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Social aspects of geothermal development

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Topics

- Social acceptance
- Social / economic impacts
- Impact evaluation
- Actions towards social acceptance
- Corporate social responsibility
- Social surveys' themes
- Social surveys in Greece

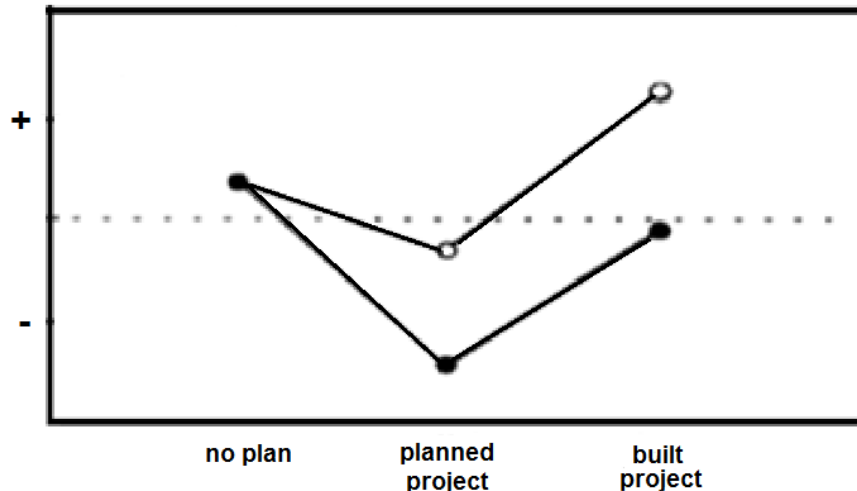
Factors affecting acceptance

Based on Romanach et al. (2012)

- **Trust in authorities/ institutions**
- **Procedural justice:** Is the process fair/ transparent/ will the locals will be listened to?/ will their opinion matter?
- **Proximity** to location (e.g. NIMBY theory)
- Subjective/objective **knowledge** of a technology/ benefits/ risks
- **Beliefs** about climate change/ energy issues
- **Perceived benefits** (economic, social, etc.)
- **Perceived risks** (environmental, health, etc.)
- **Social, economic and personal factors** (age, gender, occupation, education, political position, personality, etc.)

Social acceptance over time

- No plan
- Planned project
- Built project → positive view **IF** environmental issues are taken care of and benefits are created for local community



Public attitude towards a RES development over time

Source: Wolsink (2007)

Social / economic impacts

- Government revenues through taxes / royalties
- Job creation
- Growth in rural areas
- Multiplier effect to the economy / expansion of economy
- Less imported fuel
- Tourism promotion
- Attractiveness/ image of a community
- Transfer of knowledge, skills and technology to locals
- Residual energy used for other direct uses
- Land use issues → increased competition/ change of land use, relocation of population/ businesses, traditional culture
- Impact on property values, noise, traffic, environmental issues

Job creation

- Wide range of employment opportunities
- European geothermal sector lacks of skilled workers, scientists and researchers (Karytsas, 2013)
- Actions to prevent possible skill gaps and labor shortages
- Local communities *may* benefit from new direct jobs
- Training programs so that local workers receive the appropriate skills for the job positions
- Indirect / induced jobs created for local communities
- Geothermal: 26 jobs (direct, indirect, induced) / MW, natural gas: 6-8 jobs/ MW (U.S. Department of Energy, 2004)

Geothermal employment factors

Construction (p.yrs/ MW)	Manufacturing (p.yrs/ MW)	O&M (jobs/ MW)
6.8	3.89	0.36

Source: Institute for Sustainable Futures , 2012

Comparative job creation

Source	Construction (job.yrs/MW)	Manufacturing (job.yrs/MW)	O&M (Jobs/MW)
Geothermal	6.8	3.9	0.4
Natural gas	1.7	1.0	0.08

Source: Institute for Sustainable Futures , 2012

Multiplier effect on the economy

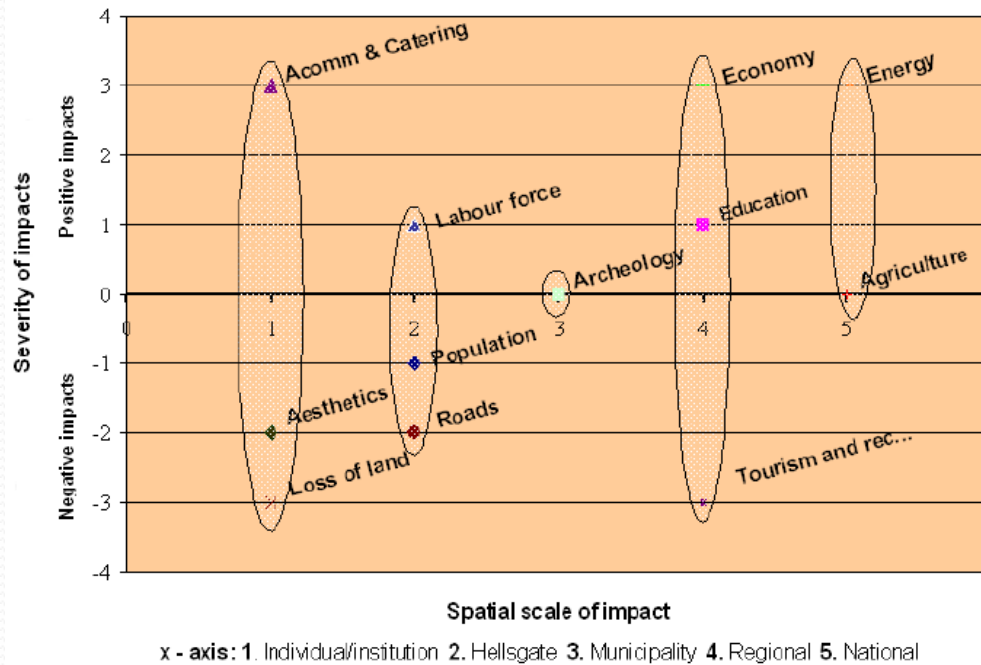
- New jobs and increased salaries
- Increased income through taxes / royalties
- Reduction in expenditure on fossil fuels for energy generation

- Creation of additional jobs, increased economic activity in other sectors, tax revenues
- Direct / indirect/ induced effects
- Example: 1\$ geothermal investment ➡ 2.5\$ in economic activity (U.S. Department of Energy, 2004)



Impact evaluation

- Scales for evaluation (Ogola, 2004):
- ✓ **Temporal:** short term/ long term/ permanent
- ✓ **Spatial:** individual/ local/ municipality/ regional/ national
- ✓ **Severity:** large positive impact to large negative impact



Indicator	Spatial	Severity	Temporal
Population	2 & 3	-1	Short Term
Education	4	+1	Long Term
Labor force	2	+1	Short Term
Loss of land	1	-2	Permanent
Tourism	1 & 4	-3	Permanent
Roads	1 & 2	-2	Long Term
Agriculture	5	0	o
Energy	5	+3	Long Term
Economy	4	+3	Long Term
Aesthetics/ visual	3	0	Long Term
Archaeological	3	0	o

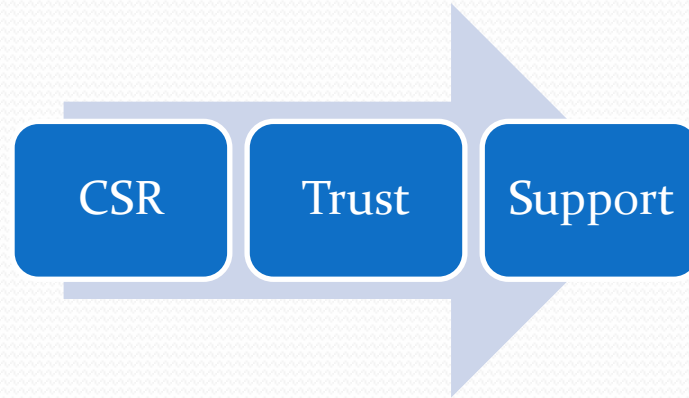
Summary of impacts in Olkaria Domes (IV) , Kenya (Ogola, 2004)

Actions to win social acceptance



- Socioeconomic survey of the area
- Social site characterization from the early stages
- Public participation
- Partnership schemes with the local community
- Information & communication strategies
- Means of information
- Economic / social initiatives with positive impact to the locals
- Prevention and minimization of negative effects on environment and people
- Consideration of traditions, culture, local communities
- Actual implementation of commitments made

Corporate Social Responsibility



Activities (based on Anaye & Cala, 2005):

- Educational support
- Health and sanitation
- Local infrastructure
- Livelihood improvement
- Sports and culture

Social surveys' themes

- Self-evaluation of understanding of geothermal knowledge
- Personal acceptance of geothermal development
- Perceived benefits/risks
- Impacts (positive/negative) of geothermal energy on other economic sectors
- Preferred distance of geothermal project from respondents' community
- Issues on which more information is required
- Disclosure of information by involved organizations /people
- Level of trust on information sources on geothermal energy resources and projects
- Trust in organizations
- Competence of organizations about energy choices
- Competence of involved organization to develop/ operate unit

Social surveys in Greece



- Literature review on social studies concerning geothermal energy
- Small number of studies focusing exclusively on geothermal energy
- Specific focus on Milos, Nisyros and Lesvos islands
- Low knowledge level of geothermal energy (20%-50%)
- Knowledge level lower than solar & wind energy
- Support is lower compared to other energy sources

Conclusions

- Knowledge & information
- Trust & justice
- Engage local stakeholders from early steps
- Create benefits that outweigh the risks
- Social & economic impacts

Sources

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Thank you for your attention

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