Energy & Environment

Acceptance of power plants, renewable energies and infrastructure projects

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Agenda

Increase energy efficiency in the transportation sector while still considering the human need for mobility

- Value of mobility
- Individual mobility

Conflicts with residents when building infrastructure

- Emotional assessment of power plants and transmission lines
- Public perception of the electricity sector

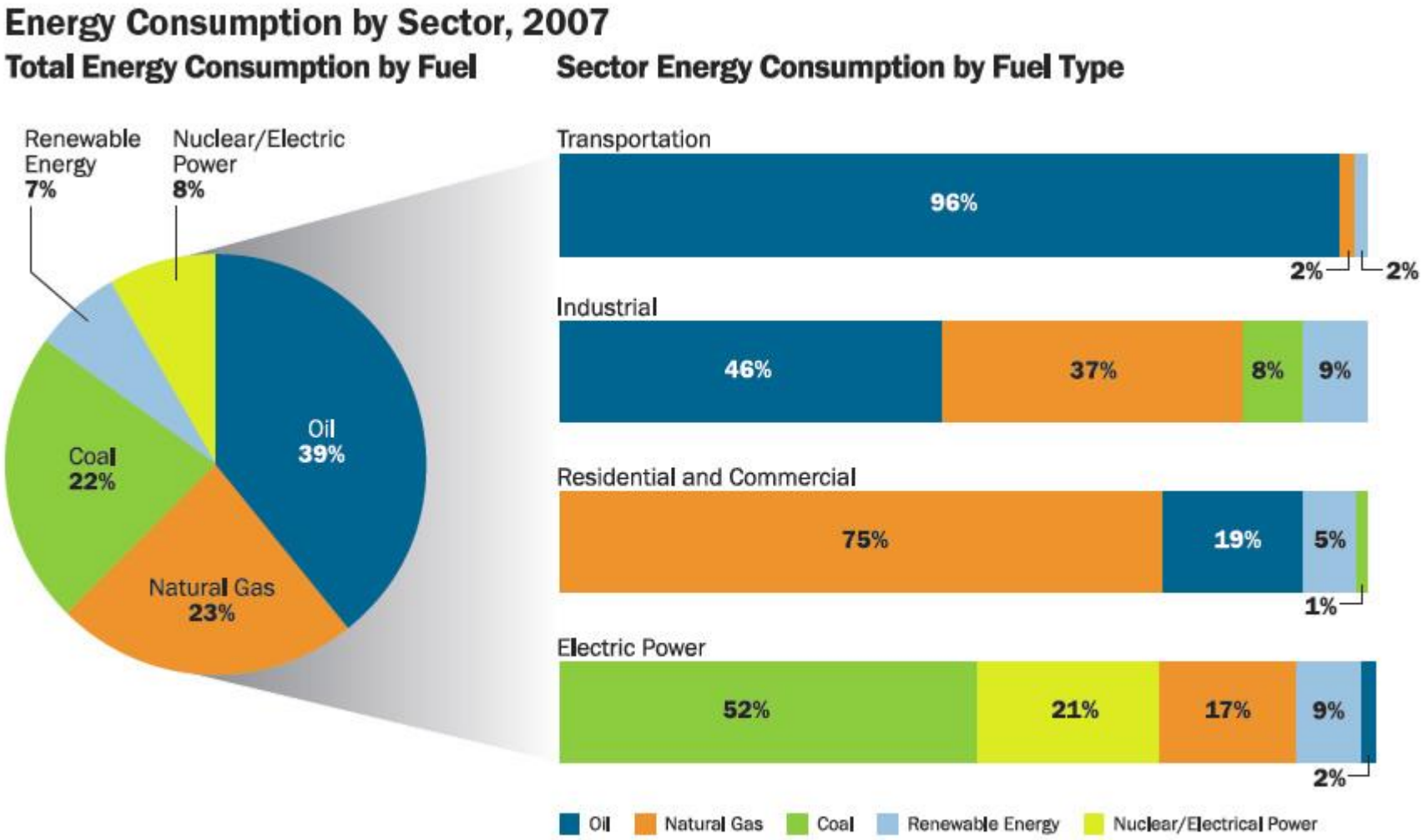
Energy efficiency in the transportation sector

Increase energy efficiency in the transportation sector

Motivation and research questions

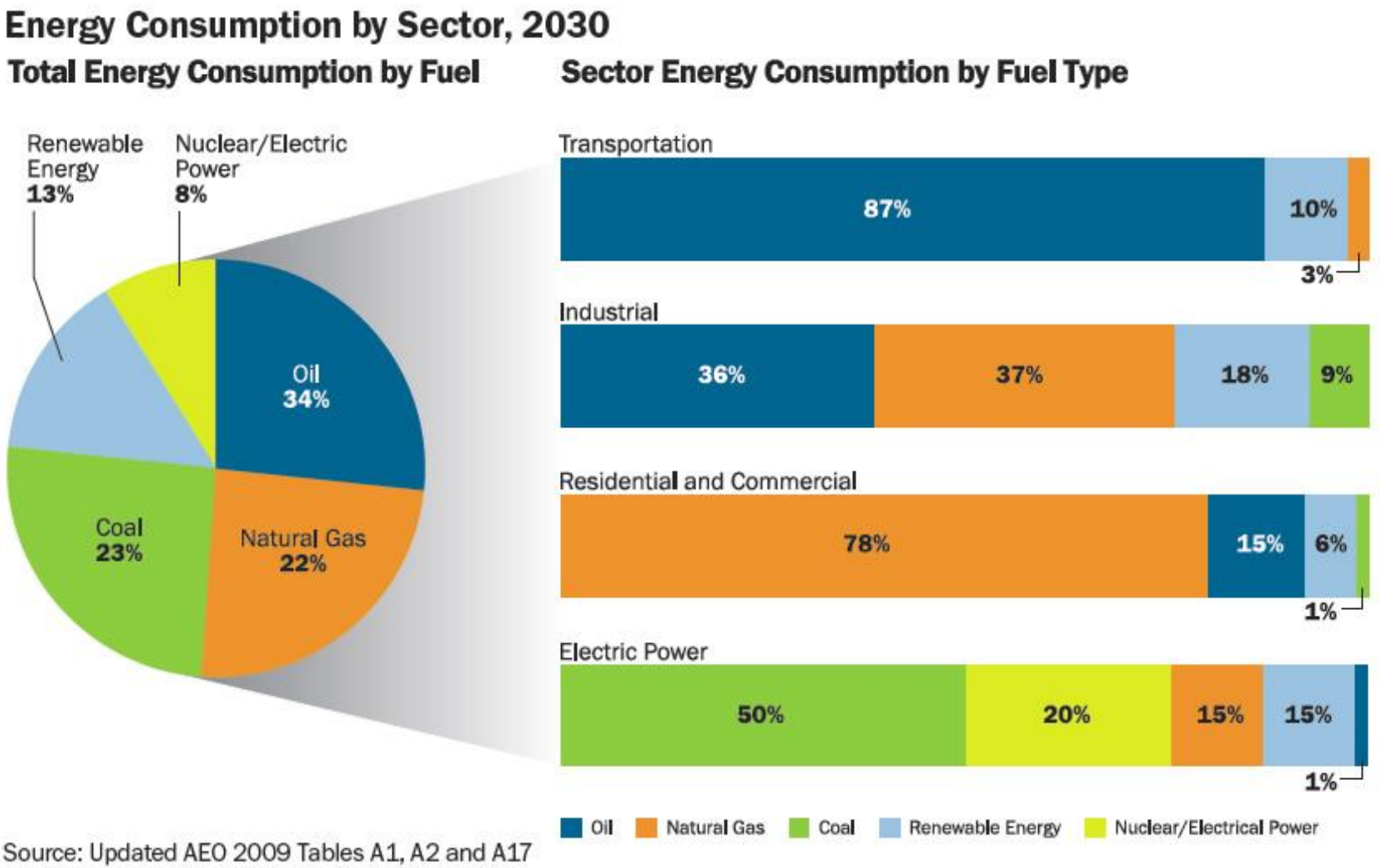
- Europe faces fundamental challenges
  - Import dependency, climate change
  - Increase energy efficiency
- Energy consumption in the transportation sector
  - GHG emissions are increasing
- Structure
  - Importance of individual mobility
  - Symbolic dimensions of mobility
  - Results

Energy economic background



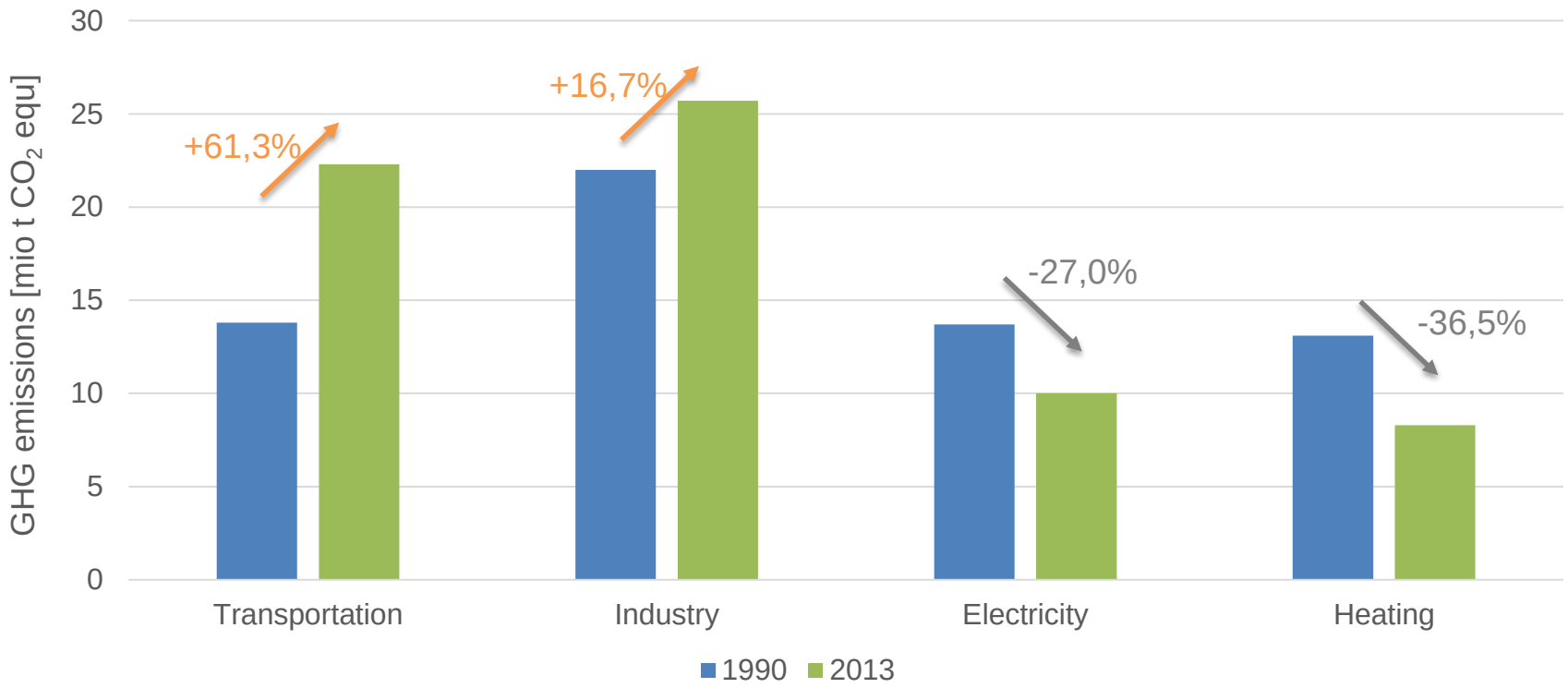
Source: Updated AEO 2009 Tables A1, A2 and A17

Energy economic background

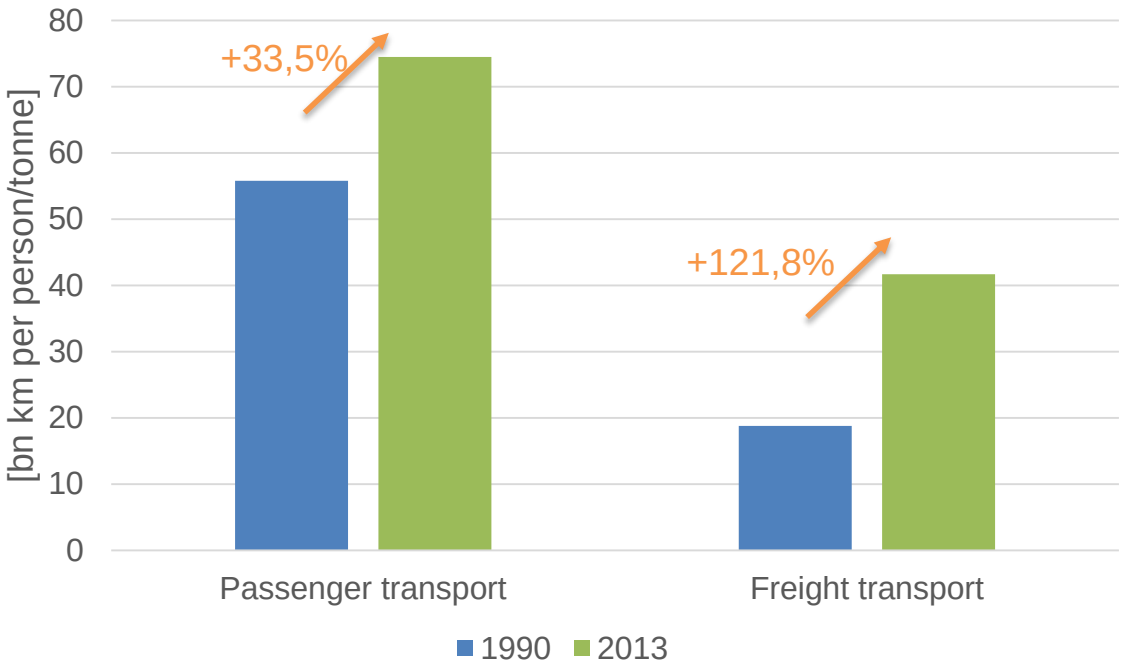


CO_2 emissions in AT

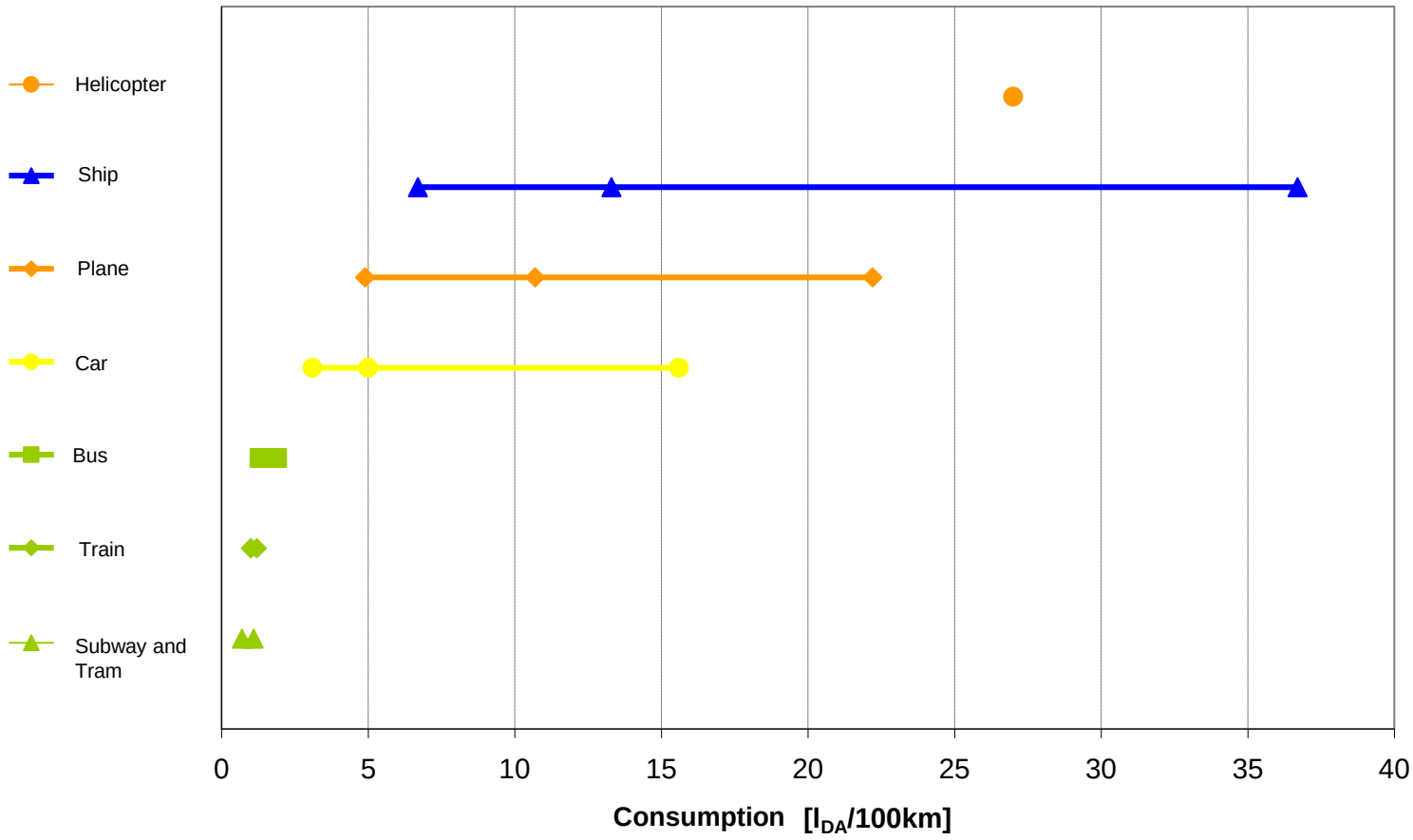
Biggest increase: emissions from transportation sector



Transportation



Energy consumption: passenger transport



l_{DA} = liters of diesel equivalent

Importance of mobility

Mobility fulfils several purposes:

- Effortless movement in space
- Accessibility of local services and opportunities to satisfy different needs
- Social prestige

Factors that govern choice of transportation

- **Autonomy**
  - Abstinence from own car would coincide with the loss of spontaneity.
- **Status**
  - My social status is enhanced by owning a car.
- **Adventurous**
  - Driving a car is fun.
- **Privacy**
  - I prefer to keep a distance from strangers.

Source: „Determinanten der Verkehrsmittelwahl“ (Hunecke, 2000):

Survey

Survey (July to August 2007) in Vienna und Styria

89 People

- 60% female, 37 years old (SD=14,1)

Relevant criteria

- Symbolic dimensions of mobility
- Habits
- Criteria for car purchase
- Subjective opinion of different means of transportation

Categories

- Regular car use
- No regular car use
- Does not own a car

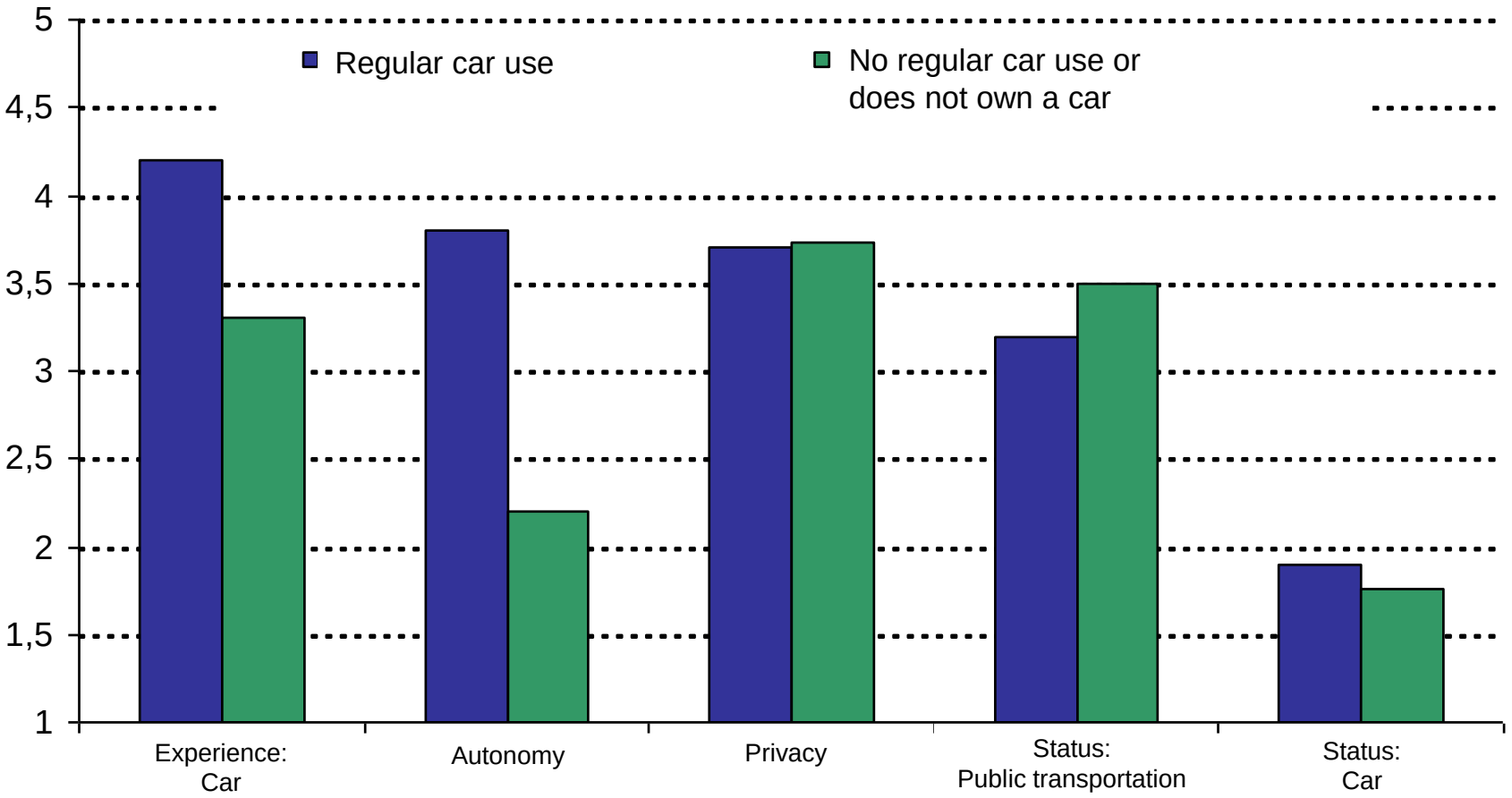
Importance of the different dimensions

Highest level of agreement with:

- Adventurous
- Autonomy

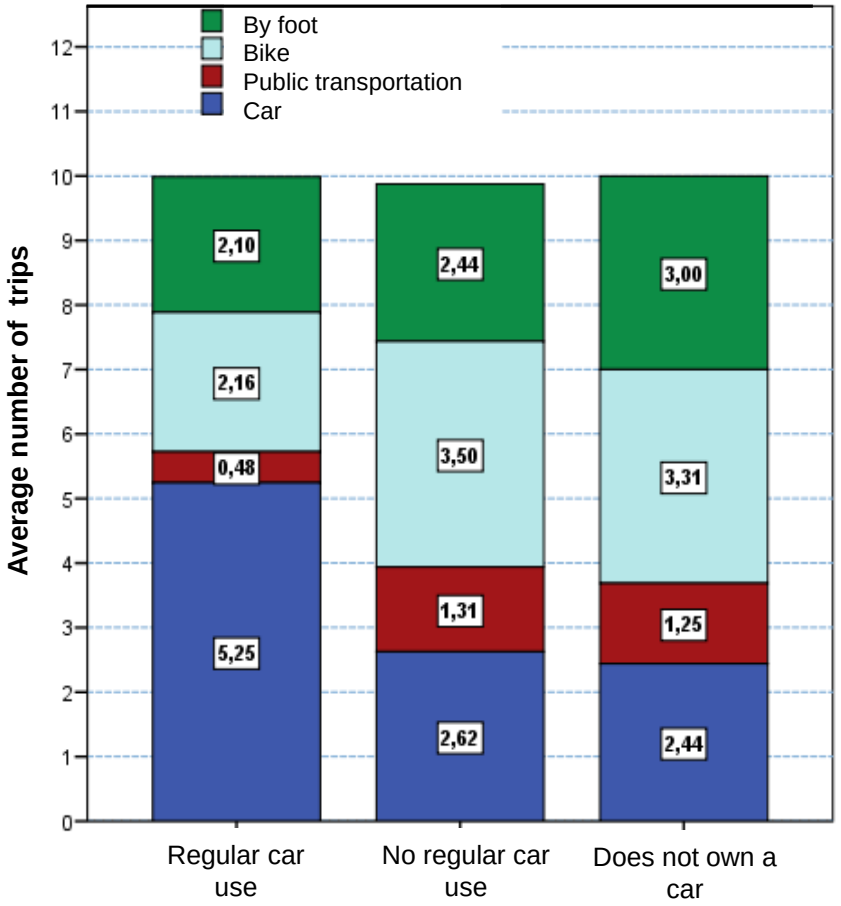
Symbolic Dimension	Regular car use		No regular car use or does not own a car	
	Average	**SD**	**Average**	**SD**
Experience - Car	4,2	0,9	3,3	1,2
Autonomy	3,8	1,1	2,2	1
Privacy	3,7	0,8	3,7	1,1
Status: Public transportation	3,2	1,1	3,5	1,3
Status: Car	1,9	0,9	1,8	0,9

Reasons for using a car

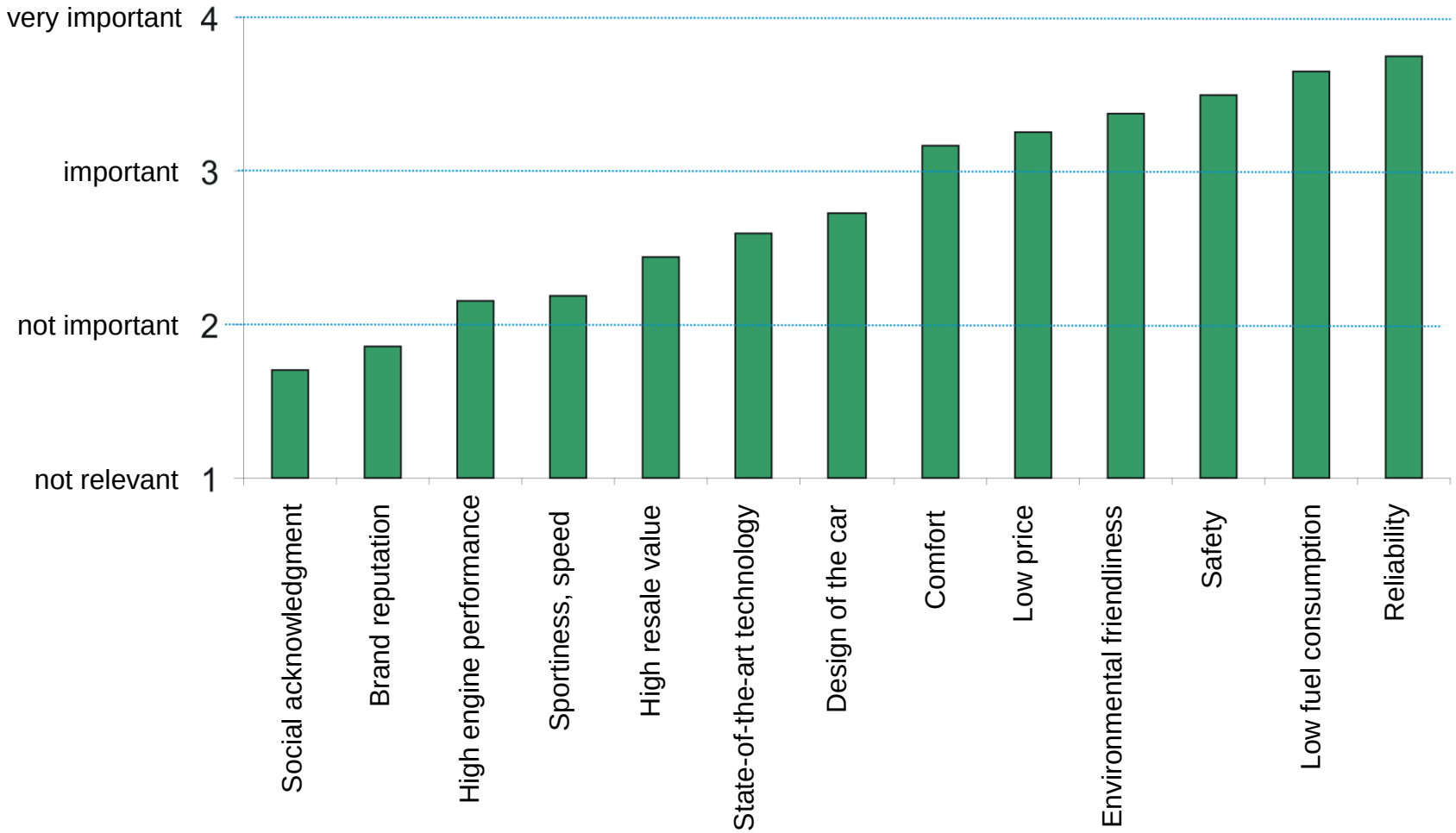


Habitual choice of transportation

Car as the most important transportation vehicle



Criteria for car purchase



Differences in purchasing criteria

People with a high degree of autonomy

- Social acceptance, high engine performance, brand reputation of high importance

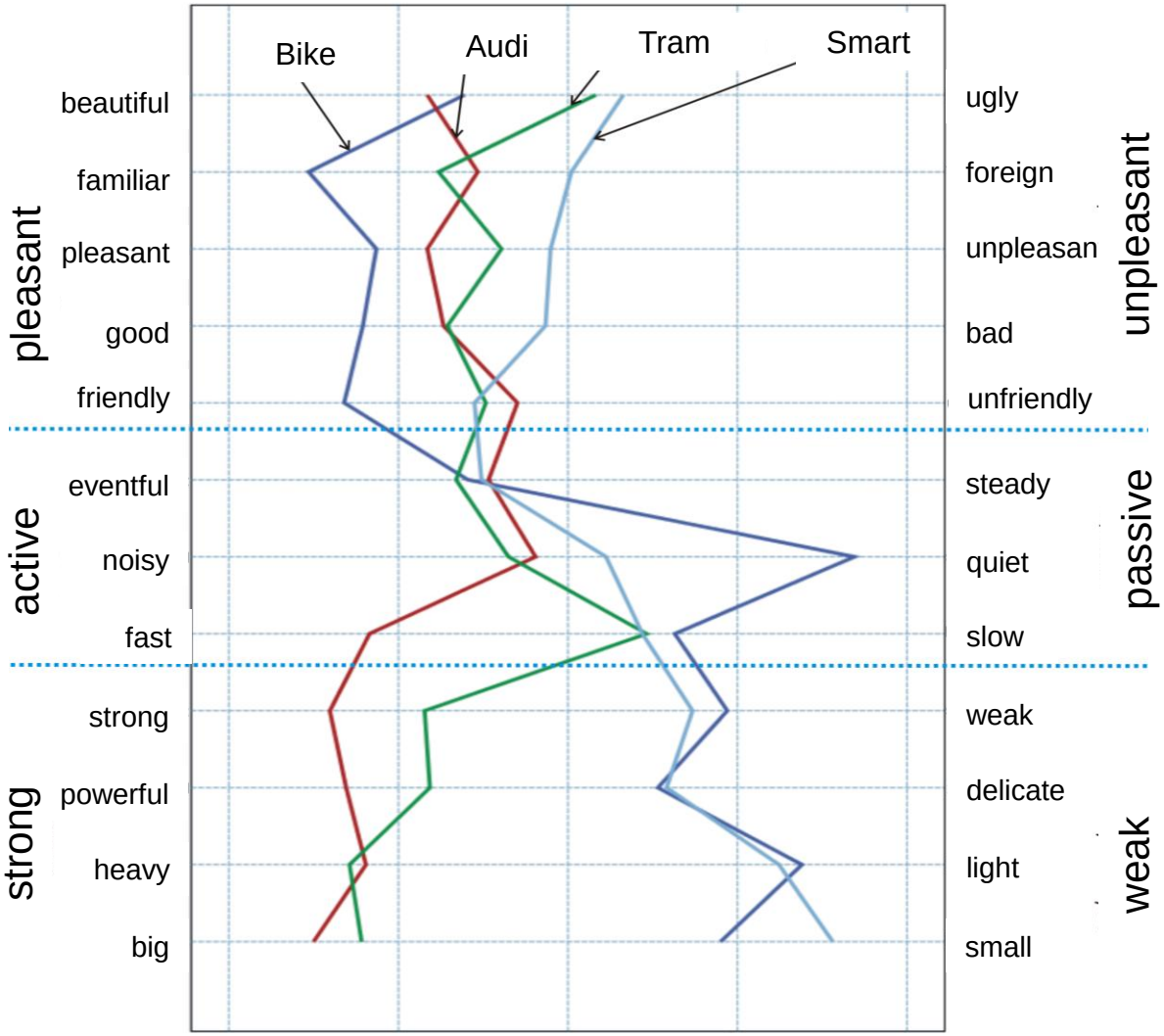
People with experience orientation

- Convenience, reliability and high engine performance

People who see the use of public transportation as a status symbol

- Environmentally friendly
- Low price and convenience is less important

Perception of different means of transportation



Symbolic dimensions of mobility

It is important to consider the symbolic dimension!

Autonomy

- Not using my car on a daily base is not an option. This would restrict me in my independence.
- Not using a car would lead to a decrease in quality of life for me.
- I can easily picture my life without a car. **(-)**

Experience

- Driving is fun.
- Driving is boring. **(-)**

Conflict area: Infrastructure/plant construction

- Individual perception of power plants
- Public perception of the electricity industry
- Transmission lines
- Conflicts associated with the construction of infrastructure

Individual perception of power plants

Individual perception of power plants

Motivation and key questions

- Numerous conflicts around energy-related infrastructure
  - i.e. 380kV-„Steiermarkleitung“, Gas CC - Klagenfurt

Aim

- Capture emotional responses to concepts and images that are related to infrastructure facilities
- Classify images as well as concepts with regard to the emotional response created
- Survey with unaffected residents

Overview

Two surveys (July, August 2007) in Styria

- 95 people, 40% female, 34,1 years (SD=13,2)
  - 18 **terms** were defined and their **emotional reaction** to these terms was recorded
  - **Result:** 80% would reject the construction of overhead-lines in their home town
- 95 people, 45% female, 30 years (SD =11)
  - 16 **pictures** were given to the participants and their **emotional reaction** to these was recorded
  - **Result:** 87% would reject the construction of overhead-lines in their home town

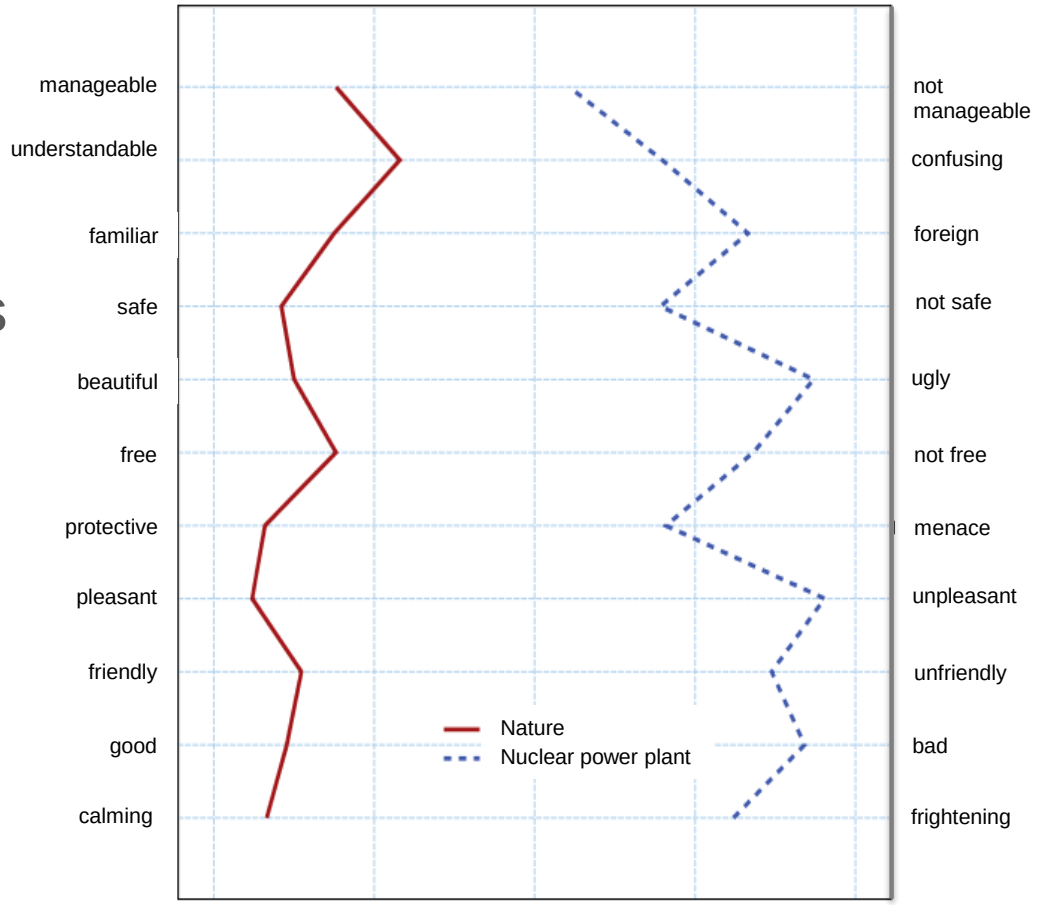
Survey evaluation

Semantic differential

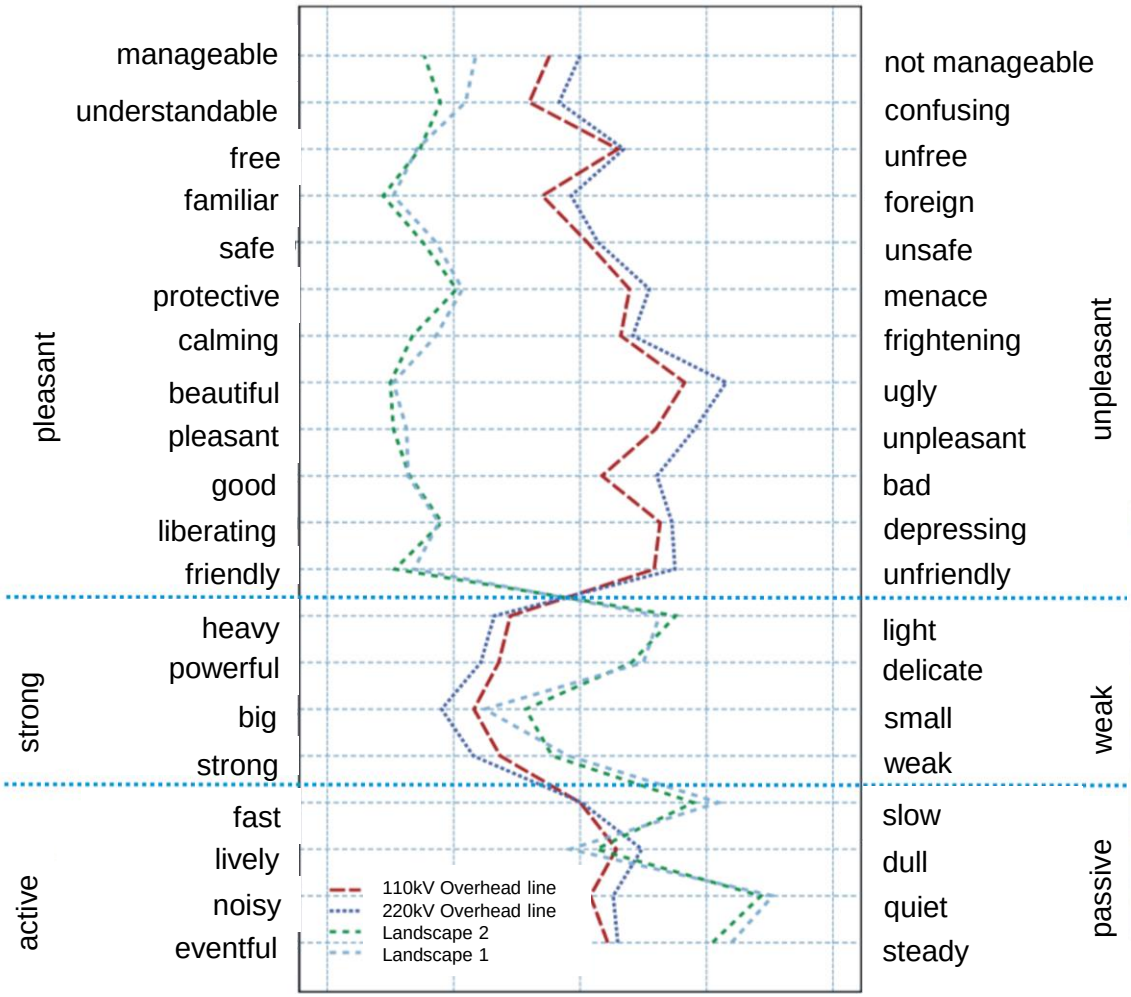
- Detects cognitive components of emotional responses

Three components

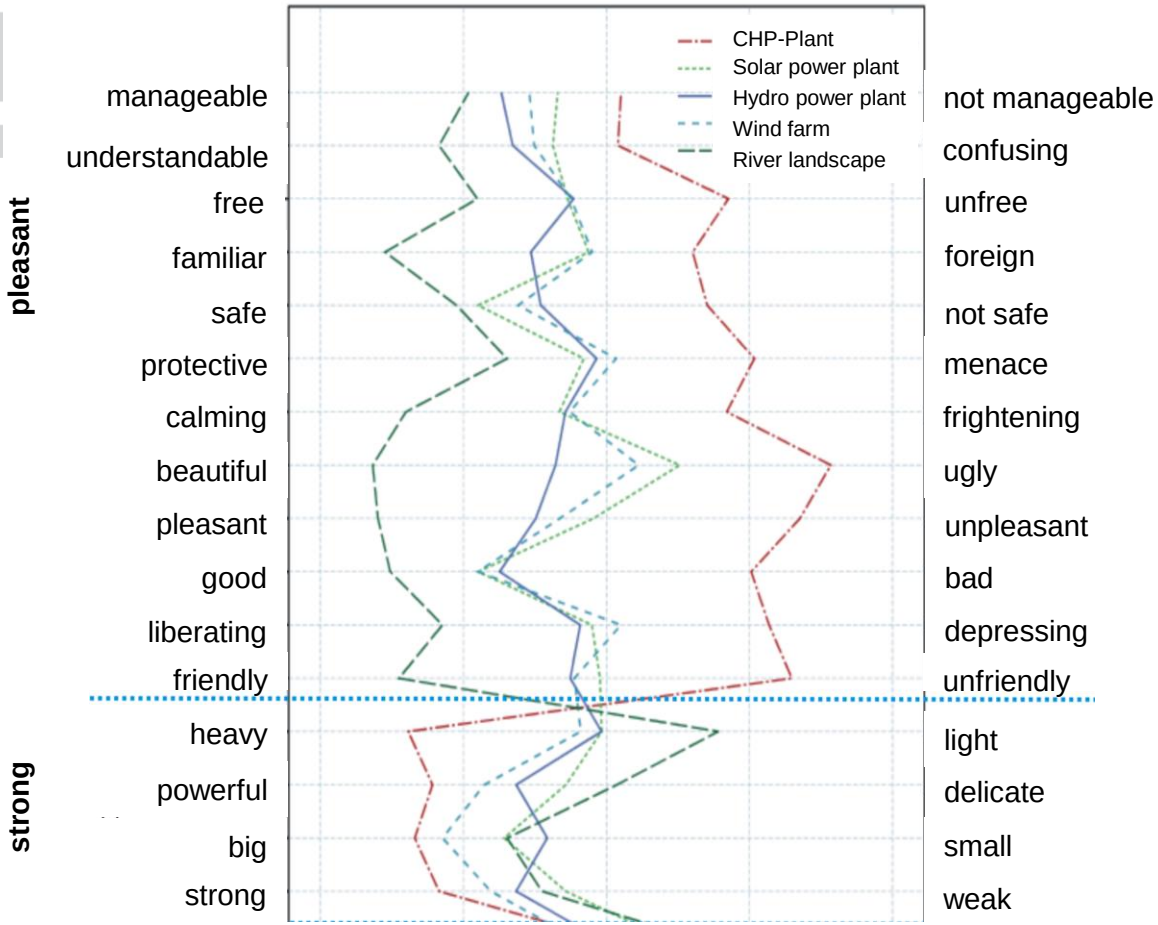
- Evaluation
- Intensity
- Activity



Landscape with/without transmission lines



Power plants



Conclusion

Infrastructure is perceived as

- unpleasant and strongly defacing nature

Most negative emotions

- Terms: Nuclear power, transmission lines
- Pictures: Thermal power plants

Most positive emotions

- Terms and pictures: Renewable power plants

Public perception of the electricity industry

Public perception of the electricity industry

Motivation and key questions

- What is the public perception of the electricity industry?
- Collect ideas and associations of the public on issues such as power, security of supply, power plant construction and transmission line construction in the electricity industry.
  - Which ideas are associated with infrastructure investments of the electricity industry?
  - What concerns do people have when a power plant and a high-voltage transmission line is planed in their home town?

Method and sample of the survey

Survey from 2007 to January 2008

Upper Austria, Styria and Carinthia

Sample:

- N =167, (49,7% female), 40,9 years old (SD= 16,1)
- 61,7% of respondents were totally against a power plant in their home town

Results

Associations with the term „***Electricity***“:

- 42 % ***basic need, enhances the quality of life***
  (Light, heat, assistance with heavy work and convenience)
- 35,6 % ***technical terms***
  (Energy, hardware and power plants)
- 12,8 % ***economic aspects***
  (Costs, work and economics)
- 9,5 % ***danger***
  (Danger, mortal danger and dangerous)

Results

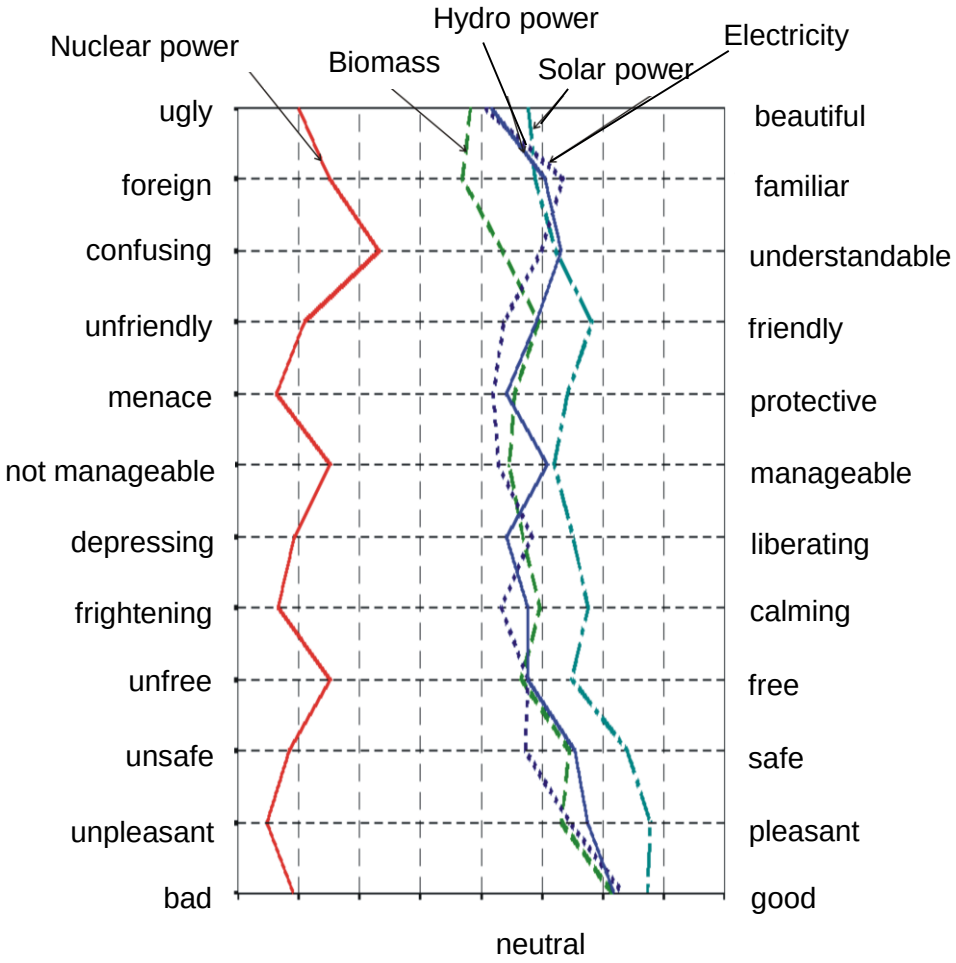
Associations with the term **nuclear power**:

- 61 % ***danger*** *(Disaster, radiation, diseases)*
- 6,3% ***rejection*** *(no, bad, unnecessary)*
- 12,2% ***positive aspects*** *(clean, climate protection, future)*
- 12,9% ***power generation and infrastructure*** *(power plants, reactor, nuclear power)*
- 7,7 % ***economic aspects*** *(cheap energy, jobs)*

Associations with the term **green power**:

- 35 % ***positive aspects*** *(eco-friendly, clean, environment, health)*
- 39 % ***different means of production*** *(hydropower, wind power, solar power)*
- 14 % ***economic aspects*** *(expensive, subsidies, cost)*
- 11 % ***skepticism*** *(not so efficient, eco-scam, propaganda)*

Perception of different terms

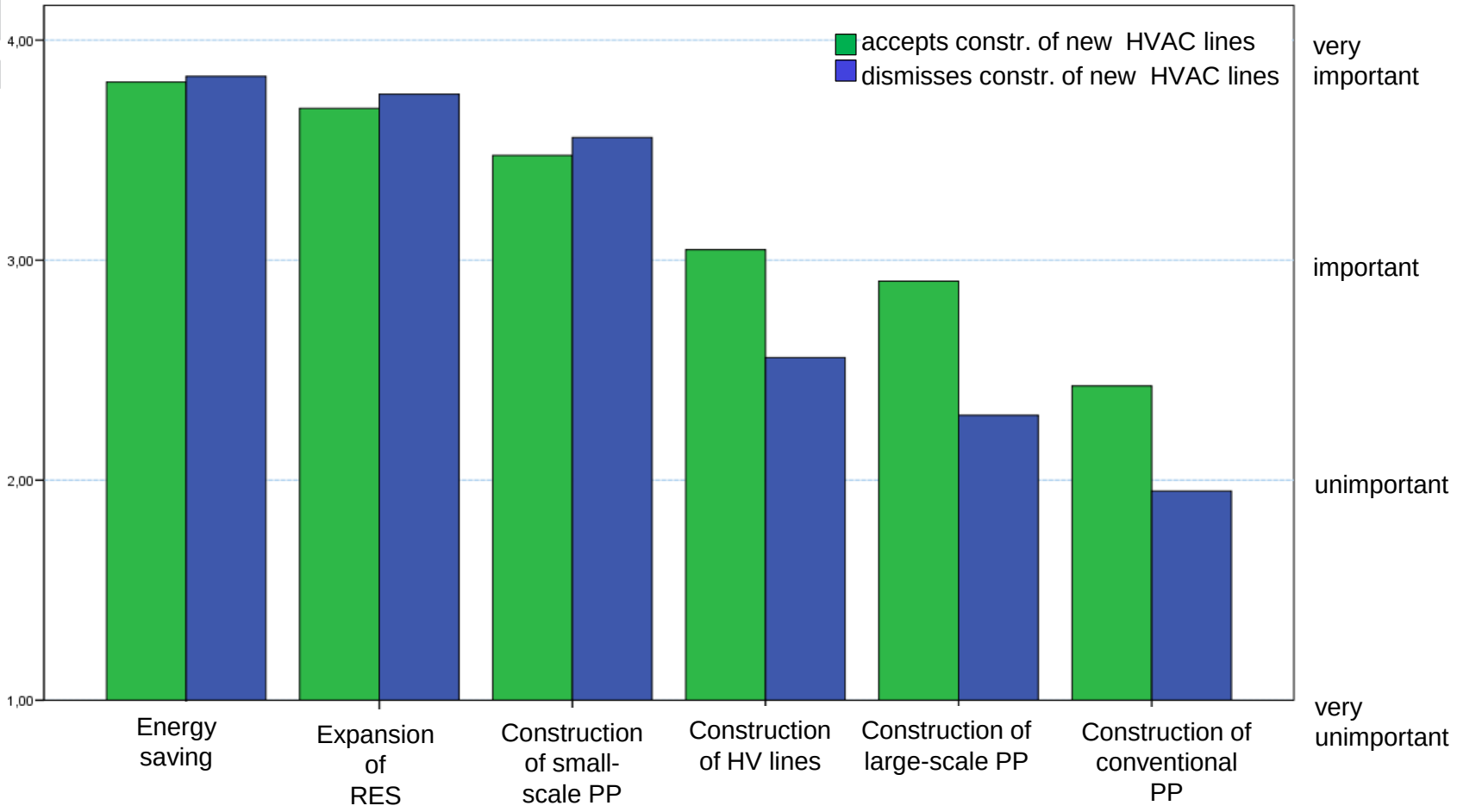


Survey by Mayer (2007) (N=95)

Justifications: importance of a secure power supply

…for the Austrian economy	… for their own family
30% economic infrastructure (production, industry, machinery)	**33 % quality of Life** (luxury, comfort, standard of living)
28% standard of living (quality of life, progress, health)	**25 % daily life** (household, medical care, work)
27% work (Work, economic growth, job security)	**16% space heating and hot water supply**
9% Dependence / electricity is essential (dependence, standstill)	**15% light** (Light, Lighting)
6% financial aspects (money, expenses, losses)	**11% cooking** (cook, stove, food)

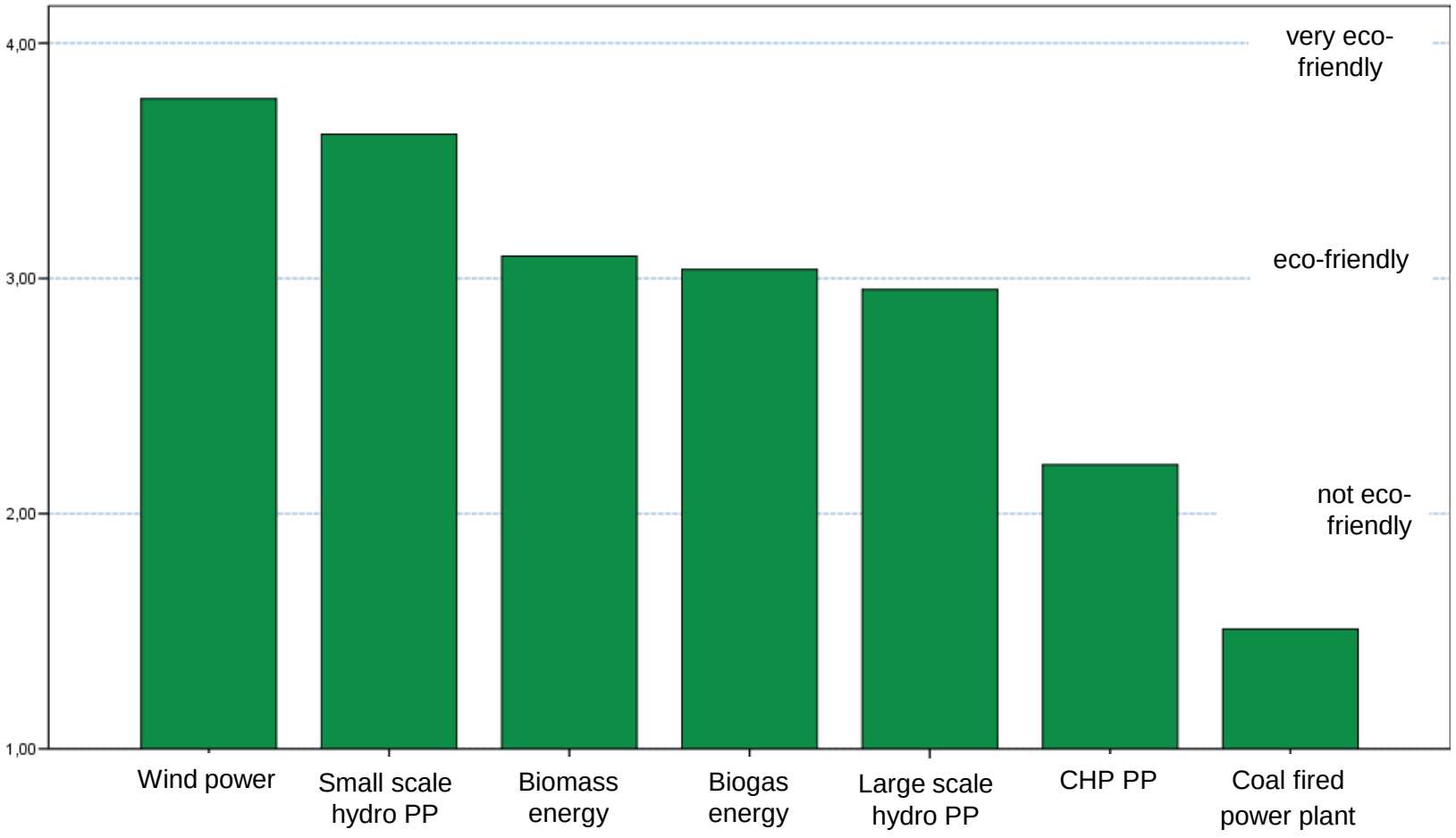
Measures to achieve a secure power supply



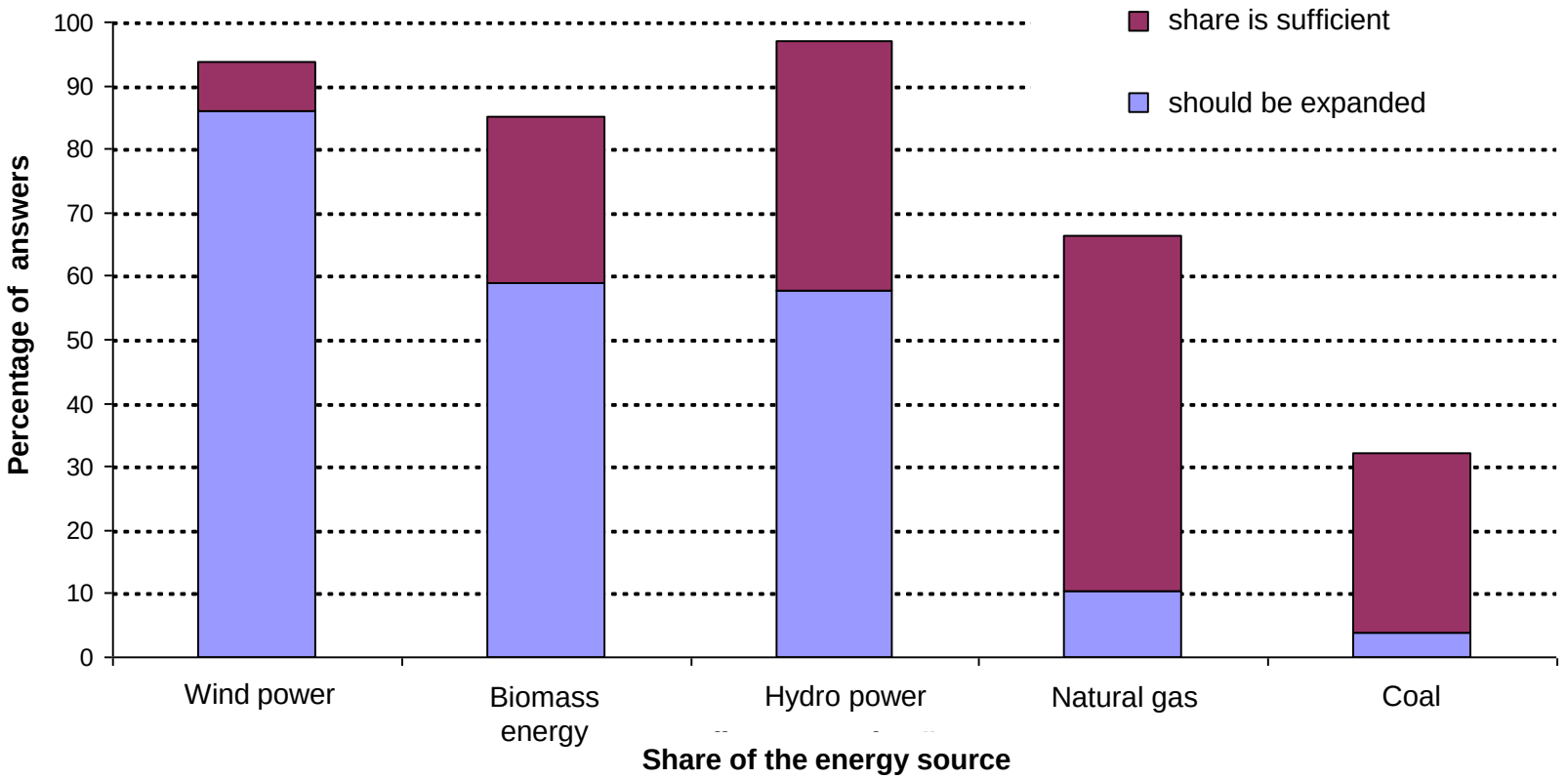
Associations with the term power plant

- 63% ***power (generation) industry***
  (i.e. hydro power plant, power generation)
- 14% ***concerns regarding the environment***
  (i.e. destruction of natural habitats, harmful to the environment)
- 8% ***economic issues***
  (i.e. progress, welfare, jobs)
- 6% ***positive term***
  (i.e. destination of interest, secure supply)

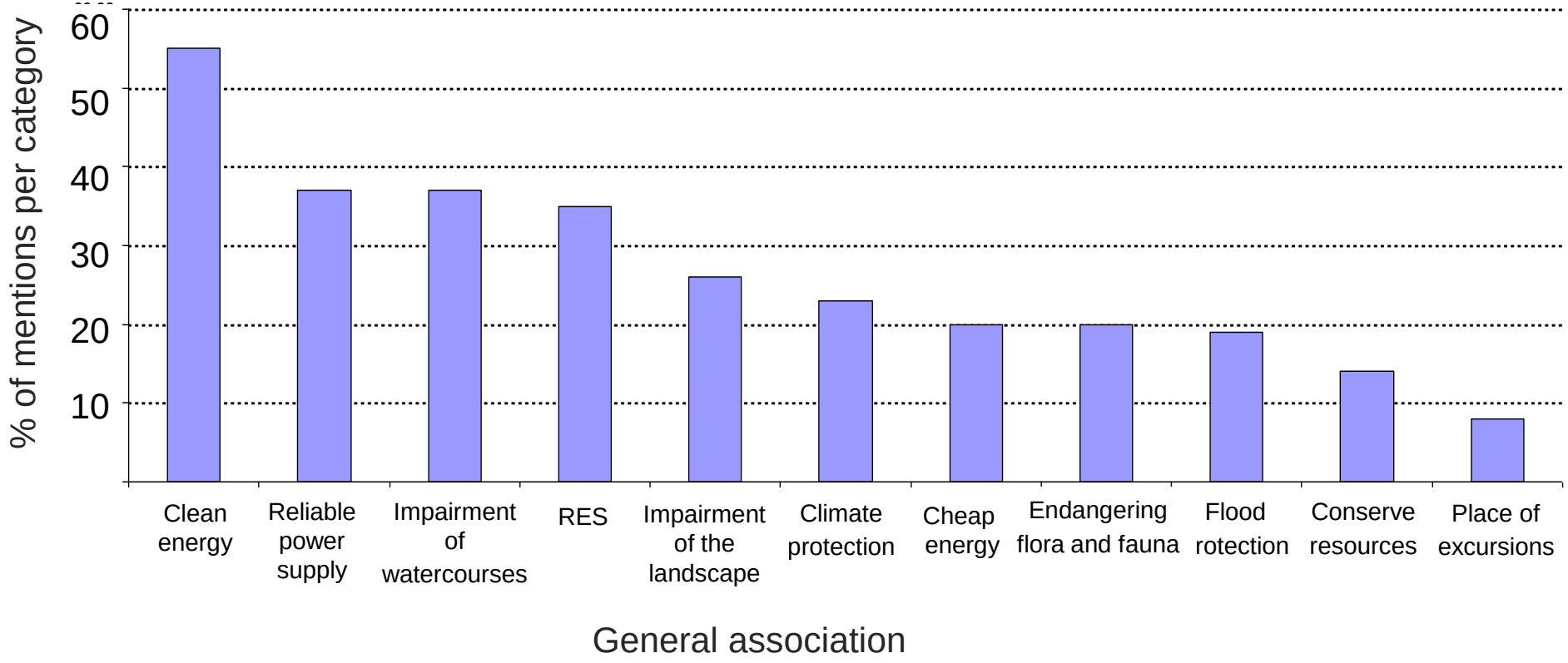
Eco-friendliness of different types of production



Future energy mix according to respondents

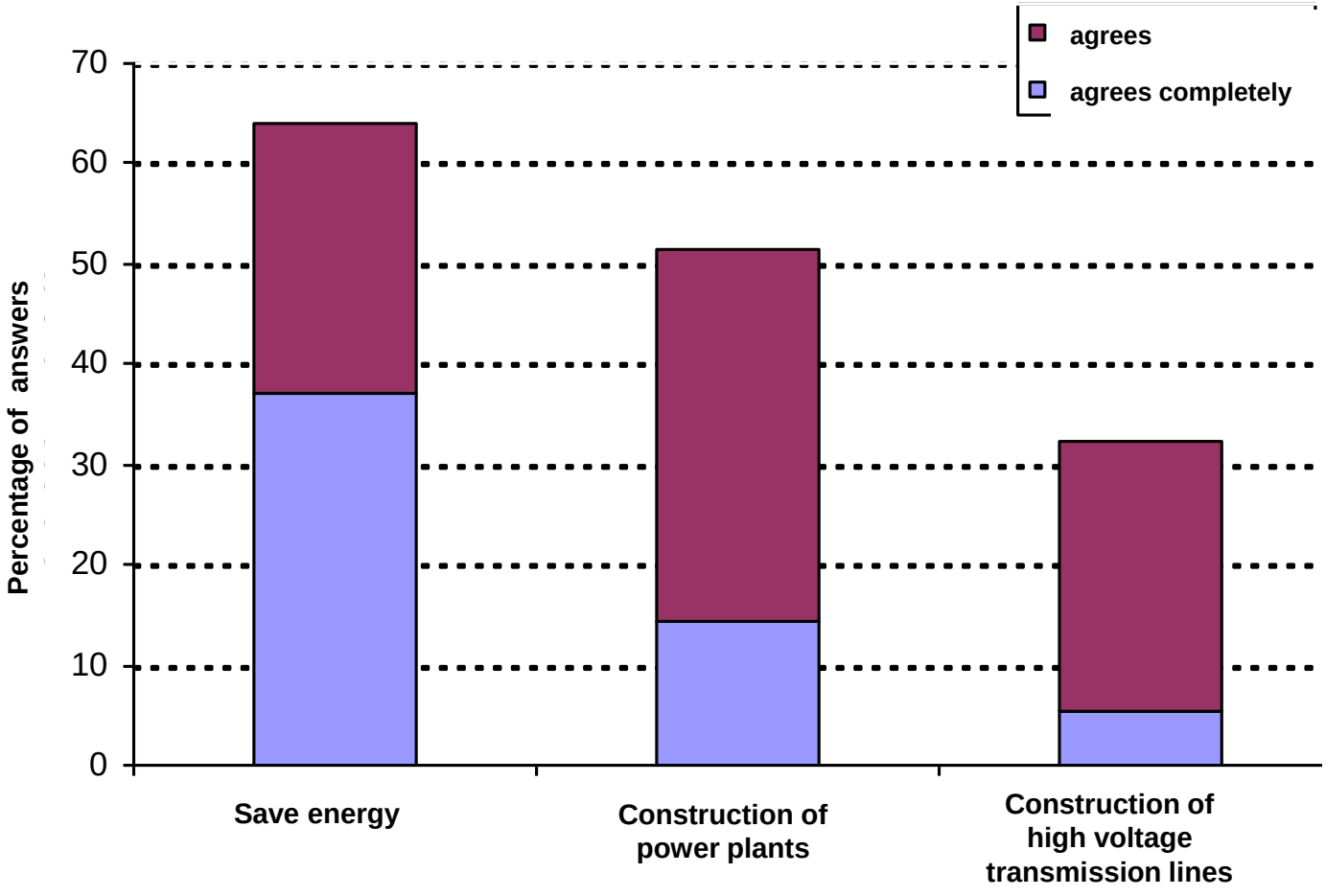


Concerns about the construction of new hydro power plants in the home town of participants

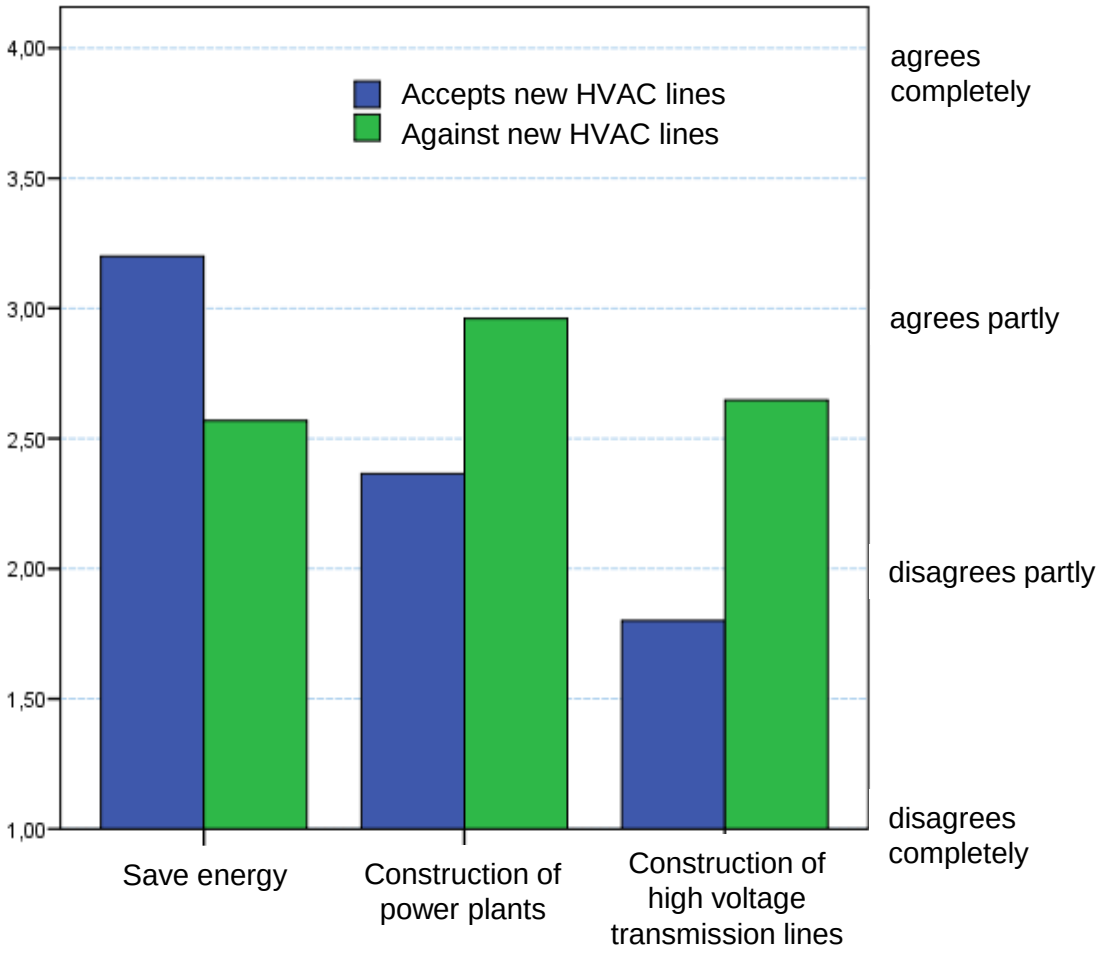


Infrastructure engineering in the home town

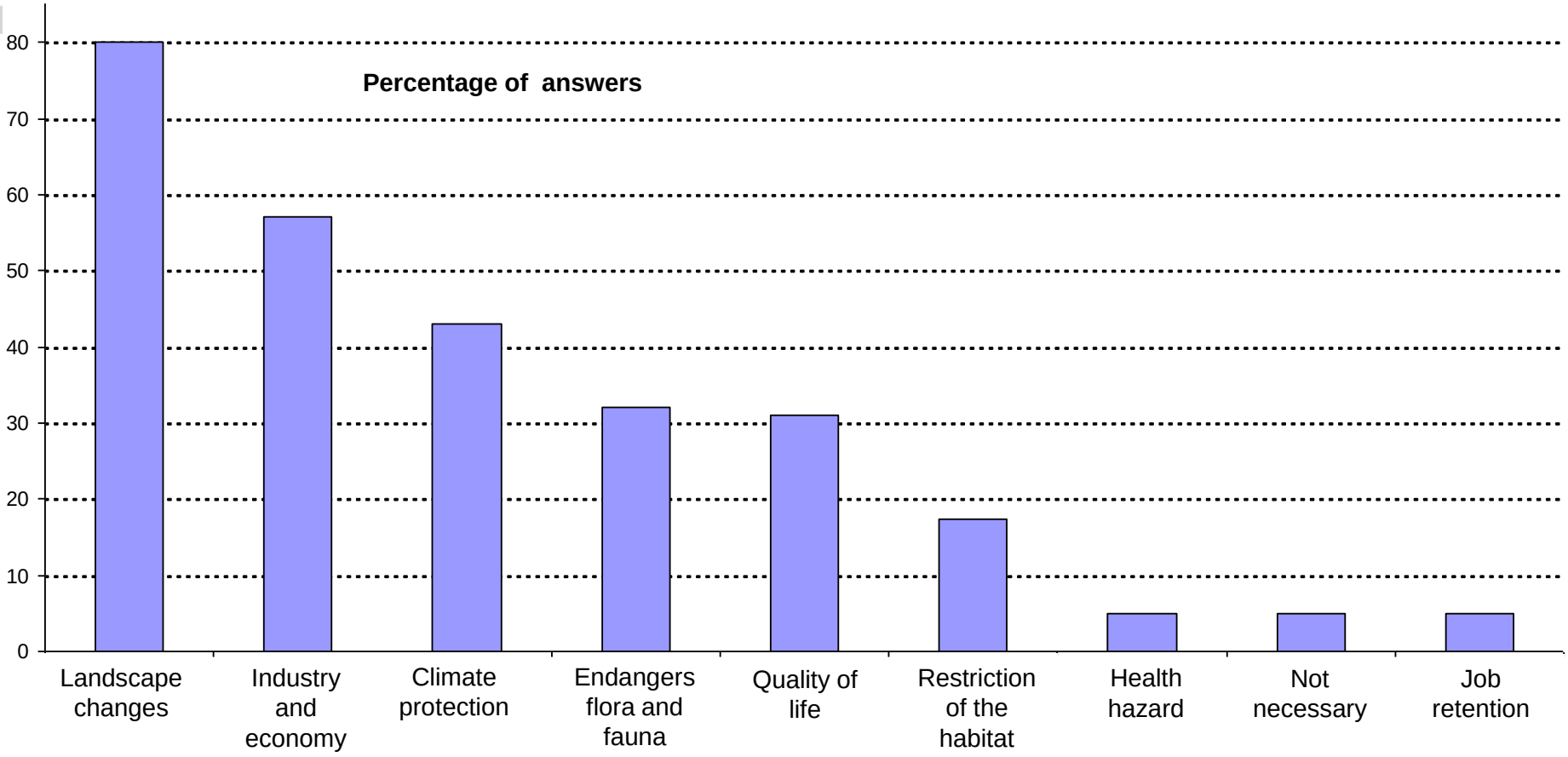
In order to maintain security of electricity supply, which measures should be taken in your home town?



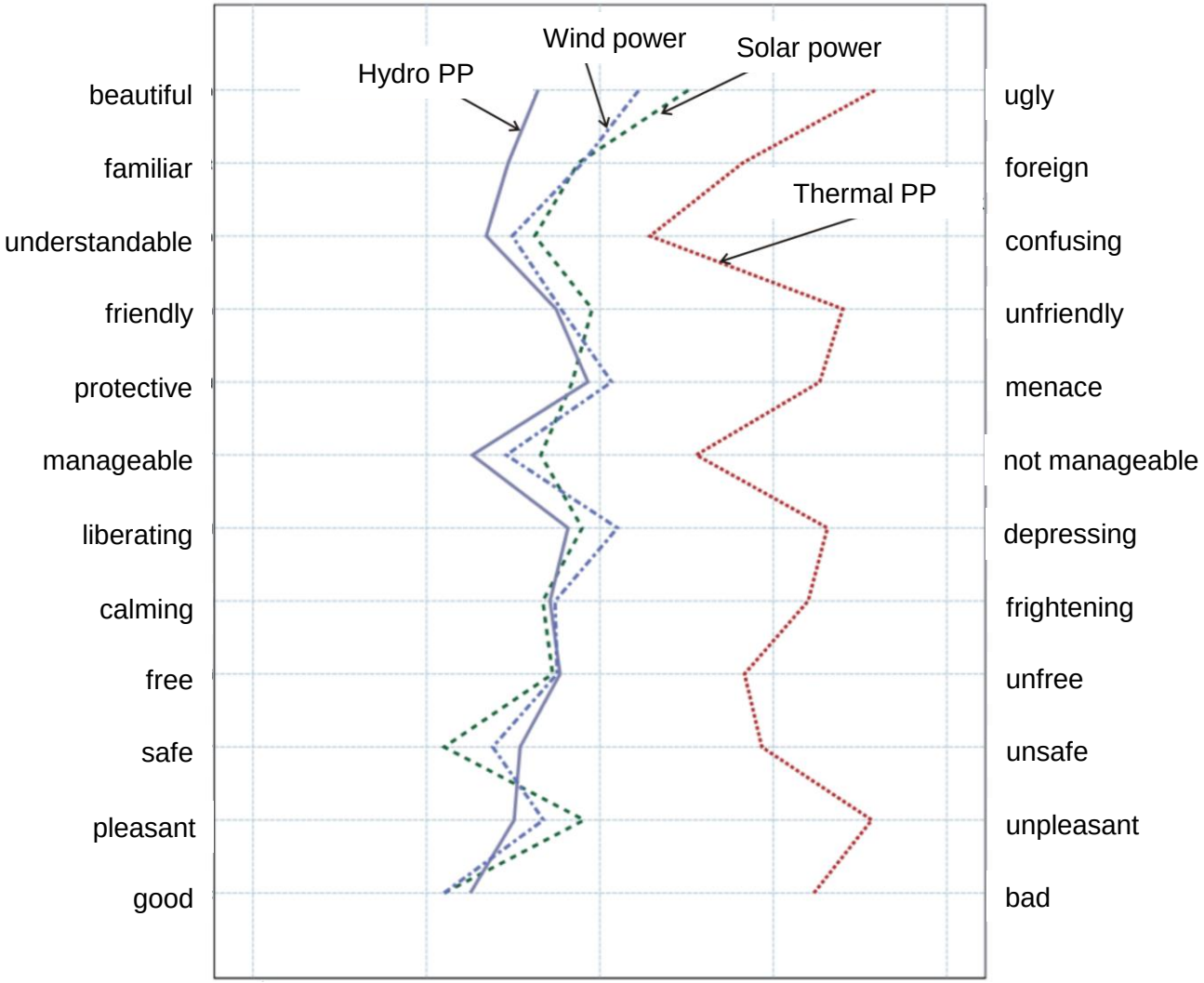
Differences in acceptance of transmission line construction in home town



Concerns about the construction of new PP in home town



Perception of power plants



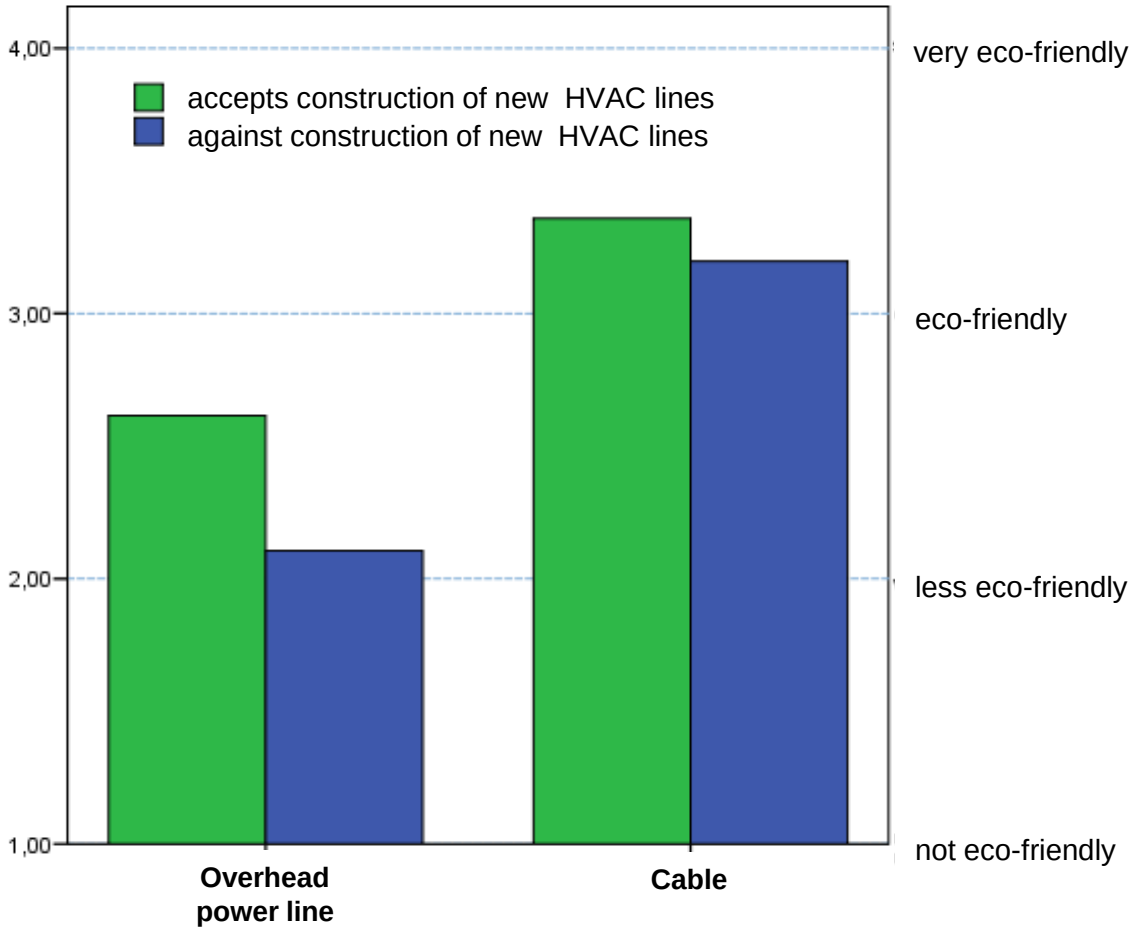
Transmission lines

Associations with the term *“electric power lines”*

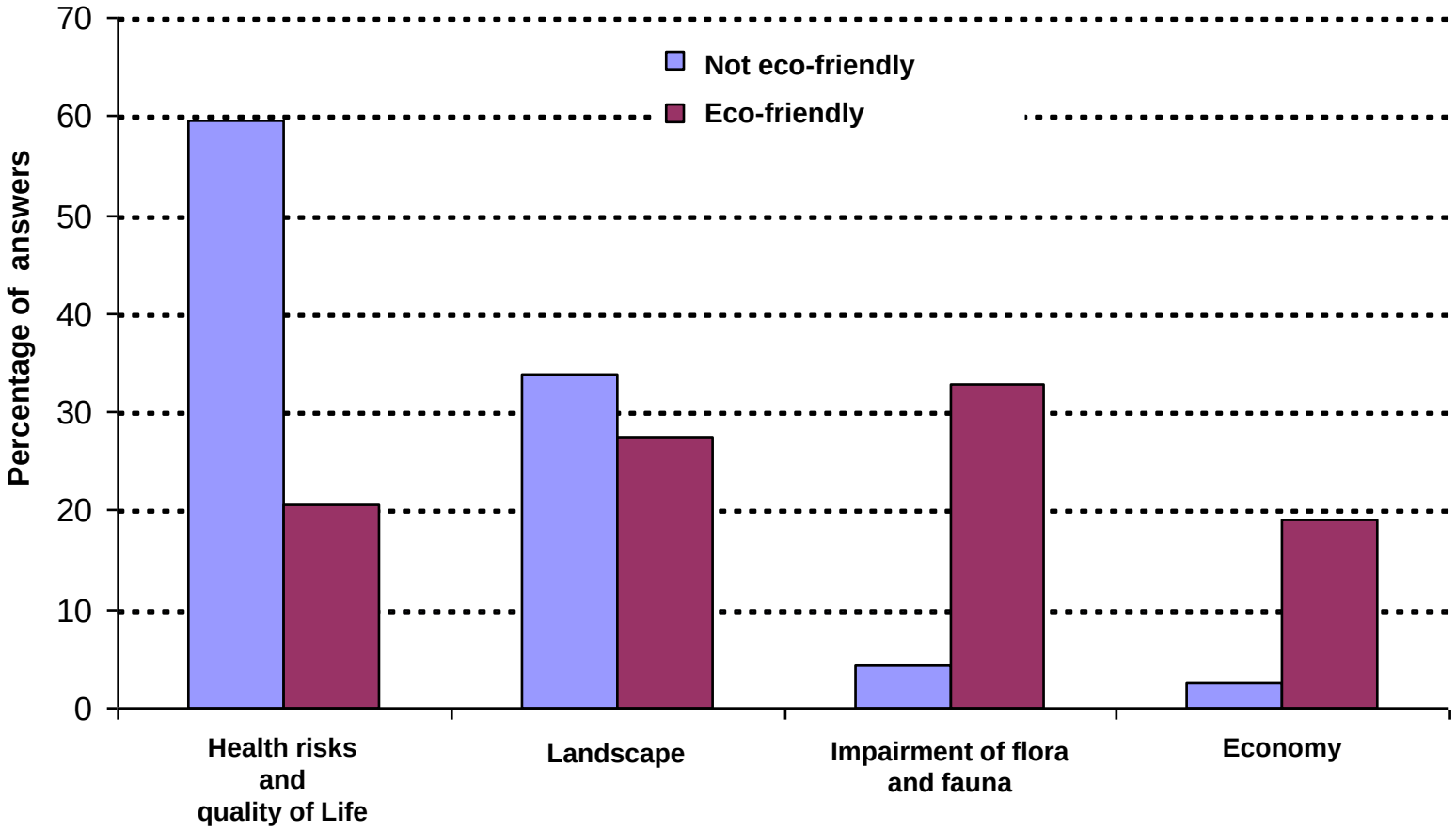
- 40% ***danger***
  (i.e. health, quality of life)
- 26% ***alteration of the landscape***
  *(*i.e. *does not look good, landscape defacement)*
- 17% ***electricity industry related topics***
  (i.e. important for economic, security of supply)
- 13% ***technical terms***
  *(*i.e. *masts, electricity, high voltage, steel)*
- 4% ***underground cables instead of overhead lines***
  *(*i.e. *Erdkabel, alle Leitungen unterirdisch verlegen)*

63 % see the purpose of a power line construction in securing the power supply for all Austrians

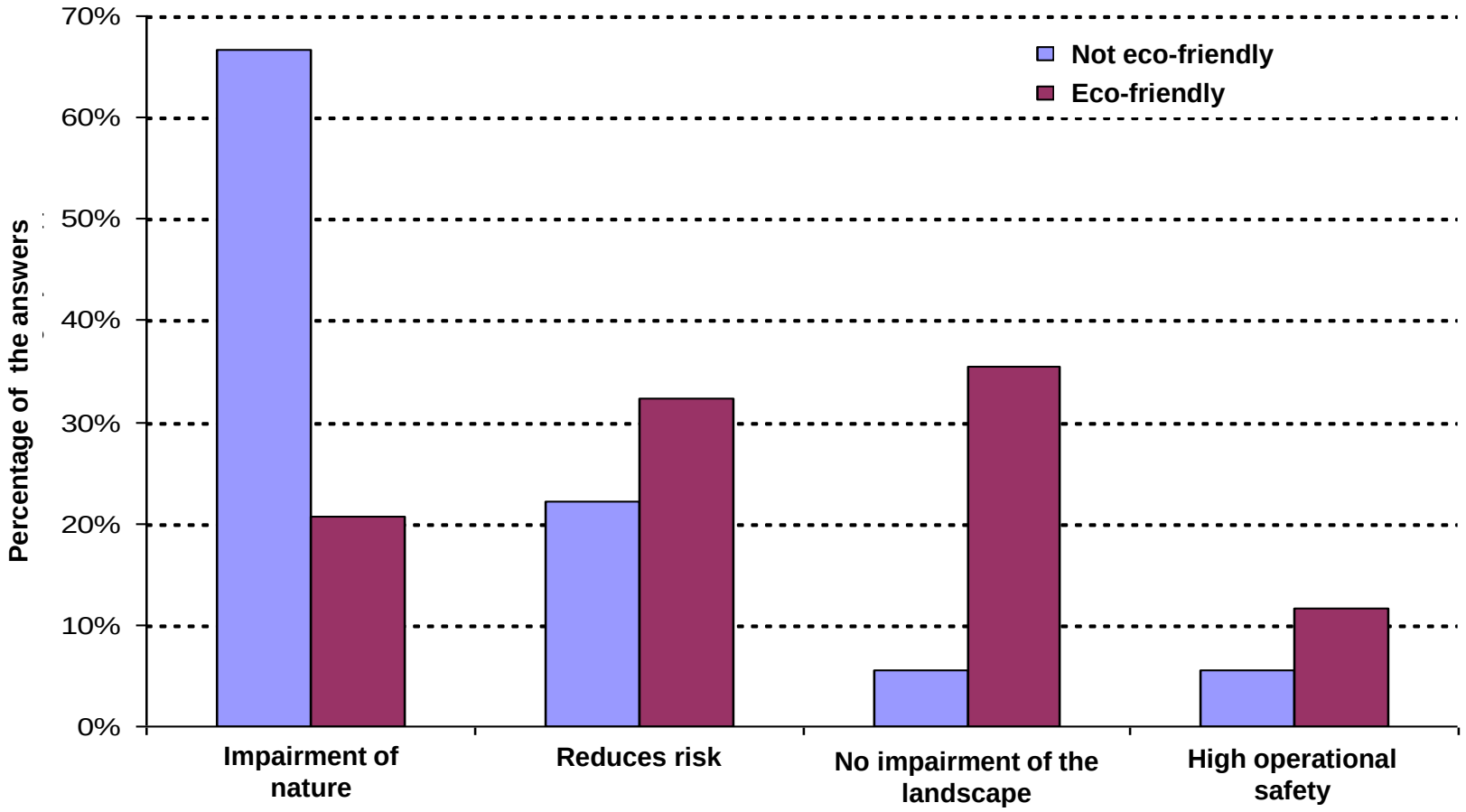
Transmission line construction: Underground cables vs. overhead lines



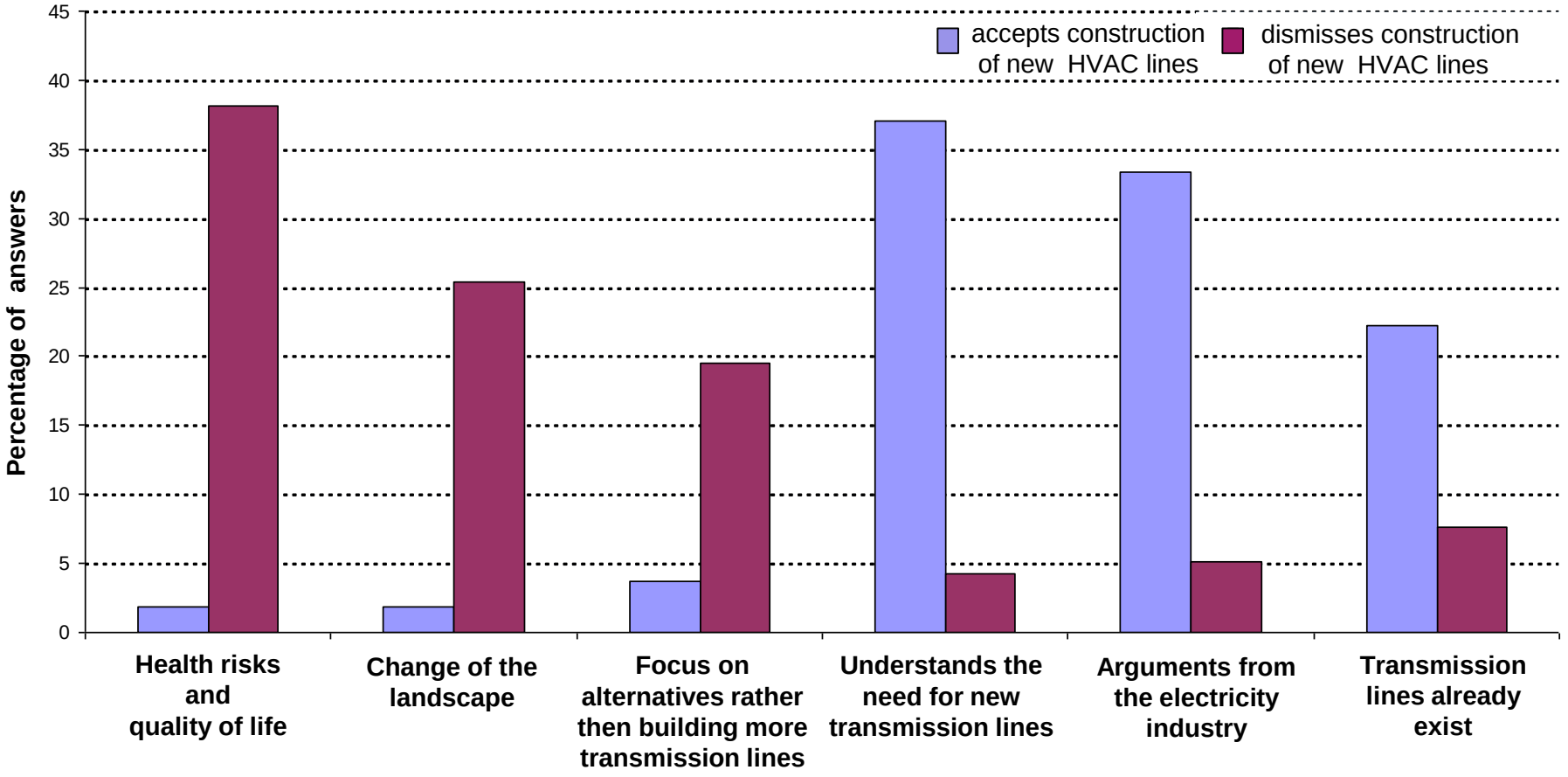
Justifying the reaction to overhead lines



Justifying the reaction to underground lines



Thoughts about the construction of new transmission lines in their home town



Conclusions

Personal view on electricity

- Nuclear power = danger
- Green energy = good (approx. 80% are for RES expansion)

Security of supply is important (family and economy)

- Actions (energy saving, power plant construction and transmission line construction)

Power plants based on RES

- Environmentally friendly PP should be built

Overhead power lines

- Dangerous (health) and deface the landscape

Power cable re-considered to be environmentally friendly

- Landscape is preserved and less dangerous

Conflicts associated with the construction of infrastructure

Motivation and key questions

- Secure power supply is important for industry
- Infrastructure projects of the electricity industry face local resistance
  - Sector plans and builds infrastructure projects worth €11bn
  - Problems caused by a missing framework for infrastructure projects
    - ⇒ Demand to speed up the authorization process
    - ⇒ Environmental impact assessment can take years
- Challenges are not of a technical nature
  - i.e. Project „Steiermarkleitung“ (authorization process took 22 years) or
  - „CCPP-Klagenfurt“

Analysis of conflicts

Different views collide

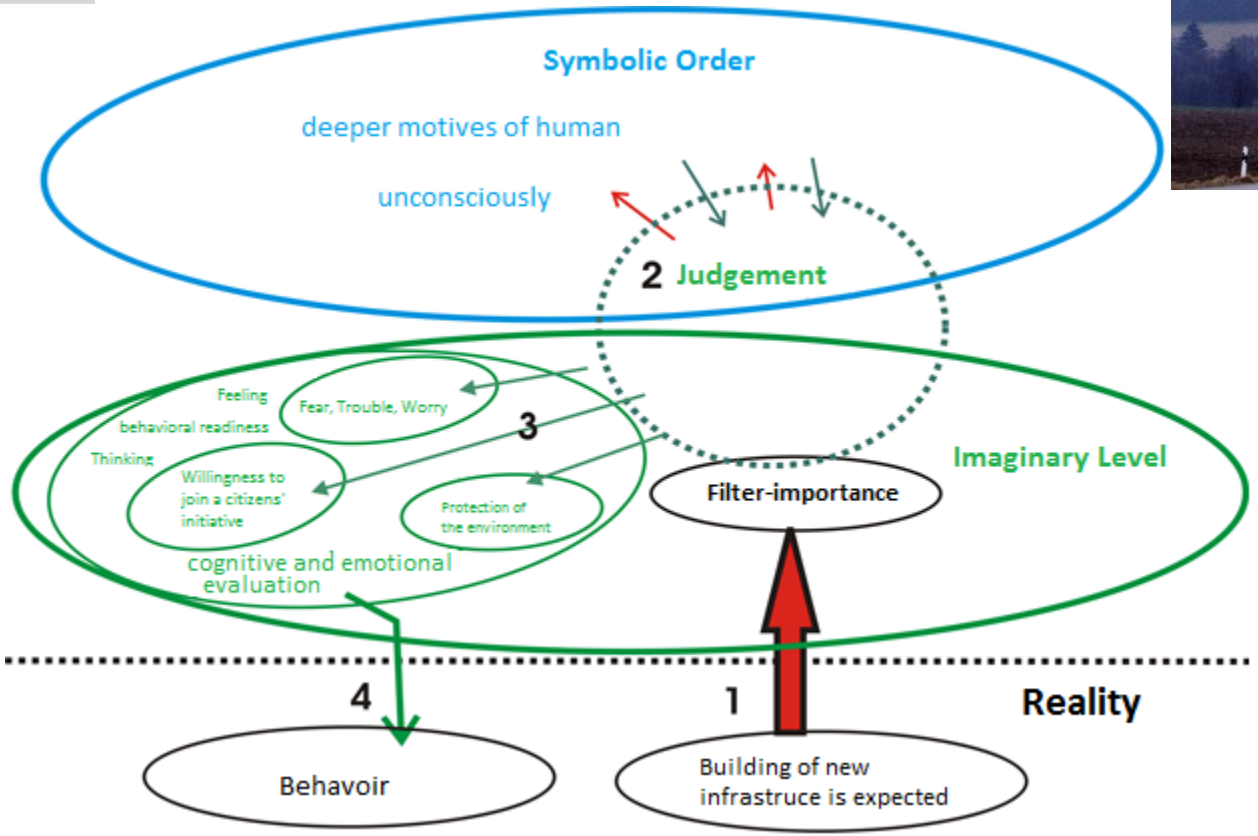
- Ecology and economy
- Not only cost-benefit aspects relevant
- Ethical and moral dimension (distributive justice)

Analysis of problems from a human perspective

Method:

- Development of a human model (include personal motives)
- Distinguish between different participants (stakeholders)
- Analysis of ongoing conflicts (i.e. „Steiermarkleitung“)
- Assortment of analytical material (reports, participant observation, newspaper articles, television reports, interview, etc.)
- Qualitative and quantitative analytical method

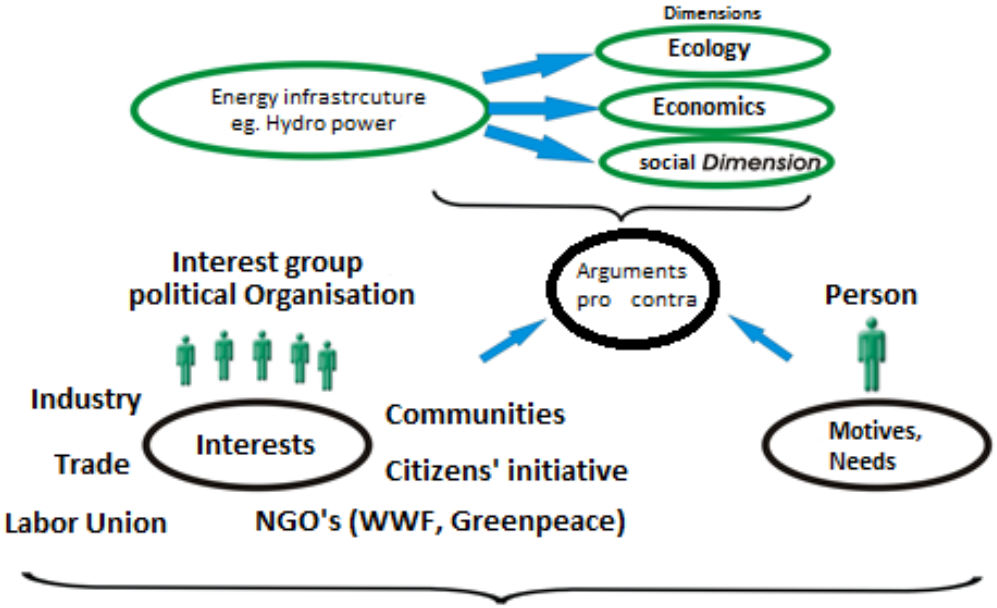
Human dimension of conflicts



Analysed objects

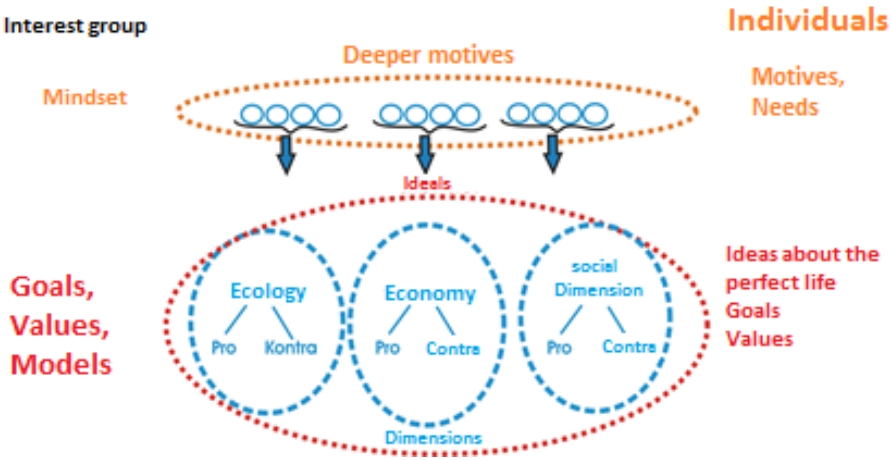
Analysed projects	Type	Citizens' initiatives
Transmission lines		
Steiermarkleitung	High-voltage transmission line (380 kV)	18 citizens' initiatives
Salzburgleitung	High-voltage transmission line (380 kV)	1 citizens' initiative (BIG – Burgkirchen)
Hydropower		
Raneburg	Pumped storage power plant	1 citizens' initiative
Koppentraun	Small scale hydro power plant	1 citizens' initiative
Schwarze Sulm	Small scale hydro power plant	Working groups were founded
Other projects (HPP Telfs, HPP Gössendorf and Kalsdorf, etc.)	Hydro power plants	
CHP plants		
CCPP Klagenfurt	Thermal power plant	10 citizens' initiatives

Overview



Analysis document

Results of the analysis from each infrastructure project



Needs and ideals

Needs	Ideal conception
Existence conservation	Health Clean nature as a solid base for healthy life (biodiversity, climate protection, landscape conservation, nature protection)
Social needs	Belonging to a group Recognition, respect and appreciation
Security needs	Secure source of income (work) Identity (home) Human need to be able to predict the future
Justice needs	Conservation of nature for future generations
Need for an aesthetic environment, landscape and nature	Quality of life, well-being, beautiful landscape

Attitude of interest groups

People in favour of construction

- ✓ Security of supply and reducing dependence on imports
- ✓ Hydropower as an economic resource of the country, benefit for all people
- ✓ Economic future of the region (attracting new businesses, prosperity, jobs)
- ✓ Long-term supply of electricity and heat
- ✓ Protecting the environment (e.g. reduction of individual domestic heating, efficiency of the power plants), contribution to climate protection by the use of hydropower

People against construction

- ✗ Preventing a meaningful energy transition (decentralized, RES)
- ✗ Danger to the health of those affected and impaired quality of life
- ✗ Supporting the nuclear lobby (electricity import from Eastern Europe)
- ✗ No need for new power plants; if necessary construction only on existing sites
- ✗ CCPP contradicts the climate protection and leads to an increase in import dependence
- ✗ Destruction of ecosystems (rivers, forests, animals,…)

Attitude of people towards CCPP

- We have the damage and others the benefits

  Our quality of life is negatively affected, we loose jobs and the electricity industry makes profits by exporting electricity.

- Adverse human health effects and quality of life

  Health of local people is at risk because of the increased pollutant emissions.

- Landscape and property devaluation

  Landscape is destroyed and our houses and properties are devalued.

- Climate change and dependence on imports

  Natural gas as an energy source contradicts climate protection. Additionally, it needs to be imported from other countries.

- Renewable energy sources instead of natural gas

  Biomass grows locally, no import is necessary and it is not expensive.

- No need for additional power plants

  In Carinthia, we have enough hydroelectricity.

Needs and motives of people

Basic needs for life (health, clean environment)
Transmission lines are a threat for the health of our children and our future generations.
Protecting the environment and nature as our livelihood is important.

Social needs - need for attention and recognition
They ignore us and do not take us seriously.

Security needs, need for control/freedom, the pursuit of independence, autarchy

Secure source of income – *I live from tourism and a transmission lines threatens future tourism.*

Self-determination (freedom) – *The transmission line limits my choice of future residence.*

Loss of control – *I feel helpless.*

Need for security is violated *– Uncertainty about the impact of the transmission line.*

Identity – *Home town must not be changed.*

Need for justice
The others earn money with the transmission line (nuclear power transport) but the line is on our territory and we have only the damage!

Preference for natural elements
Transmission lines disturb the landscape (represents a danger) and nature.

Quality of life
Interferes with my well-being and my recreative time.

Hygiene factors

Consideration of social needs

- Respect, appreciation and recognition

Refrain from restricting personal freedom and the need to control the situation

- Lack of integration causes mistrust
- Involvement of local residents

Adequate compensation

- Avoiding inequities in compensation

Considering the fact that such large infrastructure projects affect residents substantially

- Survival interests (health, quality of life)

Design of information policy

Education!

- Competent information policy
- Irrational fears of infrastructure projects can be reduced

Information has to be trustworthy

- Prevention of the feeling that contents presented by the media are not correct or trustworthy, this creates mistrust

People are more sensitive to losses than to profits

- Negative news receive more attention
- Negative news are perceived as more trustworthy

Design of information policy

First answer to change: resistance

- Forward thinking is of high importance
- People should start to think about their own behaviour – most effective way to cause change
- Information design - avoiding fearful content (will cause a defensive position!)

Consider group dynamics

- Involve people in the process (i.e. mediation)

Thank you for your attention!

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