

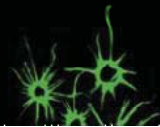


Regional Resource and Energy Management Policy

Dr. Maarten Arentsen Associate Professor Energy Policy
University of Twente
Institute for Governance Studies
CSTM



Graz July 2010



Who I am and where I come from



Expertise

·(Green) energy policies·Technology and innovation (policies) Deregulation of energy markets

Research Interests

·Evolutionary oriented institutional and technological change·Sustainable development in energy supply



UNIVERSITY OF TWENTE.

Program

- Lecture
 - The theme: (Regional) **energy innovation**
 - **Relevance of regions** as geographic entity for energy innovation
 - Resource management as **mode of coordination**
 - Effective resource **policy**

- Workshop
 - discussion



UNIVERSITY OF TWENTE.

Program

- Lecture
 - The theme: (Regional) **energy innovation**
 - Relevance of regions as geographic entity for energy innovation
 - Resource management as mode of coordination
 - Effective resource policy

- Workshop
 - discussion



UNIVERSITY OF TWENTE.

Innovation

Schumpeter: new products, new production processes (technologies), new markets, new organizations, and new inputs

Saviotti: Twin characteristic of technology:

Technical Service

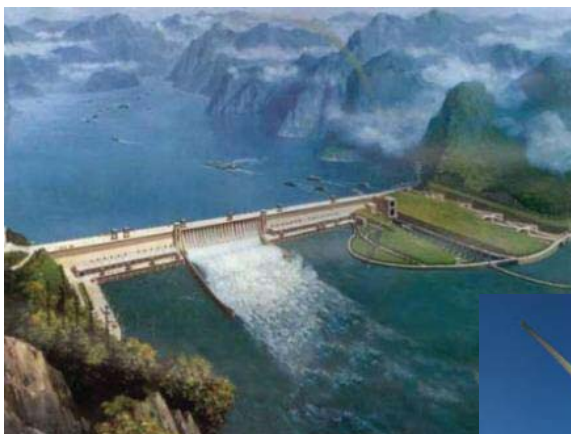
$$\begin{pmatrix} X_{i1} \\ X_{i2} \\ \cdot \\ \cdot \\ X_{in} \end{pmatrix} \quad \begin{pmatrix} Y_{i1} \\ Y_{i2} \\ \cdot \\ \cdot \\ Y_{in} \end{pmatrix}$$

- Incremental innovation: change of component
- Radical innovation: qualitative change internal structure



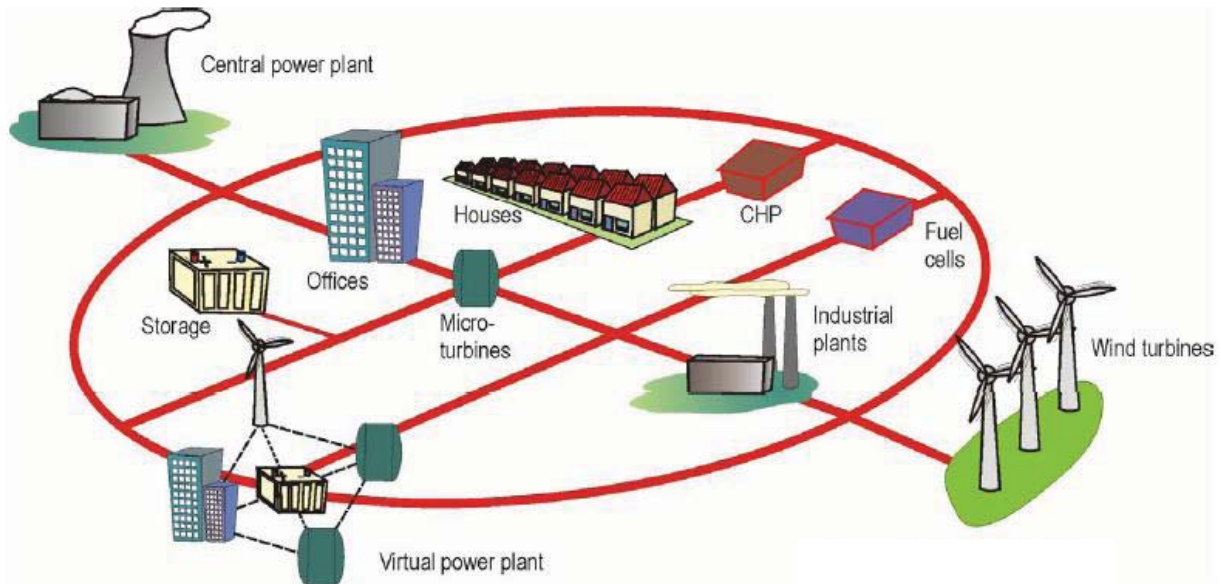
UNIVERSITY OF TWENTE.

Energy Innovation (1/3) Smart production heat, electricity



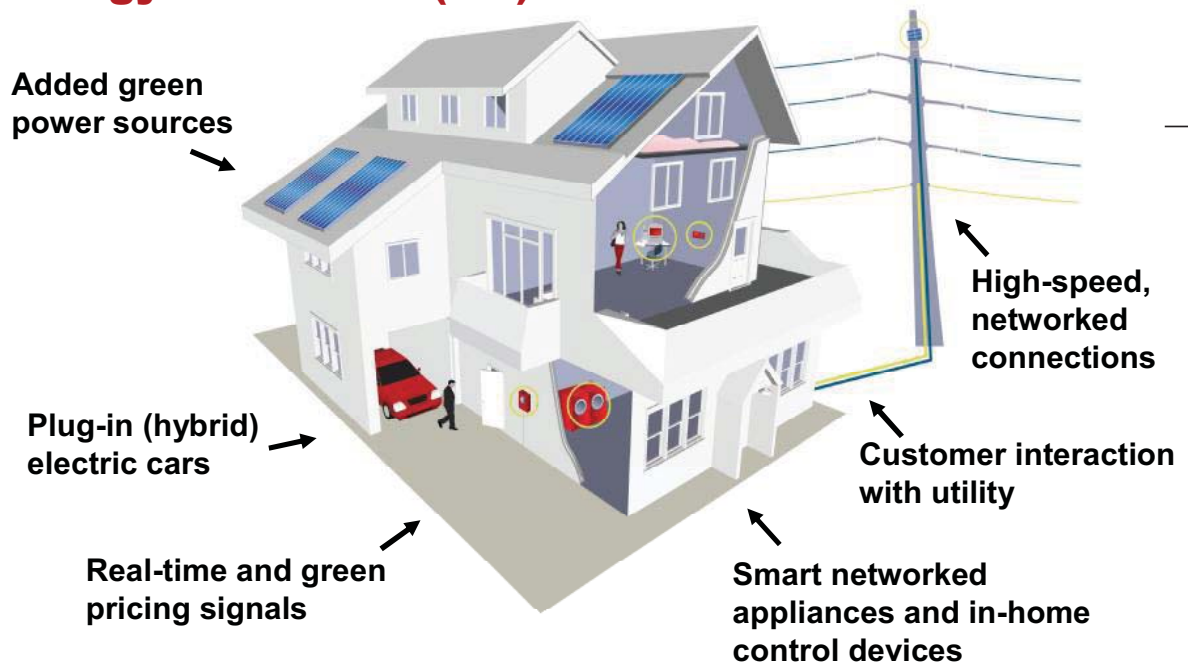
UNIVERSITY OF TWENTE.

Energy Innovation (2/3): The smart grid



UNIVERSITY OF TWENTE.

Energy Innovation (3/3) The smart house



UNIVERSITY OF TWENTE.

Energy Innovation

- Change of production, consumption and coordination of electricity and heat
- Affects technology, organisation and management of the system
- Huge challenge because of resilience dominant system



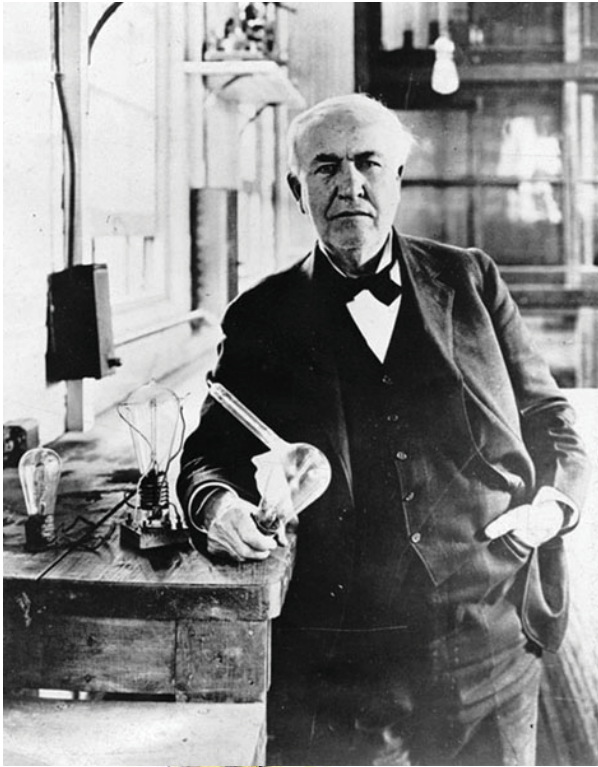
UNIVERSITY OF TWENTE.

Program

- **Lecture**
 - The theme: (Regional) energy innovation
 - **Relevance of regions** as geographic entity for energy innovation
 - Resource management as mode of coordination
 - Effective resource policy
- **Workshop**
 - discussion



UNIVERSITY OF TWENTE.



UNIVERSITY OF TWENTE.

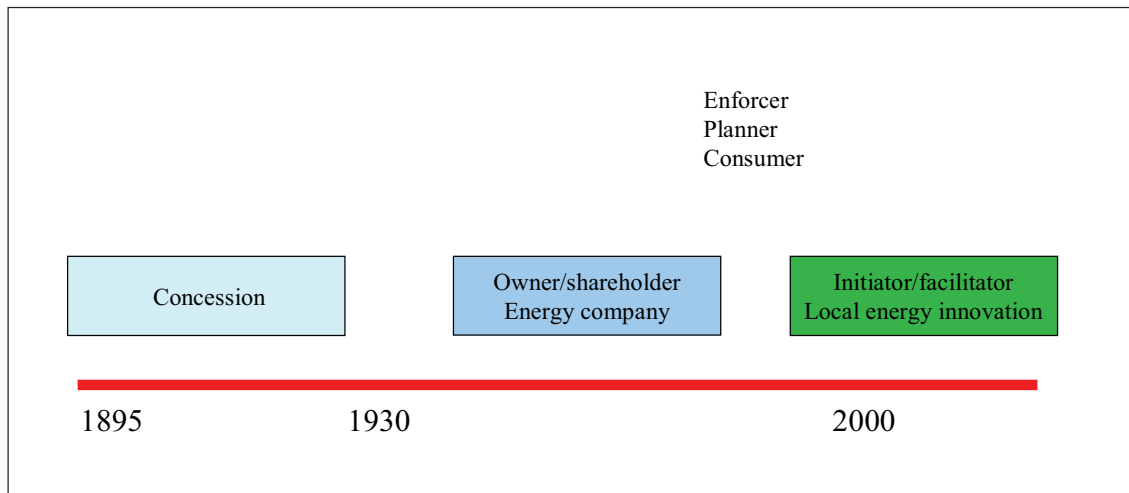
Central Station Electricity System Design principles

- Obtaining economies of scale with large generation units
- Generation units near load centers
- Transmitting electricity through high voltage lines
- Cultivating mass consumption by low and differentiated rates: supply creates demand
- Interconnection of plants to optimize on different characteristics (natural resources)
- Interconnection loads to optimize on diversity in demand
- Central coordination: technical and economical dispatch
- Lowering reserve capacity by power plant interconnections
- Accept governmental regulation to establish natural monopoly

(Hughes, 1983)

UNIVERSITY OF TWENTE.

Historical roots local engagement in energy



UNIVERSITY OF TWENTE.

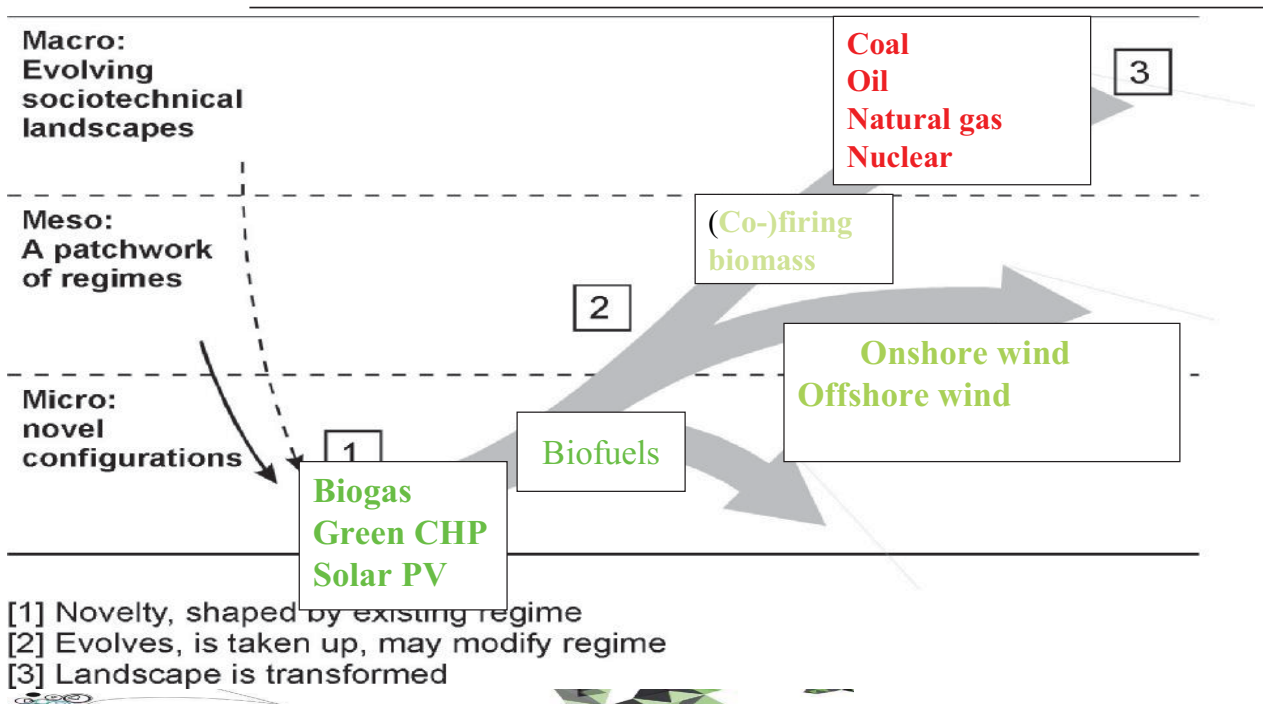
Evolution CSES: Example Netherlands

- 1880-1910: Local central station electricity systems
 - Predecessor of Distributed generation
- 1910-1949: National central station electricity system
- 1949-1995: Consolidation and optimization of the system
- 1995-2005: Liberalization and Upheaval
- 2005-.....: Hybridization of the system
 - CSES European scale
 - Distributed generation: local / regional scale

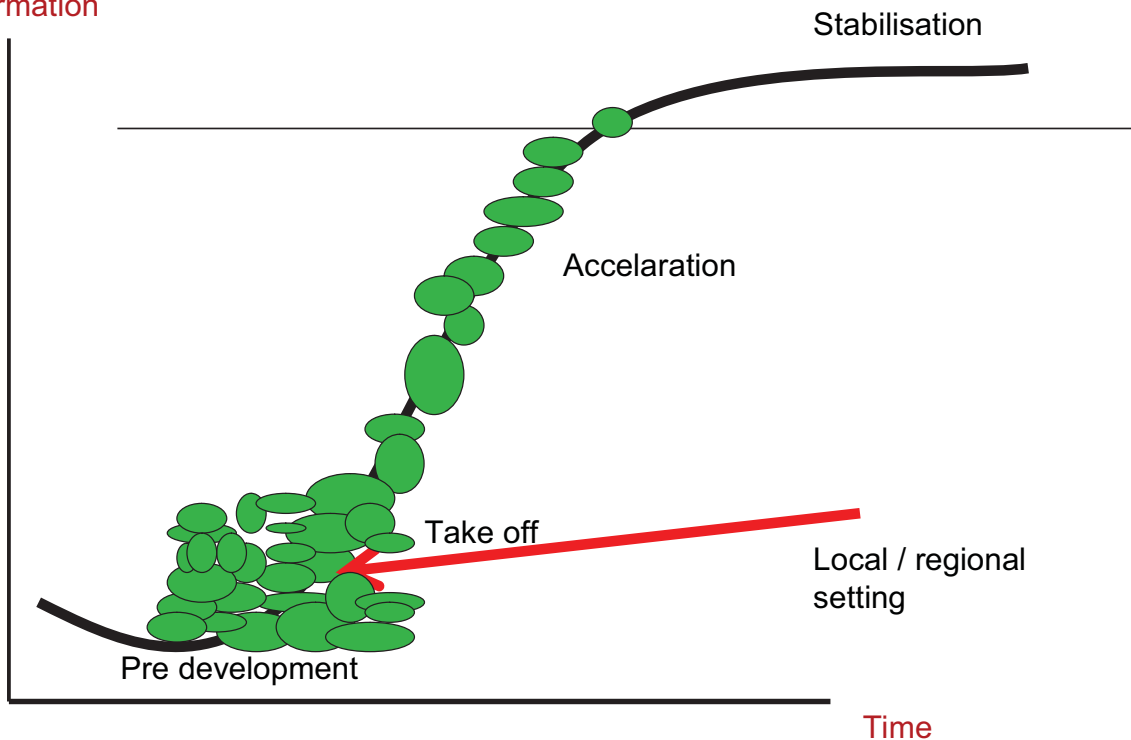


UNIVERSITY OF TWENTE.

A general Pattern of Socio-Technical Change and relevance of region



Transformation



Relevance of regions as geographic entity for energy innovation

- Region is:
- where the innovation is tested and experimented
- Where market introduction of innovation starts
- Where the implementation of innovation starts
- Where energy innovation starts through the implementation of individual projects
- Where the alignment of projects can push energy innovation
- Where energy innovation adds up to an energy transition



UNIVERSITY OF TWENTE.



Program

- **Lecture**
 - The theme: (Regional) energy innovation
 - Relevance of regions as geographic entity for energy innovation
 - Resource management as **mode of coordination**
 - Effective resource policy
- **Workshop**
 - discussion



UNIVERSITY OF TWENTE.

Management of regional resources

- Not a top-down activity or hierarchically dominated process
- Multitude of actors involved with diverged interests, knowledge and expertise
 - Industry, government, science&technology, civic society
- Diversity of knowledge, interests and expertise is important and needed
- What is the best way to coordinate the diversity for effective energy innovation?



UNIVERSITY OF TWENTE.

Mode of coordination

- Institutional approach of Elinor Ostrom (Nobel Prize winner 2010)
- Core message:

There is a solution other than bringing the commons under a central authority. This requires three functions:

 - Communication: there should be communication to discuss the problem
 - Rules to coordinate ways of self-governance (monitoring and control very important) Use rules
 - Some kind of supervising governance body, governance of use rules



UNIVERSITY OF TWENTE.

Management of regional resources: Management of Common Pool Resource



“Each man is locked into a system that compels him to increase his herd without limit – in a world that is limited.

Ruin is the destination towards which all men rush, each pursuing his own interest in a society that believes in the freedom of the commons”

(Hardin, 1968, p. 1244)



UNIVERSITY OF TWENTE.

Common Pool Resource

		Accessibility	
		Excludable	Non-excludable
Use	Rival	Private good	Common Pool Resource
	Non-rival	Club goods	Collective (public) good



UNIVERSITY OF TWENTE.

Typical Common Pool Resources

- Irrigation systems,
- fishery grounds,
- Forestry
- Water basins
- River basins
- New Renewable Energy Infrastructures



UNIVERSITY OF TWENTE.

Ostrom's position

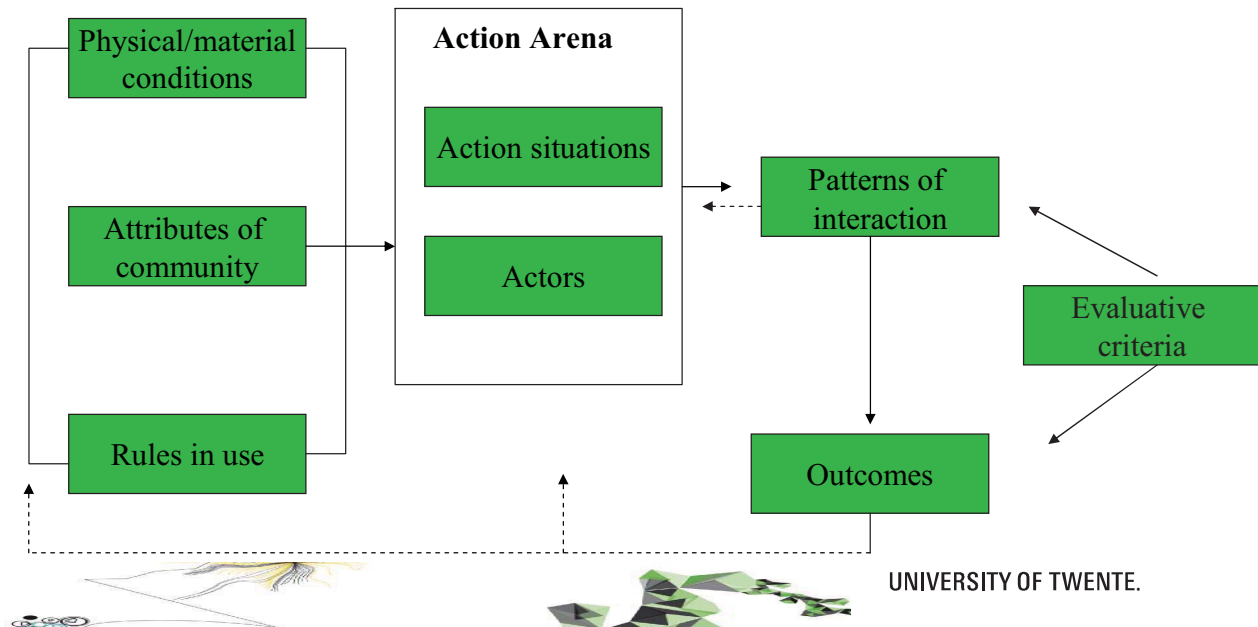
- “Instead of presuming that the individuals sharing a commons are inevitably caught in a trap from which they cannot escape, I argue that the capacity of individuals to extricate themselves from various types of dilemma situations *varies* from situation to situation.”

- What are the institutional conditions for a sustainable governance of a common pool resource?



UNIVERSITY OF TWENTE.

Ostrom's IAD Framework

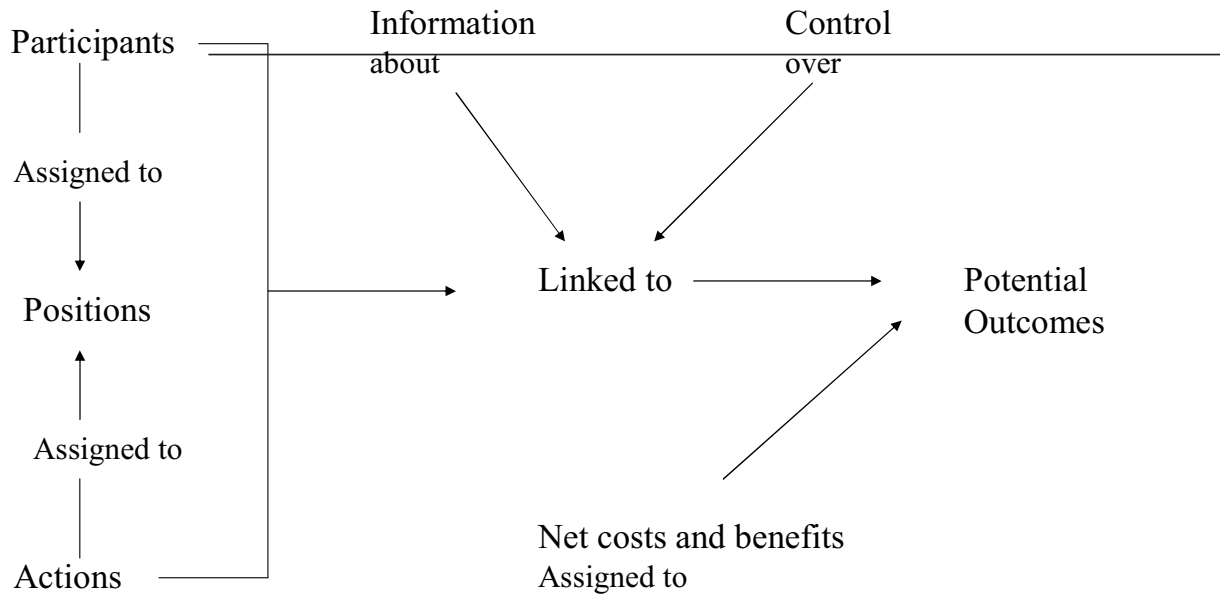


Action arena

- Social sphere where individuals interact
 - Exchange goods and services, solve problems, implement policy, dominate one another, etc.
- Used to analyse, explain and predict behavior within institutional settings
- Composed of
 - Action situation
 - Actors



Internal structure of an action arena



UNIVERSITY OF TWENTE.

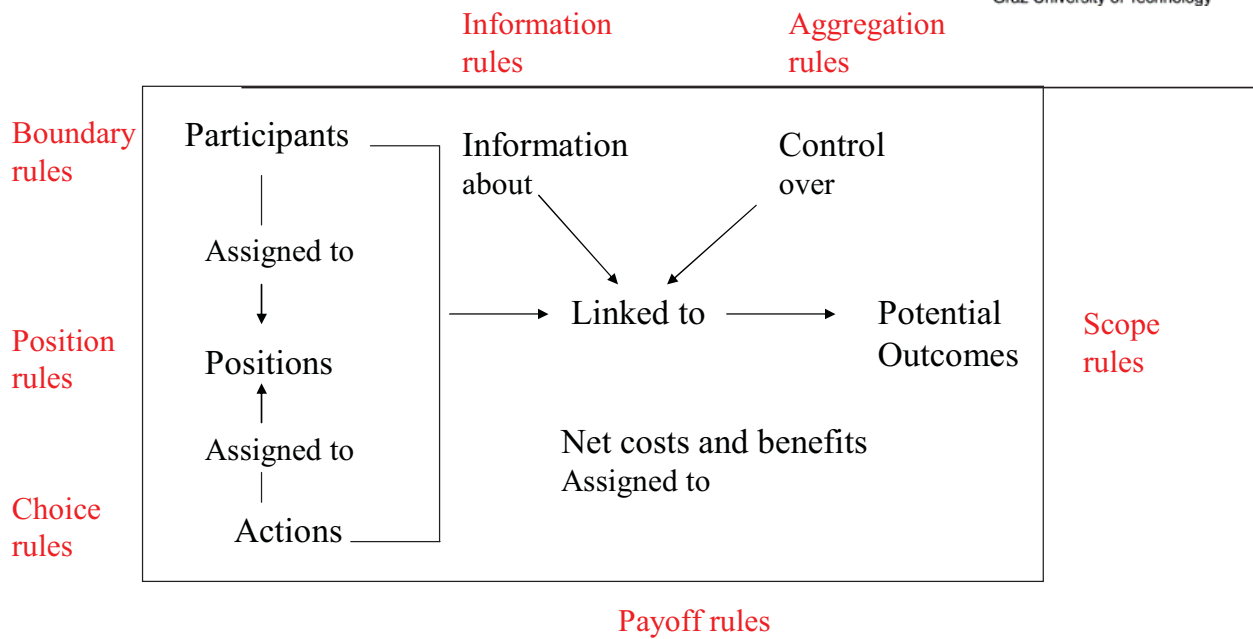
Seven rule types

- Boundary rule: who participates
- Position rule: establish positions
- Authority rule: actions assigned to positions and participants
- Scope rule: potential outcomes that can be delimited
- Aggregation rule: level of control exercised in a position
- Information rule: information processing and how its influences knowledge-contingencies
- Payoff rule: division of costs and benefits of outcomes



UNIVERSITY OF TWENTE.

Rules affecting elements of an action situation



UNIVERSITY OF TWENTE.

Relevance rule-based institutional framework

- Analysis and comparison of local arenas of energy innovation
- Analysis of evolutionary change and development local energy innovation arena
- Tracing entrance points for policy intervention



UNIVERSITY OF TWENTE.

Program

▪ Lecture

- The theme: (Regional) energy innovation
- Relevance of regions as geographic entity for energy innovation
- Resource management as mode of coordination
- Effective resource **policy**

▪ Workshop

- discussion



UNIVERSITY OF TWENTE.

Local energy innovation

- Conceived as a change of rules
- (local action arena for energy supply)
- Redefining the local energy action arena
 - Redefining set of rules
- Redefining local alliances, activities and interactions
 - Redefining content of rules
- Redefining outcomes
 - Redefining types of energy options/solutions/techniques



UNIVERSITY OF TWENTE.

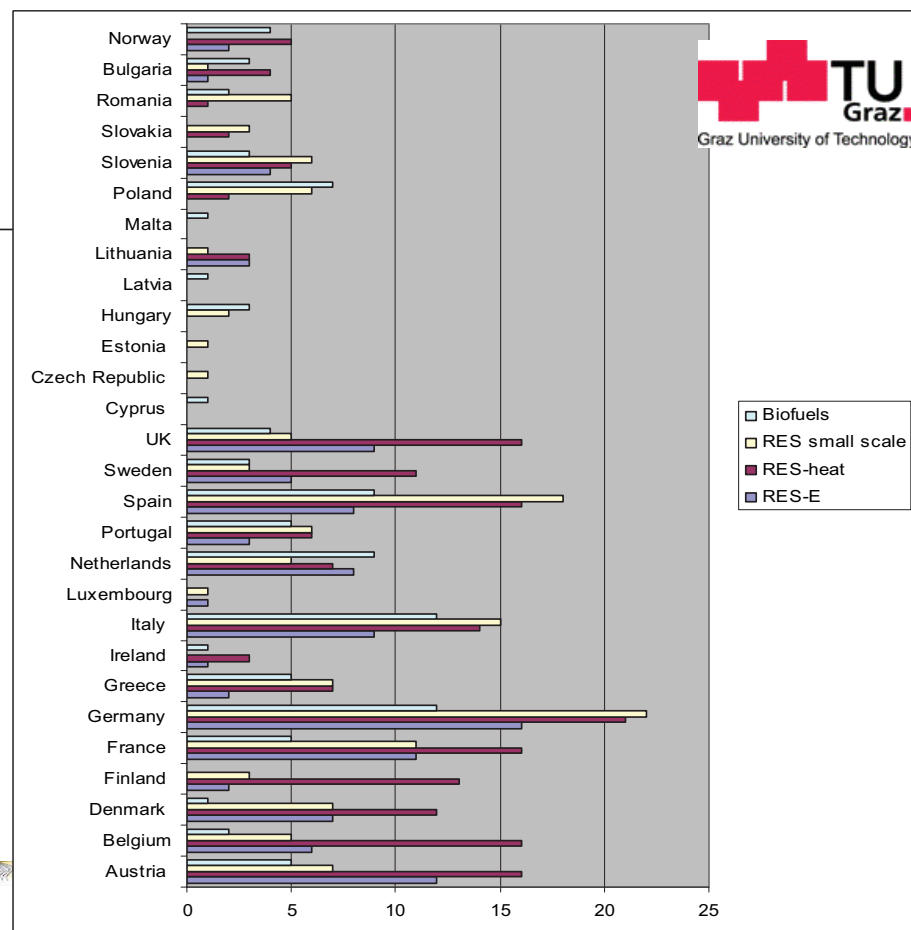
Empirical testing

- Local energy innovation activities in Europe
 - Ambition: As many cases as possible in a data file
 - Realized:
 - 62 IEE funded energy projects (2005-2007)
 - 13 projects on RES-E
 - 21 projects on RES-Heat
 - 15 projects on RES-small scale applications
 - 13 projects on biofuels
 - Survey 60 EEA communities
 - Germany, Austria and Switzerland

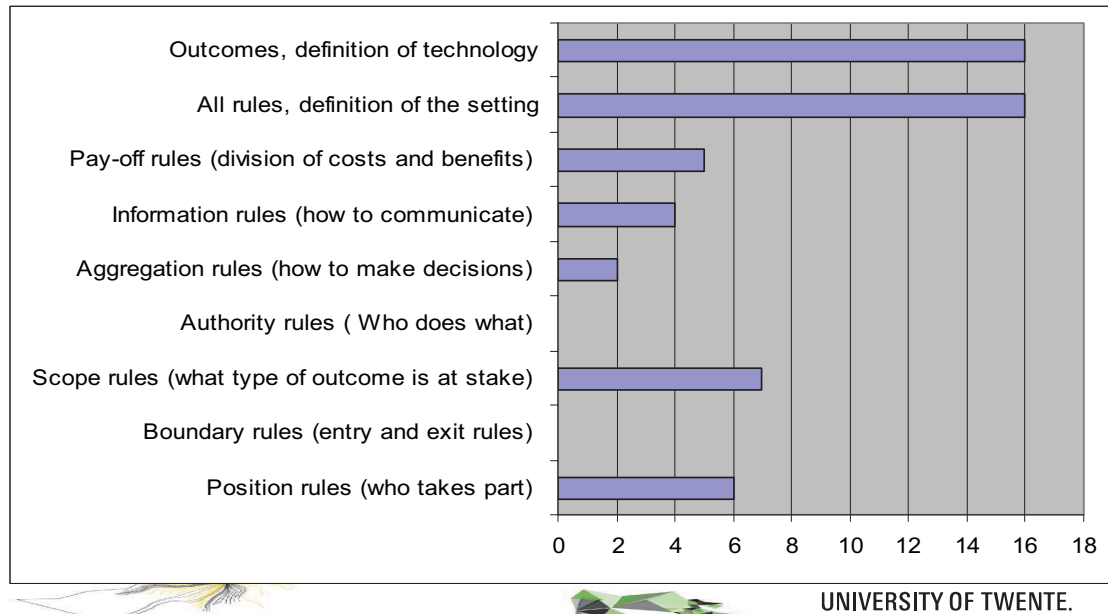


UNIVERSITY OF TWENTE.

Partner origine IEE projects



Focus of IEE projects



European Energy Award

- Europe wide methodology for local energy innovation
- Standardised performance monitoring
- EU wide benchmark of local energy performance and certification
- Bronze, silver and gold award



Alliance membership

Alliance member(s) belonging to

Municipal organisation

Permanent member

Technical expert organisations

Financial expert organisations

Industrial organisations

not for profit service organisations

Incidental members

Scientific organisations

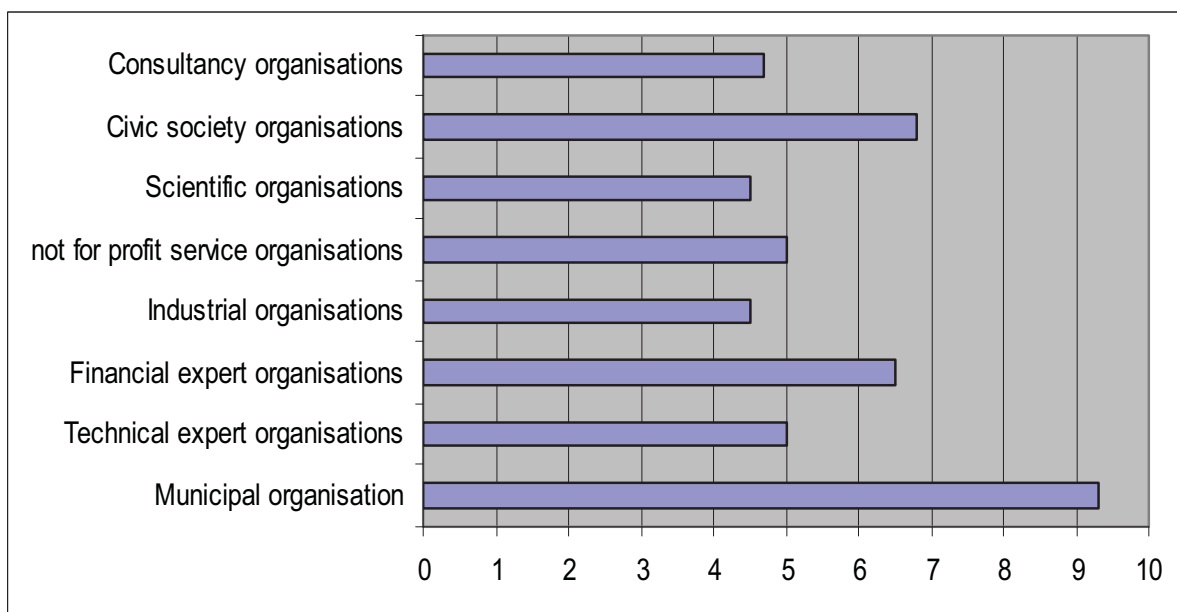
Civic society organisations

Consultancy organisations

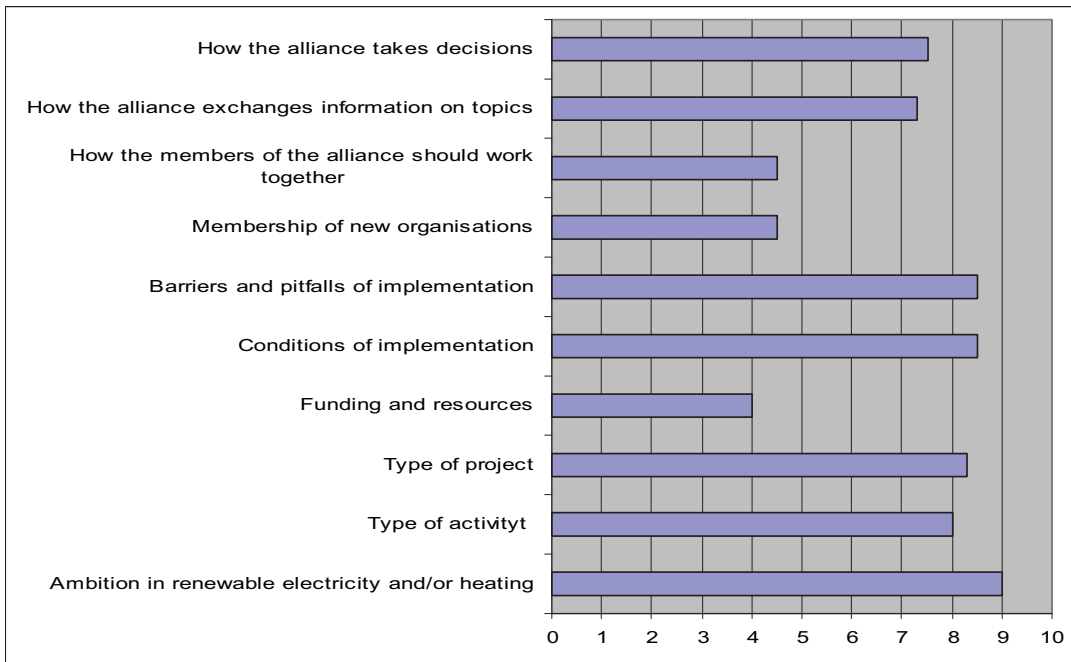


UNIVERSITY OF TWENTE.

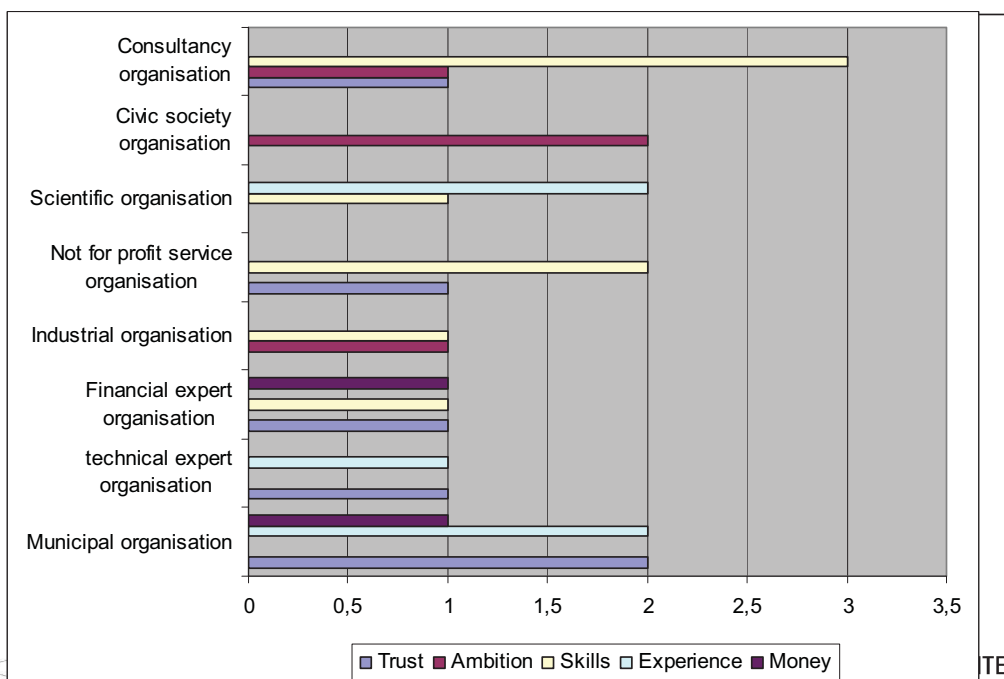
Significance alliance members
for projects (1= low, 10=high)



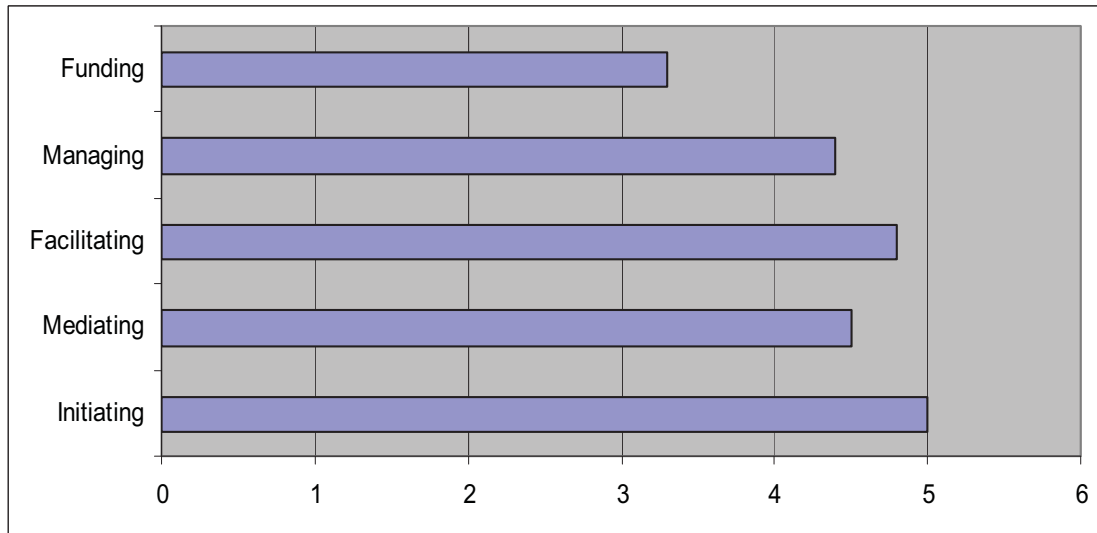
Significance of topics discussed by the local RES alliance (1=low, 10=high)



Contribution of alliance members



Relative importance different roles municipality (1=low, 5=high)



UNIVERSITY OF TWENTE.

Top 3 decisive local factors from the survey

- Motivation / Political will
- Resources
 - Financial and human
- Participation
 - NGO / Civic society



UNIVERSITY OF TWENTE.