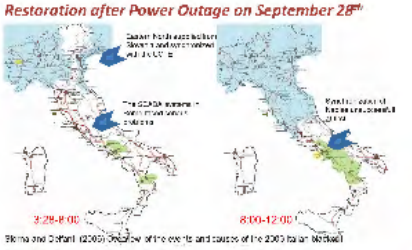
- www.blackout-simulator.com

Enables:

- Benefit-Cost analyses

- Decision makers require numerical values as input for discussion and negotiation





ENERGIE INSTITUT
an der Johannes Kepler Universität Linz

JOHANNES KEPLER UNIVERSITÄT LINZ | JKU

Logged in as Johannes Reichl
Logout

Scenario: Austria 1

Blackout region and time

Date: 14.01.2014 from 7 o'clock
Duration: 19 hours
Regions: AT33 Tirol
ITD1 Provincia Autonoma di Bolzano/Bozen
ITD3 Veneto
ITD2 Provincia Autonoma di Trento
ITC4 Lombardia

Blackout region and time

Date: 14.01.2014 from 7 o'clock
Duration: 7 hours
Regions: ITD5 Emilia-Romagna
ITE1 Toscana
ITE3 Marche
ITE2 Umbria
ITE4 Lazio
ITF1 Abruzzo

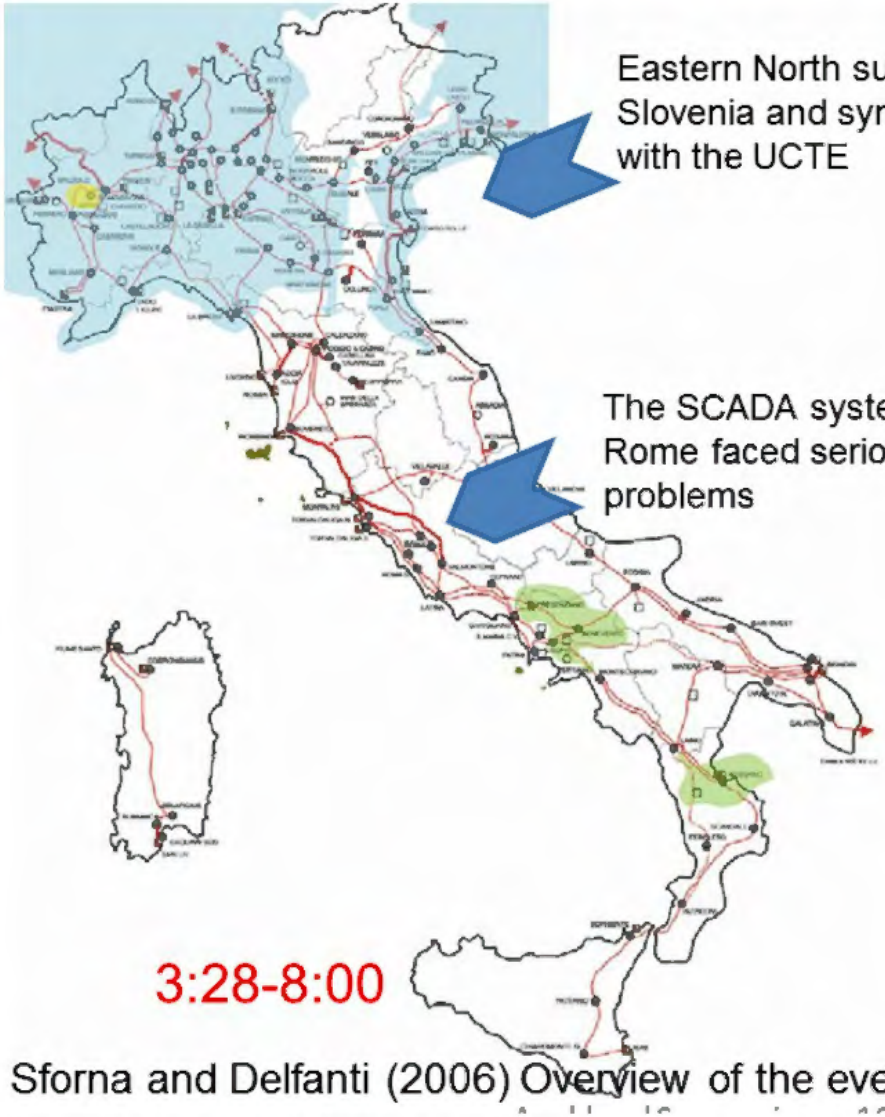
Add blackout region and time

Energy not supplied: 409,6387 GWh
Damage costs: 2.508,304 million Euro*
*Results are adjusted for inflation.

Export damage report: pdf csv

Add scenario

Restoration after Power Outage on September 28th



Sforna and Delfanti (2006) Overview of the events and causes of the 2003 Italian blackout

	Primary Sector	Secondary Sector	Tertiary Sectory	Households	Total
North	5.3	136.7	60.8	43.1	**246**
Center	20.6	217.6	154.6	98.2	**491**
South	20.9	82.8	97.6	94.3	**296**
Sicily	12.4	33.7	54.6	49.5	**150**
Total	**59.2**	**470.8**	**367.5**	**285.0**	**1,182**

all damage figures are in Mio. Euros

Assessment of the household damage

Exceptional Detail, Broad Scope:

- **Economic Methodology:** Identification of the *willingness to pay* (WTP) to avoid power outages among European households.

  Why? In economics WTP is used as a proxy for damage costs at the household level

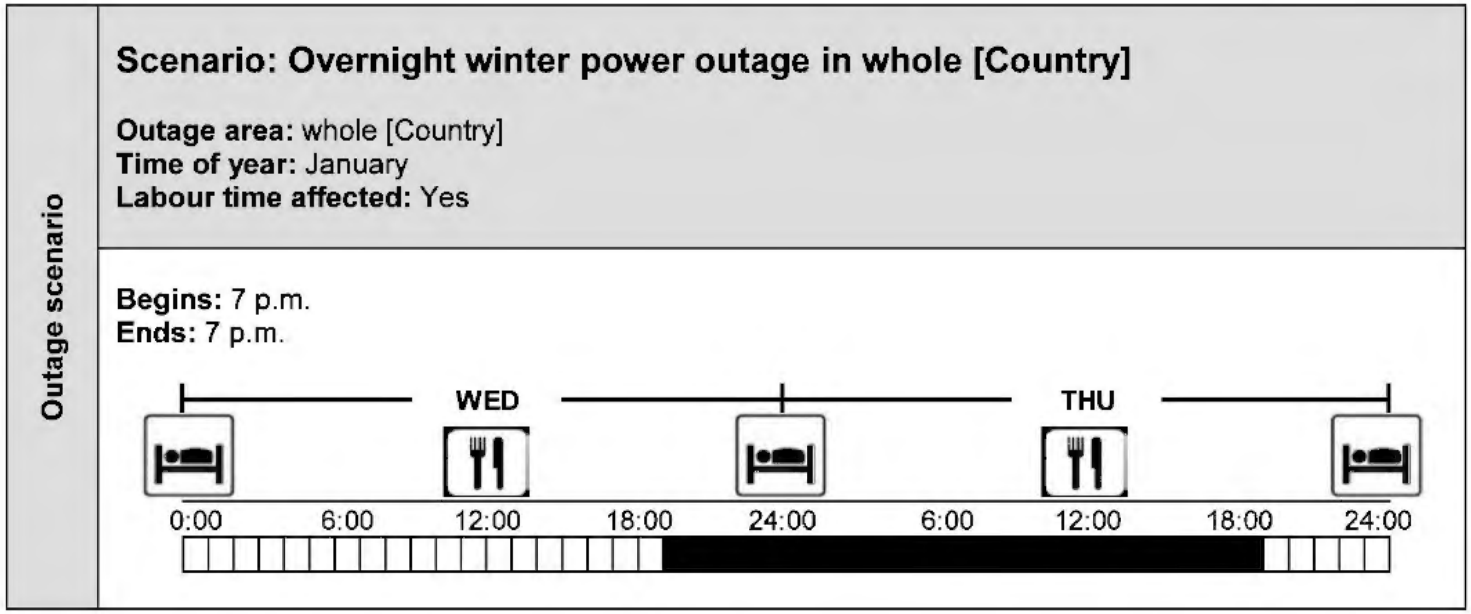
- **Survey Methodology:** Choice Experiment

1st research step - survey:

- survey on power supply security:
  - representative survey in all 27 EU nations
  - contacted about 176,000 households
  - 8,336 completed surveys
  - between 270 and 350 per nation
  - half by telephone, half online

1st research step - survey

- Elicitation of WTP: a choice experiment
- 8 scenarios of outages and bids, with only options yes/no



of course:

- all interviews in first language of respondent = 23
- all resp. had graphic at time of answering
- bid values and ordering of scenarios were shuffled

Once an investment in security is decided
- will the local population warmly welcome the measure?

Well ...  **... so ...** 

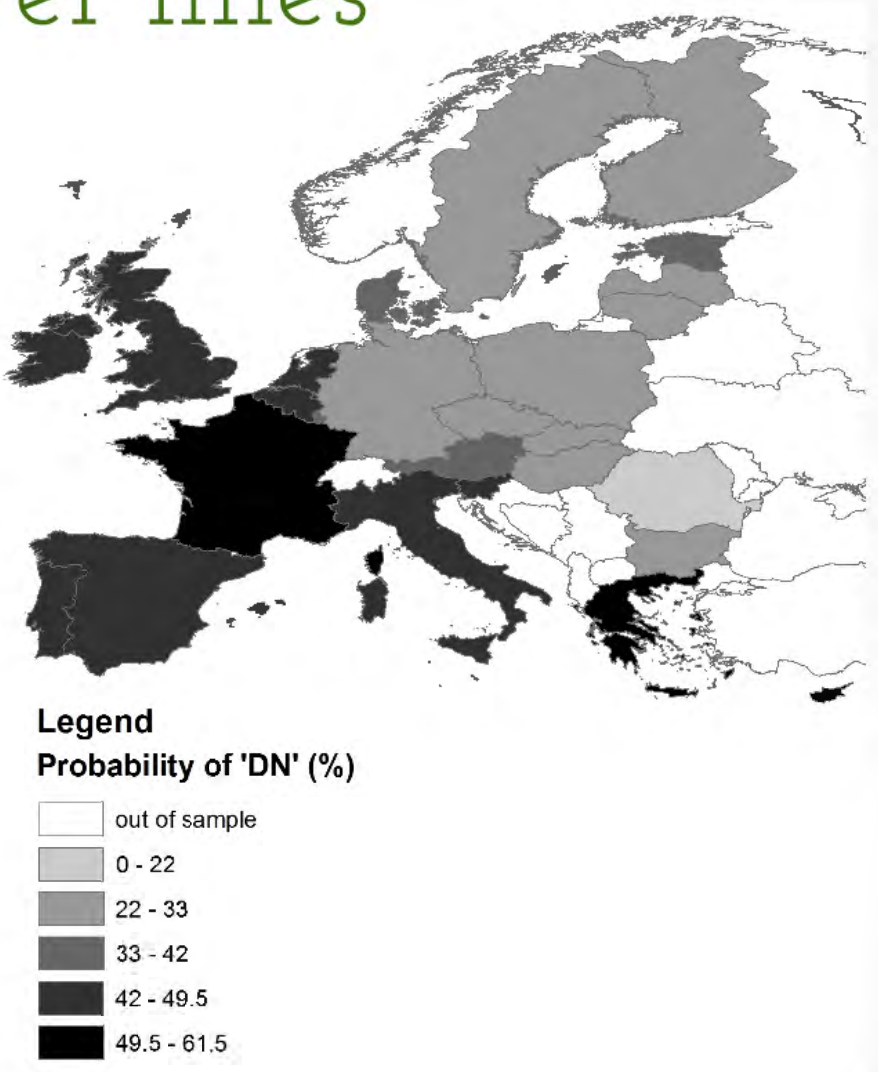
Are the mechanisms to "sell" grid enhancements to the population?

Example: new power lines

We asked 250-350 households in each of the EU-27 member states:

As part of a large infrastructure program … a high power pylon will be built 250m from your home … would you accept this program without opposition?

DN: Definitely NOT



European Commission 2011:

"The current trend, in which nearly every energy technology is disputed and its use or deployment delayed, raises serious problems for investors and puts energy system changes at risk"

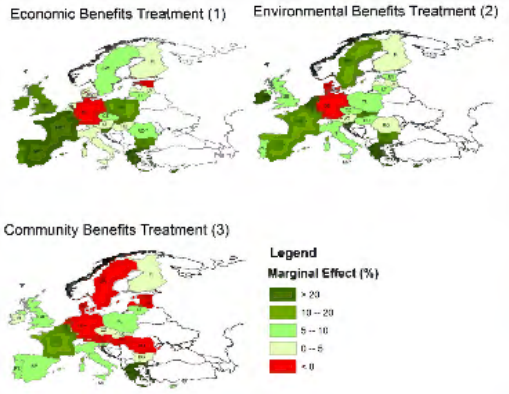
Once an investment in security is decided
- will the local population warmly welcome the measure?

Well ...  **... so ...** 

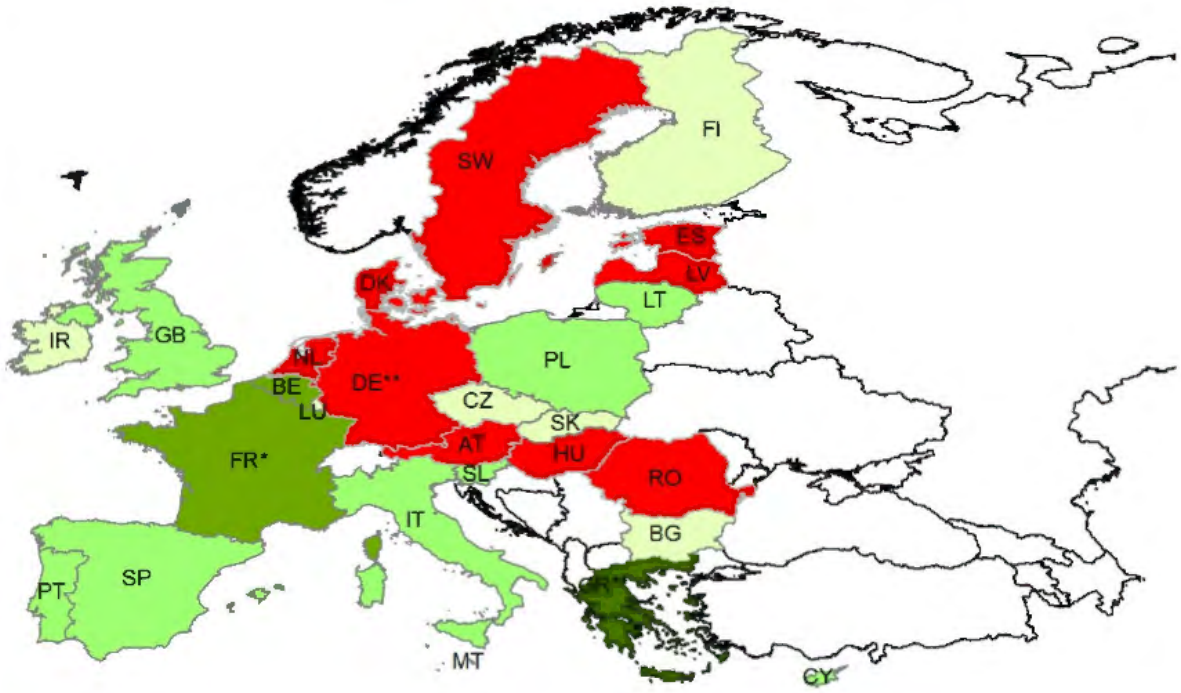
Are the mechanisms to "sell" grid enhancements to the population?

We presented respondents with three different auxiliary benefits from the new transmission line:

- A: Infrastructure is part of a programme for regional economic development = new jobs
- B: Infrastructure is required to integrate renewable energy
- C: Your municipality will get money for recreational facilities, renovations, …
- D: control group without any additional information



Community Benefits Treatment (3)

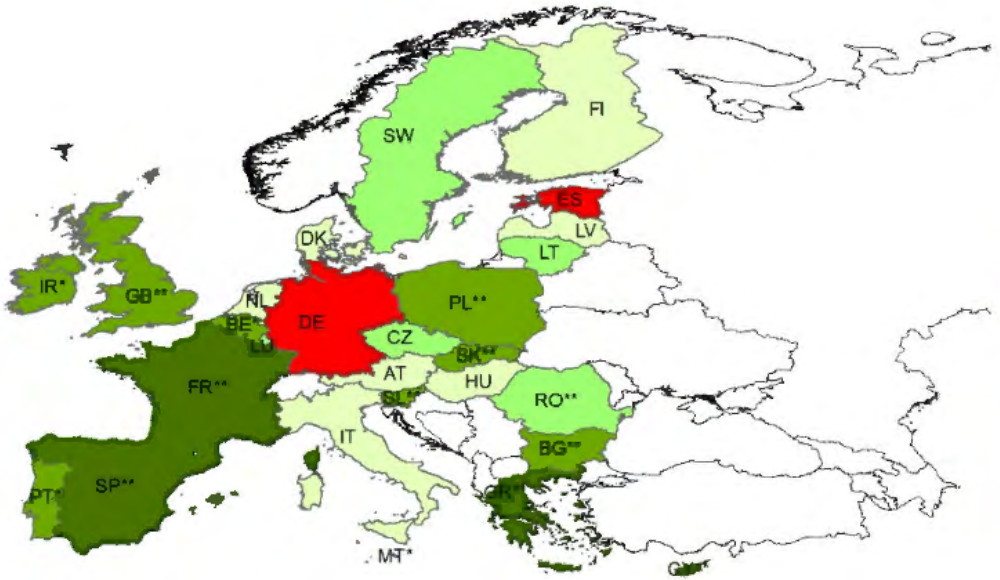


Legend

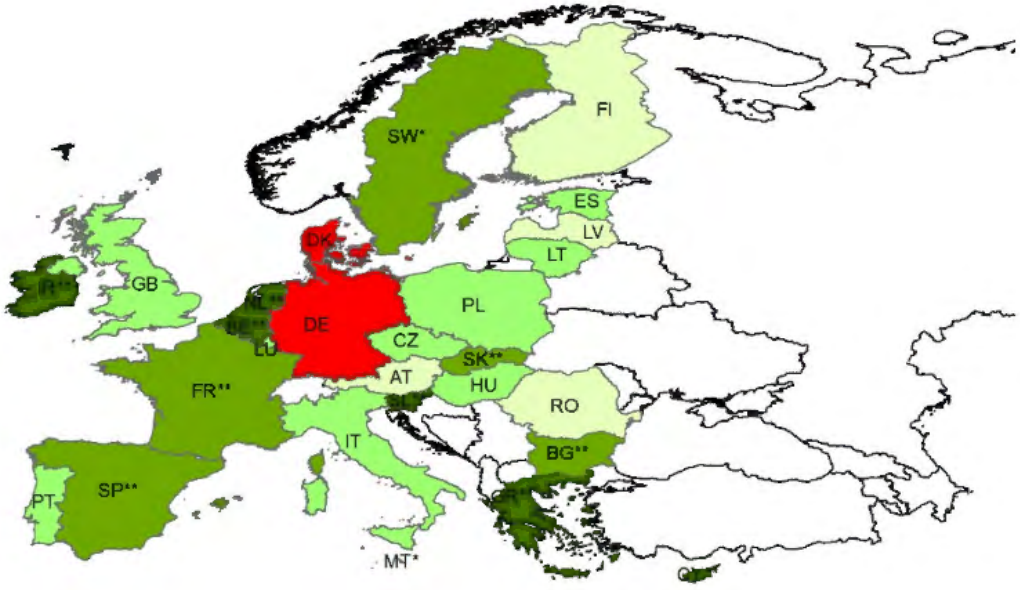
Marginal Effect (%)

- > 20
- 10 -- 20
- 5 -- 10
- 0 -- 5
- < 0

Economic Benefits Treatment (1)



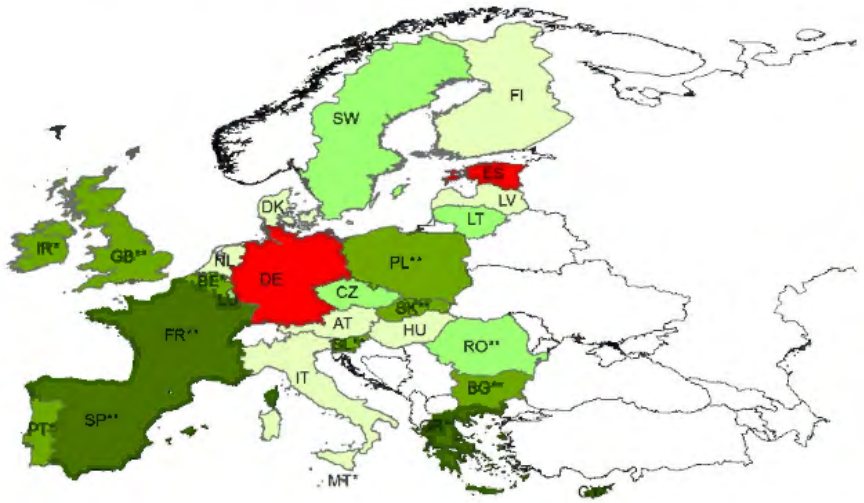
Environmental Benefits Treatment (2)



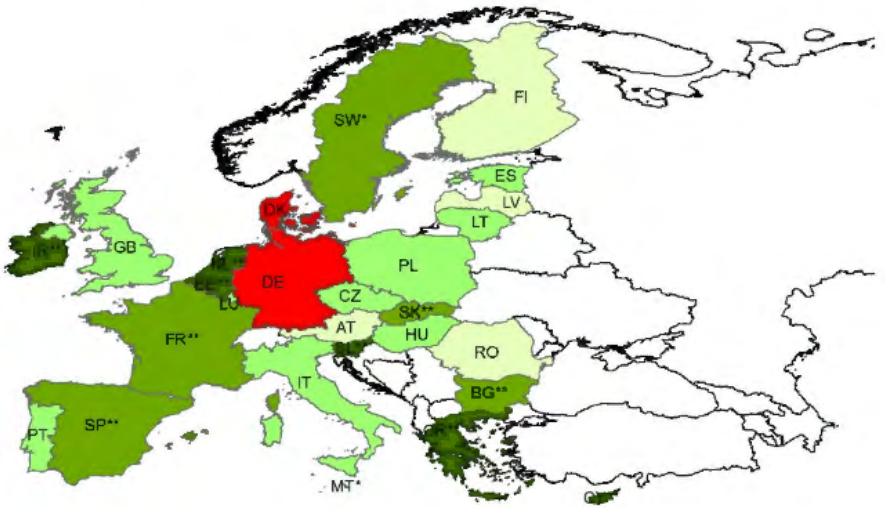
Community Benefits Treatment (3)

Legend

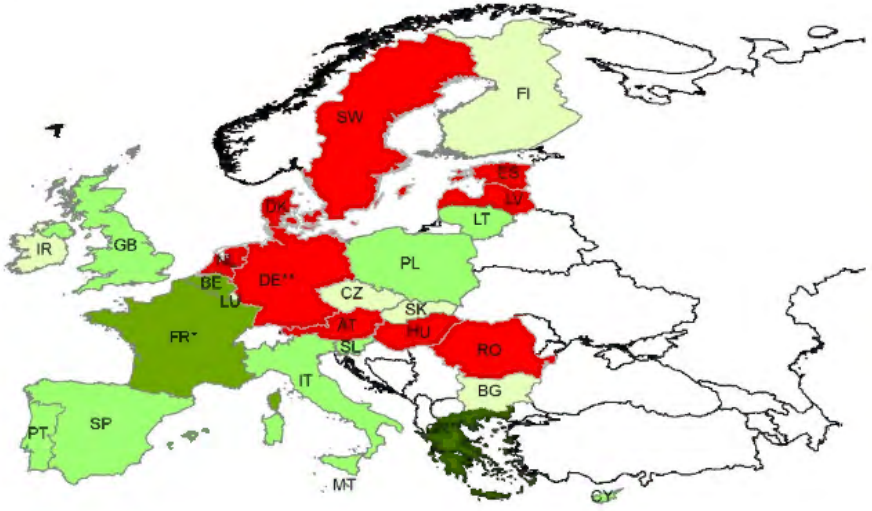
Economic Benefits Treatment (1)



Environmental Benefits Treatment (2)



Community Benefits Treatment (3)



Legend

Marginal Effect (%)

- > 20
- 10 -- 20
- 5 -- 10
- 0 -- 5
- < 0

ENERGIE INSTITUT
an der Johannes Kepler Universität Linz

JKU
JOHANNES KEPLER UNIVERSITY LINZ

Open questions:

Are tailor-made solutions to increase public acceptance necessary?

How are measures to increase cyber security seen by the population?

reichl@energieinstitut-linz.at

Foto: philipp greindl © flap.at

SESAME

The research project SESAME received funding from the 7th Framework Programme of the European Commission

SEVENTH FRAMEWORK PROGRAMME