



The blackout in Munich: how do households value security of supply?

8th ENERDAY

Conference on Energy Economics and Technology
19 April 2013

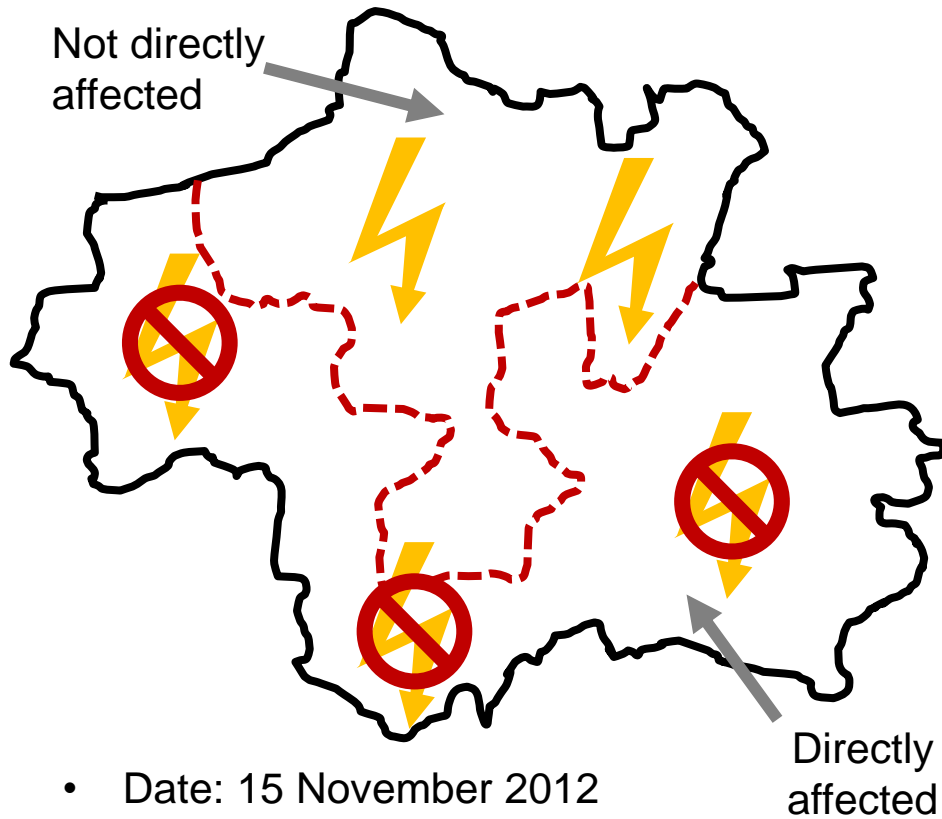
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Thomas Meyer & Dominik Möst



Overview of the power outage in Munich 2012

Introduction (1/3)

Areas affected by the power outage in Munich



- Date: 15 November 2012
- Time: 7-9 o'clock
- Roughly 50 percent of Munich was affected

- Almost half million people in the southern half of Munich were affected by the outage.
- High level of security of electricity supply in Germany (average downtime of about 15 minutes per household in 2011).
- The separation of affected and non-affected households in one city makes the outage event suitable for an interdisciplinary survey.

An interdisciplinary research approach

Introduction (2/3)

EE²

- Joint research between doctoral students from the chair of energy economics (EE2) and the Boysen-TUD-Graduiertenkolleg:

Friedrich-und-Elisabeth
BOYSEN
Stiftung für Forschung und Innovation

Valuation of
security of supply
(WTP / WTA)

Economics
(Prof. Möst)

- Alexander v. Selasinsky
- Daniel Schubert

**Communication
Science**
(Prof. Donsbach)

- Adriane Schmidt
- Thomas Meyer

Strategy of
Argumentations

Political WTP

Political Science
(Prof. Patzelt)

- Sebastian Thuß

Engineering
(Prof. Schegner/
Prof. Hurtado)

- Niels Erdmann
- Mark Erndt

Potential of
Load Shedding

Our Research Questions

Introduction (3/3)



The overarching research question:

What are the differences regarding the valuation of security of electricity supply of affected and non-affected households?

Two derived research questions (approaches):

① Qualitative approach (attitude)

How important is security of supply?

② Quantitative approach (behaviorial disposition)

What is the value of security of supply?

A representative telephone survey

Methodology (1/3)



- Only 2 months after the power cut off, we started interviewing the population of Munich (from 21 January to 5 February 2013).
- Interviewing took place in the CATI (Computer Assisted Telephone Interviews) laboratory of TU Dresden.
- 526 interviews representative for the population of Munich were conducted

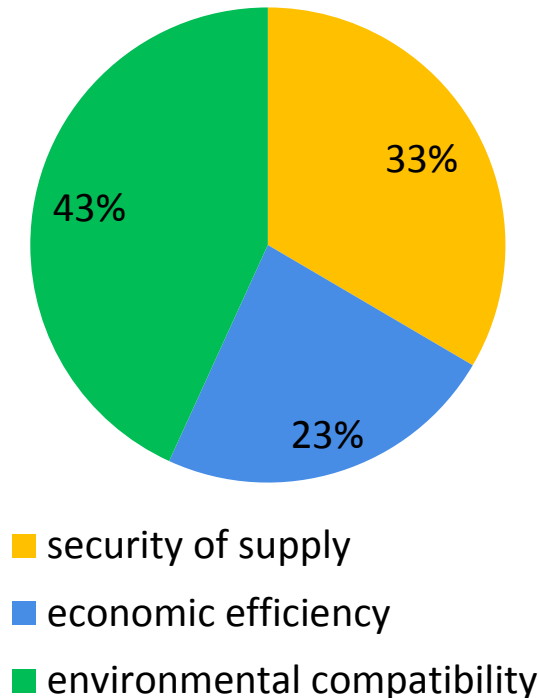
Measures to ensure the representativeness of the survey:

- Two step random sampling:
 - Random sample of land line numbers (Gabler-Häder approach)
 - Last birthday approach in order to select a interviewee within an household
- Weighting procedure

① Qualitative approach: How important is security of supply?

Methodology (2/3)

Ranking of Energy Policy Objectives (Hübner & Müller, 2012)*



- Interviewees were asked to choose the most important one of the three main energy policy objectives (according to Hübner & Müller, 2012):

- (1) security of supply
- (2) environmental compatibility
- (3) economic efficiency

- **Hypothesis:**
Affected people will value security of supply higher than non-affected.

*The objectives innovation (2%) and independency (11%) were removed for the analysis.

② Quantitative approach: What is the value of security of supply?

Methodology (3/3)

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- The contingent valuation is a utility-based stated preference method to determine the value of non-marketable goods.
- Interviewees were confronted with a hypothetical worst-case-outage-scenario and an as-realistic-as-possible-alternative was offered afterwards (e.g. backup power supply).

Scenario Characteristics

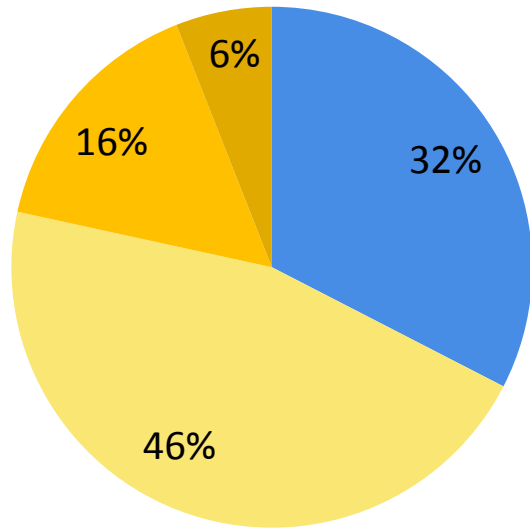
Duration	15 min, 1hour, 4 hours
Season	Winter
Daytime	6 o'clock in the evening
Weekday	Working day
Spatial dimension	City area and household only

- Two types of questions are applied:
 - Willingness-to-Pay (WTP): Payment for an alternative option.
 - Willingness-to-Accept (WTA): Outage is accepted in return for payment.

Effects of the power outage

Findings (1/4)

Index of outage effects



- not affected
- slightly affected
- moderately affected
- severely affected

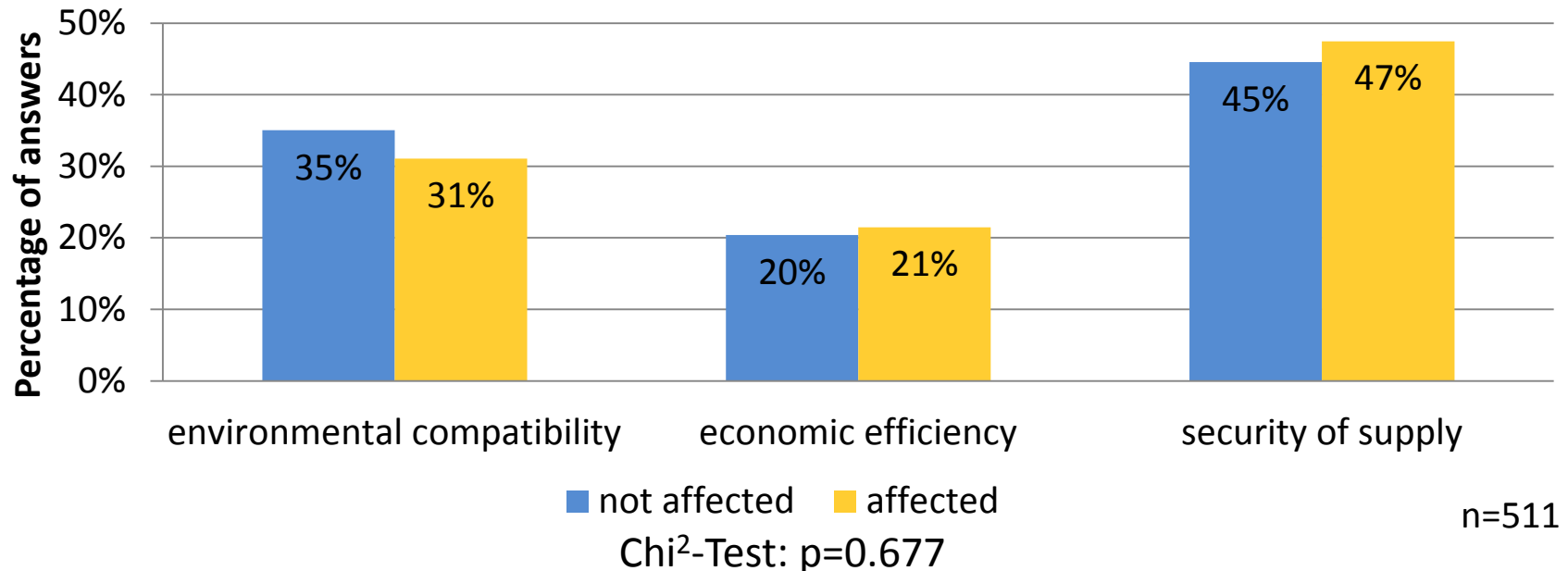
n=488

- 53% of the Munich population was affected by the outage in their own household.
- 4% of Munich households reported material damages.
- In total 68% were affected by the outage in their households or outside of it.

① Qualitative approach: How important is security of supply?

Findings (2/4)

Ranking of energy policy objectives (most important)



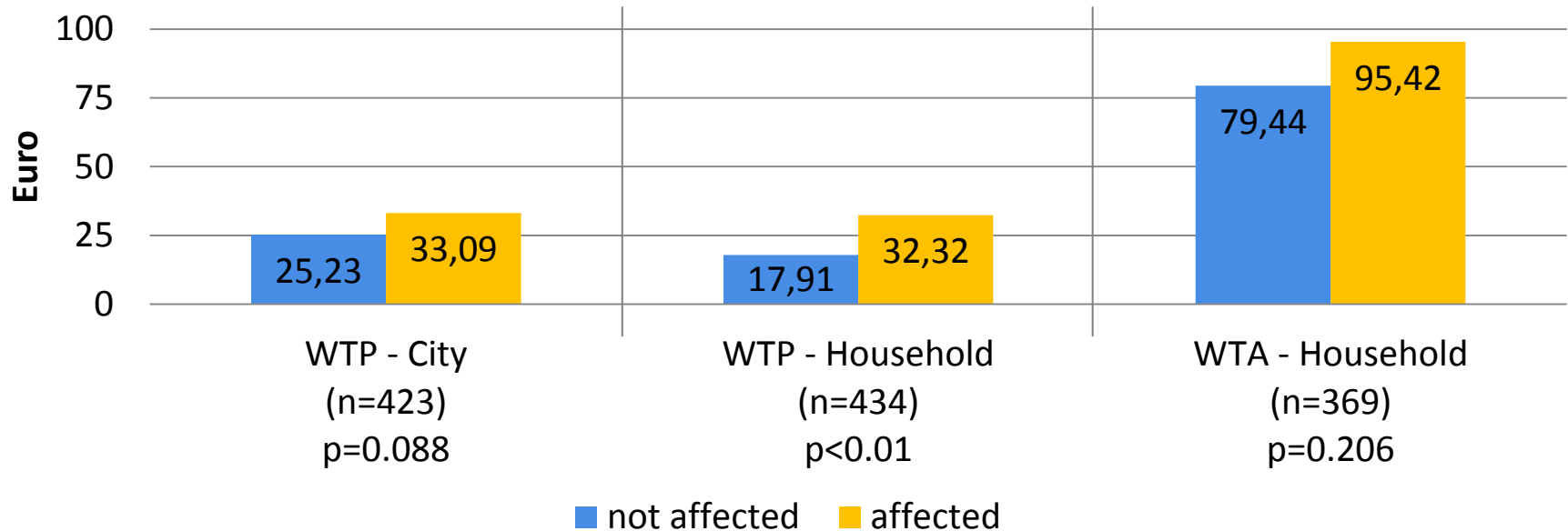
- Security of supply is the most important energy policy objective to the Munich population (in contrast to other surveys).
- Minor differences (statistically not significant) between affected and not affected people in Munich.
- Media coverage influences valuation of households?

Quantitative approach: What is the value of security of supply?

Findings (3/4)



WTP and WTA for a hypothetical outage of 4 hours



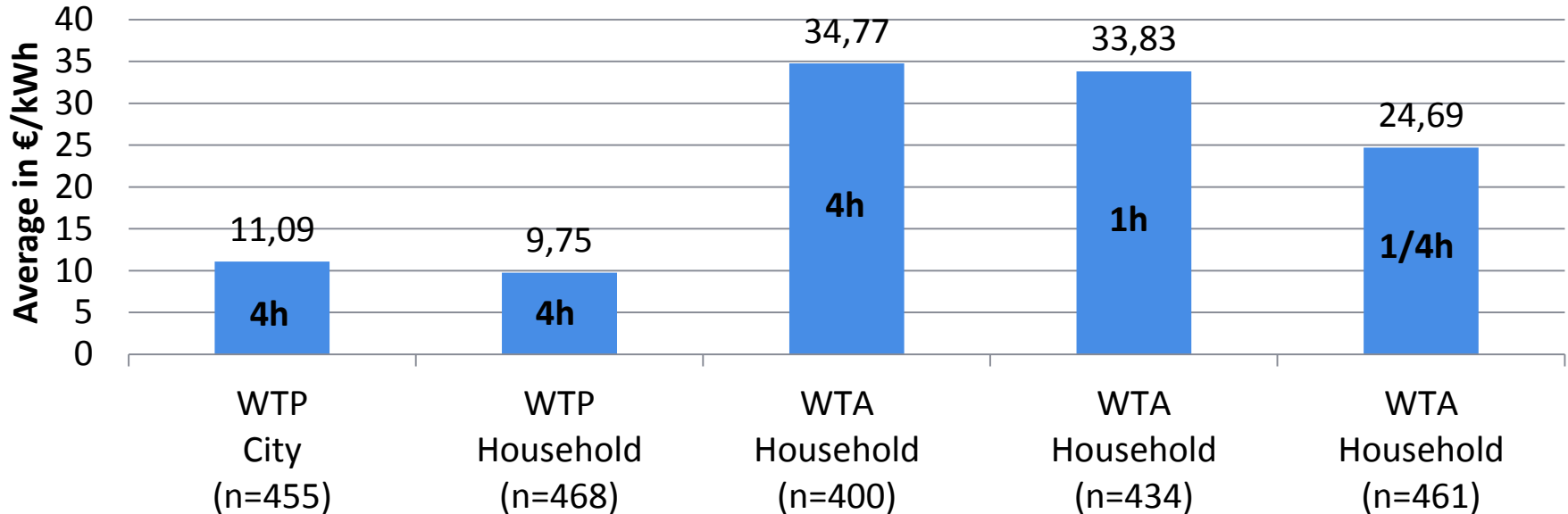
- The WTP of an outage which affects the whole city is slightly higher than for an outage which affects only the own household.
- The WTA is substantially higher than the WTP (consistent with behavioural economics).
- Significant difference between WTP (Household only) of affected and not affected households.

Quantitative approach: What is the value of security of supply?

Findings (4/4)



Standardised WTP-& WTA-Values



4h = Outage Duration

- Standardisation of values to the consumption per kWh in the outage situation (number of household members and standard load profiles)
- VoLL (Value of Lost Load) as average of the WTP and the WTA: 22.26 €/kWh.

Security of supply as breaking point for the Energiewende

Summary and Conclusions



How do households value security of supply?

	Absolute	Not affected vs. affected
① Qualitative approach Attitudes	Security of supply is the most important energy policy objective (47%)	No significant difference
② Quantitative approach Behavioural disposition	VoLL = 22.26 €/kWh	Significant difference for the WTP

- We assume that we couldn't demonstrate a difference between not affected and affected households due to the media coverage of the outage event, which influenced the attitudes considerably.
- A rather small outage will not affect the attitudes towards the energy policy objectives in a substantial way. This picture could be different for a longer outage duration.
- Therefore, security of electricity supply should be in the central point of view in the energy debate in order to not harm the public agreement to the objectives of the Energiewende.

Thank you for your kind attention.

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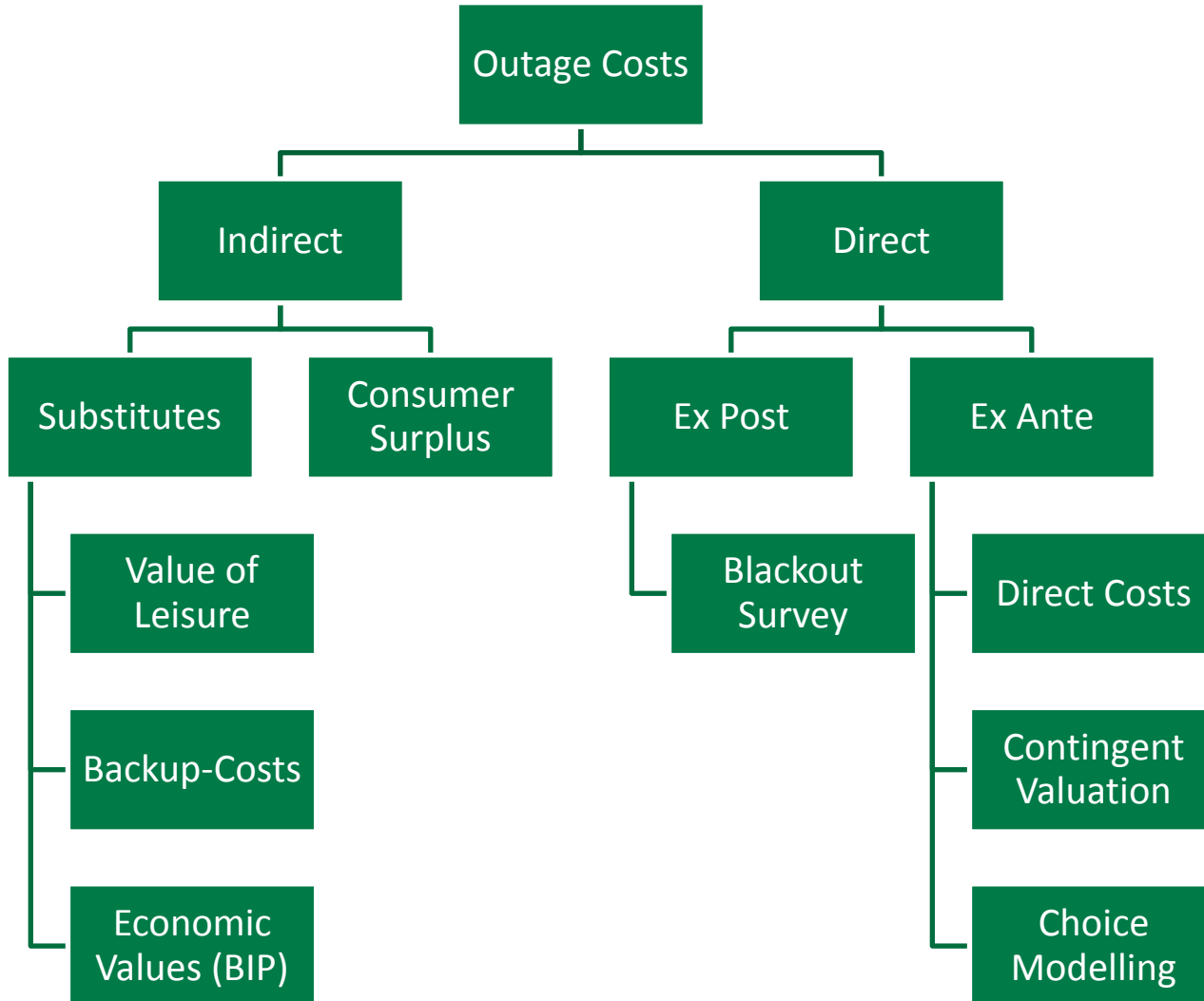


BACKUP

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3. The valuation of security of supply

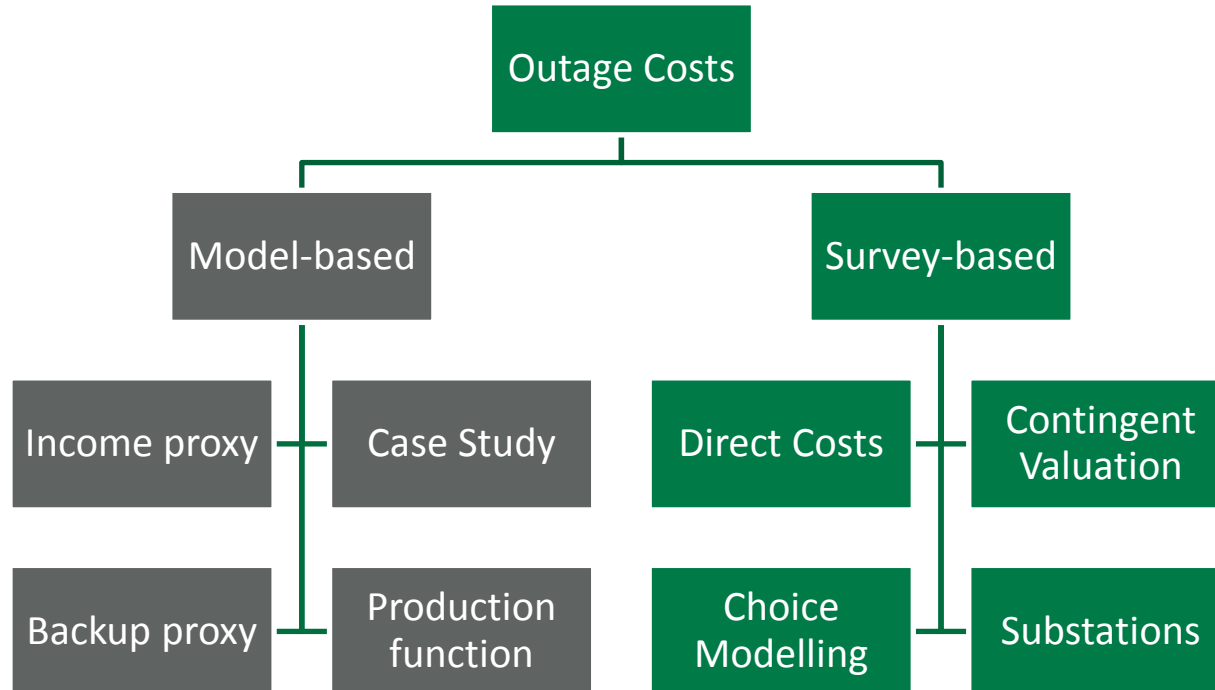
Methodology: quantitative approach



3. The valuation of security of supply

Methodology: quantitative approach ②

Approaches to determine the outage costs (according to Hoch & James, 2011)



- Only a survey-based approach could be applied due to the reason that we want to distinguish affected and non-affected households.