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National policy dialogues in Denmark, Latvia and Lithuania.

WP5 report from “Integrating Energy Sufficiency into Modelling of Sustainable Energy Scenarios

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National policy dialogues in Denmark, Latvia and Lithuania



Project partners:
Aalborg University
Lithuanian Energy Institute
INFORSE-Europe
Green Liberty Latvia



Integrating **Energy Sufficiency** into Modelling of Sustainable Energy Scenarios
- A project funded by the Baltic Nordic Energy Research Programme

National policy dialogues in Denmark, Latvia and Lithuania

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Project overview:

Integrating energy sufficiency into modelling of sustainable energy scenarios

The project was funded by the Baltic-Nordic Energy Research Program and took place 2020-2022. The project partners were Green Liberty (Latvia), INFORSE Europe (Denmark), Lithuanian Energy Institute (Lithuania) and Aalborg University (Denmark). The project was coordinated by Aalborg University. The project had an observer group with members from AirClim (Sweden), Finnish Nature Conservation Society (Finland), Naturvernforbundet (Norway), Association négawatt (France), and Stockholm Environmental Institute (Tallinn Office, Estonia).

The project objectives were:

1. Integrate sufficiency aspects into energy modelling tools applied for development of sustainable energy scenarios
2. Develop modified Danish, Latvian and Lithuanian national sustainable energy scenarios, which build upon the combination of sufficiency, efficiency and renewable energy
3. Create national policy dialogues among public and private actors in the Nordic and Baltic countries about energy scenarios that include energy demand changes from a sufficiency perspective and discuss the feasibility of these scenarios and the possibilities and limitations for socio-economic and regulatory changes enabling transition towards these scenarios
4. Disseminate the methodology for integration of sufficiency into energy modelling tools and development of scenarios, and disseminate the experiences with developing and applying these tools and scenarios to Nordic and Baltic stakeholders and to scientific journals

The following reports are available from the project:

Systematisation of experiences with energy sufficiency initiatives (Work package 2):

The report presents the applied understanding of energy sufficiency in the project and gives a literature-based overview of energy sufficiency actions within energy consumption in households and within mobility respectively. Furthermore, the report presents data, which enables integration of sufficiency actions into energy modelling.

Integration of sufficiency into energy modelling tools (Work package 3):

The report describes how sufficiency-based changes in energy demand within energy consumption in households and within mobility can be quantified at national level and can be included through exogenous and endogenous modelling approaches in EnergyPlan and MESSAGE modelling tools.

Development of adjusted national sustainable energy scenarios (Work package 4):

The report analyses how much energy sufficiency measures can contribute to the reduction of national greenhouse gas emissions. The report presents revised national sustainable energy scenarios for Denmark, Latvia and Lithuania based on the EnergyPlan and MESSAGE modelling tools with the integration of energy sufficiency.

National policy dialogues (Work package 5):

The report presents the developed concepts for national policy workshops aiming at exploring how policy measures can influence preferences for sufficiency-based reductions of energy consumption. Furthermore, the report presents the experiences from the national policy dialogues organised in Denmark, Latvia and Lithuania.

Dissemination to other Nordic and Baltic countries (Work package 6):

The report presents the experiences from a two-day workshop with dissemination of perspectives on and methods within energy sufficiency to Baltic and Nordic countries that were developed in the project. Furthermore, the report presents the joint cross-national discussions and experience sharing among the participants at the workshop. Finally, the report presents ideas for further research and knowledge development within energy sufficiency.

The reports can be requested by sending an email to the project coordinator Michael Søgaaard Jørgensen, Department of Planning, Aalborg University, Denmark at msjo@plan.aau.dk

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1.0 Introduction

The report has been written as part of the project “Integrating energy sufficiency into modelling of sustainable energy scenarios”, which is funded by The Baltic Nordic Energy Research Programme. The project is coordinated by Aalborg University and conducted in collaboration between Aalborg University, INFORSE-Europe, Lithuanian Energy Institute and Green Liberty Latvia. The aim of the project is to contribute to the development of more advanced strategies for systemic, sustainable transition of energy production and use, based on new social practices that reduce energy consumption. This contribution is met through developing new, improved national 2030 energy and climate scenarios based on the feasibility of reaching a net-zero emission and 100% renewable energy system by 2050. Besides building upon existing national sustainable energy scenarios, the new scenarios developed in the project integrate experiences from recent national sustainable energy practice initiatives within the categories; household energy consumption and mobility.

This report is a deliverable of work package 5 “National policy dialogues in Denmark, Latvia and Lithuania” and presents a developed concept of national policy workshops aiming at exploring how policy measures can influence preferences for sufficiency-based reductions of energy consumption. Furthermore, the report presents the experiences from the national policy dialogues organised in Denmark, Latvia and Lithuania.

Nordic and Baltic countries must realise fast reductions of greenhouse gases until 2030 and achieve greenhouse gas neutrality in 2050, in order to stay in line with the Paris Agreement. Due to a growing understanding that progress within renewable energy and energy efficiency alone may not be enough to curb energy demand in line with the 1,5°C climate goal, this project contributes with a focus on energy sufficiency. Changes in social practices and societal organisation can also contribute to reaching climate goals and can be addressed as a sufficiency element in energy scenarios, where sufficiency is defined as ‘rethinking and redesigning individual and collective practices to favour activities and services that are intrinsically low on energy use’ (Toulouse et al. 2017). For a more detailed discussion of energy sufficiency definitions see the work package 2 report “Systematisation of experiences with energy sufficiency initiatives”. The project objective is the development of more advanced strategies for systemic, sustainable transition of energy production and use, by integrating the new element of energy sufficiency oriented practices in national 2030 energy and climate scenarios. These energy sufficiency practices and actions are based on experiences and estimates from recent national sustainable energy practice initiatives and research related to direct energy use, within the areas of mobility and households. These energy sufficiency practices and actions have been identified and integrated into energy scenarios.

The project aims to include energy sufficiency aspects into the models used for energy development planning and create scenarios that include sufficiency measures. In pursuit of this objective, this work package involves the facilitation of three national policy workshops in the partner countries,

Denmark, Latvia and Lithuania. The workshops were conducted with the aim of exploring *how policies can influence preferences for qualitative improvements versus quantitative increases?* Policies could include e.g. taxation, subsidies, and other economic policies, consumer information, urban planning and transport policies. Box 1 builds on a study from Latvia and shows how tax policies could influence sufficiency actions in the transport sector.

BOX 1. Sufficiency action in the transport sector

Transport has a significant contribution to climate change and many countries, including Denmark, Latvia and Lithuania, struggle to decrease these emissions to reach carbon neutrality by 2050. Transport related greenhouse-gas (GHG) emissions can be expressed by the following equation:

$$CO_{2e} = pop * pop/km * km/kWh * kWh/CO_{2e} \quad (1)$$

, where pop represents the national population, pop/km is the annual per capita distance travelled (sufficiency), km/kWh is the energy intensity of transport (efficiency) and kWh/CO_{2e} represents carbon intensity of transport (substitution).

We have focused on the assessment of environmental taxes (energy, transport) as the most important economic instrument used in environmental policy to reduce transport-related emissions and predict road transport decarbonization pathways using the regression analyses.

The results show that fuel consumption has the most significant effect on the GHG emissions of transport. To achieve a result of zero emissions, a significant reduction in fuel consumption is required. This can be achieved if certain criteria are met such as environmental effectiveness, economic efficiency, equity, administrative feasibility, and cost as well as public acceptability. Moreover, appropriate public policies shall be in place - higher taxes on fuel, support for environmentally friendly infrastructure as well as motivation mechanisms for electric car use and social innovation e.g. modal shift, teleconferencing, car-pooling, to decrease the demand for mobility and stimulate sufficiency in transport.

To further influence consumer behaviour by tax policy, tax incentives should also be identified in taxes such as value-added tax, such as reducing the rate of out-put-VAT or benefits in-puts in VAT payers, or corporate income tax, for example by setting tax discounts on the purchase of battery electric vehicles, plug-in hybrids, and fuel cell vehicles, which are technologies that can reduce the GHG emissions of road transport. The positive tax shocks lead to a fall in private consumption and output in the Keynesian manner. Compared to direct taxes, indirect taxes exercise a stronger effect on macroeconomic aggregates.

Results of the study are published here:

Brizga, J., Jurušs, M., & Šmite-Rože, B. (2021). Impact of the environmental taxes on reduction of emission from transport in Latvia. *Post-communist economies*, 1-18.

doi:10.1080/14631377.2021.1965358

1.1 Approach

The purpose of the national workshops was to create policy dialogues among relevant actors in the Nordic and Baltic countries, in order to debate and generate ideas directly relevant to energy sufficiency actions and policies. The discussions took their point of departure in energy scenarios that include demand changes from a sufficiency perspective, the feasibility of different sufficiency strategies and the policy measures to support transition processes, to move towards the scenarios (the scenarios are described and accounted for in work package 4 “Development of revised national sustainable energy scenarios for Denmark, Latvia and Lithuania”.) Along the possibilities and limitations for socio-economic and regulatory changes were included to support this transition. The three national workshops were facilitated as active participation workshops with dialogues among participants and facilitators, on the basis of presentations of project findings and preliminary results. Participants from the sectors of mobility, housing and energy policy were invited, with the aim of representing different perspectives and expertise; researchers, policymakers, grassroots activists etc. The workshop concepts were discussed amongst IESIMOSSES project partners at multiple meetings in order to create a shared approach that was, at the same time, adaptable to the national context. Adaptability was important both with regards to the type of actors project partners were able to attract in their respective nations, the level of awareness around energy sufficiency and the conditions relating to the Covid-19 pandemic.

The purpose was threefold:

1. To create awareness about the sufficiency approach to energy modelling and the opportunities with regards to reaching climate targets.
2. To facilitate discussions and participation with regards to the relevance of the scenarios, additional actions/scenarios to consider, the opportunities and barriers for implementation of sufficiency strategies along with what policies can support the realisation of the scenarios (conventional as well as new ones).
3. To evaluate and assess the workshop approach, with the aim of supporting others in planning and facilitating similar workshops.

The facilitation and agenda of the policy workshops differed between the three partner countries, specifically with regards to the two first points and with regards to the number of attendees and to what degree the atmosphere was formal. In the Lithuanian and Latvian workshops where awareness

raising was a large focus, the agenda was more focused on presentations than in the Danish workshop where a larger portion of time was dedicated to discussions.

The energy scenarios were intended to work as ‘boundary objects’ which, are objects that in different types of problem solving contexts, establish a shared context that “sits in the middle” (Carlile, 2002, p. 451). Such boundary objects can enable cooperation in and between heterogeneous groups of actors from different disciplines and backgrounds when working together. Thus the scenarios were intended to serve as a basis for dialogues and participation. In the case of the workshops, the data and energy scenarios were presented as initial findings based on the empirical material identified in the project. They were thus up for debate and flexible in the sense that participants’ critiques and suggestions could provide important additions. Though the groups of participants were heterogeneous, with diverse backgrounds and varying opinions on the subject, the visual and informative material provided at the workshops established a shared context and basis for discussion. The ambition was that the scenarios would be informative and inspiring with regards to new approaches to climate mitigation, and challenging some of the political norms and conventions. Thus they were intended to be collaborative and to be co-developed further during the workshops, through the discussions.

Despite the somewhat novel nature of the workshop topic, energy sufficiency practices and policies, the organisation and structure of the workshops was rather conventional. The workshops included well-known activities such as presentations and verbal discussions, though further exploration of the topics has the potential to be explored through more participatory and extensive design approaches. However, with the rather restrictive time limitations of a one-day workshop to cover multiple and complex topics, the workshop approaches were kept conventional.

2.0 National policy workshop - Denmark

The workshop, entitled “Hvordan kan vi opnå reduktioner i energiforbruget ved at integrere tilstrækkelighedstilgange i energimodellering?” (in English: “How can we achieve reductions in energy usage by integrating sufficiency measures in energy modelling?”) was held at Aalborg University, campus Copenhagen on November 29, 2021. The workshop was primarily attended by researchers from within the fields of built environment, socio-technical sciences and energy. Additionally, attendees from grassroots organisations, NGOs and the Copenhagen municipality were present. A total of 12 participants were present, a relatively low number partially due to Covid-19 related cancellations.

The workshop was kicked off by an introductory presentation by Michael Søgaard Jørgensen on the themes of energy sufficiency, the project objectives and the workshop agenda. In the presentation, he emphasised the importance of energy sufficiency in climate policy actions and made a call for collaboration and active participation.

2.1 Summary

The workshop was divided into two sessions, one regarding changes in practices towards sufficiency, the other session regarding policy measures to support such practices. The introductory presentation was followed by a presentation by Gunnar Boye Olesen, of the preliminary findings and energy scenarios. The sufficiency actions and practices identified in the project were presented, along with the modelling methods and modelling results in EnergyPlan (an energy system analysis tool by Lund et al. (2021)). This presentation laid the foundation for the first discussion. In the first discussion round, participants were asked to form two groups based on the themes of buildings/homes and mobility, respectively, and to discuss the suggested changes and developments in sufficiency practices. They were asked to discuss the extent to which these practices are a relevant focus and what other potential practices might be considered. The proposed sufficiency actions were presented in tables during the presentation by Gunnar Boye Olesen and provided as hard copies on the tables for reference during the discussions.

Prior to the second discussion round, Rikke Veber Rasmussen made a short presentation on the subject of policy measures, with the aim of inspiring rather than steering the discussion. The presentation included an introduction to social practice theory and other approaches to sufficiency policy actions, along with examples identified in empirical literature. In the second discussion round the participants were asked to discuss what political measures might promote and support the suggested (changes in) sufficiency oriented practices. The participants stayed in their respective groups for the second discussion round.

Mobility

At the mobility table a total of eight participants were present (a list of participants can be found in appendix 1). The discussions that took place in the mobility group have been categorised and will be presented in the following.

Car ownership - the “right” and the norm

A representative from Aalborg University points out that certain things are maintained in certain ways of argumentation, e.g. categorisations such as ‘commuting’, which removes focus from the biggest problem, which she believes is the habituation of the car being used for everything. Actually, there are specific cases where the car as a mode of transportation makes the most sense, but it is used far too often for everything and even when it does not make sense. She calls the concept a “freedom car”, of which you experience having the right to keep in a parking garage, even if you really only needed to use it, e.g. to get to the summerhouse, a few times a year.

It is discussed whether it has become easier to challenge this experience of “having the right” to a car. The representative believes that it has been even more rigid than it is in the current discourse. Another representative from Aalborg University with expertise in social practice theory, points out, however, that during the same period the number of cars has increased and it has become even more common to have a car. This is exemplified by the fact that more young people get a car than before, for example students. She points to a study from FynBus showing that young people, such as high school students, get a car as soon as possible (after turning 18). Other studies show that the way you are transported as a child greatly influences how you transport yourself and your family as an adult. Increasing prosperity means that, generally, more people acquire a car. Car ownership has increased a lot in the last 10-15 years, especially as cars have become cheaper and cheaper to drive in, both in comparison to public transport and other consumption and with respect to income. This can contribute to more people feeling that they have the right to a car and/or have no experience with alternatives. These trends favour the car and therefore a reckoning with them is required.

Short distance car mobility

Practices are discussed, especially the practices involved in the shorter trips (under 5km) by car. A representative from Aalborg University shares that surprising new empirical evidence shows that there are many who leave the car at home and then walk or take the bike for grocery shopping. The participants especially discuss the small distances, as they wonder why so many small trips are made by car - only 30% of trips consist of commuting. The participants thus particularly focus on the trips that do not relate to work. An example of empirical data that spur curiosity is that 8000 trips are made by car a day in Furesø municipality - going from 400m from a bus stop and ending at around 400m from a connected bus stop. Why the car wins over buses in such circumstances is questioned.

Household budgets

Household budgets are discussed, focusing on the issue that petrol and expenses for car-sharing schemes will rarely be included in the same category of the household budget, even though one can replace the other. This often means that citizens do not compare costs on a meaningful basis. Therefore, a representative from Aalborg University with expertise in social practice theory, notes that changes in practices within household budgets could be a relevant focus area. In relation to this, another attendee highlights a nudging project in the USA that examined when the timing of payment for parking made the biggest impression on the user. It turned out to be when people received a bill once a week for parking, instead of paying per. turn. When paying per. turn the cost was far from perceived as costly to the same degree as a weekly bill.

Shifting to biking and walking

Furesø Municipality¹, is highlighted as an example of a municipality that is implementing policies with the aim to change citizens' mobility practices. The participating representative of Furesø Municipality, describes the initiatives that are being implemented to meet the municipal mobility goals, such as changing from car to walking and cycling. These goals are to be met, among other things, by upgrading bicycle facilities. This upgrade is complemented by a relatively large event in March where new bike parking facilities will be inaugurated. At this event, a mobility discussion with a large and heterogeneous group of actors will be facilitated. An opportunity will be created for citizens to test an electric bicycle, and the Landowners' Association, apartment cooperatives (andelsforeninger) and other stakeholder groups will have the opportunity to consider how such electric bicycles can be used in their associations. These initiatives are part of an action plan, prepared on the basis of a road safety report, where DKK 4.7 million per year is set aside for this effort, and where accessibility, public transport, road safety, transport to school and leisure activities are focus points. In Furesø Municipality, 60% of work-related passenger transport trips are of less than 10 km. For this reason, among other things, the group in Furesø Municipality is in the process of establishing a debate with companies about initiatives in relation to cycling (such as showers and changing rooms at workplaces), making it more attractive for employees to cycle to work.

With regards to biking and walking, a representative from Aalborg University with expertise in urban planning insists, as a sociologist, that we no longer call it “soft” mobility because it helps to maintain the regime. She argues that it makes some actors reject this form of mobility increasingly and creates unnecessary contrast between citizens who can identify with soft mobility and those who can not. Moreover, as is the case with “soft means” or “soft data”, it sounds less serious. She suggests simply referring to it as “biking and walking”.

¹ Furesø Municipality 2030 climate and green transition plan:
<https://www.furesoe.dk/media/12157/2030-plan-for-klima-og-groen-omstilling.pdf>

Different contexts - rural and city

It is pointed out that there are significant differences in mobility practices in the city and in the countryside, respectively. Professor of Aalborg University, points out that the (leisure and work) activities in which people participate have become more dispersed and that public transport coverage has at the same time decreased in many areas. Thus, one often has to travel from the country to the city to go to their activities. The representative from Fuersø Municipality points out that it is also about changes in norms, as she believes that in her childhood, people cycled to far more activities. The professor responds that the same bicycle frequency nowadays would be far more dangerous, in terms of road safety, than it was then. This however, depends on the local conditions, as some areas are equipped with good bicycle and footpath systems while it is lacking in other areas even where roads have been expanded.

With regards to the difference between city and rural areas, it is pointed out that, for example, car-sharing schemes do not exist in the countryside to the same extent as in the city. Between the big cities it is always possible to take a GoMore, whereas in the countryside other solutions are needed. The attending associate professor of energy modelling (AAU) points out that car ownership is not in fact important in itself. It is concluded that the reason why more sharing schemes are made with cars than with, for example, holiday homes, is because the difference in the length of the rental period is decisive for the price. It is mentioned that weekend package solutions for car-sharing schemes are meaningful and are on the way.

Sustainability considerations about city life as opposed to country life are also discussed in more general terms. A former global director of C40 Cities, has recently commented on the benefits of converting cities to sustainability, instead of focusing on rural eco-communities. However, attendee from Aalborg University, is sceptical of this argument, and points out that in the long run, agriculture will likely have to be run in a radically different manner to how it is currently run, and far more labour-intensive than is the case now. This will mean that more people will have to live and work in the countryside. On the whole, a parting with fossil fuels means that there is more work to be done physically, by humans. Therefore, the former global director's (of C40 Cities) argumentation can be considered too biased to the status quo.

Policy measures

A representative from Green Transition Denmark emphasises that a large part of the population does not want to change their behaviour and that strong (economic) measures are consequently needed. Road-pricing is mentioned as a potential measure, with consideration for social equity in order to avoid skewed consequences for citizens. He furthermore makes a proposal that a citizens' assembly should be established specifically on the subject of mobility, as this will provide an increased opportunity for citizens to influence each other. There is a need to establish relevant forums. A professor of Aalborg University supports the proposal and points out that general citizens' climate assemblies tend to have too broad a focus. Therefore, focusing on selected areas, such as mobility,

will be a good idea. Especially since transport / mobility is seen as a “hot potato”, and therefore rarely addressed to a sufficient degree when it is on the agenda in forums where less controversial topics can take focus. The topic often leads to a “shit storm” when addressed in most forums. Another attendee from Aalborg University with expertise in urban planning supports the point that the car discussion is not sufficiently challenged and often avoided, and provides an example from a green district where one of the sustainability criteria is that there is only *one* parking space per household instead of two. The car is so embedded in the culture that it is hard to talk about. Here, a citizens’ assembly could possibly introduce the conversation to wider groups so that it would not persist as a topic of “shaming”. There is a lack of cultural understanding of mobility.

The attending representative from Aalborg University with expertise in ecological economies points out that in order to see a reduction in transport, it requires a reckoning with standard economic thinking, i.e. the idea that we must see an increase in prosperity in the form of an increase in economic growth. These considerations lead to a discussion of socio-economic models. The professor of urban planning (AAU) mentions that when public health, noise and pollution is added to socio-economic transport analyses and calculations, the prioritisation of cars does not hold up. The participating transport economist (from Green Transition Denmark) does not immediately agree that these additions will have a markedly different effect, since the time values used in socio-economic analyses are currently very high. This is mainly due to the fact that the loss of time when not being able to transport oneself by car is converted into lost working time. The attendee from Aalborg University with expertise in urban planning mentions that other studies just show that people would work more if they did not sit in traffic in their cars (e.g. to and from work). She also mentions that the Eddington Transport Study succeeded in making socio-economic analyses which gave markedly different results than the standard ones. The representative of Fuersø Municipality mentions that the Supercycle Paths also succeeded in making some socio-economic calculations where public health, noise and other things were included, and thereby showed a significant advantage of the Supercycle Paths. Copenhagen has similar experiences. Concludingly, traffic models and socio-economic models must include all the factors, such as public health and noise. Professor in urban planning (AAU) also points out the rigidity of the current system and that singular measures are consequently insufficient.

Consumption corridors, and fundamental needs vs. luxury

The attending professor in ecological economies (AAU) emphasises that in addition to focusing on policy measures for transportation, we need to recognise a fundamental truth: that we can not afford the rich (referring to the book “Why we can’t afford the rich” by Sayer (2015)). If the sustainability crisis is to be taken seriously, it is not affordable that some people are extremely rich, as is the case now. Therefore, measures such as higher taxes, wealth taxes, etc. must be included to recognise this issue. It is of no use that we keep talking about the growing mobility decreasing, when prosperity must be decreasing. Another attendee (from Aalborg University) emphasises her support

for this statement, but points out that it is far more difficult to argue for this in general and that arguing for lovely cities is far “easier”.

Professor in ecological economies also refers to a recent study (Oswald et al., 2020) of different consumption areas, with an analysis of environmentally problematic types of consumption and types of consumption that are mainly consumed by rich and poor, respectively (see figure 2.1). A study like this can contribute to the understanding that there is a need for different measures depending on the areas of consumption in question. At the same time it is a problematization of, for example, CO2 taxation which lumps consumption into one category. Instead, fundamental needs and luxury consumption are to be viewed differently. Professor in urban planning (from Aalborg University) points out the rigidity of the system as it is now and the difficulty of addressing such a large issue. She highlights urban planning as a great tool for addressing mobility issues because it has the potential to distribute measures in a less skewed way than many other tools.

Mapping product categories

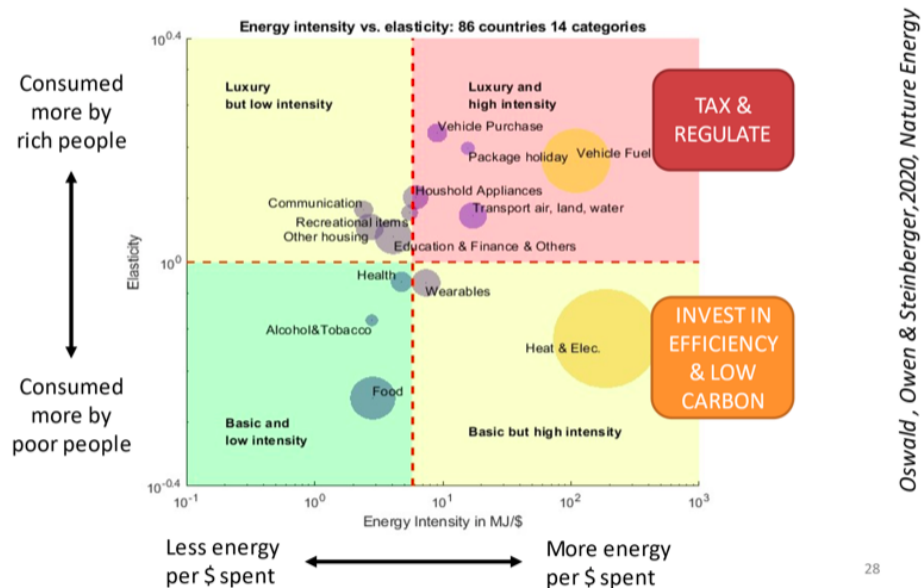


Figure 2.1 - *Luxury vs. basic consumption (Oswald et al., 2020)*

Further work and collaboration

The first part of the discussion in the mobility group dealt with the actual translation of data from the recommendations in the IDA report “Transition to Sustainable Mobility” to EnergyPlan by Hartmann et al. (2021) (e.g. the assumptions behind integrations into the model), since two of the participants (representing Aalborg University and Furesø Municipality) were involved in writing the report and therefore had a special interest here. It was questioned whether the translation from report to model is lacking and how this can be dealt with through further collaboration. It is also pointed out

that taking a point of departure for policy recommendations in the IDA report makes good sense, as it consists of good and well-thought-out initiatives.

Housing

At the housing table a total of eight participants were present (see appendix 1). The discussions that took place in the housing group have been categorised and will be presented in the following.

Particularly challenges and barriers to change were discussed. These were divided into four main topics: economic and structural, (rules and regulation in) construction, human-housing relationship, (general) consumption.

Economic and structural

Barriers to sufficiency: capitalization of the housing market, financing schemes and political ideologies, as well as the Danish Financial Supervisory Authority, banks and their rules and procedures.

There should be a limit on the number of square metres in new building areas, so that older citizens can reside in smaller, newer buildings and families with children can utilise the older, larger homes of the elderly. Additionally, options for support for housing improvements and for more people to live together should be offered. There is also a need for a higher degree of residency requirement. Furthermore, the societal norm that entering the housing market is a very attractive goal and a way of ‘gaining access’ to all the other areas of life should be challenged.

Construction

Barriers to sufficiency: current municipal rules for construction and restrictive calculation models. Current building regulations are a barrier to recycled materials.

Flexible housing should be available, where space can be added and subtracted according to need, in order to reduce the number of square metres per. inhabitant. New residential areas should include more shared facilities, which would reduce the amount of individual dwelling space needed. It is also discussed whether new construction currently is often less functional and therefore creates more "waste" of space. The construction sector is rigid, but there is a need for flexible construction where you can opt out on certain rooms. This has not been effectuated yet. One focus should be on establishing larger communal kitchens with the possibility of shared cooking, and the opportunity to gain access through renting, so that it is possible to manage with a smaller home.

With regards to drying clothes: if people are to get rid of a tumble dryer, or not acquire a tumble dryer in the first place, it needs to be possible to air dry clothes at one's home. It requires facilitation of the practice, so that it can emerge. For example, it takes time, which can be a barrier for busy

families with children. It must be a requirement for larger residential buildings that secure (preventing theft) drying facilities are included.

Human-housing relationship

Barriers to sufficiency: there is a lack of solutions for, for example, older residents who live alone - that the change of housing must be made easier. It is discussed how it might be possible to weaken the relation to one's home, in order to support that citizens can move to different, more suitable housing at different stages in life. This also relates to the societal norm of the housing market being seen as a 'success goal'. Barriers in apartment cooperatives (andelsforeninger) with regards to relocation and exchange schemes are also mentioned along with the need for help to relocate, especially for the elderly who find moving unmanageable.

It is pointed out that it may be easier to spot the collective aspects of practices in mobility than in housing. There is still a need to focus on the collective in housing, but it may be another type of area to think about regarding housing (e.g. as capital gains on large homes, taxation and the right to exchange).

Consumption

Barriers to sufficiency: invisible consumption, lack of understanding of and control over one's own consumption, lack of utilisation of hot water storage capacities.

CO₂-taxation is mentioned as an incentive to reduce consumption, but it is pointed out that this will only affect those who have room for manoeuvre. The problem of hidden resource consumption and how this can contrast to a "culture of frugality" is also mentioned. The problem with hidden resource consumption is that it makes it harder to change habits, especially smart technologies make consumption invisible, making citizens unaware of how much they use. Better visibility, knowledge and understanding of one's own energy consumption would provide better options for reducing consumption. Some tools are needed to bring consumption closer to the consumer, making it visible. A relevant question would then be how much the citizens themselves can control and perhaps it is necessary to think in larger energy communities.

Hot water systems should be better managed according to need. It is a good storage option, which is not taken advantage of due to peak-loads. Furthermore, companies that recycle hot water and the heat from hot water create opportunities that should be taken advantage of.

Meta reflection

An important meta-reflection also comes to the fore at the end of the workshop: the changes in practice we are looking at can be considered "peanuts" in the larger context, and they may not have any significant impact. The discussions are often characterised by individual actions in the traditional

sense, and thinking in “wholes” is difficult. Therefore, facilitator Michael Søggaard Jørgensen proposes another workshop where these considerations can be better taken into account, based on the reflections from this round. What is needed is collective actions. Since 1990, there has been a reduction in water consumption as a result of effective efforts. But the energy consumption in the living area and the heat and hot water we use and waste, as well as transport, these are the big areas that can really make a difference. It is also the busy everyday life that makes people resort to the "appliance solutions", i.e. the convenience based solutions. Collective changes in practice are about normative as well as time management factors.

2.2 Outcomes

In plenary, after the first and second round of discussions, respectively, the participants were asked to summarise their main points from their group discussions. Based on these plenary summaries and discussions, the main points from the mobility group for moving towards energy sufficiency within mobility were:

- A goal within mobility should be that almost 100% of all trips of less than 2 km must not be made by car and approx. 75% of trips of less than 5 km must not be made by car. A focus on challenging the small trips by car - these are often related to shopping and leisure.
- Although these short trips do not have the most significant effect on CO₂, a change here could have a great impact in terms of changing habits and increasing awareness and the experience of actually having the opportunity to do things differently. Therefore, there should be a massive effort on short trips because this is where the habits can really be changed, but at the same time a strong awareness that the long trips are also very CO₂ heavy.
- By using the 15-minute cities concept, where everyday functions are all within 15 minutes by walking or biking from one's residence, it could be possible to prevent short trips such as driving your kids to school by car. Such an effort should be implemented to reckon with the habit that the first thing one does after walking out the front door is to get in the car. There is a need for a break with the "everyday life chains" - if you break some of them, you can break more. It is necessary to break the chains of habits, since humans do not consciously and rationally consider all actions, but largely act in their daily lives in the form of chains of habits.
- Traffic models and socio-economic models must integrate all relevant factors, such as public health and noise.
- Societal and political trends that have favoured the car historically need to be reckoned with and challenged.
- A citizens' mobility assembly should be established in addition to a citizens' climate assembly.
- Further relevant studies could focus on: socio-economic models, urban planning and citizens' mobility assembly.

The main points from the housing group were:

- Flexible housing with dwelling space added and subtracted according to need should be a possibility.
- Need for higher degree of residency requirement and smaller new buildings.
- Visibility and knowledge of one's own consumption is needed.
- Utilising companies that recycle hot water and the heat from hot water.
- Challenging the societal norm that entering the housing market is a high priority goal, 'success indicator' or access granting.
- Make new constructions highly functional with limited waste of space.
- Include holiday houses with regards to dwelling space policies.
- New residential areas should include more shared facilities.
- Establishing more smaller dwellings for older residents along with practical relocation assistance for the elderly who find moving unmanageable.
- A limit on the number of square metres in new building areas, so that older citizens can reside in smaller, new buildings and families with children can utilise the older, larger homes of the elderly. Additionally, offering support for housing improvements and for more people to live together.
- A requirement for larger residential buildings that secure clothes drying facilities are included.

3.0 National policy workshop - Latvia

The national policy workshop entitled “Cik daudz enerģijas ir pietiekami?” (english: “How much energy is enough?”) took place in Riga, Latvia on November 29, 2021. Due to the Covid-19 pandemic, the workshop was held in online form (via Zoom Video Communication). 33 participants from Ministries, professional associations, ANGOs and Agademi registered for the meeting (a list of registered participants can be found in appendix 2). Policy professionals involved in decision-making processes, such as from the environmental and energy ministries, environmental NGOs and professional associations were invited, as well as academic researchers working with energy modelling. The researchers were interested in learning about other studies, and decision-makers wanted to learn more about the research results and their possible application. The workshop overlapped with the necessity to revise national energy scenarios to reflect EU Fit for 55 targets, which also helped to attract attention.

With regards to the workshop agenda, efforts were made to balance presentations with discussions, so that presentations were followed by 2 discussions: one on policy measures to support sufficiency action in the transport sector and another focussing on the housing sector. Additionally, an online expert survey was organised to collect the responses from all participants.

3.1 Summary

As an introduction, the basis for the project and workshop were established as follows. Most existing models for the development of the energy sector and the dynamics of GHG-emissions focus on measures to improve energy efficiency and the transition to renewable energy sources (RES). These measures are important and can improve people's quality of life and reduce the environmental impacts, but are largely insufficient to achieve the necessary reductions in emissions and energy consumption. This can be largely explained by the lack of attention paid to adequacy measures related to demand-side management, which also includes the reduction and optimization of consumption, and the habits of individuals.

There are two sides to energy sufficiency. On the one hand, it aims to limit energy consumption of large energy consumers. On the other hand, attention is being paid to eradicating energy poverty. Thus, according to the sufficiency approach, sustainable energy consumption can be considered to be in a certain ‘corridor’ with its upper biophysical and lower social boundaries.

The following is a summary of the views and opinions expressed by the participants in the discussion, which were not always the same for all participants. The discussion was organised into two major blocks: mobility and housing.

Mobility

The abandonment of private cars is not equally suitable for everyone, such as families with children, so the structure of users and the purposes for which a car is used are important. The number of cars is not directly related to emissions. In Latvia the number of cars per capita is one of the lowest in Europe, but the emissions are rather high. So the key is to reduce the distances travelled and not the number of cars.

The more plans are made for multimodal transport and the convenience of trains, the more people would change their habits in favour of public transport.

There are a lot of activities that are already happening that the communities enjoy. Various proposals can be devised from the sidelines, but it is interesting to find out the public's opinion about things that are already happening where there is traction. It is advisable to look carefully and cautiously at measures that have not been so far tested in Latvia.

If the public is asked what it wants, the most popular answers are not always feasible in practice. Thus experts should also be questioned. Society is not homogenous and the circumstances and conditions are different for each individual, which means that one policy approach will not work universally for everyone.

People do not live with the European climate plans on a daily basis. That is why it is important to connect them with people's daily lives. Because they will affect life today and in the future. You have to think about how to address people. Habit change: the proportion needs to be increased through deliberate / voluntary action, not just coercive measures.

Officials, politicians and green businesses often do not distinguish between GHG-emissions and air pollution. Understanding the difference is important in terms of health effects (climate and air pollution targets).

Last year has made some changes in the transport use: the abandonment of public transport in favour of the private car; to some extent also a bicycle. No data on pedestrians.

Figure 3.1 shows results from the online expert survey on the discussion on the potential of sufficiency measures to reduce GHG-emissions from the transport sector. The data from this expert survey show that participants find the greatest potential lies in switching to public transport and cycling or walking. On the other hand, the measures with the lowest GHG-reduction potential are car and drive sharing, reduction of private flights and micromobility. In addition to the measures included in the survey, the participants also mentioned the following actions as important:

- Attractive public transport;

- Spatial planning, which envisages that institutions that provide services to the population are easily accessible by public transport and not far from reach;
- Measures that reduce the need for mobility - a place of work and study close to home;
- To develop microgeneration of electricity and to promote the connection of e-car charging to the produced electricity.

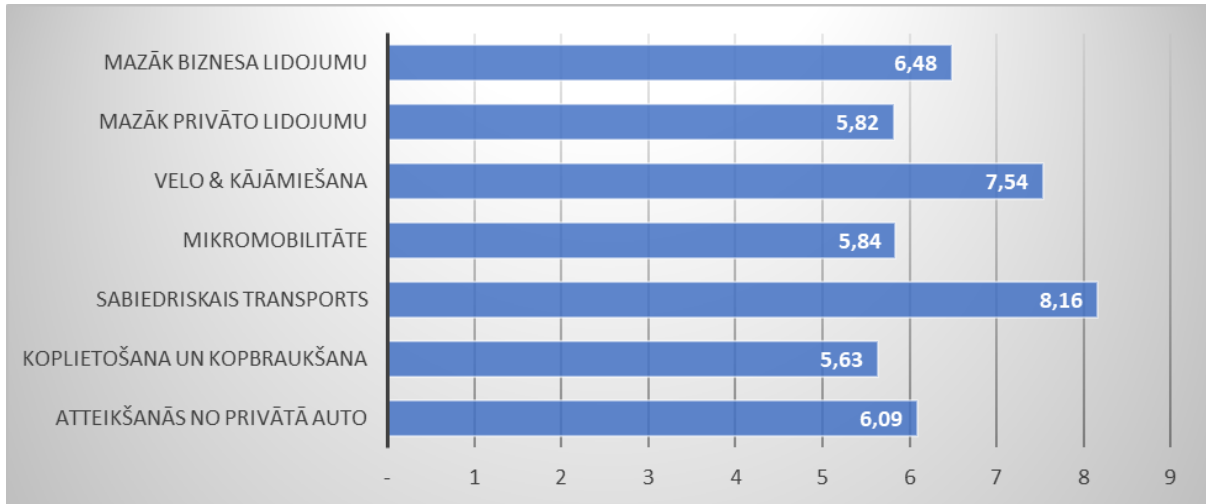


Figure 3.1 - Sufficiency measures in the transport sector - expert assessment.

In English, from the top: fewer business flights, fewer private flights, cycling and walking, micromobility, public transport, car sharing, abandonment of the private car. Note: The higher the number, the higher the GHG emission reduction potential of the measure (scale from 1 to 10).

To the question "What do you think would be the public acceptance of various mobility policy measures?" the participants considered tax breaks, school buses and teleworking to be the most socially acceptable. The participants assessed the application of speed limits most negatively. There is also a lack of support for the introduction of free taxis for women at night and for the adaptation of public spaces to non-motorized transport (see figure 3.2).

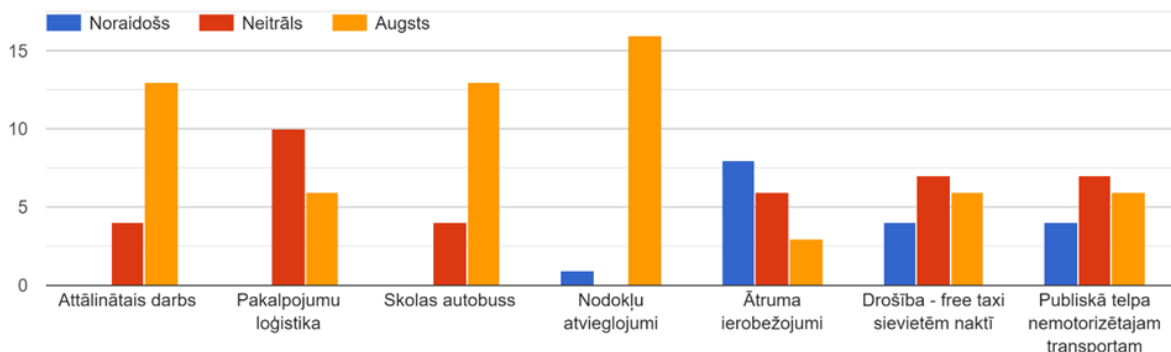


Figure 3.2 - Expert Rating: What do you think would be the public acceptance of various mobility policy measures? In English, from the left: teleworking/remote working, service logistics, school bus,

tax benefits, speed limits, safety - free taxis for women at night, no motorised vehicles in public spaces. Blue: negative, red: neutral, yellow: high.

In addition, participants suggested the following potential policy instruments:

- Free electrified public transport;
- Establishment of Park & Ride system in Riga and other large cities;
- A school bus to help get students to school;
- Three- to four-year individual quota of kilometres flown;
- Restriction of sports using fossil fuel vehicles;
- Secure bicycle parking at railway stations.

Housing

The survey on public acceptance to reduce energy consumption varies from region to region. One of the reasons for a higher readiness to reduce the indoor temperature in the Vidzeme region could be a higher proportion of renovated houses and heat control options within the house. When assessing the answers as a whole, different socio-demographic indicators have to be taken into account, e.g. people's comfort zones and habits differ significantly.

There are significant regional differences in per capita heated living space. In urban centres it is smaller than in rural territories. But an additional aspect is internal migration. In development centres, per capita living space may decrease while growing in the periphery due to declining population.

Thermostats and other smart solutions are good tools to reduce energy consumption not compromising comfort (e.g. when the room is not in use). They are introduced in new projects, but the existing housing stock is often difficult to adapt.

Reducing the use of electrical appliances could be difficult to implement in practice. Priority is given to smart technology solutions and energy savings.

The process of house renovation is an opportunity to improve the evenness of temperature and heat accounting, as well as to improve the possibilities for the house owners to regulate temperature in different rooms and times of the day. Buildings require thermostats for heating systems so that the room temperature is adjustable in each apartment.

It's not always possible to lower the water temperature due to the risk of Legionnaires' disease.

In the coming decades, there will also be a shift in heat supply to electricity consumption, for example with heat pumps. Technological costs are high, the main obstacle is cost. The set of measures depends on how much money you can afford to invest. As the economic situation deteriorates, energy poverty will increase.

In cities, a large proportion of buildings could be connected to district heating. However, district heating companies cannot invest if the regulator does not allow them to raise funds for such purposes. Only EU funds remain.

Due to the decentralisation of heat supply, there are high heat losses. An overall assessment is needed, otherwise services will become more expensive without increasing efficiency. Although the foundation of old buildings is difficult to transform, losses can be reduced by creating symbiosis.

Figure 3.3 shows the discussion on the potential of sufficiency measures to reduce GHG-emissions in the housing sector. The survey responses show that smart energy metering and the Internet of Things are thought to have the greatest potential. In turn, the measures with the lowest GHG emission reduction potential, according to the participants, are related to the possibilities of sharing - communal lifestyle. There is also relatively little support for reducing the use of electrical appliances, reducing floor space and lowering water temperatures. In addition to the measures included in the survey, participants also mentioned the following actions as important:

- Renovation of buildings and insulation of dwellings, ensuring energy efficient ventilation;
- Renovation of heating mains;
- Biomass cogeneration in district heating systems, solar energy pilot projects for hot water production with solar collectors and heat storage tanks;
- Reduction of building renovation costs - standard projects cheaper than standard buildings. Residents who are unable to participate financially in a building renovation project must provide support to the municipality.

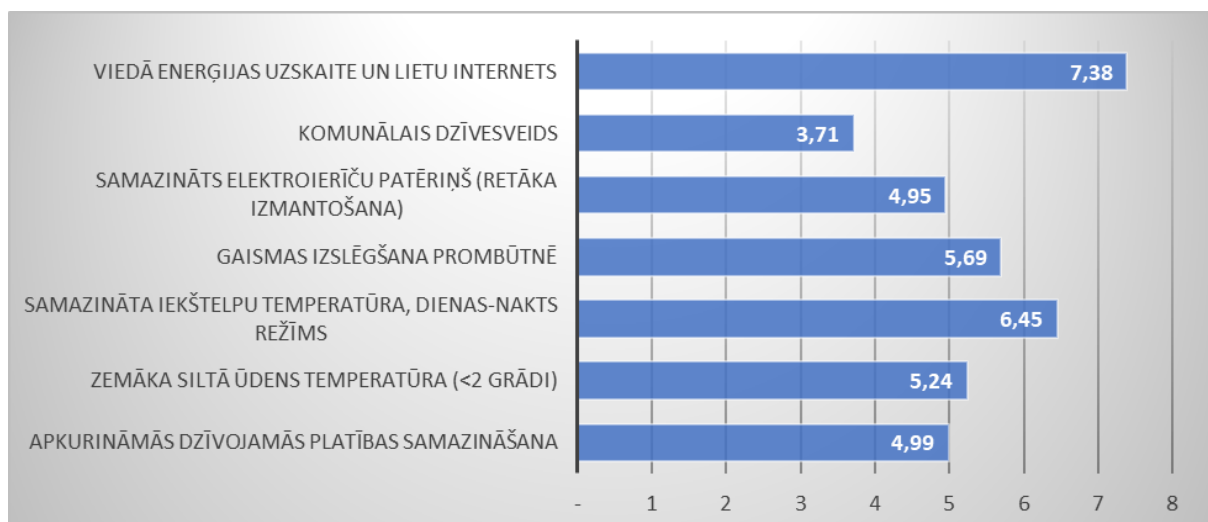


Figure 3.3 - Sufficiency measures in the housing sector - expert assessment.

Note: The higher the number, the higher the GHG emission reduction potential of the measure (scale from 1 to 10). In English, from the top: smart energy accounting and the internet of things, communal lifestyle, reduced consumption of electrical appliances (less frequent use), turning light off when absent, reduced indoor temperature (day-night mode), lower warm water temperature (by 2 degrees), reduction of heated living space.

To the question "What do you think would be the public acceptance of various housing policy measures?" the participants considered the support program for the installation of thermostats and individual metres to be the most socially acceptable, but the financial instruments for dividing single-family houses into several dwellings are seen as having the lowest public acceptability (see Figure 3.4).

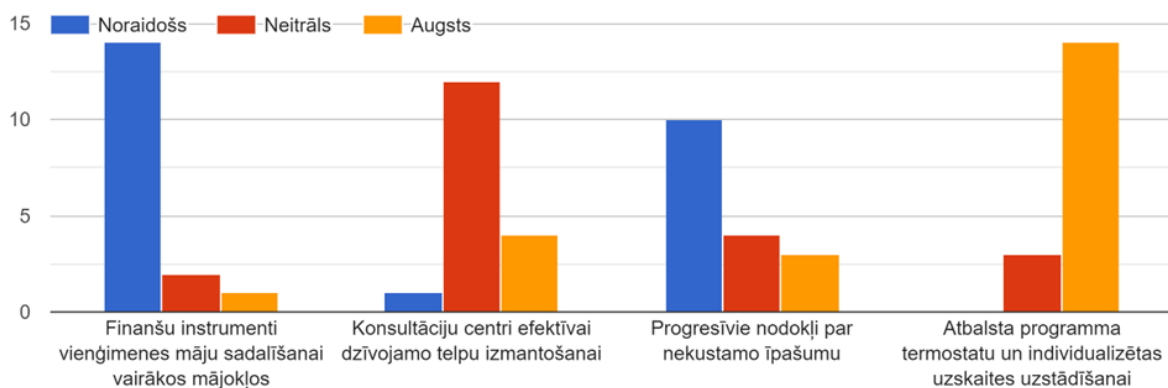


Figure 3.4 - Expert assessment: What do you think would be the public acceptance of various housing policy measures? In English, from the left: financial instruments for the division of single-family houses into several dwellings, counselling centres for the efficient use of living space, progressive real estate tax, support program for installation of thermostats and individual metres. Blue: negative, red: neutral, yellow: high.

In addition, the participants made the following suggestions for potential policy instruments in the housing sector:

- Differentiation of electricity supply price depending on the volume of consumption (the lower the consumption, the cheaper);
- Tax relief for the purchase of particularly energy-efficient electrical equipment;
- Reduce payments related to the purchase and sale of real estate, as this is a significant disincentive to real estate transactions;
- Extending the obligation scheme to heat producers / suppliers, thus facilitating the entry of new players into the building renovation market;
- Oblige the building owner to improve the energy performance of the building;

- To control the observance of the existing construction standards in order to prevent further deterioration of the technical condition of the buildings;
- Support for solar collectors and construction of heat accumulation engineering systems for hot water preparation both in private houses and apartment buildings;
- The support program for the installation of thermostats and individualised metering should be included in building codes as a mandatory requirement in new and existing buildings. The measure is in most cases economically justified, so the need for additional support must be assessed;
- Support for district heating.

3.2 Outcomes

Some general conclusions from the workshop are:

- Policy-making needs to understand: what are the needs and opportunities of society? And not leave anyone behind.
- The NECP Council of the Ministry of Economics will approve the working groups. They should discuss the common goals and the proposal discussed in this discussion.
- It would be valuable to integrate data and approaches on energy sufficiency measures into economic modelling tools. Active and technical cooperation with the Ministry of Economics would be useful.
- One should be careful of ideas that fit in Germany but are not self-evident in Latvia: e.g. a communal lifestyle. The funding of the measures must be assessed individually.

The workshop was considered successful since it brought sufficiency actions into the political radar of decision-makers and triggered some interesting discussions among participants. As a follow-up, the Ministry of Economics asked for more information on the project results and were also interested in participating in the following competency workshop (which is reported in work package 6: “Development of Nordic-Baltic competence and experience sharing within energy sufficiency”).

4.0 National policy workshop - Lithuania

The national policy workshop in Lithuania entitled "How to make energy transition easier? The role of energy sufficiency" was held on 10 November 2021 in Vilnius. The workshop benefited from the cooperation with the Young Academy of Lithuanian Academy of Sciences, which provided meeting facilities, and the CACTUS project also dealing with energy sufficiency issues. Due to considerations for the changing Covid-19 pandemic, the workshop was held in hybrid mode with almost 20 attendees participating in person and more than 30 online participants. The registered participants include representatives from Energy, Environment, Transport, and Foreign affairs ministries, Lithuanian Energy Agency, energy companies, research institutions, and non-governmental organisations (see appendix 3 for a full list of registered participants).

Considering a low awareness level about energy sufficiency in the country, a broad participation focusing on policymakers was aimed at for this workshop. Most of the participants had similar intentions, mainly to improve their knowledge about behaviour-related factors in energy consumption and their possible role in the overall decarbonization process.

The agenda and activities were affected by several factors. Firstly, the workshop was organised in cooperation with the CACTUS project² to present a broader overview of the problem. Secondly, due to the pandemic, the workshop was organised in hybrid mode with on-site and online participation possibilities and internet broadcasting (a recording of the workshop is available on youtube). Covid-19 restrictions limited the possibilities, which made it impractical to host a full-day workshop. The restrictions and the rich content (presentations from two projects) determined the structure of the workshop with a set of relatively short presentations and a guided discussion.

4.1 Summary

The workshop was opened by the President of the Lithuanian Academy of Sciences Jūras Banys. In his speech, he focused on the importance of energy sufficiency in the overall decarbonisation process. Vice-president of the Alliance of Lithuanian Consumer Organisations Kęstutis Kupšys emphasised energy poverty issues in energy sufficiency considerations. There are many households to whom energy sufficiency means, first of all, increased consumption to the level that reflects basic needs. Michael Søgaard Jørgensen, the leader of the project “Integrating Energy Sufficiency into Modelling of Sustainable Energy Scenarios” (IESIMOSEs), briefly presented this project and stressed the importance of cooperation between Nordic and Baltic countries.

² Lithuanian policy workshop in cooperation with CACTUS
<https://cactus-energy-sufficiency.eu/lithuanian-policy-workshop/>



Figure 4.1 Participants of Lithuanian policy workshop

Afterwards, two additional ongoing projects on energy sufficiency were presented with more details. CACTUS (Consolidating Ambitious Climate Targets with End-Use Sufficiency) is a project on energy sufficiency and its integration into climate and energy strategies in Central and Eastern Europe, funded by the EUKI European Climate Initiative. The project aims at introducing preparators of energy development scenarios, policymakers and other stakeholders interested in the EU's climate change and energy development strategy to energy sufficiency. The implementation of the CACTUS project is coordinated by the association négaWatt (France) together with partners, including the Lithuanian Energy Institute, REKK Foundation (Hungary) and Fraunhofer ISI (Germany). For the purpose of this report, presentations and discussions from the workshop are organised into two sections: mobility and housing.

Mobility

Inga Konstantinavičiute (LEI) discussed the tendencies and directions of energy consumption as well as energy sufficiency potential in Lithuanian passenger transport sector. She demonstrated that the transport sector is the largest CO₂ emitter in the country. The most significant growth of CO₂ emissions comes from passenger transport, where diesel fuel is widely used in cars. Seeking to reduce CO₂ emissions by 9% in 2030, the country has to implement all existing and planned policy measures of NECP2030. From a long term perspective, the energy sufficiency concept should be integrated into policy. Seven indicators of energy sufficiency were analysed. The analysis results disclosed that Lithuanians travel less than the EU average, although distances travelled become longer. Travelling by private cars dominate in the modal split. Public transport accounts for only a

small share (10%), as this way of travelling is not popular in the country. If the energy sufficiency approach is implemented, travelling distances per person will increase, but they will be lower than the theoretical potential. However, in comparison to the PRIMES model estimates, CACTUS assumptions allow reducing the upward trend of passenger-km by 25%. The number of cars per person increases and the EU level was achieved in 2018. However, passengers' cars used in Lithuania are old. Increasing distances travelled by cars could be stabilised at EU level in future. For this purpose, the country has to encourage the use of public transport, soft mobility, car sharing, and more widely introduce online shopping or home offices. The relevant measures to promote public transport include financial support, comfortable timetables and high frequency, priority lines, smart tickets, advanced ticketing system connecting urban and interurban routes, bans when entering the city centre, and others. Travelling by rail is very unpopular in Lithuania today. It is expected that due to the implementation of the infrastructure project Rail Baltic, the distances travelled by rail could increase by several times. Interest in soft mobility would increase due to infrastructure development projects too. Finally, due to the implementation of the aforementioned energy sufficiency assumptions, fuel consumption could decrease by 550 ktoe in 2050.

Housing

Antoine Durand (Fraunhofer ISI) provided insights into the sufficiency initiatives and solutions in Germany. He argued that sufficiency-oriented practices could be implemented at different levels (for example, EU or region). Still, he observed that sufficiency actions are usually taken at local and community levels and are supported by programs implemented by the relevant ministry. Best practices are found in household (appliances), food and mobility sectors. Namely, seeking to utilise under-occupied living space, consulting offers for older landlords are provided, or information of different options (selling, renting, co-living, etc.) is given. To reduce the rent for students, they can take part in the housing for help (shopping, cleaning) program. Aiming at facilitating moving people to more suitable flats, the platform for exchanging apartments or houses is established. The country has funding schemes for sustainable and affordable housing and rents. Financial support is provided for the construction or modification of dwellings of the limited floor area and based on other sufficiency criteria. Cities are very active in reducing the number of private cars. Therefore, they promote the use of shared cars or public transport and purchase cargo bikes. In Berlin, they have a programme to re-use products such as furniture, clothes, etc. Seeking to prevent rubbish and waste (zero waste), the "unpacked" shops are established in almost all cities.

Viktorija Bobinaite (LEI) discussed the tendencies and directions of energy consumption and energy sufficiency potential in Lithuanian households. She reminded the participants that Lithuania's climate and energy policy aims to ensure that the country by 2050 becomes an energy-sustainable and independent state in which energy from renewable energy sources (RES) meets 90% of final needs. In the electricity and DH sectors, all energy needs to be produced using only RES. In the context of

Lithuania's climate and energy policy, energy sufficiency is a new concept. Still, its content and structural parts are already included in the dimensions of the NECP2030, such as decarbonisation, reduction of energy consumption or horizontal measures. Mainly, the concept of energy sufficiency is linked to changing consumer behaviour in the transport sector by promoting eco-driving, inland waterway transport, public road transport or cycling, and the emergence of co-transport services, which would contribute to reducing GHG emissions. The plan also includes measures to reduce energy poverty, i.e., to deal with energy insufficiency. To reduce energy consumption, energy suppliers have reached agreements to train and advise consumers, and a higher rate of excise duty is applied to fossil fuel users. As can be seen, the approach to energy adequacy is only emerging. However, fuel and energy consumption here tends to increase by 1.1% annually, with households accounting for one-third of total final energy consumption. There is a slight downward trend in household fuel and energy consumption of 1.1%, with a target of a 12% reduction in 2030 and a 25% reduction in GHG emissions by 2030. Historically, about 70% of all energy in households is used for heating and about 15% for lighting and electrical appliances. The structure of fuel and energy used for heating purposes is dominated by RES (firewood) and DH heat, but their consumption is 2.2% and 1.7% less each year. The share of fossil fuels is around 15%, but it tends to increase due to the increasing use of natural gas. The demand for electricity for lighting and the operation of electrical appliances is growing. It increased by about 16% during 2010-2020. Within the framework of the CACTUS project, 9 indicators to characterise energy sufficiency were singled out. These are social, housing and energy indicators. Some of these indicators are moving in the direction favourable to energy sufficiency, others need to be adjusted through the policy measures. The estimates of indicators in 2050 were made and then compared with the theoretical potential. In the following, a brief review of the dynamics of each indicator and the factors influencing it, are presented and the expected values for 2050 were provided for discussion.

The size of Lithuanian households declines. In 2008 the household consisted of 2.5 persons, compared to 2.2 persons in 2017. This means that smaller and larger households are being set up in dwellings built for larger households or that the same number of people need more housing. Households are shrinking due to a person's choice to live alone and for couples – without children and separately from their parents. The demographic situation in Lithuania is deteriorating. It is deteriorating due to high emigration and natural change of population, which is affected by declining birth rates. Due to the rapid population decline in the country, the number of households is declining. Considering EUROSTAT's projections of population and estimate that the household size is 2.2 persons in the future, a reduction in the number of households is fixed by 2050. There will be just under 1 million households in the country. Historically, the number of dwellings has increased in Lithuania. According to data from 2017, there were about 1.5 million dwellings. 60% of dwellings are detached houses. Their number is growing faster than housing in apartment buildings. The pandemic situation dictates that people tend to choose to live in the countryside, i.e. where individual houses are built. In CACTUS, researchers discussed how much housing Lithuania would need (what is the need?) and how many could there be in the country (what is the supply)? It is expected that

following the dynamics of the number of households and the tendency that would be a share of households who want to have at least a few dwellings, the demand for housing nationwide will significantly decrease. The supply of housing will also decline. Considering the renovation plans, the historical rate of housing demolition and new construction, it is believed that the supply of housing will remain higher than the demand. That difference was called the vacancy rate. The share of vacant housing will increase. In 2050, 15% of dwellings could be vacant.

This is an unfavourable trend for energy sufficiency. From an energy sufficiency perspective, one should think about what to do with the surplus housing stock, as at least part of this fund will definitely need fuel and energy to sustain. The results of the household analysis show that regardless of the size of income, there are individuals and households in the country living in very large dwellings, such as up to 200 m² per capita, with a median housing floor area of 38.5 m² per person. Therefore, the country has the potential for energy sufficiency in terms of housing area per person. The concept of energy sufficiency could be related to a heated dwelling area of 32.3 m² per person in Lithuania when the theoretical potential is estimated at 30-35 m² per person.

For many years, the size of housing has been associated with the social status of the family. Large individual houses up to 200-250 m² were built. During 2000-2019 the average area of new dwellings decreased from 169 m² to 136 m² in individual houses and from 72.5 to 61.5 m² in multi-apartment houses. It is expected that the area of housing will decrease in both sectors in the future. In the sector of individual houses, more houses with an area of up to 80 m² will be built. The housing area of apartment buildings could reach 54 m². It has been calculated taking into account the requirements of the technical building regulations regarding the minimum area of the premises and the expected size of the household. The need for fuel and energy for cooking is declining. The reason for this is the replacement of gas ovens with more efficient electric and induction ovens with class A+. It is expected that in the future 2 times less fuel and energy will be used for this purpose than in the base year 2017. After evaluating the discussed energy sufficiency assumptions, it is obtained that energy consumption in Lithuanian households will decrease. The levels of sufficient energy consumption were compared with those that will be achieved through energy efficiency policies. It is seen that by 2035 energy sufficiency will reduce energy consumption to the same extent as energy efficiency improvements. However, after 2035 the energy sufficiency approach could reduce energy consumption faster than increasing energy efficiency. The reduction in energy consumption due to energy sufficiency could be 18% higher than due to energy efficiency improvements in 2050. Various measures can be taken to realise the potential of energy sufficiency. An overview of global experiences was made, allowing them to be grouped:

- In order to reduce housing space per capita, support could be provided to investors when they build or renovate homes to suit the needs of older people; older (single) people could be encouraged to move to smaller dwellings or dwellings with common areas, fiscal

measures could be imposed on real estate, and bans on the construction of individual houses in certain areas could be imposed.

- In order to promote co-living, multifunctional spaces (bubbles) could be set up for work, leisure and living, and co-living spaces could be built.
- In order to reduce the vacancy rate, there is a practice to tax such dwellings.
- To reduce energy consumption in the dwelling, regulations are used to reduce temperatures or install smart thermostats as part of subsidy programs.

Vidas Lekavičius (LEI) presented the results of the performed household survey (2020) regarding their practice to save energy. The results disclosed that 3/4 of households save electricity, heat and water. 2/3 of households would not agree to pay more for energy from RES. In comparison to the results of Eurobarometer (2006), this share decreased. And this discloses that there is a slow movement in the direction towards sustainable consumption. To help mitigate climate change, half of the households would not agree to save energy, but if support is given, the share is 45%. Women would agree to save energy more often than men, but if support is given, then men also would choose solutions to reduce energy consumption. High-income households would agree to reduce energy consumption more often compared to low-income ones. The latter might suffer from energy poverty which limits their possibility to reduce energy consumption. Low-income households would more often agree to introduce energy sufficiency solutions in their lives if support is supplied to them. Moreover, younger people are more flexible in accepting new approaches to energy savings than people over 65. Higher educated households of size 3 and more persons better understand the need for energy sufficiency than other groups of people. Taking this into account and considering the median level of energy consumption per adult equivalent as a benchmark, it was estimated that energy consumption could be reduced by 20.4% if households were motivated to use the median amount of energy. The share would increase to 30.5% if only reduced energy consumption is assumed (the median level or less). Energy consumption would decrease by 2.5% if people would agree to reduce energy consumption on a voluntary basis. This reduction would be 3.5% if support for energy sufficiency is provided.

Further discussions on energy sufficiency in Lithuania

If energy sufficiency assumptions are realised and reductions in energy consumption would occur, then changes in the energy system would happen. Those changes were presented by Arvydas Galinis (LEI). He used one of the scenarios of Lithuanian Energy Strategy as a baseline for the calculations. It was assumed that the price of CO₂ emissions would increase from 52 EUR/t (2020) to 104 EUR/t (2030). In the baseline, electricity is produced using natural gas, wood, wind, solar and hydro energy. The current 70% of import of energy would be changed to own production already in 2030. In the heat production sector, biomass in combination with waste heat, municipal waste and some share of natural gas, would be a core source of heat energy. Consumption of oil products would decrease, but biofuels and biomass would increase in the primary energy consumption. Due to the reduction in oil products and natural gas, CO₂ emissions would be reduced. Energy sufficiency-based scenarios show

reductions in consumption of oil products and other fossil fuels due to measures in the transport sector, as well as cuts in biomass due to efforts in households for heat consumption. The savings of different fuels and energies received due to the implementation of reduced demand scenarios, could be in a range of up to 14%. If household survey demand scenarios are analysed, then savings in different fuels and energies could reach up to 16%. The results demonstrate that energy sufficiency measures do not make significant changes in the energy system. Biomass CHPs are implemented at lower rates, electricity imports and solar energy for heating could decrease. Implementation of energy sufficiency measures may lead to about 100 MW changes in overall installed capacity. In extreme cases, this could be 200-300 MW. Due to reductions in consumption of fossil fuels, CO₂ emissions would also be reduced.

Finally, the discussion was organised to disclose measures of energy sufficiency relevant in Lithuania and thus far uncovered issues by CACTUS, including the development of the renewable energy source (RES) sector in the context of energy sufficiency. Participants agreed that concern of energy sufficiency and rational use of energy is worth attention. However, they noticed that several issues were not considered in the current discussions on energy transition. What would be the transition to RES on the path towards energy sufficiency from the point of view that RES energy would not be cheaper than energy from fossil fuels? Production of RES energy might require energy storage systems which are expensive. Therefore, what would be the impact of RES energy on demand? The participant argues that from the perspective of Lithuanian history, mandatory principles are a step back to when society was forced to behave in a requested way. Secondly, nature does not understand where the CO₂ emissions come from, i.e. biomass, natural gas or coal. To argue that biomass does not emit is a political argument.

Responding to the comments, A. Galinis agreed that RES technologies require additional infrastructure (storage systems, etc.) and this impacts on prices, but the benefits of RES come through other channels, i.e. through the health system and its expenditure. Furthermore, A. Galinis agreed that emissions from burning biomass might be high, but this is in a short-term perspective. In the long term, growing biomass sequesters CO₂, therefore, it is considered a carbon neutral fuel. The discussion was organised on presented energy sufficiency measures. The representative from the Ministry of Transport said that this issue should be solved in a complex way. Then, a representative from the Ministry of Foreign Affairs asked about other measures than financial ones at the individual level to support energy sufficiency. Currently, these measures are inadequate as they are small for people of lower purchasing power. Communication measures could be a choice, but they are effective for only 6 to 12 months. Later they have to be repeated. Communication with society is provided, but still, communication is not sufficient. Education is relevant too, but it needs time and finance. Representative from Lithuanian Consumer Alliance asked about a model for good communication with consumers. LCA consults consumers regarding how to change habits when saving energy, but it does not know what is an ideal model of that. It operates on terms such as to consume less or consume more efficiently. She noticed that consumers want proposals based on

numbers, i.e. how many km a person can drive a car to be sufficient, etc. Regarding a model for communication, the LEI representative suggested applying a customer journey model. It is based on understanding how a family acts every day, in which points of daily life they need energy and face problems and then propose measures for those problems. A. Galinis said that the measures on the current policy agenda are overbored and provided an example of a tax on cars. He said that the car itself does not emit. The use of fuel is a source of emissions. Therefore, people can't accept that measure but agree on a tax for fossil fuels. A. Pazeraite added that change of behaviour should be by showing an individual value of things but not saying what a person should not do.

4.2 Outcomes

Some of the main points emerging from the debates were:

- Energy poverty needs to be considered since, for many households, energy sufficiency means increased consumption to the level that reflects basic needs. Measures to deal with energy insufficiency are included in the Lithuanian NECP2030.
- Sufficiency-oriented practices and actions could be implemented at different levels, though they are usually taken at local and community levels with support from programmes implemented by relevant ministries.
- Examples from Germany of best practise energy sufficiency actions in household, food and mobility sectors such as: utilising under-occupied living space, facilitating moving people to more suitable flats, schemes for sustainable and affordable housing and rents, support for the construction or modification of dwellings of limited floor area, reducing the number of private cars and promotion of car sharing or public transport and cargo bikes.
- Energy sufficiency policy recommendations from the CACTUS project in the realm of mobility include: encouraging the use of public transport, soft mobility, car sharing, and more widely introducing online shopping or home offices. Promoting public transport via financial support, comfortable timetables and high frequency, priority lines, smart tickets, advanced ticketing system connecting urban and interurban routes, bans when entering the city centre, and others.
- In the Lithuanian NECP2030, the concept of energy sufficiency is emerging, and is linked to changing consumer behaviour in the transport sector by promoting eco-driving, inland waterway transport, public road transport or cycling, and the emergence of co-transport services, which would contribute to reducing GHG emissions.
- An overview of global experiences, by the CACTUS project, shows various measures that can be taken to realise the potential of energy sufficiency in housing, such as:
 - Supporting residents in moving to smaller or shared dwellings in order to reduce housing space per capita along with fiscal measures and regulation in the sector.
 - Setting up co-living spaces and multifunctional spaces (bubbles) for work, leisure and living.
 - Taxing vacant dwellings in order to reduce the vacancy rate.

- Using regulation to reduce energy consumption in the dwelling, by reducing temperatures or installing smart thermostats as part of subsidy programs.
- On the questions of how best to communicate to citizens and consumers, it should be taken into account that many communication tactics are effective only for a limited time (of 6 to 12 months), after which they would need to be repeated. Consumers want proposals based on numbers, i.e. how many km a person can drive a car to be sufficient. A customer journey model could be used as a model for communication.
- It was argued that national historical contexts should be taken into consideration since, due to Lithuanian history, mandatory principles can be seen as a step back to when society was under authoritarian rule.

The workshop was successful in terms of participation, since it attracted relevant professionals that participated in the discussion and increased awareness about energy sufficiency among policymakers. The workshop would have been more successful with regards to feedback and active participation if organised on-site or online only. The hybrid mode attracted more participants (which was good for awareness raising), but online participants were rather passive in the discussion.

5.0 Workshop outcomes

This chapter includes a summary and evaluation of the three national workshops highlighting the main outcomes, and a reflection on the workshop framework with suggestions for future workshops on the topic.

5.1 Summary and evaluation of the three national workshops

One aspect that was highlighted in each workshop was that of energy poverty and the difference between luxury/excess consumption vs. consumption to cover basic needs. This consideration is important both in terms of implementation of policies and ensuring social acceptability, but also in terms of differentiating policy measures depending on the types and levels of (energy) consumption targeted. In many instances throughout the workshops, different kinds and scopes of (energy) consumption were discussed, which calls attention to the complexity and interrelatedness of consumption areas and practices. Furthermore, the connection between economic policy and modelling on the one hand and energy policy and modelling on the other, was highlighted in several discussions.

The level at which to implement sufficiency actions was also discussed at all three workshops, and it was highlighted that actions at the community level can be supported by programmes implemented by relevant ministries, since it is very relevant to leverage the sufficiency practices and activities already existing and emerging at the community level. Furthermore, it was highlighted that targeting practices at the collective level is crucial in order to create significant impact, but that this is very challenging. Accounting for historical and nationally specific contexts was also urged.

An extensive list of potential policy measures can be extracted from the three workshops with reference to diverse sources from research, national and local climate plans. However, combining these recommendations into a well-designed policy package will require further research efforts and is beyond the scope of this report.

The workshops were considered successful in the sense that they attracted relevant professionals, resulted in valuable discussions and increased awareness about energy sufficiency among different groups, particularly policy makers in Lithuania and Latvia. However, and largely due to the pandemic circumstances, the workshop formats were limited, with regards to time and/or participants/participation. It was clear that hosting more workshops on the subject of energy sufficiency is highly relevant.

5.2 Reflections on the workshop framework

It might be beneficial to consider hosting the policy workshops in two turns, as suggested by the building/home group at the Danish workshop. A common ground and shared understanding of some of the main barriers to creating sufficiency oriented practices was established to some degree during the workshop discussions. Having had such fundamental discussions in the groups might serve as a stronger starting point for developing new practice and policy suggestions. Furthermore, a second workshop with an increased focus on further developing such new suggestions and designing coherent policy packages could be facilitated with more participatory methods than was deemed possible at the first workshop. In such a case, it could be relevant and interesting to draw on methods from the field of *sustainable transition design*. Such approaches could draw on innovative methods, such as the ones developed by Gaziulusoy, Ceschin and Irwin (see Gaziulusoy, 2019 “Transition Design: How?”) or as proposed by Gaziulusoy and Ryan (2017); Gaziulusoy, Boyle and McDowell (2013) and Quist and Leising (2016). This could include the generation of more detailed, cohesive and normative future scenarios in a participatory manner, based on the systematisation of the different types of knowledge (analytical and innovative) at play in the policy workshops (Gaziulusoy and Ryan, 2017; Quist and Leising, 2016); or of visioning and backcasting methods as developed by Irwin (2015) and Irwin et al. (2013); or scenario methods by Gaziulusoy, Boyle and McDowell (2013), for linking developments at the micro-level with societal macro-level innovations, through explorative and back-casting scenario building.

An online Baltic-Nordic competency workshop was hosted subsequent to these national policy workshops with participating policy professionals and energy modelling experts from Lithuania, Latvia, Denmark, Norway, Sweden, Finland, Estonia, France and Holland. This workshop spanned one and a half days for more in-depth activities and included demonstrations in energy modelling programmes and participatory engagement. The workshop drew on experiences from the policy workshops and included some of the same participants. It was summarised and evaluated in the work package 6 report entitled “Development of Nordic-Baltic competence and experience sharing of energy sufficiency”.

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Appendix 1

National Policy Workshop - Denmark

List of participants at the mobility table

Name	Affiliation
Iva Ridjan Skov	Aalborg University, Department of Planning
Inge Røpke	Aalborg University, Department of Planning
Leif Kajberg	Council of Sustainable Traffic
Malene Freudendahl-Pedersen	Aalborg University, Department of Planning
Lene Hartmann	Furesø Municipality and IDA T&B
Johan Nielsen	Green Transition Denmark
Rikke Veber Rasmussen	Aalborg University, Department of Planning (facilitator)
Gunnar Boye Olesen	INFORSE-Europe (facilitator)

List of participants at the housing table

Name	Affiliation
Line Kryger Aagaard	Aalborg University, Department of the Build Environment
Helga Jacobsen	Tiny Varigheden
Anne Sofie Møller Askholm	Aalborg University, Department of the Build Environment
Aske Emil Ditzel	Copenhagen Municipality
Ulrik Jørgensen	Researcher and consultant in the area of energy communities and sustainable transition
Emil Thomsen Øberg	Aalborg University
Andreas Klinkby Mansa	Aalborg University
Michael Søgaard Jørgensen	Aalborg University, Department of Planning (facilitator)

Appendix 2

National Policy Workshop - Latvia

List of registered participants

Name, Surname	Affiliation
Vera Suzdaļenko	Būvniecības valsts kontroles birojs
Līga Bleikša	BVKB
Āris Ādlers	Jūras Zeme
Helēna Rimša	Ekonomikas ministrija
Janis BRIZGA	Zaļā brīvība
Linda Zuze	Zaļā brīvība
Magda Jentgena	Latvian Wind energy association
Dana Lūse	Zaļā Brīvība
Inese Olafsone	Employers Confederation of Latvia
Einārs Cilinskis	Ministry of Economics
Edgars Smiltāns	Conexus Baltic Grid
Jaanis Ikaunieks	Riga Energy Agency
Jeļena Ziemele	University of Latvia
Kristīne Ozoliņa	Pārresoru koordinācijas centrs
Selina Vancane	Riga city council
Valdis Ratniks	Riga Energy Agency
Līga Žogla	EKODOMA
Dzintars Jaunzems	Riga Technical University
Arnis Bergs	biedrība "Bezizmešu mobilitātes atbalsta biedrība"
Edgars Vīgants	RTU
Tomass Liepnieks	Sadales Tīkli
Jānis Eisaks	Conexus
Sanita Kalnača	Cross Sectoral Coordination Centre
Krista Petersone	Zaļā brīvība
Zane Galindoma	VARAM
Ojārs Balcers	Latvijas Zemes draugi
Kārlis Lakševics	University of Latvia
Ance Ansone	JSC Conexus Baltic Grid
Karlis Mendzins	Uzladets
Gatis Bazbauers	Riga Technical University
Uldis Biķis	LKF
Edgars Vīgants	Latvian Renewable Energy federation

Appendix 3

National Policy Workshop - Lithuania

List of registered participants

Name	Affiliation
Vytautas Adomavičius	Kaunas University of Technology
Gintaras Adžgauskas	Lithuanian Energy Institute
Pijus Andrejauskas	
Audrius Arcišauskas	UAB Tauragės šilumos tinklai
Tomas Aukštinaitis	Ministry of Environment
Tomas Bajorūnas	AB "Litgrid"
Rimantas Bakas	Lithuanian Energy Institute
Daiva Bikulčienė	Lithuanian Electricity Association
Arūnas Bukantis	Vilnius University
Sigitas Cibulskas	AB Vilniaus šilumos tinklai
Mindaugas Česnavičius	Lithuanian Energy Institute
Algirdas Dargužas	Lithuanian Energy Seniors Club
Jurgis Dumbrava	Lithuanian National Accreditation Bureau
Jolanta Dvarioniene	Kaunas University of Technology
Vytautas Džiuvė	Lithuanian Energy Institute
Darius Gražys	VEESLA UAB
Aušra Grėbliūnaitė	Ministry of Energy
Vygintas Grinis	Lithuanian Energy Institute
Jūratė Jaiūnienė	Lithuanian Industry Trade Union Federation
Karolis Januševičius	Lithuanian Energy Agency
Aušrinė Jovaišaitė	Exedra Corporate Finance
Rymantas Juozaitis	UAB "ENG Group"

Dovilė Kapačinskaitė	Ministry of Energy
Viktoras Karaliūnas	Nature Research Centre
Daumantas Kerežis	Ministry of Energy
Jurij Konon	AB Vilniaus šilumos tinklai
Antanas Krasauskas	Koncernas ACHEMOS GRUPĖ
Albinas Kusta	Lithuanian Academy of Sciences, Vytautas Magnus University
Saulius Kutas	Lithuanian Energy Seniors Club
Gvidas Laugalis	AB Vilniaus šilumos tinklai
Birutė Linkevičiūtė	Litgrid, AB
Aurimas Lisauskas	Lithuanian Energy Institute
Elena Mačiulaityte	Ministry of Energy
Linas Martišauskas	Lithuanian Energy Institute
Viktoras Mekas	Lithuanian Energy Seniors Club
Darius Migilinskas	Vilnius Gediminas Technical University
Regina Mikutaitė	National Energy Regulatory Council
Lina Murauskaitė	Lithuanian Energy Institute
Vita Naujokaitytė	Ministry of Foreign Affairs
Vladas Kęstutis Nekrašas	AB Vilniaus šilumos tinklai
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Aušra Pažėraitė	Lithuanian Energy Institute
Romualdas Pocius	Medardas Čobotas Third Century University
Andrius Puzas	Center for Physical Sciences and Technology
Robertas Radžvilas	LITGRID AB
Kristina Rimkūnaitė	Ministry of Foreign Affairs
ARVYDAS SEDEKERSKIS	Lithuanian Electricity Association
Anastasija Skunčikaitė	National Energy Regulatory Council

Laimutis Stočkus	Kaunas University of Technology
Viktorija Strazdaitė	National Energy Regulatory Council
Vilius Šaduikis	Lithuanian Energy Seniors Club
Tomas Šidlauskas	UAB Alvora
Matas Taparauskas	National Energy Regulatory Council
Rūta Trainytė	Consumers' Alliance
Edmundas Tunaitis	National Energy Regulatory Council
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