T17cP20 / Energy Decentralization

Topic : T17c / Sectorial Policy - Environment

Chair : Magali Dreyfus (CNRS)

GENERAL OBJECTIVES, RESEARCH QUESTIONS AND SCIENTIFIC RELEVANCE

The energy issue is a transversal topic which crosscuts several public policy fields and addresses several challenges (e.g. climate change, energy security, economic development, social inequalities). Taking action in this sector is therefore a priority for central governments for domestic reasons but also to tackle global challenges and build sustainable futures. In particular, the energy sector entails opportunities for climate co-benefits through the development of renewable energies, improvement of energy efficiency and the reduction of greenhouse-gases emissions.

Yet, policy-makers and the scientific community have early recognised the role of local governments, and in particular cities, in the development of sustainable environmental policies and climate governance.

Traditional centralised energy systems seem outdated and a decentralized, new model of governance seems, for many actors, more adequate. In fact, scholars have shown that energy transition cannot be based only on a technical shift. Therefore a redistribution of powers and competencies across scales, as well as new patterns of intergovernmental relations, are keys to the efficiency of low-carbon policies.

Depending on the domestic institutional context, local governments may have important competencies in energy production and/or supply, planning and energy demand management. The aim of this panel is to examine experiences of decentralization in the energy sector or any reforms introduced to foster the phasing out of fossil (or fissile) energy based systems. Potential topics for the panel might include the following (indicative):

- Process and institutional steps which led to the decentralization of an energy “activity” (motivations, legislative steps, territorial levels to strengthen)
- National debates about the new balance of powers to promote between central States and local authorities (is decentralization a common consensual solution?)
- Powers, tools and financial support provided by central governments to local governments to foster low-carbon policies
- Impacts on local governance and environmental outcomes
- Barriers and drivers for local action
- Institutional and legal innovation
- Local autonomy in energy activities

This list is indicative and other pertinent paper proposals may be selected.

CALL FOR PAPERS

The aim of the panel “energy decentralization” is to explore the relations between central and local governments in the energy sector.

Depending on the domestic institutional context, local governments may have important competencies in energy production and/or supply, planning and energy demand management. The aim of the panel is to examine experiences of decentralization in the energy sector or any reforms introduced to foster the phasing out of fossil (or fissile) energy based systems.

Against this background the panel welcomes papers which address the above issue and in particular contributions presenting institutional reforms triggered at the national level, but also local initiatives or any multi-level action aiming at starting/enhancing an energy transition process.

Paper should, as much as possible, highlight the reasons motivating the transformations, their debates or controversies, their stages (e.g. legal landmarks) and advancement, the degree of involvement of other stakeholders (citizens, businesses…) impacts on citizens and environmental outcomes if available.

T17cP20 / Energy Decentralization

Chair : Magali Dreyfus (CNRS)

Session 1Energy multi-level governance: from central governments to local governments

Friday, June 30th 08:15 to 10:15 (Oei Tiong Ham OTH 1 - 1)

Social and institutional innovations for enhancing energy decentralisation and climate change mitigation in developing countries

Dumisani Chirambo (Brandenburg University of Technology Cottbus- Senftenberg)

The Sustainable Development Goals (SDGs) are calling for state and non-state actors to reduce the vulnerability of communities to climate related extreme events, and other economic, social and environmental shocks and disasters; and for universal access to modern energy preferably through the use of Renewable Energy Technologies (RETs). An estimated 68% of current total anthropogenic greenhouse gas emissions emanate from energy related-activities [1] hence there is a great threat that increases in energy access and demand in Sub-Saharan Africa (SSA) can potentially lead to rises in anthropogenic emissions of greenhouse gases which result in climate change [2]. Additionally, climate change can be anticipated to increase as Intended Nationally Determined Contributions containing global ambitions to mitigate and adapt to climate change are falling short of the goal to limit temperature increase to 2°C [3]. Consequently, a failure for developed and developing countries to address sustainable energy access and climate change can arguably perpetuate inequality and food insecurity which may culminate into social and political disruptions, including forced migrations and conflict in SSA [4].

Local governments are often the closest entities for planning and implementing renewable energy and climate change policies and programmes suitable for the particular geographic and social context in which they are located. However, a combination of a relatively low priority to environmental education; bureaucratic delays in adopting and implementing policies and strategies; and a lack of awareness of the implications of climate change for future economic growth and development hampers the impacts of policies and programmes at implementation stage. Arguably, enhancing local government capacities to facilitate successful energy transitions may only be permissible in SSA by correcting market and government policy failures, and introducing new technologies, business models and financial innovations [5].

Olstrom [6] suggested that climate change was a complex multi-level problem that would adequately be addressed by complex multi-level systems such as polycentric governance systems. Similarly, facilitating energy decentralisation through RETs is a complex problem as deployment is constrained by social and economic issues such as poverty, lack of political will and wrong approaches in addressing the energy problem [7].

This paper explored the constraints and opportunities for local governments and non-state actors in SSA to facilitate the attainment of the SDGs to achieve universal energy access and combat climate change and its impacts. Using data from various research articles, case studies, policy briefs, and project reports, this paper expounded upon the work of Elinor Ostrom on polycentric governance systems by presenting a polycentric Microfinance Beneficiary Led Development Framework (M-BLDF) as a mechanism to enhance energy decentralisation and climate change mitigation in developing countries. The paper highlighted that many local governments on their own can neither successfully strengthen local resilience and adaptive capacity nor promote local renewable energy deployment. However, local government partnerships with non-state actors like microfinance institutions and the adoption of polycentric governance systems can enhance Africa’s institutional capacity and create new social systems to facilitate successful energy transitions for universal energy access.

Local autonomy in energy decision-making and management in Ghana

Akosua Baah Kwarteng Amaka-Otchere (Kwame Nkrumah University of Science and Technology)

Daniel Inkoom (Kwame Nkrumah University of Science and technology)

The challenge of centralised energy management in Ghana is as old as the sovereignty of the nation. The Akosombo Dam was built soon after independence as part of the country's foremost and crucial development infrastructure to produce hydroelectric power with generation capacity of 1020MW. Later, the Kpong and Bui Dams were also built giving a total installed capacity of 1580MW. Hydroelectric power has been supplied power to the country for six decades through state institutions - the Volta River Authority, the Ghana Grid Company and the national distribution companies, that is, the Northern Energy Development and the Electricity Company of Ghana. Power generation has predominantly been dependent on rainwater until the past two decades. The Akosombo plant, by virtue of Ghana's growing and energy demanding population, climate change and resultant averse rainfall pattern and the plant's gradual obsoleteness could only meet about 50% of its generation capacity. It has since then been complemented with thermal generation (and independent power production from the private sector), with several challenges. Nonetheless, Ghana experienced the worst energy crisis in the past decade. Again, in the case of electrification access, 87% of the 72% households which have access are urban dwellers. Ghana also currently experiences a new political era. One of the key industrialisation and development policy of this era is the "one district, one factory" policy. This undoubtedly could have major energy implications. In 2011, the government introduced the Renewal Energy Law as part of an energy reformation and transition process. The government aims at achieving 10% of its energy mix from RE by 2020. However, the energy management instrument still lies with the Central Government.

This paper examines the provisions of the reformation instrument – the Renewable Energy Law (REL) which is the most recent and considered as the catalyst for change in the energy sector. It also examines the policy and regulatory framework which operates in tandem with the REL, the extent to which they imply devolution of power and decision-making to the 262 local governments (also known as District Assemblies (DA)) and the capacities of the local governments to execute this responsibility. The study was undertaken in the Builsa North, Kassena-Nankana-East and Atebubu-Amantin Districts. Data was collected using qualitative instruments and secondary data was organised through document review.

Key among the findings was that the DAs were not involved in energy decisions that affected them. Consequently, they were apathetic to energy initiatives and management in their jurisdictions. Power supply was dissociated from the activities of the main DA administration. Adhoc renewable energy programmes which involved them required the formation of ad hoc teams; the stakeholder Departments of the DA worked independently of each other serving separate and mostly divergent interests.

It is recommended that Energy Committees are formed at the DA levels. The RE Directorate should be decentralised and strengthened as a DA department. Neighbouring districts should team up resources to undertake energy projects.

Collaboration and Reflexivity in Local Energy Governance: Lesson Learned from Seoul City's Case

Youhyun LEE (Ajou University)

1. Background
'Regional Energy Policies' in South Korea have been criticized for being too dependent with the 'Central Government's Energy Policies.' This level of dependence has been termed 'excessive,' especially because "Regional Autonomy (is said to) have No Autonomy" in South Korea. Thus, in principle, 'Local Governments' have played a very minimal role in the energy sector. To date, 'Local Governments' have carried out 'Small Energy Projects,' while the 'Central Government' evaluates the potential and relevance of the proposed project, then approving them. However, recent trends in the energy sector now show more opportunities and capabilities for local governments to conduct their 'own' energy policies and projects. Thus, the research conducted in this article approaches this issue to define the barriers and drivers' local governance has in South Korea's 'New, Renewable Energy Policy,' while seeking to find an appropriate balance for 'Regional Energy Governance' Models'.

2. Main Research Questions
- To analyze the Institutional and Legal Framework with South Korea's New, Renewable Energy Policies.

- Analyze the role of Local Government in Policy-Making, in particular, towards Energy Sector Processes.
- Analyze the Barriers and Drivers' in Local Governance, proposed via Case Study:

Case Study 1 - Local (Incheon City) vs. Central Government's 'Tidal Installation Facility' Proposal.
Case Study 2 - Seoul City's 'One Less Nuclear Power Plant' initiative.
- The Challenges and Takeaways in establishing Local "Energy" Governance in South Korea.

3. Case Study – Local Governance Models in New, Renewable Energy Policy
Case Study 1 – Local (Incheon City) vs. Central Government
Since 2012 when South Korea implemented its Renewable Portfolio Standard (Herein referred to as RPS), - a regulation that requires the increased production of energy from renewable energy sources - electricity

suppliers have been required to produce a certain percentage of its energy from renewable sources of energy. Two projects have been proposed, with both actors intending to build ‘Tidal Installation Facilities’ at the Ganghwa dams, located just north of Incheon City. The projects have been initiated by: (1) Incheon City’s Local Government and (2) South Korea’s Central Government, specifically ‘the Ministry of Land and Transport.’ Both actors intend to build Tidal Facility’s at different sites within the same region: Incheon plans to build the facility west of the Ganghwa Dams, while the Ministry of Land and Transport plans to build to the South. The root of this conflict has been proposed as a ‘lack of communication,’ and with ‘Clean, Maritime sites’ (Renewable Energy Sites) still being very limited in South Korea, rivalry for these Tidal Facilities have been very competitive, further fueling competition.

Case Study 2 – Seoul City’s ‘One Less Nuclear Power Plant’ initiative.
The ‘Local Government of Seoul’ has initiated the ‘One Less Nuclear Power Plant’ initiative as part of its ‘Regional Energy Policy’ plan. There are four major components of the plan, each point characterized as follows: (1) decentralizing current electricity generation methods for the expansion of renewables, (2) further development of ‘Low-Carbon’ cities, (3) the creation of more ‘Green Jobs,’ and (4) realizing the diversification of electrical distribution as a social project. This motive, with regards to renewable energy, saw that Seoul city has put forward emphasis towards its support of Photo-Voltaic (Solar) as a renewable energy source. The creation of Seoul’s Feed-in-Tariff (FIT) is another interesting point because the ‘Central Government’ and the MOTIE recently replaced the ‘national, energy policy instruments’ from FIT to the RPS in 2012. However, Seoul city’s local government revitalized FIT to promote the growth of renewables, a method that contradicts the national plan. The ‘One Less Nuclear Power Plant’ initiative is, therefore, considered an evolution removed from traditional energy conservation campaigns. It should be noted that the local government has presented a successful model of energy policy through various institutional improvements, despite the limitations of its competencies.

Two ways to success - Expansion of renewable energies in the federal states of Germany

Stefan Wurster (The Bavarian School of Public Policy)

Christian Hagemann (Bavarian School of Public Policy)

From an international perspective Germany is often considered as a role model for clean energy transformation. The German “Energiewende”, which means change to a non-nuclear-regenerative energy system, depends crucially on the expansion of renewable energies. The success of this transformation process is highly contingent on developments in the federal states, who are able to co-decide on energy policy. However there is a tremendous gap in the expansion rate of renewable energy generation among the German Bundesländer. While leading states such as Mecklenburg-West Pomerania and Brandenburg have almost or more than quadrupled their electricity production by renewable sources in the last decade, states like North Rhine-Westphalia have yet failed to double. So it is timely to ask for the factors that influence the development of renewable energies at the federal state level: What role does the (non-) existence of natural energy resources play under specific economic framework conditions? Does party politics make a difference and what are the effects of specific political institutions and policy instruments?

The analysis compares the spread of renewable electricity production in all 16 federal states in Germany from 2004 to 2014, considering all 50 cabinets during this period. Using fuzzy-set QCA, it is possible to detect combinations of factors leading to the (non-) occurrence of accelerated expansion of renewable electricity production at the state level. In addition, the method allows to reveal equifinal pathways that connect different causal combinations to the same results.

Based on our data, we find two promising avenues for a successful expansion of renewable electricity production. On the one hand, a group of economically less developed states succeeded in pushing ahead with the expansion by using it as part of an economic innovation strategy. In contrast, within the economically more developed states the party composition of the respective state government (Green government involvement) played a significant role. The results hint at the so far underestimated role of renewable energy transformation as a factor of economic development under specific political scope conditions. It also shows ways for expansion strategies transferable to other (federal) countries.

California's Experience with Decentralized Clean Energy Systems: An Overview of State and Local Policies

Rosmarin Heather (InterAmerican Clean Energy Institute)

This paper provides an overview of California’s state and local policies to promote decentralized clean energy systems and to foster a transition away from fossil fuel-based energy.

Distributed generation of renewable electricity plays an important role in meeting California’s energy needs.

As of October 2016, almost 9,400 megawatts (MW) of renewable distributed generation (RDG) capacity were operating or installed in California, with an additional 900 MW pending. Thus, California is close to achieving a statewide goal to install 12,000 MW of RDG by 2020. RDG systems include solar, small hydro, biomass, wind, and geothermal projects of 20 MW or less which can operate both for self-generation and for providing energy to the market.

Policymakers' motivations for supporting RDG include job creation, energy security, reduction of the climate and public health impacts of fossil fuel pollution, and avoidance of transmission and distribution line losses and infrastructure costs. In addition, RDG projects are important for achieving California's recently enacted legislative goals to generate 50% of electricity from renewable resources and to reduce greenhouse gas emissions 40% below 1990 levels by 2030.

The paper summarizes the status of key state and local initiatives including:

- Statewide goal to install 12,000 MW of RDG by 2020.
- Net metering, feed-in-tariffs, and self-generation incentives that support RDG.
- Procurement policies at the state and local levels that promote RDG.
- Building standards and codes that facilitate RDG.
- Policies that promote on-site and grid-scale storage of energy generated by RDG.
- State technology and policy roadmaps for microgrids and transportation electrification.
- Loading order policy, which prioritizes energy efficiency, renewable energy and distributed generation ahead of fossil fuels.
- Local land use and permitting policies that facilitate RDG.
- Local initiatives to transition from fossil fuel production to renewable energy production on public land.

Further, the paper considers the diversity of and interaction among policy mechanisms at multiple levels of government – state, county, and city – that are helping to achieve California's RDG goals. Types of policy mechanisms used in California include legislation, regulation, executive orders, job creation & economic development plans, standards, procurement policies, financial incentives (e.g., grants, loans, rebates, credits), taxation, public-private partnerships, voter referenda, utility programs, and state-facilitated technology and policy roadmaps.

An important feature of California's energy policymaking is significant involvement from the private sector as well as from university researchers and environmental and social justice nongovernmental organizations (NGOs). However, national energy policy currently plays a limited role in California's RDG landscape. The primary means by which national policy interfaces with California's RDG initiatives is through research and development funding and federal tax incentives for renewable energy development.

Therefore, California offers an instructive example for how subnational governments can achieve ambitious energy decentralization goals primarily through state-level policymaking and close coordination with local governmental units (counties and cities), private sector stakeholders, universities, and NGOs.

T17cP20 / Energy Decentralization

Chair : Magali Dreyfus (CNRS)

Session 2Discourses and policy networks, communities and assessment of energy decentralization

Friday, June 30th 10:30 to 12:30 (Oei Tiong Ham OTH 1 - 1)

Centralised or decentralised electricity infrastructure? An analysis of discourses and technological infrastructure dimensions in Germany

Simon Funcke

Chantal Ruppert-Winkel

It is highly debated whether the transformation of the German electricity infrastructure towards renewable energies should follow a centralised or a decentralised development pathway. At the same time, it often remains unclear what constitutes a centralised or decentralised electricity infrastructure. Therefore, the following analysis is based on a proposed definition of four technological electricity infrastructure dimensions that could be taken into account (Funcke, Bauknecht 2016): *connectivity* is concerned with the level of grid connection, *proximity* is looking at the geographical distribution of power plants, *flexibility*-options are needed to balance generation and consumption, and *controllability* determines the coordination of generation and consumption on a technological level as well as on markets.

This contribution sets out to answer the questions a) which storylines are uttered by actors and discourse-coalitions concerning this issue and b) which role do the four technological dimensions of electricity infrastructure play in the storylines of these coalitions. For this, Hajer's Argumentative Discourse Analysis (ADA) framework is applied. In a first step, desk research and 11 helicopter interviews were conducted to gain an understanding of the German electricity infrastructure concerning (de)centralisation and the relevant actors. Furthermore, a comprehensive corpora of documents by the identified actors as well as an additional 14 in-depth interviews were conducted to cover missing aspects and revisit preliminary results.

Within the German electricity infrastructure debate, three discourse-coalitions can be distinguished. Their main storylines and positions concerning (de)centralisation are as follows: 1) The *Economic Efficiency* coalition is highlighting the importance of a cost-effective infrastructure. Whether the infrastructure is built in a centralised or decentralised manner is not at the core of the arguments but it is generally pointed out that national or international approaches are considered to be more cost-effective what indicates a preference for centralised technologies. 2) The *Renewables Now* coalition is pointing towards the urgency of implementing renewable energies as quickly as possible to mitigate climate change. Again, the question of centralisation or decentralisation is not given a strong emphasis. Members of this coalition often point towards a co-existence of centralised as well as decentralised technologies. 3) The *Citizens' Energy* coalition focuses on local or regional roll-out of renewables close to load centres, prefers to develop decentralised flexibility options and connects additional aspects like a stronger democratic control or benefits for the local economy to their storyline.

We conclude that a decentralised electricity infrastructure on all four technological dimensions is only pursued by one of three discourse-coalitions, *Citizens' Energy*. The actors composing this coalition are associations from the field of renewables as well as many actors or organisations from the local level. Recent political decisions on the national level, seem to weaken this coalition's position as the construction of new renewable power plants for small actors has become more difficult.

Keywords: Decentralisation; discourse-coalitions; storylines; Economic Efficiency; Renewables Now; Citizens' Energy

Funcke, Simon; Bauknecht, Dierk (2016): Typology of centralised and decentralised visions for electricity infrastructure. In Utilities Policy 40, pp. 67–74. DOI: 10.1016/j.jup.2016.03.005 .

The Implementation of the German Energy Transition at the Local Level - Challenges, Beliefs and the Emergence of Collaboration Networks

Heike Brugger (University of Konstanz)

The German Energiewende—energy transition towards a green energy supply—is a unique national project. It represents the German response to at least three policy problems, including: 1) global climate change, 2) overdependence on foreign energy resources, and 3) the wish to opt out of nuclear energy. Many policies within this project are implemented at the state and national levels. However, communities have far reaching authorities in policy areas that are part of the transition process, such as energy supply, public transportation and the building sector. Furthermore, involving communities in the decision making process helps to attenuate controversies arising from NIMBYism. While some counties have made significant progress towards a transition to renewable energies, others lag behind. I argue that this can be explained in part by the formation and maintenance of policy networks among stakeholders at the local level; this is because networks allow actors to more effectively collaborate and find consensus on mutually agreeable strategies. This paper uses two emerging approaches for policy analysis—network analysis and the Advocacy Coalition Framework—to explain network emergence and network evolution in the case of the German Energy Transition at the local level.

This paper studies three aspects of local energy policy making: 1) the differing challenges that rural and urban areas face when implementing the energy transition, 2) the structure of the local policy process in form of collaboration networks and advocacy coalitions and 3) the differences in the ability of those networks to address the challenges.

In order to identify barriers and drivers for the advancement of the energy transition at the local level, successful and less successful urban and rural areas are compared. For this purpose, the study is based on four German counties, identified through the method of difference. Relevant stakeholders in these counties were identified through the analysis of newspaper content and surveyed about the issues they are working on, their perceptions of the local policy process and their collaboration network. Discourse network data (newspaper analysis) and ego-centered collaboration networks (survey data) are combined to estimate different types of policy networks. Exponential random graph models (ERGM) and the quadratic assignment procedure (QAP) are then applied to study the importance of shared beliefs for the formation of these collaboration networks.

The results of this paper emphasize the importance of favorable policy networks for successful local energy policy making. Furthermore, they can inform how policies which have to be implemented at the local level have to be designed, in order to take the different policy networks as well as the different responsibilities and challenges of rural and urban areas into account.

Local forms and eco-social functions: community energy models in Canada and New Zealand

Julie MacArthur (University of Auckland)

Christina Hoicka (York University)

On 4 November 2016 the Paris Agreement came into force, prompting renewed attention to mechanisms for climate change mitigation. For energy researchers, community interventions spurred by public policies have long held promise for addressing the climate crisis. These include reducing opposition to new green infrastructure, providing new social mechanisms for learning, literacy and facilitating economic development. Energy programs based in local community partnerships have been shown to be highly successful in engaging large segments of the population. However, empirical research continues to uncover many differences in the specific forms, functions and policy settings that relate to community initiatives across jurisdictions. For example, we observe that in Canada, “community energy planning” is often driven by municipalities, and “community” is interpreted as “local” or “location”; participation from the residents of the community is not necessarily understood as central. Meanwhile “community” in “community power” often implies ownership and control of energy assets, represented by generation co-operative structures with varied policy supports. In New Zealand, community power takes the model of community trusts that largely control the local electricity grid following the country’s radical electricity restructuring in the 1990s.This paper contributes to the empirical literature by examining the forms and functions of community energy projects in Canada and New Zealand, two countries with high per-capita greenhouse gas emissions and distinct practices of ‘community energy’. Based in empirical examples selected for a range of models, and in an interdisciplinary approach that employs political science, geography and engineering knowledges, this paper considers the questions: what models of community energy have emerged in these jurisdictions and how has policy choice shaped these differences? What are their limits? What is the connection between form

and function of community energy? Addressing these questions will generate new methods to better understand how to encourage and support community-based interventions as mechanisms for climate change mitigation.

Decentralized energy production and community sustainability: How hydro electricity shall contribute to local development

Aki Suwa (Kyoto Women's Univ)

The Japanese energy market is currently experiencing a drastic market liberation processes. The electricity market reform, originally started during the 1990s-2000s when the nation facilitated retail competition for high-voltage customers, further proceeded in April 2016, when the market is fully opened to allow about 85 million households and small businesses to choose electricity suppliers for the first time. The reorganization is part of post-Fukushima arguments, to develop a stable supply of electricity, lower rates and more choices. The March 2011 earthquake and nuclear meltdown led to blackouts in the capital region of Japan, revealing the vulnerabilities of the nation’s power system. The meltdown led to the closure of the nuclear plants, forcing utilities to import fossil fuels and raise electricity rates.

Locally produced hydro electricity (especially under the 1000kW capacity) is one of these decentralized renewable electricities, and there are a number of local governments, groups and businesses started to develop hydro electricity using resources available to their community. The community based hydro electricity development is expected to play an important role both in economic and social integration senses: as know widely, Japan is facing rapid aging and community decline problems, and the locally produced electricity often functions to enhance community aspiration, as well as a tool to gain financial income through the sales of the electricity.

There is, however, a question regarding promoting hydro electricity how these local projects could have long-term business and community sustainability. Even though the electricity market was liberalized, there are some political uncertainties as to the business environment for the local renewable producers. In addition, though locally available, hydro energy could also be developed by big businesses and the financial benefits may be only experienced by the large capitals, hence there is a remaining argument on to whom the local resources belong to.

In order to answer the question as whether the hydro electricity project may contribute to the community sustainability and development, this presentation traces the history of local hydro electricity development in Japan, then classifies recently developed local hydro projects into different categories, to identify how they demonstrate community sustainability. This presentation also argues how the potential and uncertainty as to the decenstralised renewable projects in the face of changing central political environment and consumer awareness.

Assessing decentralised electricity systems

Simon Funcke

Dierk Bauknecht

Moritz Vogel

Four dimensions can be distinguished when analysing electricity infrastructure from a technological perspective: the grid level of power plants (*connectivity*), the geographical distribution of power plants (*proximity*), flexibility options like grids and storages (*flexibility*) and infrastructure control, i.e. the coordination of generation and consumption (*controllability*) (cf. Funcke, Bauknecht 2016). As social science researchers on energy topics consistently point out, the electricity infrastructure should be considered as a socio-technical system. Therefore, we add the social-economic dimensions of *democratisation* (i.e. *re-municipalisation* and *participation*) and *ownership* to our analysis. In this contribution, we endeavour to assess the technological dimensions of decentralised electricity systems from an economic as well as social perspective.

Methodologically, we draw on the infrastructure typology introduced above, additional literature as well as debates concerning electricity systems to identify the relevant system dimensions. The assessment is carried out as a first approximation, highlighting differences as well as advantages and disadvantages on each system dimension.

The economic assessment of the technological dimensions reveals that decentralised electricity infrastructure has the potential to increase or decrease the overall system costs, depending on the assessed dimension. A reduced necessity for grid expansion, if power plants are built close to load centres,

is an example for the *proximity*-dimension. In other dimensions, e.g. *connectivity*, both effects can be expected, as reduced economies of scale for smaller and decentralised power plants could lead to an increase while a better modularity can decrease overall costs. Concerning *ownership*, as one example of a social-economic dimension, it is often argued that small-scale power plants connected to the distribution grid (decentralised *connectivity*) and in close *proximity* to points of consumption increase chances of acceptance as well as the possibility of (financial) *participation* of larger groups of citizens. Even though it could be argued that a larger and more diverse group of owners in a centralised system with large-scale generation is also possible, e.g. through bonds or shares, a decentralised *ownership* potentially entails additional characteristics: a redistribution of power, a higher security of investment if the owner of the power plant consumes its own electricity and who identifies with, supports or opposes new projects.

The contribution at hand does not provide a final answer whether centralised or decentralised electricity systems are preferable. It rather points towards a likely mix of centralised and decentralised elements on the different system dimensions. In addition, it highlights a wide range of dimensions that can be considered when discussing future electricity scenarios or making decisions on electricity policy as well as crucial aspects for each dimension.

Keywords: decentralisation; electricity infrastructure; ownership; re-municipalisation; democratisation; participation

Funcke, Simon; Bauknecht, Dierk (2016): Typology of centralised and decentralised visions for electricity infrastructure. In Utilities Policy 40, pp. 67–74. DOI: 10.1016/j.jup.2016.03.005.

How effective is the HEI-DOE Partnership in Contributing to Climate Change Mitigation and Achievement of SDG #13 Climate Action: Assessment of Affiliated Renewable Energy Center Partnerships

Jocelyn Cuaresma (University of the Philippines-National College of Public Administration and Governance)

Higher education institutions (HEIs), particularly State Universities and Colleges (SUCs) have existed to develop a highly literate community, able to contribute to the development of the society and the economy. Government policy on climate change assigns a role on HEIs in educating and capacitating people on climate change adaptation and mitigation, and in developing strategies to adapt to climate risks and mitigate greenhouse gas emissions. Some 45 HEIs, including SUCs, have entered into partnership with the Department of Energy (DOE) to engage in climate change mitigation programs through the promotion of the use of renewable energy. The study examines the impact of five (5) DOE-SUC partnerships in climate change mitigation on the immediate community where they operate and seeks to answer the question: to what extent and in what ways have the partnerships contributed to the local and national efforts of climate change mitigation?