



# International Conference

**6-7 JUNE | 2019**

## New Pathways for Community Energy and Storage

Contact: [secretariat-ivem-ssg-ct@rug.nl](mailto:secretariat-ivem-ssg-ct@rug.nl)

Venue: Energy Academy, Groningen, The Netherlands

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Key notes | Parallel sessions | Workshops | Round tables | Excursions

Venue: Energy Academy, Groningen, The Netherlands



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research institute groningen

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# INTRODUCTION

Dear participants,

We welcome each of you to this international conference on New Pathways for Community Energy and Storage, organized by the Universities of Groningen and Twente, in cooperation with their partners. This conference is being organized within the framework of Community Responsible Innovation towards Sustainable Energy (CO-RISE) project funded by the social responsible innovation program of Dutch Organization for Scientific Research (NWO-MVI).

Energy storage is one of the key issues of the energy transition and local energy communities are important drivers behind the transformation towards a more sustainable energy system. This conference aims to address important questions related to energy transitions and the role of community energy and storage therein. We bring together researchers and practitioners with an aim to provide you with new stimulating insights and contacts to continue your efforts for promising pathways, in theory and practice, regarding technological and social aspects of energy transition.

We hope you will enjoy your stay at the Energy Academy Europe, home of departments of the University of Groningen, Hanze university of applied sciences, and New Energy Coalition, a cooperation of key players in energy research.

In addition we suggest you to visit some activities of our university, celebrating its 405th anniversary this week, and the city of Groningen, the lively economic and cultural capital of the northern part of the Netherlands.

Have a great conference!

Henny van der Windt, Ellen van Oost, Binod Koirala,  
Esther van der Waal and Annemiek Huizinga





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# VENUE

## International Conference New Pathways for Community Energy and Storage | 6-7 JUNE 2019

### Energy Academy Europe

Nijenborgh 6 | 9747 AG Groningen | The Netherlands

#### Energy Academy Europe

This 100% sustainable building, located at Zernike Campus in Groningen and completed end of 2016, is a pioneering system for future sustainable constructions.

It is labelled the highest BREEAM score '\*\*\*\*\*Outstanding' and in March 2017 won a prestigious international BREEAM Award. The building is an icon, a flagship project for the region, and the 'place to be' for energy experts, students and entrepreneurs.

\*\*\*\*\*

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# PROGRAMME | DAY 1

09:00	Walk-in, registration and coffee		
10:00	Welcome by the organizers		
10:15	Keynote speech  Room 5159.0029		
	Aligning institutions and technology in community energy systems – Prof. Dr. Rolf Künneke, TU Delft		
	Just transitions - Can community energy ensure a better low-carbon transition – Dr. Mari Martiskainen, University of Sussex		
11:15	Coffee break		
11:30	Parallel Sessions		
	Transformative power of community energy  Room 5159.0009   Moderator: Ankit Kumar	Citizens’ engagement in Community energy  Room 5159.0065  Moderator: Clemens Bernardt	Community energy storage and flexibility  Room 5159.0291   Moderator: David Parra
	The transformative power of community energy: Between theory and practice - Beata Kviatek	Examining the relationship between neighborhood identification, community energy norms and social networks in explaining participation community energy initiatives - Fleur Goedkoop, Daniel Sloot, Jacob Dijkstra, Lise Jans, Andreas Flache, Linda Steg	Socio-technical alignment of community energy storage – Binod Koirala, Ellen van Oost
	Analyzing the determinants of the size of investments by community renewable energy members: findings and policy implications from Flanders - Thomas Bauwens	Participatory experimentation with energy law: digging in a ‘regulatory sandbox’ for energy cooperatives and homeowners’ associations in the Netherlands - Esther van der Waal, Tineke van der Schoor, Alexandra Das and Henny van der Windt	Energy storage on EU Islands, legal aspects of community-size projects – Romain Mauger
	Energy renovations and local renewable energy communities in the South Harbour district - a reconfiguration of the present energy provision regime - Ulrik Jørgensen	Causal pathways to participation in energy cooperatives - Adelle Ranville	Energy storage concept within EU INTERREG project power-to-flex - Adenieke Bettinger, Piotr Biernacki, Tobias Roether, Wilfried Paul, Patrick Werner, Sven Steinigeweg
		The state of prosumerism in the Netherlands - S. Oxenaar, J Wittmayer, L Horstink	
13:00	Lunch		
14:00	Parallel Sessions		
	New Pathways for community energy innovation  Room 5159.0291  Moderator: Henny van der Windt and Esther van der Waal	Local energy innovation  Room 5159.0065   Moderator: Franco Ruzzenenti	Changing roles and responsibilities  Room 5159.0009   Moderator: Mari Martiskainen
	Pitches and round table on opportunities and challenges for innovative energy communities, experiences and new thoughts from following invited communities and organisations: Paddepoel Energiek, GrEK, Provincial Nature and Environment Federation.	Co-existence of emerging energy communities with centralized energy system: energy clusters in Poland - Agata Stasik	Grid operators in crowd-based energy innovations: Unlikely institutional entrepreneurs - Maria Galeano Galvan, Eefje Cuppen, Mattijs Taanman
		Micro-hydro power in Nepal – A journey from standalone micro-hydro to distributed generation - via skype - Jiwan Kumar Mallik, Satish Gautam, Binod Koirala, Surendra Mathema	Capabilities and relational power: Understanding Acceptance of Wind Energy in Southern Mexico - Paola Velasco Herrejon
		A bottom-up effective energy utilization approach with the help of community: Indian Scenario – Karan Sareen	The role of middle actors in the transition to a low carbon society - Tali Zohar
		Suitability areas for energy planning in community – Jürgen Knies	
15:30	Coffee break		
16:00	Parallel Sessions		
	New Pathways for Local Energy Storage  Room: 5159.0009  Moderator: Ellen van Oost and Binod Koirala	Responsible innovation in community energy    Room: 5159.0058   Moderator: Henny van der Windt	Community energy in Europe  Room: 5159.0105   Moderator: Tineke van der schoor
	Pitches and round table on opportunities and challenges for local storage systems, experiences and new thoughts from:  Rob den Exter (Storedenergy) Dominique Doedens (Gridflex Heeten / Escozon) Gerrit Miedema (DrTen) Jacques Mathijssen (Solarfreezer) Stefan Olsthoorn (Energy Storage NL)	How can value sensitive design fail its task in design for changing values? The case of energy systems - Anna Melnyk	Barriers and opportunities for community renewable energy in the south of Europe - Ana Delicado, Maria Jose Prados, Ana Horta, Monica Truninger, Carolina del Valle
		Technologies of engagement: How battery storage technologies shape householder participation in energy transitions – Sanneke Kloppenburg, Robin Smale, Nick Verkade	Barriers and opportunities for French citizen led energy communities - Doutre Julien
		Evaluating energy justice in local smart grid systems - Christine Milchram, Geerten van de Kaa, Rolf Kuenneke, Neelke Doorn, Rafaela Hillerbrand	Community energy in Italy: lessons from existing evidence - Chiara Candelise, Gianluca Ruggieri
		Political power, influence, and the socio-technical configuration of community energy: Insights from three comparative cases - Marie Claire Brisbois	Spatial imaginaries as a concept for studying innovation in local sustainable energy systems - Eveline de Smalen and Esther van der Waal
18:00	Networking with drinks   Humprey's restaurant, Vismarkt 42, 9711 KV Groningen		
19:00	Conference Dinner   Humprey's restaurant, Vismarkt 42, 9711 KV Groningen		

# KEYNOTE SPEAKER

Rolf Künneke



Aligning institutions and technology in community energy systems | Prof. dr. Rolf Kunneke

Rolf Künneke is full Professor Economics of Infrastructures at the Faculty of Technology, Policy and Management (TPM) of Delft University of Technology. He applies an institutional economic perspective towards responsible innovation, institutional design, regulation, and modelling of energy systems. He analyses the interrelatedness of technical and institutional features of sustainable energy infrastructures. He worked with Nobel laureate Elinor Ostrom on the governance of social-ecological and socio-technical systems. He was member of the board of a national research program on the Dutch gas infrastructure (EDGaR). Recently he is Principal Investigator of the Amsterdam Institute for Metropolitan Solutions. His recent research focuses on societal values of smart energy systems.

# KEYNOTE SPEAKER

Mari Martiskainen



Just transitions - Can community energy ensure a better low-carbon transition | Dr. Mari Martiskainen

Mari Martiskainen is a Research Fellow at the Science Policy Research Unit (SPRU), University of Sussex. She is a member of the Sussex Energy Group. She has a specific interest in the transition to a more fair, clean and sustainable energy world. Her research centres around energy policy, with specific focus on the issues of developing low energy housing, addressing energy poverty and promoting renewable energy. Dr. Martiskainen has worked with a range of conceptual approaches, including sustainability transitions, grassroots innovation, innovation intermediation, user innovation, and energy justice. She has worked with a range of stakeholders and partners, including community groups, not-for-profit organisations, businesses and consultants.

ABSTRACT AND PARALLEL SESSIONS | DAY 1

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PARALLEL SESSION | TRANSFORMATIVE POWER OF COMMUNITY ENERGY

The Transformative Power of Community Energy: Between Theory and Practice  
*Dr. Beata Kviatek | Centre of Expertise Energy, Hanze University of Applied Sciences Groningen, the Netherlands*

**ABSTRACT**  
The community renewable energy is often seen as the way to address the societal challenge of energy transition. Many scholars foresee a key role for community energy in accelerating of the energy transition from fossil to renewable energy sources. For example, some authors investigated the transformative role of community renewable energy in the energy transition process (Seyfang and Smith, 2007; Seyfang and Haxeltine 2012; Seyfang et al. 2013; Seyfang et al. 2014; Smith et al. 2017; Martiskainen, 2017; Ruggiero et al. 2018; Hasanov and Zuidema, 2018; de Boer et al. 2018). Recognising the importance of community energy many scholars studied different internal and external conditions that contribute or hinder the success of local renewable energy initiatives (Walker et al. 2007; Bomberg and McEwen, 2012; Seyfang et al. 2013; Wirth, 2014; Hasanov and Zuidema, 2018; Ruggiero et al. 2018). One of such conditions contributing to the success of community energy initiatives is the capacity to adopt and utilize new technologies, for example, in the area of energy storage, which would increase flexibility and resilience of the communal energy supply systems. However, as noted by Ruggiero et al. (2018), the scholarship remains unclear on “how a very diverse and relatively small sector such as community energy could scale up and promote a change in the dominant way of energy production”. What is then the real transformative power of local renewable energy initiatives and whether community energy can offer an alternative to the existing energy system? This paper aims to answer these questions by confronting the critical review of theory with the recent practice of community energy in the Netherlands to build and scale up independent and self-sustaining renewable energy supply structures on the local and national scale and drafting perspectives on the possible role of community energy in the new energy system.

## Analyzing the determinants of the size of investments by community renewable energy members: findings and policy implications from Flanders

*Thomas Bauwens | Copernicus Institute of Sustainable Development, Utrecht University*

### ABSTRACT

Community renewable energy initiatives are increasingly recognized as important actors to trigger citizen investments in renewable energy facilities. Little is known, however, about the determinants of the size of community renewable energy members' financial investments. To address this gap, this paper presents a multivariate econometric analysis of the economic, social, environmental and institutional determinants of the size of investments in community renewable energy. It relies on a large-scale survey of 3,963 members of two renewable energy cooperatives located in Flanders, northern Belgium. Results show that the return on investment is the most important determinant for members of large communities of interest, while, for members of smaller communities of place, environmental, social and other non-economic drivers tend to dominate financial motives. The presence of other cooperative members in close social networks plays a particularly strong role in the latter kind of communities, highlighting the importance of social interactions as a driver for investments. These results can help policy-makers to design more fine-grained policy measures for fostering financial investments at the community level, and project developers to tailor segmented communication strategies about the goals and benefits of projects.

Key-words: renewable energy, cooperative, community energy, citizen engagement, investments, community finance.

## Energy renovations and local renewable energy communities in the South Harbour district - a reconfiguration of the present energy provision regime

*Ulrik Jørgensen | Department of Planning, Aalborg University, Denmark*

### ABSTRACT

Taking outset in studies of the Danish energy transition from a centralised system of energy provision to distributed customers regulated by law securing heat and power to households and companies, the paper presents as a backdrop for the present initiatives on local energy communities the pathways that lead to an integrated energy system both concerning energy transmission form and the roles of the involved actors from producers, distributors, energy communities and users. Especially the new actor: energy communities, defined by the EC in two new directives is of great interest in this context.

The legal constitution of energy communities open for a variety of new organisational forms ranging from the typical and known production cooperative, to new forms of market based exchanges between producers and formalised local communities that can fill an important gap in the existing energy systems. Based on studies in the local South Harbor district of Copenhagen examples of existing and new energy communities and their organisation and role in social inclusion and community building will be exemplified.



## PARALLEL SESSION | CITIZENS' ENGAGEMENT IN COMMUNITY ENERGY

Examining the Relationship Between Neighbourhood Identification, Community Energy Importance, and Social Networks in Explaining Participation in Community Energy Initiatives

*Fleur Goedkoop<sup>1\*</sup>, Daniel Sloot<sup>1\*</sup>, Jacob Dijkstra<sup>2\*</sup>, Lise Jans<sup>2\*</sup>, Andreas Flache<sup>2\*</sup>, Linda Steg<sup>2\*</sup> | University of Groningen*

### ABSTRACT

Community energy initiatives have received increasing interest as a means to promote a sustainable energy transition. Importantly, these initiatives are dependent on motivating a sufficient number of participants. This raises the important question of why people become involved in community energy initiatives. Social science research has investigated this question from different theoretical perspectives, proposing different factors to be important for people's initiative involvement. Next to personal, pro-environmental motivations which have been shown to be positively linked to people's initiative involvement, importantly involvement implies working together with others within the local community and engaging in sustainable energy behaviour together with others in the community. Following this notion of the importance of group processes, one strand of research has focused on the neighbourhood as an important entity, suggesting identification with the neighbourhood and the perception of community energy norms as important determinants of why people become involved in community energy initiatives. In addition, research from a social network perspective takes the interpersonal relations between community members, and the influence that spreads through this network, into account. We aim to integrate these different approaches by examining the influence of identification and community energy importance in interplay with the interpersonal relations and contact between community members in their predictive power on initiative involvement. We use quantitative data from ten villages and city neighbourhoods in the Netherlands (N=954), in which a local renewable energy project has recently been started. We estimate effects of identification, community energy importance, individual social networks variables and their interaction in a proportional odds model of intention to participate.

Participatory experimentation with energy law: digging in a 'regulatory sandbox' for energy cooperatives and homeowners' associations in The Netherlands

*Esther van der Waal (University of Groningen), Tineke van der Schoor (Hanzehogeschool Groningen), Alexandra Das (University of Groningen), and Henny van der Windt (University of Groningen)*

### ABSTRACT

To facilitate energy transition, in several countries regulators have devised 'regulatory sandboxes' to create a participatory experimentation environment for exploring revision of energy law. These sandboxes allow for a two-way regulatory dialogue between an experimenter and an approachable regulator to innovate regulation and enable new socio-technical arrangements.

We focus on the Dutch Energy Experimentation Decree (EED) that invites homeowners' associations and energy cooperatives to propose projects prohibited by extant regulation. In order to localize, democratize and decentralize energy provision, local experimenters can, for instance, organise peer-to-peer supply and determine their own tariffs for energy transport.

However, these experiments do not take place in a vacuum but need to be formulated and implemented in a multi-actor, polycentric decision-making system through collaboration with the regulator but also energy sector incumbents such as the distribution system operator. We are, therefore, especially interested in new roles and power division changes in the energy sector as a result of the Decree. Our central question is: What can be learnt from the EED about the use of regulatory sandboxes for facilitating bottom-up, participatory innovation in the energy system?

Theoretically, we rely on Ostrom's concept of "polycentric governance" to study the dynamics between actors involved in and engaging with the participatory experiments. Empirically, we examine 14 approved energy experiments through interviews and document analysis. Our conclusions will focus on the potential and limitations of a regulatory sandbox for participatory innovation in a polycentric system, and especially on democratization of legal innovation in the studied context.

## Causal pathways to participation in energy cooperatives

Adélie Ranville | Grenoble Ecole de Management

### ABSTRACT

Energy cooperatives encourage the energy transition and defend a vision of a democratic management of the energy. Enacting this vision require however to encourage an active participation of members. The motivations behind member's participation in community energy are diverse, and participants can form heterogeneous groups (Bauwens, 2016; Radtke, 2014). The drivers of participations such as collective identity, social networks, social norms, trust or financial incentives are also interacting in a complex way (Hoffman & High-Pippert, 2010). Some factors seems also to be both antecedent and consequences of participation, this suggest complex causal loops. The paper aims to propose a framework and a method accounting for this complexity. The study rely on original data collected through a survey with a French energy cooperative. The questionnaire was sent to all members (around 4000) and 395 questionnaires were completed. The level of participation was evaluated in a fine-grained way through self-reported behaviours. Data will be analysed through a fuzzy set Qualitative Comparative Analysis, QCA (Ragin, 2008). This method allows to cope with the equifinality and the complex interactions between the factors identified in the literature. The expected results are the identification of different profiles of participants corresponding to different complex causal paths. The results can help energy cooperative to propose adapted forms of participation matching different profiles.

### References

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## The State of Prosumerism in the Netherlands

Oxenaar, Sa., Wittmayer, Ja., & Horstink, Lb. | *a* DRIFT, Erasmus University Rotterdam | *b* University of Porto

### ABSTRACT

Driven by more affordable renewable energy (RE) technologies and the need to prevent dangerous levels of climate change citizens, governments, public institutions, and companies are increasingly generating RE for own use. In the Netherlands there are now between 350.000 and 400.000 households (CBS, 2018), an estimated 5000 companies (Rabobank, 2018), and over 500 energy cooperations (HierOpgewekt, 2018) doing this. This 'prosumerism' phenomenon – active energy users combining the roles of producer and consumer – is part of, and contributes to, the ongoing transition to a largely decentralized energy system based on RE. It challenges the current market structures and institutions (Parag & Sovacool, 2016), and in addition to increasing RE production and supporting grid management (Nursimulu, 2016), has the potential to promote energy democracy (Szulecki, 2018), strongly reduce energy use (Tsousos, forthcoming), and so contribute to a fairer and more inclusive energy transition. The increasing importance of prosumerism has also been acknowledged by the European Commission in highlighting its role in achieving the objectives of the Energy Union. However, despite its growing importance and desired mainstreaming the characterization and mapping of the extent of this phenomenon, especially in a collective context, can still be improved. This paper provides insight in this new role in the Dutch energy system by looking at collective prosumer initiatives, ranging from energy cooperatives and community energy to associations, foundations, and (social) enterprises in the Netherlands. Using a mix of methods - desk study, survey data, participant observation, and practitioner interviews - it provides an overview of prosumerism in the Netherlands. Looking at different types of initiatives and identifying barriers and opportunities such initiatives face, looking at financial, regulatory, institutional, and socio-cultural aspects. In this way it explores the incentive structures that support (and hinder) such initiatives and gives lessons for the mainstreaming of prosumerism.

# PARALLEL SESSION | COMMUNITY ENERGY STORAGE AND FLEXIBILITY

## Socio-technical alignment of community energy storage

*Binod Prasad Koirala, Energy Transition Studies, ECN part of TNO | Ellen van Oost, Department of Science, University of Twente | Henny van der Windt, Science and Society Group, University of Groningen*

### ABSTRACT

Energy Storage technologies are going through great deal of public discourse, networking and experimentation. The decreasing cost of energy storage and increasing demand for local flexibility is opening up new possibilities for energy storage technologies deployment in community energy systems. In this context, community energy storage can help to better integrate the heat and electricity system at the local level and can positively contribute towards energy transitions while accommodating the needs and expectations of citizens and local communities. Yet, there are technological, societal and systemic challenges of integrating energy storage technologies in the largely centralized present energy system which demands for socio-technical innovation. This article aims to align technical, demand, regulatory and political articulation of new energy storage technologies with potential of application in community level such as DrTen and ECOVAT . In this regard, a number of tools has been applied such as socio-technical configuration, socio-technical scenarios, multi-path mapping. Community energy storage necessitates not only technical innovation but also social innovation for its wider adoption. Socio-technical alignment is crucial to show how the technology works, to validate the business model, actors collaboration, as well to improve the public perception and acceptance regarding the community energy storage.

Keywords— energy transition, community energy storage, responsible innovation, energy system integration

## Energy storage on EU islands, legal aspects of community-size projects

*Dr Romain Mauger | Faculty of Law, University of Groningen*

### ABSTRACT

The SMILE project is part of the Horizon 2020 programme of the European Union and runs from 2017 to 2021 (<https://www.h2020smile.eu/>). Its main goal is to install and test 9 different smart grids technologies (including electricity batteries or smart devices for energy storage and for EVs charging) on 3 EU islands (Samsø, The Orkneys and Madeira) with different contexts.

Now halfway through the project, the first results are known. On the legal side, substantial progress has been made in EU law, with the definition, role and actors of storage clarified and the recognition of energy communities in the new Electricity market and Renewable energy sources directives. The combination of these provisions already opens up new avenues for the islands communities part of the SMILE project. In the Member states concerned by the project, an evolution of the national or local regulatory framework for energy storage is also taking place, both for medium- and large-scale installations connected to the grid or for small-scale behind-the-meter equipment.

In this paper, we will present the results of our work realised on assessing the rapidly changing EU and Member states legal framework for electricity storage, with a specific eye on islands' specificities. As the SMILE project islands form limited size communities, the focus will be mostly placed on small-scale energy storage facilities. Finally, the regulatory aspects presented will be put in perspective with the just transition criteria.



## Energy storage concept within EU INTERREG project power-to-flex

*Adenike Bettinger a, Piotr Biernacki a, Tobias Röther b, c, Wilfried Paul a, Patrick Werner a, Sven Steinigeweg a | a University of Applied Sciences Emden/Leer, EUTEC Institute | b 3N Kompetenzzentrum, Niedersachsen Netzwerk Nachwachsende Rohstoffe und Bioökonomie e.V. | c University of Applied Sciences and Arts Hildesheim/Holzminden/Göttingen (HAWK)*

### ABSTRACT

The ratio of renewable energy sources like wind and sun to the net electrical energy production in Germany is increasing year-to-year. In 2018 it amounted 40 %. Nevertheless plants for renewables like wind and solar plants had to be switched off occasionally to prevent grid overload. That practice shows the need for a more efficient use of this power and therefore the need for storage concepts.

The Power-to-Flex project is investigating different storage options on the levels of small houses, business complexes and for the mobility sector. In total 18 partners from the Netherlands and Germany cooperate in this project. One study has been conducted about the environmental impact of using excess electricity to produce methanol. As a case example it was assumed that CO<sub>2</sub> is utilized from the waste water treatment plant of Emden, Germany. A life cycle assessment was carried out to compare methanol production using excess electricity to conventional methanol production. In conclusion the results show that methanol produced by excess electricity has a much lower impact on the environment than the conventional production.

Another study concerning hydrogen as a seasonal storage system was conducted. Targeting the self-sufficiency of an office building it was assumed that the excess solar energy, converted by the PV plant on the roof of the building, is used to operate an electrolyzer and produce hydrogen. The hydrogen is stored using different options like metal hydrides or high pressure tanks and reused to operate a fuel cell in times of need for energy. The results show that the total energy self-sufficiency is technical feasible but cannot currently be economically realized under the given circumstances. However the results show also that hydrogen is suitable for a seasonal storage system.

## PITCHES AND ROUND TABLE | NEW PATHWAYS FOR COMMUNITY ENERGY INNOVATION

*Moderation: Dr. Henny van der Windt | Esther van der Waal, MSc*

We asked our panel members - who are involved in energy initiatives at national, provincial and local level - to reflect on the following questions:

- What were the enabling factors for the current position of the organization you represent? What is its transformative and innovative power? (e.g. awareness raising, developing adapted technology, new business models, new citizens involvement, new networks in the energy sector)
- What are the main activities of energy initiatives in the Netherlands and in which direction can they potentially extend these? What are external threats and opportunities, and internal strengths and weaknesses impacting their development?
- What roles do energy initiatives play, can they play and should they play (for instance, providing energy, operating energy networks, creating more awareness, providing services)? What are main hurdles and opportunities? Do you fore see a changing role for local energy initiatives?
- To what extent should energy initiatives cooperate – and how – with municipalities, energy companies, DSO's and other large energy players? Who are, can and should be key partners?
- What does such cooperation mean for the position and identity of an initiative? What are key challenges for now and the near future?

### Contributions to the workshop from:

- Anne Marieke Schwenke: developments in Dutch community energy (Independent researcher)
- Els Struiving: neighborhood district heating system in Groningen (Strategist & networker Paddepoel Energiek)
- Harm-Jan Prins: new pathways for energy communities (Groninger Energiekoepel)
- Michiel Mulder: community as project developer (Energie VanOns/NMG)
- Maarten van der Laan: new roles for energy communities (ICT)

# PARALLEL SESSION | LOCAL ENERGY INNOVATION

## Co-existence of emerging energy communities with centralized energy system: energy clusters in Poland

*dr Agata Stasik | Koźmiński University, Warsaw, Poland*

### ABSTRACT

The goal of this paper is to reflect on the dynamics of co-existence of emerging energy communities with the dominant role of centralized, coal-based energy system embedded in the infrastructure, interests, knowledge structures, and identities. That is, I ask how the legal, social, and cultural conditions constructed with and for the centralized system impact the organizational, social and technological shape of grassroots energy innovations. For the purpose of this analysis, Polish energy policy constitutes an intensive case in which the incumbent actors, namely the state-owned energy companies relying on coal for energy production, enjoy the particularly strong position. Renewable energy sources (RES) develop in Poland relatively slowly due to unfavorable energy policy securing the position of these companies. However, recently Ministry of Energy started to support the emergence of “energy clusters,” presented as an organizational and technological solution for Polish transition to RES. Energy cluster is broadly defined as a civil law agreement that may include natural persons, legal persons, scientific units, research institutes, and local government units for the generation and balancing of energy needs, distribution, or trade of energy from RES or other sources or fuels within a distribution network. The area of operation of an energy cluster cannot exceed one district (powiat) or 5 communes (gminy). This broad definition leaves space for various organizational and technological innovations. The paper contains the analysis of 1) the role of “energy cluster” in Polish energy policy, as described in strategic documents published in January 2019; 2) the legal and organizational conditions for the development of energy clusters; 3) the organizational, social and technological innovations in selected energy clusters.

## Micro Hydropower in Nepal- A journey from stand alone micro-hydro to distributed generation

*Jiwan Kumar Mallik, Renewable Energy for Rural Livelihoods Project at the UNDP, AEPC-RERL/UNDP | Satish Gautam, Renewable Energy for Rural Livelihoods Project at the UNDP, AEPC-RERL/UNDP | Dr. Binod Koira-la, Science Technology & Policy Studies, University of Twente | Surendra Mathema, Preesu Electronics Pvt. Limited, Nepal*

### ABSTRACT

Nepal is known in the world for having successful community-led stand alone micro hydro plants (MHP) that have transformed rural economy. Unfortunately, as soon as the national grid reaches a micro hydro catchment area, things start falling apart. For various reasons, the community people eventually start using grid electricity and stop the operation of MHP. Thus, the Government of Nepal has come up with the policy for grid interconnection of MHPs having capacity less than 100kW. This opportunity of transforming a standalone system to grid connected system (distributed generation) owes several advantages for both the utility grid and the micro hydro plants. The technological difference between grid interconnection of MHP and other hydropower projects shall be discussed in detail from the Nepalese context. A MATLAB simulation analysis is presented to demonstrate the technical viability of the interconnection in the 11kV feeder line. Moreover, financial and economic analysis of the grid interconnected systems is discussed. This paper also focused on how droop features of Electronic Load Controller (ELC) shall manage the proportional load sharing among the MHP plants.

Key Words — Micro Hydro Plant, Distributed Generation, Electronic Load Controller, Droop Characteristics

## A Bottom-Up Effective Energy Utilization Approach with the help of Community: Indian Scenario

*Mr. KARAN SAREEN, Assistant Director | Central Electricity Authority, Ministry of Power, Government of India*

### ABSTRACT

India has ample amount of coal reserves but coal based power generation has adverse impact on the environment if not properly dealt with. One of the critical issue viz-a-viz Safe and sound utilization of Ash from thermal power plants can easily be resolved with the participation of community. Community owned underground BIO-GAS digester tank can be constructed/developed from Ash obtained from thermal power plants for producing Bio-gas which can be used as fuel for combustion engines, thereby converting it into mechanical energy and thus powering an electric generator to produce electricity. Surplus energy can be supplied to the grid and the revenue generated in this regard can be used for the benefit of the community. Domestication of cattle in Indian community can be easily seen as a part of their tradition or culture which is one of the reason that India has one of the largest cattle population in the world. The large amount Cattle waste/dung in addition to the bio- waste/green waste collected from the community households can be used for producing Bio-gas at large scale. This would also support Government of India (GOI) to set up Compressed Bio-Gas (CBG) production plants and make available CBG in the market for use in automotive fuels under 'Sustainable Alternative Towards Affordable Transportation' (SATAT) innovative initiative and further help in waste management. Taking another scenario where water is generally needed for irrigating the Agricultural land of the communities. Municipal water systems transmit large amount of water through the pipes to the farms of the communities. Within the pipes, series of turbines can be installed. These turbines will spin as the water flows through the pipe and is therefore, useful for generating power. In this way local community can assist GOI in achieving the United Nations Development Programme (UNDP) Sustainable Development Goals no. 7(affordable & clean energy), 9(Industry, Innovation & Infrastructure) and 13(Climate Action).

## Suitability Areas for Energy Planning in Communities

*Jürgen Knies | Jade Hochschule*

### ABSTRACT

A good 30% of final energy consumption is accounted for by heat supply (space heating, domestic hot water), so that a correspondingly large potential can be realized here. With the supply of heat, however, the focus is more on urban areas. Thus it comes about that two planning cultures meet that were previously considered separately: Energy planning from the perspective of energy suppliers and from the perspective of urban planning.

Past practice with regard to energetic redevelopments in urban areas has generally been based on previously established limits of the study and project area. Neighborhood effects and synergies cannot be taken into account in this way. The delimitation itself influences the procedure, results and conclusions for implementation, without the actors further questioning this effect. There are no planning "guard rails" for detailed technical planning. In line with the countercurrent principle, impulses from subprojects and individual decision-makers can flow back to influence the overarching strategy.

With the help of fuzzy logic methods, suitability areas for heat supply options are derived that provide a suitable basis for fuzzy planning. On this basis, the existing and future required potential of renewable energies for a decarbonized heat supply can be assessed. The result is an approach with which the previous form of municipal heat planning can be further developed into an energy master plan and utilized as a dynamic planning instrument, tested in the Cities of Oldenburg, Bramsche, Wallenhorst. The suitability areas can be used as a spatial matrix and thus as a planning "guard rail" for the subsequent detailed planning at district level.



# PARALLEL SESSION | CHANGING ROLES AND RESPONSIBILITIES

Grid operators in crowd-based energy innovations: unlikely institutional entrepreneurs?

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## ABSTRACT

Grid flexibility and storage are key challenges in a transition to decentralized renewable energy systems. To a large extent, these are institutional challenges, as solutions typically imply new roles and responsibilities for actors. As part of their search for their role in the energy transition, grid operators are experimenting with decentralized ‘crowd-based innovations’ (CBI), e.g. collaborating with households in using electric vehicles for grid balancing. CBIs are typically associated with promises of an engaged and empowered crowd. From an institutional perspective, the role of grid operators with respect to CBI is interesting, as they are on the one hand part of the incumbent institutional system and strictly regulated, and on the other hand –as part of their search for redefining their role – they act as institutional entrepreneurs (Hardy & Maguire, 2008) trying to achieve institutional change. The activities of grid operators have been contested by other actors in the field, arguing that the experiments go beyond the legally allowed role of grid operators. In this paper we answer the question: What motivates and allows grid operators to create room for experimentation with CBIs and what does that imply for the role of the crowd? Drawing on literature on institutional entrepreneurship we first theoretically explore how (and why) actors who are part of the system are able to create experimentation spaces. Then we conduct a narrative analysis of experimentation by grid operators in the Netherlands, analysing (proclaimed) roles of the crowd and changes in strategies of grid operators and other actors, based on Dutch media reporting. Our analysis shows that, although grid operators are, from a theoretical perspective, unlikely institutional entrepreneurs, they are quite successful in achieving institutional change. Our analysis furthermore points to a gap between the promises of the crowd and the reality in which experimentation takes place.

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Capabilities and Relational Power: Understanding Acceptance of Wind Energy in Southern Mexico

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## ABSTRACT

Within Sen’s capability approach (in Sen 1984, 1999, 2009) the notion of power is essential, as he defines capabilities as a “kind of power” (2009: 270) and development as a “fundamentally empowering process” (2009: 249). However, it is unclear how Sen’s notion of power, mainly linked to responsibility and individual empowerment, conceptualises and evaluates associative aspects, such as power relations, that may constrain or enhance individual capabilities. In a sense, the capability approach is a framework that has talked about empowerment but has not addressed power. By bringing together Sen’s capability approach and Gaventa’s method to power analysis, also known as the “power cube” (Gaventa 2006), this paper presents a mixed-methods research design to collect information of differing stakeholders’ perceptions about public engagement and governance decisions in Mexico’s the wind energy sector. The main objective will be to explore how communities, wind farm businesses and local governments are exercising agency to maintain or transform conflicting relations linked to the construction and maintenance of wind farms, as well as project cancellations and plant shutdowns. To make this case, the research drew from methodologies that have employed the CA to carry out a three-stage mixed-method approach that complemented the evaluative ability of Sen’s capability approach at the individual level, with the potential of Gaventa’s work to analyse power relations within individuals and institutions. In the first stage, 121 semi-structured interviews explored diverse individual stakeholder’s perceptions of well-being (government officials, indigenous people living next to wind farms, landowners, NGOs, Academia, and wind farm developers), which were then turned into a relevant set of close-ended questions completed by 557 participants across three communities. In a third stage, results were collectively organised and analysed through group discussions to understand how social norms and power dynamics affect the ways in which stakeholders, especially the most marginalised, exercise voice (or not) and influence critical aspects regarding planning and construction of wind farms in the Isthmus of Tehuantepec, Mexico. Preliminary findings conclude that local acceptance under sustainable terms will only be attained through inclusive community engagement that pays particular attention to valued ways of being and doing of the local population, such as access to high quality medical services, employment, higher education, diversified sources of income, and strengthening family ties in the Mexican case. This paper aims at recognising spaces for change and transformation of exclusion in the wind energy sector, to generate insights about promoting a sustainability agenda that situates today’s marginalised people as central and active agents of development, and challenge asymmetric power relations within green transformations.

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## The role of middle actors in the transition to a low carbon society

*Tali Zohar | Department of Natural Resources & Environmental Management, University of Haifa, Israel*

### ABSTRACT

Tackling climate change and meeting the carbon reduction targets in the next coming decades, requires a wide range multi-disciplinary and socio-technical transition in energy systems, energy policy and consumer behavior.

Governments and regulators seek to reduce energy consumption in a top-down manner, usually by providing economic incentives for deploying low carbon technologies and efficiency standards. On the other end, local communities, grassroots and NGOs are promoting low carbon society in a bottom-up manner, by encouraging investments in renewable energy projects and by supporting sustainable low carbon norms and lifestyle. However, these two strategies for promoting change – from the top and from the bottom – often fail to effectively alter production and consumption patterns and bring about a more system wide transition. The middle-out (MO) is an innovative socio-technical framework for transition to a low carbon society. It focuses on the middle-actors as agents of change, and on the middle-out influence they exert on top actors (government, regulator and suppliers), bottom actors (end users) and sideways (other middle actors). This research focuses on the middle out impact of one middle actor, 'Mishkei HaKibbutzim'. Kibbutzim are rural, cooperative local communities. 'Mishkei' is an association of 270 kibbutzim in Israel, a share-holders in 'Dalia' private power station and entrepreneur of renewable energy and energy storage initiatives. The research follows and analyses the ways and strategies through which 'Mishkei' promotes a low carbon transition from the middle out: (1) middle-top: as a key player in the energy market it shapes a low carbon governance, (2) middle-bottom: as an association of 270 Kibbutzim, with large agriculture and industrial sectors as well as around 140,00 households, it promotes consumer engagement and changes end-users consumption patterns, (3) middle-sideways: serves as a source of knowledge and encourages the assimilation of innovative projects in various organisations.

## PITCHES AND ROUND TABLE | NEW PATHWAYS FOR LOCAL ENERGY STORAGE

*Panelists: Rob den Exter, StoredEnergy | Dominique Doedens, Gridflex Heeten/Escozon | Gerrit Midema, DrTen | Jacques Mathijssen, Solarfreezer | Stefan Olsthoorn, EnergyStorageNL*

*Moderation: Dr. Ellen van Oost | Dr. Binod Koirala*

Energy Storage technologies are going through great deal of public discourse, networking and experimentation. The decreasing cost of energy storage and increasing demand for local flexibility is opening up new possibilities for energy storage systems deployment at the local level. In this context, energy storage can help to better integrate the heat and electricity system at the local level and can positively contribute towards energy transitions while accommodating the needs and expectations of citizens and local communities. Yet, there are technological, social and systemic challenges of integrating energy storage in the largely centralized present energy system which demands for socio-technical innovation.

The aim of this session is to explore new and innovative socio-technological energy storage configurations at local and regional level. It brings together researchers and practitioners interested in the societal dimensions of energy storage technology and the technological aspects of social innovation around energy storage technologies.

### We plan to have an interactive session with the following guiding questions:

- Which energy storage technologies ( electricity/heat) are promising for local and regional application?
- What are the institutional preconditions for the emergence of energy storage in the Netherlands? Which barriers in practice are foreseen?
- How to govern local energy storage? Which new business models or its combination are feasible?
- How the roles and responsibilities of different energy system actors will change with introduction of energy storage? How can energy storage facilitate collaborate between energy system actors such as network operators, technology developers, installers as well as citizens and communities?
- Are socio-technical innovations in energy storage technologies responsible? How to address the issues such as privacy, autonomy, sustainability, economic feasibility and ownership?

## PARALLEL SESSION | RESPONSIBLE INNOVATION IN COMMUNITY ENERGY - I

How can Value Sensitive Design fail its task in design for changing values?  
The case of energy systems

*Anna Melnyk | Delft University of Technology*

### ABSTRACT

Values have a fundamental role in the energy sector since they shape our socio-technical systems. At the same time, values are dynamic and may change after a system has already been designed. As a consequence, a mismatch may occur between the values that were embodied in the past, when designing the socio-technical systems and the new and emerging values we find important today. Value Sensitive Design (VSD) is a commonly used approach for the embodiment of values in technical and institutional design. Numerous scholars were applying VSD framework to a broad range of topics in the energy sector, including shale gas, nuclear energy, biofuels, offshore energy parks, and smart grids. However, each of these applications has been lacking the explicit sensitivity to the dynamic nature of values. Such a static vision of the values in VSD results in short-term solutions to design for values. Whereas in the long run, this may abolish adaptability of design to changing values. It is particularly problematic when designing energy systems since they are generally hard to change. By “locking” certain values in socio-technical systems for decades, designers determine the societal path without a backlash for new potentially relevant alterations. Thus, due to the social and moral value change, some thoughtful considerations about an adaption to the current values and the adoption of new values in the energy systems are necessary. This explorative paper aims to illustrate some insights about values change in energy systems in order to confront VSD with these findings and achieve two outcomes: i) highlight the design challenges that are raised by values change in the energy sector, ii) use these insights to indicate the gap that VSD has as a method to design for values.

Technologies of engagement: How battery storage technologies shape householder participation in energy transitions

*Sanneke Kloppenburg, Robin Smale, Wageningen University | Nick Verkade, TU Eindhoven*

### ABSTRACT

The transition to a low-carbon energy system goes along with changing roles for citizens in energy production and consumption. In this paper we argue for a focus on how public engagement in energy transitions is mediated by technologies. Drawing on literature from science and technology studies, we examine how energy storage technologies engage householders in low-carbon energy systems. Based on our empirical work, we identify five storage modes: individual energy autonomy; local energy community; smart grid integration; virtual energy community; and electricity market integration. We argue that for householders, these storage modes facilitate new engagements with energy, and new relationships with other householders and with other actors in the energy system. At the same time, householders will also face new dependencies on information technologies and intermediary actors to organise the multi-directional energy flows which battery systems unleash. With energy storage projects currently being provider-driven, we argue that more space should be given to experimentation with diverse new ways of relating to energy and new forms of social organisation of energy production and consumption.



## Evaluating energy justice in local smart grid systems

*Christine Milchram, Geerten van de Kaa, Rolf Künneke, Neelke Doorn, Faculty of Technology, Policy and Management, Delft University of Technology | Rafaela Hillerbrand, Institute for Technology Assessment and Systems Analysis, Karlsruhe Institute of Technology*

### ABSTRACT

In the transition to more sustainable energy systems, growth in small-scale renewable energy sources allows and requires an increased participation of consumers and citizens in energy generation. Smart grid systems – such as virtual power plants, peer-to-peer energy sharing, or neighbourhood batteries – can facilitate the active participation of consumers and citizens in the electricity system. Such systems are therefore seen as contributing to more just, open, and accessible electricity systems: an energy transition for all and by all.

Despite this potential, it is unclear to what extent smart grids might contribute to energy justice or exacerbate existing injustices. More specifically, it is unclear what technological and institutional design choices support justice. Energy justice research has up to now focused mostly on generation and use of energy. With the convergence between energy and information technologies, however, smart grids affect energy justice beyond generation and use because of the increased use of digitally connected systems, automation, and recording and sharing of real-time data.

In this paper, we explore how evaluations of justice in local smart grid systems can be influenced by the systems' technological and institutional design. We present findings of a case study research, in which we compare local smart grid pilot projects in the Netherlands that combine small-scale electricity generation with storage, smart metering, and a control and monitoring system. Insights are built on semi-structured interviews and content analysis of secondary material.

The paper contributes to the energy justice literature with empirical insights on how justice considerations can be incorporated in the design of smart grids. We propose a framework and method to evaluate the embeddedness of energy justice in institutions and technologies. We provide design recommendations targeted at policy makers and technology designers.

## Political power, influence and the sociotechnical configuration of community energy: insights from three comparative cases

*Marie Claire Brisbois | Science Policy Research Unit, University of Sussex*

### ABSTRACT

Decentralized community energy (CE) producers are capturing a growing share of electricity markets. As this share increases, CE producers are becoming increasingly effective political actors. The traditional political privilege enjoyed by incumbent electricity producers is challenged by CE actors as they begin to shift control over energy supplies and associated market influence. Political struggles between competing interests are increasing. However, the nature and extent of these power shifts in different countries (e.g., different policy outputs, changing political discourse), and their consequences for energy policies and systems (e.g., democratic quality of policy processes, energy system organisation) are still poorly understood.

This paper presents results from three comparative case studies – Canada, the Netherlands, and Great Britain – from a larger study examining a) if increases in CE are leading to larger shifts in political influence structures; b) through which mechanisms power is shifting, and; c) what the consequences of this will be. This paper focuses specifically on results related to the ways that national energy governance, and the ways that political influence is expressed therein, is shaping the social and technical configuration of CE development. The study uses theory on power, institutions, and transitions to draw out findings from 54 key informant interviews and extensive document analysis.

Results reveal a number of relevant dynamics. In particular, in unsupportive regimes (i.e. Ontario, Canada and Great Britain) there is significant innovation of solutions behind-the-meter, and development of partnerships with actors previously not part of energy systems (e.g., cities, not-for-profit institutions). This has consequences for national governments that are democratically accountable for ensuring reliable and affordable energy supplies, and equal opportunities for citizens. Results from the Netherlands are more progressive but still present opportunities for better governance outcomes. The consequences for shifts in political power distribution as a result of these dynamics are addressed across cases.

## PARALLEL SESSION | COMMUNITY ENERGY IN EUROPE

### Barriers and opportunities for community renewable energy in the south of Europe

*Ana Delicado, ICS, University of Lisbon | María-José Prados, University of Seville | Ana Horta, ICS, University of Lisbon | Mónica Truninger, ICS, University of Lisbon | Carolina del Valle, University of Seville*

#### ABSTRACT

Portugal and Spain are success stories in terms of renewable energy (RE). Both are quite close to meeting their 2020 targets: 31% of energy from renewable sources for Portugal (already at 28% in 2017), 20% for Spain (18%). When we look at electricity generation, renewables are responsible for 54% of consumption in Portugal and 36% in Spain (EU average 30%).

However, in the Iberian Peninsula the RE market is dominated by large companies and community energy and self-production are marginal. Energy cooperatives are scarce: only one in Portugal and a handful in Spain (and these are almost exclusively commercialisation cooperatives, which do not own generation facilities). This situation is due to policies that favoured large operators and until recently placed significant obstacles to domestic generation (what was called in Spain “the sun tax”). This has an impact on RE landscapes, dominated by large-scale facilities such as wind farms with dozens of turbines in the mountain ranges of the north and extensive photovoltaic solar plants in the plains of the south.

Yet, this seems to be changing. European directives and national policies seem to be redirecting towards community and distributed production. New initiatives are emerging that aim to bring energy production closer to the place of consumption (in houses, neighbourhoods, industrial and commercial buildings) and closer to the control of users. But how will these changes play out in a context dominated by large operators? What is the role of public authorities? Will bottom-up or top-down approaches prevail? What is the response of communities? What impact will this have on energy landscapes?

This presentation will seek to address some of these issues. It is based on the European funded (MSC RISE) project PEARLS Planning and Engagement Arenas for Renewable Energy Landscapes and the TERRYER project (funded by the Spanish government).

### Barriers and opportunities for French citizen led energy communities

*Doutre Julien | Grenoble École de Management*

#### ABSTRACT

There are many energy Communities in France that did appear during last decade, and we can count around 300 of them wish would mobilize around 10 000 citizens. Part of a more global phenomena, those communities aim to develop a citizen led renewable energy production. Although this phenomenon is developing more and more, the scientific literature concerning the French communities remains incomplete and most of the literature comes from public organization such as ADEME . However, managing its own energy production is by no mean an easy task: some reports argue that there is an economic fragility in the business model, difficulties from the government to follow this new tendency and some issues with the buying fares of the produced electricity. These problems are not yet addressed in scientific researches and that's why we believe that this work could provide help. Thus, we have identified several obstacles that require a meticulous mastery of the business model mobilized by the citizens wishing to create an energy community . The purpose of this paper is to identify these barriers to the development of citizen led energy communities in France. Those barriers can be economical, legal or specific to some communities. Every community is somehow unique but there are common issues for them that we will develop further. To this end, we first propose to highlight the different elements and actors involved in the creation and functioning of the French energy communities. Then we will be able to present a “World” (Becker 1988), that allows us to map the roles and functions of the different actors that revolve around these communities. The field-work includes about twenty interviews with communities, public and associative structures, which have a role of facilitator. The interviews conducted with these actors provide a more detailed understanding of the different interactions and networking that make citizen led energy production possible. From there it will be possible to identify these obstacles and draw some recommendations that would help energy communities or involved public organizations to smoothen the process of setting up renewable energy production.

## Community energy in Italy: lessons from existing evidence

*Chiara Candelisea, GREEN, the Centre for Research in Geography, Resources, Environment, Energy and Networks, Bocconi University | Gianluca Ruggierib, Dipartimento di Scienze Teoriche e Applicate, Università degli Studi dell’Insubria*

### ABSTRACT

Community energy (CE) initiatives for investments in the energy sector have been progressively spreading across Europe and are increasingly proposed as innovative and alternative approaches to guarantee higher citizens participation in the transition toward cleaner energy systems. However, the degree of recognition of the potential contribution of citizens to the energy transition and the level of deployment of CE initiatives still varies considerably across Europe. CE initiatives are more common in North Europe, particularly in countries such as Denmark, Germany and the UK, and far less developed in Southern Europe [1-6]. As a consequence relatively limited is the academic literature researching dynamics, drivers and conditions for implementation of CE initiatives in South European countries [7, 8]. This study goes in the direction of filling this gap by focusing the attention on Italy, and by providing a comprehensive review of CE initiatives emerged in the country since late 2000s. CE initiatives have been systematically searched for and qualitative and descriptive data have been collected through semi structured interviews with one to two representatives of each of them. The review presents a very heterogeneous sector with CE initiatives been developed by following diverse process dynamics, by different actors and through varying organizational structures. Mostly, the results show a sector still at its niche level, mainly characterized by the development of rather small, ‘ad hoc’ initiatives, for the majority dedicated to PV system deployment and with a strong local focus. Its development has been largely dependent on generous PV FiT schemes, which have made PV investments quite profitable and relatively low risk. The majority of renewable energy plants have been developed between 2008 (date of implementation of first FiT scheme) and 2013 (date of discontinuity of FiT support to PV). Since then there is very little evidence of new CE initiatives in Italy. The only CE initiatives still developing renewable energy plants to date are the few larger ones with a national scope in their activities, for which case studies are presented in the paper. Conclusions are drawn in terms of conditions for future sector development and policy considerations.

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## Spatial imaginaries as a concept for studying innovation in local sustainable energy systems

*Eveline de Smalen, LMU Munich; Rachel Carson center | Esther van der Waal, University of Groningen*

### ABSTRACT

This explorative, transdisciplinary study focuses on the imagination of local energy systems innovation through spatial imaginaries and combines insights from a literary and spatial perspective. Spatial imaginaries are stories and ways of talking about places and spaces, which help shape material. Spatial imaginaries are performative in a sense that they are producing, reproducing and changing social perceptions about places; even among those whom have never been there, or of spaces that do not yet exist. Hence, spatial imaginaries could be a fruitful concept to better understand the local energy innovations as these also sprout from the imagination of their initiators as they also do not exist yet and need to be shaped as ideas first. The underlying question we want to contribute to is: how can and do spatial imaginaries of energy innovation help to shape local energy systems of the future?

The disciplines of literature and geography are both fundamentally interested in imaginations of space, place and future and can help us understand how we can imagine local energy systems as very different to what we have been used to by contributing insights into the ways these imaginations function and the effects they have in society. Literature study allows us to explore the construction, implications and limitations of innovating through imaginations in a world that is fickle and unpredictable, and increasingly so in the contemporary period of environmental change. Using a spatial perspective, we can see more concretely what the practical challenges and opportunities are for local energy systems change towards sustainability. In this way, the two disciplines complement each other and show how we can use the concept of spatial imaginaries productively in the effort to create a more sustainable future.

In the future, we plan to add an empirical study, but as we are in the early stages of this transdisciplinary research, the presentation will mainly focus on the use of spatial imaginaries as a theoretical concept and methodology for studying local energy systems innovation.



# PROGRAMME | DAY 2

09:00	Walk-in and coffee		
09:30	Keynote speech   Room 5159.0029		
	Community energy storage: Opportunities, challenges and perspectives – <i>Dr. David Parra, University of Geneva</i>		
	Developing country perspective on community energy: Learnings from Indian smart grids – <i>Dr. Ankit Kumar, TU Eindhoven</i>		
10:30	Coffee break		
11:00	Parallel Sessions		
	We energy tool   Room 5159.0291 / 5159.0090 Greenergy   Moderator: <i>Roel van Veen</i>	New business models for community energy and storage   Room 5159.0110   Moderator: <i>René Benders</i>	Responsible innovation in community energy - II   Room 5159.009   Moderator: <i>Henk Moll</i>
	Planning for a sustainable future: The case of we energy tool as an interactive planning practice - <i>Frank Piere, Mathieu Przybyla, Roel van Veen, Stern Brouwer, Eloy Krikken, Demi Imming, Tania Ouariachi Peralta</i>	Co-operative energy storage, towards a feasible business case - <i>Tineke van der schoor, Simon Visbeek, Raymond Kruyer</i>	Facilitating the participation of vulnerable consumers in renewable energy communities – Towards an inclusive design of the Clean Energy Package – <i>Florian Hanke, Jens Lowitzsch</i>
	The energy transition in everyday life: About Epistemic rights and responsibilities in local energy initiatives - <i>Roel van Veen</i>	Exploring the effect of business models on the economics and functioning of energy storage systems using agent based modelling - <i>S.A.R. Mir Mohammadi Kooshknow, F. Ruzzenenti, M.A. Herber</i>	Investigating the potential of collective actions initiatives for the energy transition - <i>Alessandro Scullio</i>
	Demonstration: We Energy Tool - <i>Roel van Veen</i>	Institutional strengthening and commercial operation of micro-hydro power project in Nepal as Business model - <i>Subas Chandra Kunwar</i>	The local energy transition and constructive technology assessment - <i>Karel Mulder</i>
		Local market mechanism and fairness in community micro-grids - <i>Bertrand Cornélusse</i>	Developing RRI methodologies for emotional and ethical evaluation in place based energy storage imaginaries - <i>Gareth Thomas</i>
12:30	Lunch		
13:30	Closing Speech   Room 5159.0029		
	Investing in a Renewable Future – Renewable Energy Communities, Consumer (Co-)Ownership and Energy Sharing in the Clean Energy Package - <i>Prof. Jens Lowitzsch, European University Viadrina, Frankfurt (oder), Germany</i>		
14:30	Coffee break / drinks		
15:00 – 18:00	Excursions ENTRANCE Zonnepark bij het dorp 't Zandt ( Energie co-operative Zonnedorpen), Sea-salt pilot EAZ company, farmers working with EAZ wind turbines and storage		

# KEYNOTE SPEAKER

David Parra



**Community energy storage: opportunities, challenges and perspectives | Dr. David Parra**

David Parra is a senior researcher and teaching fellow at the University of Geneva (UNIGE) where he coordinates the energy storage research since 2016. He is also a PI in the Swiss Competence Centre for Heat and Electricity Storage in Switzerland, as well as visiting researcher at the Massachusetts Institute of Technology (MIT) since 2017, after receiving funding from the Swiss National Science Foundation to establish a new collaboration.

His has expertise on renewable energy and storage technologies, systems and policy with a combination of both modelling and experimental experience which has proven to be useful for the successful deployment of pilot projects and engagement of consumers. His research is interdisciplinary in nature and incorporates technical, economic, environmental and social dimensions, with the latter being expanded at the moment. He has proved the ability to lead collaborations on projects and publications in Switzerland and abroad. Before, David Parra was a Post-doc at the University of Geneva from 2014-2016. He obtained a PhD on energy storage for communities at University of Nottingham from 2010-2014, funded by E.ON and European Regional Development. Before that, he was a researcher on solar energy for heating and cooling at the Spanish Research Council (CSIC) from 2008-2010.

# KEYNOTE SPEAKER

Ankit Kumar



**Developing country perspective on community energy: learning from India smart grids | Dr. Ankit Kumar**

Dr Ankit Kumar is a human geographer working on socio-cultural issues that impact people's access to basic infrastructure in the global South. He is currently a postdoctoral researcher at School of Innovation Sciences, Eindhoven University of Technology, working on social and institutional aspects of smart grid developments in India. Ankit has a PhD in Geography from Durham University, UK. His research interests revolve around critical development studies, postcolonial studies, digital social sciences and energy geographies. He has published in various journals including Energy Research and Social Science, Social and Cultural Geography, Geoforum. Website: <http://www.ankitk.com>.

Latest Publications: Kumar A. (forthcoming) Between metis and techne: politics, possibilities and limits of improvisation, Social and Cultural Geography  
Kumar, A. (2019) 'Beyond technical smartness: Rethinking the development and implementation of socio-technical smart grids in India', Energy Research & Social Science. Elsevier, 49 (October 2018), pp. 158–168.  
Kumar, A. et al. (2019) 'Solar energy for all? Understanding the successes and shortfalls through a critical comparative assessment of Bangladesh, Brazil, India, Mozambique, Sri Lanka and South Africa', Energy Research & Social Science. Elsevier, 48(March 2018), pp. 166–176.

# KEYNOTE SPEAKER

Jens Lowitzsch



**Investing in a renewable future - Renewable energy communities, consumer (co-)ownership and energy sharing in the clean energy package | Prof. Jens Lowitzsch**

Jens Lowitzsch holds the Kelso Professorship of Comparative Law, East European Business Law and European Legal Policy at Europa-Universität Viadrina Frankfurt (Oder). He directs the Inter-University Centre (Viadrina, Freie Universität Berlin, Sveučilište u Splitu and Université Paris 1 Panthéon-Sorbonne). His main fields of expertise are employee and consumer financial participation, energy law, privatisation, insolvency law, European Law and legal policy, distributive justice and the renewal of the European welfare state. Dr. Lowitzsch was born in Germany and besides his mother tongue speaks fluently English, French, Italian, Polish and is proficient in Spanish and Russian. He studied law and Slavonic studies at Freie Universität Berlin and Uniwersytet Jagiellonski Kraków. After the postgraduate judicial service at the Berlin Regional Court of Appeal, he passed the bar exam in 2002. In the same year, he earned his PhD at Freie Universität Berlin.

Dr. Lowitzsch directs the HORIZON 2020 project “SCORE – Supporting Consumer Co-Ownership in Renewable Energies” as coordinator (CSA 2018-2021, see <https://www.score-h2020.eu/>) He edited the book “Energy Transition – Financing Consumer Ownership in Renewables – 18 country studies and a comparative analysis” published in January 2019 with Palgrave/McMillan; this book advocates Consumer Stock Ownership Plans (CSOPs) investigating their feasibility in all countries under consideration.

## ABSTRACT AND PARALLEL SESSIONS | DAY 2

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## PARALLEL SESSION | WE ENERGY TOOL

### Planning for a Sustainable Future: The Case of We Energy Tool as an interactive planning practice

*Frank Pierie, Mathieu Przybyla, Roel van Veen, Stern Brouwer, Eloy Krikken, Demi Imming, Tania Ouariachi Peralta*

Keywords: sustainability; energy transition; serious games; planning tool; educational technologies

#### ABSTRACT:

The urgency of climate change and the complexity of the energy transition challenge indicate the need for increased awareness and collaboration between all involved stakeholders in order to design fitting sustainable systems. Although there are many available solutions, an optimal balance considering the point of view from all parties involved is out of sight without a transparent overview of possible technical solutions and a dialogue among all parties. Besides that, the sun does not always shine, wind can provide a lot of energy, but can also encounter protest by local residents; biomass could be a good solution, but its yields are lower and its environmental footprint is greater. In search of innovative approaches, serious gaming is gaining attention among scholars and practitioners, as a tool to raise awareness on sustainability and energy transition. Therefore, focus is placed on designing a transparent planning tool containing technical knowledge and a serious gaming approach to activate stakeholders in planning and dialogue. Within “the We-Energy Tool”: challenges in the provision of affordable energy from renewable sources for an entire town or city are addressed, by aiming for the creation of an ideal sustainable energy mix. During planning sessions, players will negotiate, from their respective stakes, which energy source they want to employ and on which location, with the goal to make a village or city energy neutral. The We-Energy Tool requires players to solve complex problems, covering multiple domains, and different competencies and expertise. In the workshop we will present details about the tool including future development and use, but most importantly, ask for feedback on possible improvement on the proposed tool.

### The Energy Transition in Everyday Life: About Epistemic Rights and Responsibilities

*Roel van Veen | Hanze University of Applied Sciences Groningen*

#### ABSTRACT

The most crucial questions for sustainability research are no longer about what is causing the problems, but are about how we can solve them: how can we facilitate the transformative societal changes that are necessary to develop a sustainable society? Public and civil society engagement is increasingly playing a role in the energy transition. Buzzwords like participation and co-creation are often mentioned in this regard, but are hard to design and carry out in practice.

Local Energy Initiatives (LEIs) are forms of grassroots innovation. These niches of social innovation are changing the traditional roles of citizens and consumers. LEIs and energy regime actors are more and more acting together, but cooperation is hard because of inherently different institutional identities and logics. Furthermore, the energy transition is a transition-in-the-making. Knowledge and the related rights and responsibilities to shape the future energy system is, therefore, still being negotiated in social interaction. Knowledge is socially produced and epistemic claims are closely related to personal and/or institutional identities. People can, therefore, become really heated when their claims are being rejected or when their concerns are not taken into account. Energy regime actors still have difficulties with including LEIs in their governance, but LEIs are often also struggling with joining forces with them.

This paper studies public and/or stakeholder meetings in participatory innovation trajectories and employs discursive psychology to analyse real-life and real-time social interactions to understand how both niche and regime actors work on shaping the future of the energy system. Specifically, we focus on epistemic stance and the mechanisms through which participants hold each other accountable and sanctionable for the knowledge they display. Ethnography provides the contextual background in which these social interactions take place. We aim to contribute to facilitating constructive and inclusive dialogues about achieving sustainable energy futures.

## Demonstration: We-Energy Game

*Roel van Veen | Hanze University of Applied Sciences Groningen*

### ABSTRACT

The We-Energy Game is a serious game that has already been played well over 300 times with almost 5000 participants. Originally, the game was developed to make a scientific presentation more interactive and fun, but more and more it was being strategically employed to start a dialogue about the energy transition in different institutional settings. Local governments are our primary target group, but we also play the game with local energy initiatives, housing corporations, companies and, increasingly, primary and secondary schools. It is also incorporated in several higher education programs in Groningen.

The We-Energy Game is all about different stakeholder groups in the energy transition and the dynamics of their interactions. Each participant represents a stakeholder group and together they have to make a specific local community energy-neutral. They can opt for different renewable energy sources and have to decide where these would fit in spatially in the landscape. This invites to discussions and negotiations about an optimal energy mix for the area. For more information, please, have a look at [www.we-energy.eu](http://www.we-energy.eu).

We would like to propose a demonstration of the We-Energy Game. A regular session consists of a 10 minute introduction followed by two play rounds, with increasing difficulty, of 20 minutes and is wrapped up with a discussion of about 10 minutes. It can be shortened to a minimum of 30 minutes.

## PARALLEL SESSION | NEW BUSINESS MODELS FOR COMMUNITY ENERGY AND STORAGE

### Cooperative energy storage, towards a feasible business case?

*Tineke van der Schoor, Simon Visbeek, Raymond Kruyer*

### ABSTRACT

Energy cooperatives are beginning to expand their role from stimulating small-scale electricity production to developing local energy systems, including cooperatively owned energy storage solutions. However, many technical, social and financial obstacles are encountered in this process. It is as yet unclear how new roles of citizens, building owners, grid operators and energy cooperatives will develop. Furthermore, it is difficult to assess if a feasible business case is at all possible given present context conditions in the Netherlands.

Currently, there are pilots underway to combine energy storage with solar parks and charging infrastructure for electric mobility. In Weert, a solar park of 5.200 panels is combined with a neighbourhood battery. In Groningen, a neighbourhood storage facility of 600 kWh will be installed in an apartment block, as part of a larger refurbishment scheme. This will be connected to the installation of four charging poles for electric vehicles. Procedures for 'smart charging' are currently being developed to manage intermittent demand and production of solar energy, where storage provides a buffer between EV-charging and PV-panels.

We study a pilot project in Zuidhorn which aims at a combination of smart charging with a solar car park. For this study, we will engage four focus sessions with stakeholders. We aim to develop three variants of a business case; peakshaving, energy trading, and storage as buffer facility for the grid operator.

Theoretically, we rely on the multilevel perspective, to assess what niche and regime dynamics are at play in the case of energy storage. We will explore emerging bundles of technology, social functions, ownership, management and energy trading, to come to grips with new sociotechnical arrangements for community energy.

Our study will shed light on the perspectives of stakeholders in the local energy transition and deliver insights in the feasibility of cooperative energy storage in the near future.

## Exploring effects of business models on the economics and functioning of energy storage systems using agent-based modeling

*S.A.R. Mir Mohammadi Kooshknow, F. Ruzzenenti, M.A. Herber | ESRIG Institute, University of Groningen*

### ABSTRACT

Electricity storage is recognized as a solution to better integrate variable renewable generation into the electricity system, however implementation of electricity storage systems (ESS) is globally negligible. From the business perspective, main barriers for development of ESS worldwide include problems in viability of business models, and regulatory and market environments. These two domains are inter-related as the former refers to internal logic of a business and the latter influences the environment of a business. We previously developed a design space and a set of potential solutions for electricity storage business models in the context of the Netherlands, and illustrated that there were various potential business model patterns based on applications, customers, owners, and locations of ESS (Mir Mohammadi Kooshknow & Davis, 2018). To make a bridge from the abstract business model ideas to real-world application, some steps needs to be taken including prototyping, where we aim to quantitatively estimate the model's earning potential, and to evaluate continuity of a business. We use agent-based modeling to analyze the markets in which ESS products and services can be traded incorporating various bottom-up features. Furthermore, we use exploratory modeling analysis approach in which series of computational experiments are used to study and analyze systems under uncertainties. This study will present the profit of ESS business under various business models design and uncertainties in the business environment.

## Institutional Strengthening and Commercial Operation of Micro Hydro Power Project in Nepal as a Business Model \*

*Subas Chandra Kunwar | Renewable Energy for Rural Livelihood (RERL)*

### ABSTRACT

In Nepal, it might take much more years to connect with electricity line of the national grid due to the remote landscape and geographical structure. From the last two decades, development of small scale micro hydro-power projects have been promoted in various parts of the regions. It is found that micro hydro plants as a promise to increase rural electrification, particularly in poor, isolated regions and also helping on social transformation through various productive end-uses. However, these micro hydro projects still face numerous problems mainly on management and financial aspects, as a result, it is not functioning properly on its's full swings. In absence of institutional setup, the large numbers of already established micro hydro projects are unable to collect sufficient revenue even for their survival. At present, most of these are operated either in subsistence level or fall nearly in sick condition. If micro hydro projects does not possess the proper management with incentivize system which raise the question of commercial operation and management.

Commercial business model have been implemented in selected micro hydropower projects in Nepal in order to improve the overall performances on institution, governance and management system. Appropriate business model and institutional strengthening bring positive impact in micro hydro projects for sustainable management and operation. Thus, it is envisioning that the plants should be operated and managed as a business model for sustainability and to increase the attractiveness. This will help to increase the plant load factor and generate revenue to enhance financial sustainability.



## Local market mechanisms and fairness in community microgrids

*Bertrand Cornélusse | University of Liège*

### ABSTRACT

In community microgrids, members of a community can exchange energy and services among themselves without going through the usual channels of the public electricity grid. In [1] we have introduced and analyzed a framework to operate a community microgrid, and to share the resulting revenues and costs among its members. A market-oriented pricing of energy exchanges within the community is obtained by implementing an internal local market based on the marginal pricing scheme. The market aims at maximizing the social welfare of the community, thanks to the more efficient allocation of resources, the reduction of the peak power to be paid, and the increased amount of reserve, achieved at an aggregate level. A community microgrid operator, acting as a benevolent planner, redistributes revenues and costs among the members, in such a way that the solution achieved by each member within the community is not worse than the solution it would achieve by acting individually. In this way, each member is incentivized to participate in the community on a voluntary basis.

In this paper we will analyze the impact of several formulations of the local market clearing problem on some fairness measures such as the one introduced in [2].

[1] Cornélusse, B., Savelli, I., Paoletti, S., Giannitrapani, A., & Vicino, A. (2018). A Community Microgrid Architecture with an Internal Local Market. arXiv preprint arXiv:1810.09803.

[2] Cornélusse, B., Ernst, D., & Lachi, S. (2018). Optimal operation and fair profit allocation in community microgrids. Proceedings of CIRED Workshop 2018.

## PARALLEL SESSION | RESPONSIBLE INNOVATION IN COMMUNITY ENERGY - II

### Facilitating the participation of vulnerable consumers in renewable energy communities – Towards an inclusive design of the Clean Energy Package

*Florian Hanke and Jens Lowitzsch | European University Viadrina*

### ABSTRACT

In the Clean Energy Package of the European Union the fight against energy poverty and the inclusion of low-income households (LIHs) and vulnerable consumers have a prominent place. Although the political aim is clearly set, the lawmakers have refrained from specifying how to include LIH and what policies in particular to implement. When consumers become prosumers of renewable energy (RE), they produce a part of the energy they consume, thus reducing their overall expenditure for energy, and the sale of excess production gives them a second source of income. These positive effects on disposable household income further increase when prosumership is coupled with energy efficiency (EE) and decreased consumption reduces the amortisation period of the investment as less money is spent on energy and more production may be sold to the grid.

There is, however, a condition attached in order for these effects to materialise: investment capital, either savings or access to credit. LIHs as a rule have neither savings nor access to credit; but even if they manage to raise the necessary funds, means-tested transfers pose a barrier to LIHs since to be eligible for social transfer payments they must liquidate all assets. This problem is exacerbated by the fact that (energy) poverty negatively affects the capacity for sound economic decision-making, complicates trade-offs and leads to short-sighted and risk averse assessments. All these factors prevent LIH to participate in renewable energy communities (RECs) as put forward by the 2018 recast of the Renewable Energy Directive (RED II).

We argue that Consumer Stock Ownership Plans (CSOPs) mitigate these problems and open up the existing hermetic system of property ownership. Successful participation firstly depends on a supportive regulatory environment with a welfare regime not only allowing but actively supporting financial participation of LIHs in RE projects. Secondly, project design must consider the poverty situation by providing access to information, simplifying required decision-making and applying nudging and re-framing of decisions. In addition, given the tense financial situation of LIHs, participation should translate to immediate benefits.

## Investigating the potential of collective action initiatives for the energy transition

*Alessandro Sciallo | Università di Torino*

### ABSTRACT

There are large knowledge gaps around the governance of the low carbon energy system transition in a smooth and participative way, ensuring that citizens are at the centre of the required fundamental transformation and enabling the full efflorescence of their creative potential. Social innovation is a prime way to tap into that potential while Collective Action Initiatives (CAIs, e.g. energy communities, cooperatives, purchasing groups) are a prime way to mobilize people and to ensure the acceptance for and participation in the necessary transition process. As of today, the role of citizen-driven CAIs and their contribution to the energy transition has neither been quantified at an aggregate level, nor has their contribution potential been estimated or understood in sufficient depth. However, both social innovation and CAIs lack widely shared definition and proper scientific and field tested understanding of their development and factors for success. The research activity starts from seeking for a definition of CAIs, intended as a social innovation in itself and provisionally identified in organizational settings of people acting together in pursuit of common interests while Social Innovation is an innovation - both in processes and in products - aimed at fulfilling societal functions by engaging social actors (Hubert et al. 2010) The problem in analyzing collective action is its lack of sharp edges: people vary continuously from intensive involvement to passive compliance, interests vary from quite individual to nearly universal and in general CAIs result from changing combinations of interests, organization, mobilization, and opportunity interplaying within a landscape of technical, institutional, economic, social and cultural factors that may facilitate or hinder the activities of CAIs..Based on a shared definition of CAIs will then be possible to measure their success and estimate their contribution to the energy transition, as well as help support policies that further their development. At this aim complex research approved has been designed unfolding along three stages. The first stage consists of a Europe-wide data collecting allowing the quantification of the aggregate contribution of CAIs to the energy transition (e.g. installed capacities, people involved, energy services provided, finances invested etc.). and the identification, through the means of a cluster analysis, of a number of CAI typologies. The second stage provides extensive surveys and identifies candidates for in-depth case studies of CAI activities in six selected EU countries: Belgium, Estonia, Italy, Netherlands, Poland, and Spain. The third stage focusses on engaging CAI members and local representatives in a process of co-production of knowledge. through 30 comparative case studies (5 for each selected country) and 6 participatory case studies (1 for each selected country) will be carried out by national teams composed of researchers and CAIs representatives. The expected impacts of the project are two-fold. Firstly, the research will advance the scientific knowledge on the motives, desires, objectives and barriers of such collective action initiatives and their historical and future role in the energy transition. Building on the information gathered and tested for its robustness, it will be then co-developed and tested supportive tools together with CAI members, decision makers and the scientific community. All the actors of the energy system will be benefitted by the results of the research activity: CAIs (existing and future) will be able to find solutions for further developments; Citizens will gain awareness about the benefits of participating in local level energy production, distribution and consumption; Policy makers will be provided with many evidence-based tools to support the energy transition; The European Union will be supported in developing a broader decentralized, affordable, secure, inclusive and sustainable energy system.

## The local energy transition and constructive technology assessment

*Karel Mulder | HHS & TU Delft*

### ABSTRACT

The approach of Constructive Technology Assessment has been introduced to “reduce the human costs of trial and error learning in society's handling of new technologies, and to do so by anticipating potential impacts and feeding these insights back into decision making, and into actors' strategies”[1]. Niche experiments have been carried out to trigger and facilitate interaction and learning regarding novel technologies. However, in the current energy transition, the drive for change is not created by opportunities emerging from options created by research; The drive for change has emerged as a new societal challenge to reduce the emission of greenhouse gases, efficiently use scarce resources and the prevention of earthquakes in the North of the Netherlands.

Still, I will argue, that this is not simply a change of societal preferences leading to different choices regarding more or less equivalent energy technology options. Energy technologies have become strongly interrelated. Novelty is therefore required at systems level, but at this level, a dominant paradigm is guiding urban energy systems development: large scale centrally controlled district heating networks. However, the further societal embedding of district heating networks might be problematic, and problems might be foreseen. This implies that there is a context that is in many ways comparable to a CTA context: a ‘natural’ trajectory and signs that this trajectory might not be completely unproblematic.

This paper will discuss necessity/opportunities for CTA efforts in regard to the ‘Dutch heat transition’ by discussing heat transition efforts in The Hague, and evaluate the necessity of specific CTA features.

1. Schot, J. and A. Rip, The past and future of constructive technology assessment. Technological forecasting and social change, 1997. 54(2-3): p. 251-268.

## Developing RRI methodologies for emotional and ethical evaluation in place-based energy storage imaginaries

*Gareth Thomas | Cardiff University*

### ABSTRACT

Energy storage imaginaries are distinct from other energy infrastructure in that the changes they imply are not restricted to a single social domain or technology vector but cut across a range of relationships, practices and infrastructures in novel ways. This is particularly true at a community scale where localized ownership, greater municipal or industrial involvement in local energy systems, and an array of other governance models may come into play. This poses a methodological challenge for RRI researchers interested in the emotional and ethical aspects of transitions involving storage. Not only do researchers need to relate details of diverse technologies and systems, but also to encourage reflection on the multiple facets of community and daily life with which storage may interrelate. This paper outlines an innovative methodological approach to RRI research, centered on a multi-disciplinary, place-based demonstration of smart energy systems in Port Talbot, South Wales, including potential new battery, hydrogen and thermal storage. Our research aims to anticipate what multiple expert imaginaries for place-based storage demonstrators might mean in light of local peoples' values and experience of living in the area. By going beyond abstract ethical principals' we aim to better anticipate how processes of infrastructure and governance change may impact upon 'lived futures', the relationships and emotional attachments that render the future tangible and allow us to anticipate what desirable future states might look like. We detail the design and piloting of a range of activities designed to meet this goal including affective mapping interviews and multi-modal workshops in which interview participants will come together with researchers and artists to imagine, draw and physically model interactions between future storage infrastructures with existing industries, communities and environments. We will conclude with brief reflections on our ongoing use of these methods and by inviting discussion of our upcoming work and the role of art in anticipatory design.

# PRACTICAL INFORMATION

## CONFERENCE WEBSITE

<https://www.rug.nl/fse/conference-community-energy-and-storage>

## INTERNET ACCESS

At the University we use the WiFi network named Eduroam. You can use the login details provided in the information bag received at the beginning of the conference.

## PUBLIC TRANSPORT

Bus line 1 or 15 will bring you to the City Centre of the Energy Academy building (bus stop Nijenborgh)

## TAXI AND CAR

The parking spaces P0, P2 and P4 are equipped with barriers. When using the parking spaces P0, P2 or P4 (closest to venue), your host will have announced your arrival and a parking space is reserved for you. On arrival, you must report via the intercom of the enclosed car park. You give your name and the name of the employee for whom you are coming. If you can not find a parking space, you can go to the free parking (P5 and P6), which are located further on the property. P0, P2 and P04 are only accesible for employees and guests of the University of Groningen.

If you need a Taxi, the reception of the Energy Academy can book it for you (Taxi rides are at your own cost)

## BICYCLE

You can rent a bicycle from the dutch railroads, the so called OV-fiets. These are available at the bicycle parking Groningen Central Station. For more information on reservations and prices please visit our conference website.

## CITY MAP | ZERNIKE CAMPUS

A map of the city of Groningen and Zernike campus are provided in the information bag.



# PARTNERS



Cogas is more than 50 years active as independent grid operator in the eastern part of The Netherlands. In the coming years we foresee that the energy landscape and the role of grid operators will drastically change. Our new role will be focused on stimulating new (regional) alliances. Cogas aims to collaborate with other stakeholders to realize a sustainable region in which people can comfortably live and work.



Dr Ten, specializes in product and process innovation within the sport, food, energy and chemical sectors. Our team at Dr Ten is ready to help you or partner with you on developing your innovative ideas into real products. We believe that innovation is not just another theory on paper, but we believe in giving practical proven advice that will help you in developing your innovative ideas into real products. For our work, we make use of laboratory and process facilities, on-site, at the TU Delft or our very own laboratory.



At this time, there is still a substantial potential in the realization of the sustainability of the Agri-food sector and the built environment, where those concerned are eagerly looking for heat storage solutions. The currently known systems only store energy for short periods of time or the realization of such a system is not economically cost-effective. However, the Ecovat® energy storage system has an innovative principle: affordable thermal energy storage across the seasons. On the cutting surface of Agrifood, renewable energy and the built environment, Ecovat® is the missing link.



Fudura measures flows of energy and makes them transparent and controllable. Fudura also rents out business equipment for energy management. Being a market leader, Fudura helps over 23.700 business clients in The Netherlands with a reliable and effective energy management.

## UNIVERSITY OF TWENTE.

The Department of Science, Technology, and Policy Studies (STePS) takes the assessment and governance of innovations and emerging technologies as its central theme of teaching and research. STePS considers in particular strategic issues that are multidisciplinary: they involve developments in science, technology, politics and society, as well as interaction between them. Studies conducted within STePS link analytical and normative perspectives, and consider not only technological innovations but also innovations in governance.

# SPONSOR

New Energy Coalition is a knowledge and network organisation striving for a sustainable world by boosting the acceleration of the energy transition. This system transformation requires business enterprises, (knowledge) institutes and policy makers to innovate in close collaboration in order to achieve breakthroughs in technology and knowledge, in economic and societal implementations and in people's mindset and behaviour. As a catalyst, New Energy Coalition drives innovation and education by bringing together knowledge, policy and entrepreneurship.

New Energy Coalition is working with five themes, of which one is 'local energy systems'. In order to facilitate further knowledge development and an academic community working on this theme, New Energy Coalition is supporting the conference 'New pathways for community energy and storage'. New Energy Coalition would like to invite the academic community to cooperate in further developing the knowledge and optimizing the societal impact.

# New Energy Coalition

# EXCURSIONS



## ENTRANCE | Centre of Expertise Energy

EnTranCe, the Centre of Expertise Energy, speeds up the transition to clean, renewable and affordable energy. Scientists, students, businesses, authorities and social institutions all come together to share their knowledge at our centre of expertise. Together we develop the innovations that are much needed for the energy transition and strengthen the regional knowledge economy.



## EAZ company, farmers working with EAZ wind turbines and storage

Wind energy is for everyone! Also for you. Farms, businesses and households in rural areas all profit when saving on their energy bill. Wind energy is abundant in the Maritimes and electricity rate are significant. E.A.Z. Wind has made it economically profitable to produce your own wind energy.



## Zonnepark 't Zandt (Energy cooperation Zonnedorpen), Sea-salt pilot

The sea salt battery pilot takes place at solar park 't Zandt, a project of cooperative Zonnedorpen. The solar park has two unique characteristics. The first is that the consumers of the energy do not need to invest in the park, so its green energy is accessible for people of all socio-economic backgrounds. The second is that the highest point of the solar park is only 1 meter above the ground-level. The combination with a hedge results in a minimal visual impact.

