PROSEU

Prosumers for the Energy Union:
mainstreaming active participation of
citizens in the energy transition

Charging the future:
Roadmaps and value tensions for mainstreaming prosumerism to 2030 and 2050

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Summary of PROSEU

PROSEU aims to enable the mainstreaming of the renewable energy Prosumer phenomenon into the European Energy Union. Prosumers are active energy users who both consume and produce energy from renewable sources (RES). The growth of RES Prosumerism all over Europe challenges current energy market structures and institutions. PROSEU's research focuses on collectives of RES Prosumers and will investigate new business models, market regulations, infrastructural integration, technology scenarios and energy policies across Europe. The team will work together with RES Prosumer Initiatives (Living Labs), policymakers and other stakeholders from nine countries, following a quasi-experimental approach to learn how RES Prosumer communities, start-ups and businesses are dealing with their own challenges, and to determine what incentive structures will enable the mainstreaming of RES Prosumerism, while safeguarding citizen participation, inclusiveness and transparency. Moving beyond a case by case and fragmented body of research on RES Prosumers, PROSEU will build an integrated knowledge framework for a socio-political, socioeconomic, business and financial, technological, socio-technical and socio-cultural understanding of RES Prosumerism and coalesce in a comprehensive identification and assessment of incentive structures to enable the process of mainstreaming RES Prosumers in the context of the energy transition.

Summary of PROSEU's Objectives

Eight key objectives at the foundation of the project's vision and work plan:

- **Objective 1:** Document and analyse the current state of the art with respect to (150-200) RES Prosumer initiatives in Europe.
- **Objective 2:** Identify and analyse the regulatory frameworks and policy instruments relevant for RES Prosumer initiatives in nine participating Member States.
- **Objective 3:** Identify innovative financing schemes throughout the nine participating Member States and the barriers and opportunities for RES Prosumer business models.
- **Objective 4:** Develop scenarios for 2030 and 2050 based on in-depth analysis of technological solutions for RES Prosumers under different geographical, climatic and socio-political conditions.
- **Objective 5:** Discuss the research findings with 30 relevant stakeholders in a Participatory Integrated Assessment and produce a roadmap (until 2030 and 2050) for mainstreaming RE Prosumerism.
- **Objective 6:** Synthesise the lessons learned through experimentation and co-learning within and across Living Labs.
- **Objective 7:** Develop new methodological tools and draw lessons on how the PROSEU methodology, aimed at co-creation and learning, can itself serve as an experiment with institutional innovation.
- **Objective 8:** Create an RES Prosumer Community of Interest.

PROSEU Consortium Partners

Logo	Organisation	Type	Country
	FCIENCIAS.ID	Private non-profit association	Portugal
	UPORTO	University	Portugal
	ICLEI EURO	Small and medium-sized enterprise	Germany
	CLIENTEARTH	Non-governmental organisation	United Kingdom
	UNIVLEEDS	University	United Kingdom
	DRIFT	University	the Netherlands
	UNIZAG FSB	University	Croatia
	LEUPHANA	University	Germany
	ECO-UNION	Non-governmental organisation	Spain
	IÖW	Private non-profit limited company	Germany
	CE Delft	Small and medium-sized enterprise	the Netherlands

Table of contents

List of tables

List of figures

Executive summary

This report is part of the Horizon2020 research project PROSEU, which set out to assess the financial, social, and technical implications of mainstreaming prosumerism across Europe. Part of this research was understanding possible and desirable directions of prosumer energy futures. In this report's precursor, 'Synthesis of incentive structures: input for Participatory Integrated Assessment', it was stated how:

"*The mainstreaming of RES prosumerism is viewed as part of a broad, long-term transition process, and we need to take the directionality (the multiple possible development paths) of this transition process seriously*"[1] .

This report presents the outcomes of a participatory process in which these multiple development paths and futures of prosumer business models, social dynamics, and technical systems were explored with a wide range of stakeholders. First, we outline the objective of the report and the process of the Participatory Integrated Assessment (PIA) (Section 1). Second, we discuss six leverage points, or 'buttons to switch' for affecting the future, which were distilled from the rich outcomes of this participatory process (Section 2). Third, we highlight three key value tensions which underlie these leverage points, and for which value prioritisations will need to be made. Once a decision has been made on what the desired direction for the future is, readers can refer to the respective roadmap associated with that future (Section 3). Fourth, 10 provocations for mainstreaming prosumerism towards 2050 are presented: a conversation tool which can be used to discuss what a preferred future for prosumerism looks like (Section 4). Fifth, and finally, we provide inspiration for how to put the provocations to use through appreciative inquiry (Section 5).

This report serves multiple audiences and interests. Therefore, we have broken down the structure of the report into several sections. You can read these separately, depending on what you want to know about the future of mainstreaming prosumerism in Europe.

Are you:
- … trying to understand the objectives, data and underlying process of the Participatory Integrated Assessment? Read Section 1 introducing the PROSEU project and the transdisciplinary research work that this report is based on.
- … interested in what leverage points there are for mainstreaming prosumerism in future energy systems? Read Section 2 about the six leverage points that emerged.
- … keen to learn about the key tensions for mainstreaming prosumerism, possible futures, and ways to get there? Read Section 3 outlining tensions, futures and roadmaps along financial, political and technological aspects.
- … ready for some introspection on your own value orientation? Dive into the 10 provocations for mainstreaming prosumerism presented in Section 4.
- … motivated to start a dialogue or further inquiry into the future of prosumerism? In Section 5 we help you get started by explaining the fundamentals of appreciative inquiry.

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1 Pel 2019, p. 13.

1. Introduction

1.1 "*We need to start having these conversations*"

In 2050, 89% of all energy in the residential sector in Europe could be generated by Renewable Energy Sources (RES) prosumers[2]. Prosumers produce their own energy to switch on their lights, charge their phones or do their laundry. Apart from individual prosumers, RES prosumer initiatives are important actors. A RES prosumer initiative is a "*collective energy actor that produces [renewable] energy [to] provide in its own energy needs, and/or those of its members, and in some cases selling excess energy to [others]*"[3]. The numbers suggest that, if we want, prosumerism, and RES prosumer initiatives, could be a cornerstone of a European continent run on renewable energy, as envisioned in the European Green Deal[4].

In fact, some have argued that a decentralised energy system driven by RES prosumer initiatives is the best way to foster energy efficiency, accessibility, and justice[5]. However, for prosumerism to fulfil this potential, many decisions and measures would need to be taken. What might an energy system in which prosumerism is mainstreamed look like? Which obstacles would need to be overcome, and which opportunities would have to be created? At the very essence, these questions are about the values that we, as a society, want to see materialised in future energy systems. These questions were central to a participatory process that we organised with 139 frontrunners from policy, business, research, non-profit and prosumer organisations.

While discussing these underlying values during the participatory process, a participant remarked that "*We need to start having these conversations!*". This report aims to do exactly that: by providing 10 roadmaps and 10 provocations for mainstreaming prosumerism towards 2050, we aim to open up dialogues and deepen inquiries into what a desirable energy system, in which prosumerism is mainstreamed, looks like. The provocations are a tool to ignite conversations and serve as a map to navigate long-term (policy) decisions and plans to shape the future. These conversations, dialogues and inquiries expose the value tensions which continuously will need to be addressed in the coming decades. The 10 roadmaps we present support a further exploration of how different futures might be reached, once a value prioritisation has been made.

1.2 Democratising the directions of the future

The reason for developing these provocations and providing multiple roadmaps, rather than one singular roadmap for the future of prosumerism, is three-fold. First, a perfect future for mainstreaming prosumerism does not exist. An undisputed road towards the *best* future cannot single-handedly be determined by any one actor: what is the best way forward is a matter of

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2 Gährs et al 2020
3 Horstink et al 2019
4 Commission Communication (EU) 2019
5 e.g. Van Veelen 2018 or Wittmayer et al 2021

interests and perspective. Second, the future is uncertain: detours and readjustments would soon render a singular roadmap obsolete. Remaining aware of different pathways can help to be more resilient to (unexpected) shocks. Finally, and third, we argue that continuously exploring the variety of futures is crucial to strengthen energy democracy. After all, the outcome of future energy systems will depend on how values and interests are negotiated between market, state, and community, as well as how power is shared among these spheres[6]. In turn, this should be the result of a transparent democratic process, in which actors are enabled to take part in deliberating the future of energy systems, through which different interests can be taken on board in decision-making.

We identify a democratic deficit in current debates, where often specialist knowledge is needed in order to be able to discuss the future of energy systems. By working towards a shared language to discuss energy futures, we hope to empower more actors to join the debate on what values need to be prioritised for the future of energy. The leverage points, value tensions, roadmaps and provocations in this report are tools which can be used for this purpose. Policymakers, decision-makers, civil society organisations, as well as energy entrepreneurs and prosumers can use them to negotiate and understand each other's values and challenge each other. Researchers can use them to embed their research in the policy debate, and citizens can act on them by questioning current policy directions. As such, we consider these roadmaps and provocations a vital contribution to democratising the mainstreaming of prosumerism.

"We consider this report a vital contribution to democratising the mainstreaming of prosumerism."

1.3   Background to this report

This report is the culmination of a Participatory Integrated Assessment (PIA) process, which was organised between March - October 2020. A PIA emphasises involving stakeholders beyond academia to validate and refine research outcomes[7]. Involving a diverse set of PIA participants is meant to prevent coming to business-as-usual scenarios and staying within prevailing normative frameworks.

For PROSEU, this process was initiated to assess and discuss, in a participatory way, the factors influencing the mainstreaming of prosumerism. These factors had been synthesised from the PROSEU work on policy and governance, technological options, as well as finance and business[8]. Three sessions were organised on business models, social dynamics and energy systems respectively. The outcomes of these sessions, in the form of the six leverage points discussed in Section 2, were validated through a fourth session. As such, this report builds on an analysis of the PIA discussions between a wide variety of stakeholders coming from policy, business, energy agencies, research and prosumer initiatives. The complete PIA-journey, as well as more information on the background of the participants, is pictured in Figure 1.

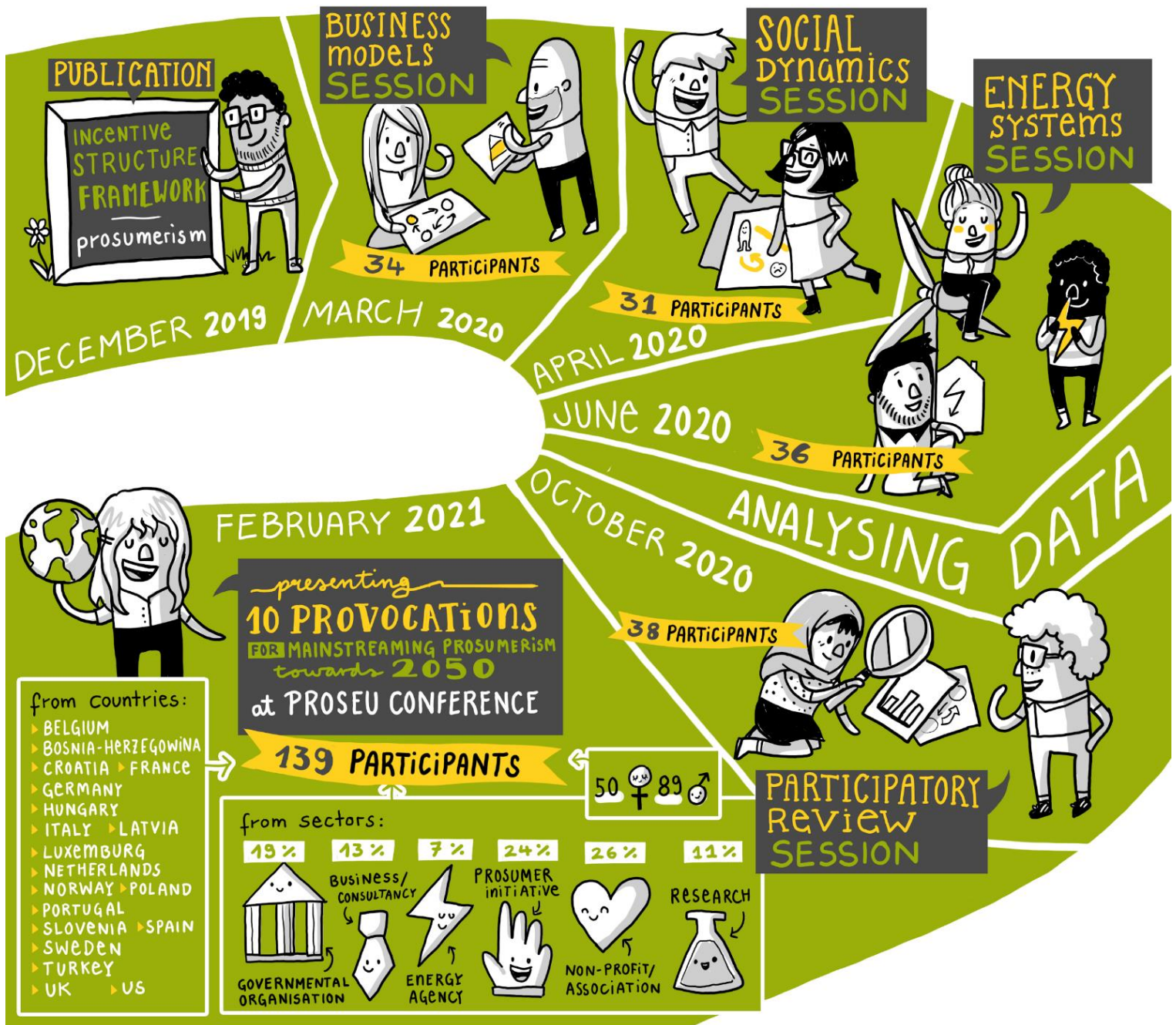6 Avelino and Wittmayer 2016
7 Salter et al 2010
8 Pel et al 2019

Fig. 1. The Participatory Integrated Assessment (PIA) process of the PROSEU project.

2.   Presenting six leverage points

In this section, we discuss six leverage points, which emerged from the PIA discussions as crucial elements that shape and design future prosumer energy systems: 1) Governing logics; 2) Prosumers in energy markets; 3) Financial incentives; 4) Designing the electricity grid; 5) Digitalisation and data-use; 6) Determining the role of the broader public. To understand each of these elements, we define them below and discuss underlying tensions and trade-offs that emerged from the discussions.

2.1   Governing logics

Institutional logics can be understood as a set of connected ideas, beliefs and discourses that are associated with a particular way of organising in society[9]. In relation to prosumerism, three relevant logics are market logics, state logics and community logics. State logics are generally characterised by the aim of organising for the common good, through means of legislation, policy, and bureaucracy: it is public[10]. Market logics are characterised by an orientation on profit and trade, and community logics can be understood as a typically informal and non-profit way of organising[11]. Logics are not necessarily linked to specific actors or domains: for instance, a state actor might be organised according to market logics or, an economy can be run according to state or community logics. Depending on what logics are dominant in governing prosumerism, actors will prioritise different organising principles[12].

PIA participants observed that market logics are currently dominant in most domains in relevant to energy systems. This is demonstrated by the power exerted by large companies, as well as a belief in economic growth and market logics to address societal issues. Relatedly, it was argued that much energy policy and regulations are focused on large companies rather than communities. The idea emerged that state, market, and community logics are each important, but need to be consciously mobilised for different goals.

Market logics were considered indispensable for harvesting creative input by entrepreneurs and spurring innovation through competition, and to wield the ability to scale products and business models. Meanwhile, state logics were considered paramount to safeguard values of the common good, by prioritising accessibility, inclusion, and local democratic control. National law and regulation were considered as necessary to support alliance-building between energy communities, allow for experimentation, professionalisation of cooperatives, as well as for removing financial barriers and facilitating exceptions and (financial) incentives for prosumers. Hereby it was also mentioned how governments should take a facilitating, not a controlling approach, embedding regulation with the lessons learned and experiences of energy communities.

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9 Avelino and Wittmayer 2016
10 Wittmayer et al 2021
11 Idem
12 More explanation of these logics can be found in Pel et al 2019

Finally, community logics were considered vital to increase citizens' participation in the energy transition, motivating people to organise, and improving democratic processes. It was also considered that this is yet the least developed logic when discussing prosumerism.

2.2   Prosumers in energy markets

The energy market regulates how energy is distributed and traded. For instance, it regulates whether prosumers can feed their generated energy back into the grid. Issues such as regulations and tendering in the energy market determine what players can enter the energy market, and under which conditions. Many participants agreed that the current way in which energy markets are regulated makes it difficult for small and decentral energy communities to compete with large and global companies. Although support structures for prosumers greatly differ across European countries, it generally appears that large market players tend to win tenders for energy projects. Arguably, the process of mobilising a group of people to develop an energy community project is much different from that of a large company, where such processes are standardised, and where resources can be allocated to do so.

Creating a more level playing field for local initiatives and large companies or fostering a hybrid system where collaboration would be encouraged was considered desirable for developing the future energy market. If prosumers are to participate in the market, differentiation would need to be made between market actors, to shield and incentivise civic actors and integrate them in the market. Such integration would increase the complexity of the market, so the challenge would be to keep regulations and processes to enter the market simple to understand, as it may soon become too complicated. Making policy and prosumer rights and benefits easily understandable for citizens and, importantly, 'stable' was considered key. Besides, the rights and positions of legal entities, such as energy communities and cooperatives, need to be strongly anchored in national law, and developed in collaboration with prosumers. Municipalities were suggested as suitable actors to manage participation processes, support prosumer initiatives entering the market, and create more awareness among citizens on how to enter energy markets.

2.3   Financial incentives

The leverage point of financial incentives concerns the question of how different actors and institutions can collaborate to provide an ecosystem of financial incentives. This includes issues such as tax regulations, or the accessibility of seed funding to make initial investments. A financial ecosystem that incentivises prosumers might be designed by collaboration of state, market and civic or non-profit actors. To allow more people to engage in prosumerism, regulators may enable cheaper renewable energy technologies, e.g., through taxation or investments, or by providing long-term subsidy schemes. Financial investments in innovation of business models, technologies, and other forms of financial support can support prosumers to overcome barriers of high in-front costs.

For prosumers who are able to raise capital (e.g., through savings or crowdfunding), developing a sustainable business case was considered the main challenge. To support prosumer business models, a long-term vision on the role of prosumerism in society ought to be developed. This would

provide guidance and stability. Long-term financing schemes that can be developed further are (ethical or community) bank loans, consumer credit or issuing municipal bonds. Favourable tax regulations such as tax exemptions on prosumer energy can also be explored further. Also, regulations not directly related to finance, such as those related to the energy performance of buildings can also directly support business models. An example of this are financial mechanisms for retrofitting residential buildings as part of the European Commission's 'Renovation wave' policy[13]. Another way to influence financial incentives for prosumers is for institutions to assess how they might divest from fossil-based energy sources, and how fossil-based energy might be regulated e.g., through carbon taxation. As a result of a broader fossil fuel phase out policy, including fossil energy price moderations, and electrification of sectors (e.g. mobility and heating) prosumers could obtain a stronger position in the market.

2.4 Designing the electricity grid

When designing a new, or changing the existing, electricity grid, the question is how prosumers will practically relate to that physical infrastructure. This concerns decisions on issues such as more flexibility, decentralisation and democratising governance.

 In the PIA discussions, there was a consensus on needing to create more flexibility in the grid, but what this means exactly is not always clear, nor who should be in control of this. Nevertheless, large investments are necessary to allow for more transport capacity, connection of micro-grids, and integration of storage, e.g., connecting electric vehicles as storage batteries is part of creating more flexibility. Also, demand-side flexibility is an important issue: flexible tariffs can help with lowering the peak energy demand using renewable energy at peak generation. An intermediary, acting on behalf of prosumers, might help to manage this. Central investments to adjust the grid to prosumers are needed, while keeping its management local. A more decentralised and local energy system would need aggregation and electricity exchange between prosumers to be possible, as well as local interoperability of assets (i.e. computer systems being able to exchange information).

 Importantly, the question emerged whether the grid will be managed bottom-up together with prosumers, or as a top-down centrally organised process? It was considered important to manage an energy system with regional expertise coming from prosumers, local authorities, citizens, DNO's, DSOs, as well as regulators and the central government. Participants would also need resources to be able to participate, and trust would need to be fostered. Needs will be different in different areas and social and cultural diversity needs to be acknowledged and catered to. While citizens want, and are able to participate, others may prefer to have everything arranged without participating. All the while, the overall system charges, and how these will be paid for, should be kept in mind. Again, municipalities were considered a suitable partner to manage the local grid.

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13 European Commission n.d.

2.5 Digitalisation and data-use

For shaping the future of prosumerism, decisions must be taken about the use of data, and the degree of digitalisation, including the use of smart metering, blockchain technology, interoperability, and energy storage. The first overarching issue is whether the energy system should be data poor, or whether we should collect as much information as possible. It was discussed how this is somewhat of a misleading tension, as energy digitisation is already happening. Moreover, if welcomed and made accessible it may enable citizens to become more active players in the energy market. Insights into the produced, consumed, and stored energy can be used to forecast energy demand and supply and to account for energy exchange. What data sufficiency looks like, what data is needed exactly and with what resolution (e.g. collected every 15 minutes, or every minute?) and scale (e.g. collected per neighbourhood, street, household, or per device level?) are questions that need more debate. The purpose of collecting data also needs to be communicated, so that citizens can have an informed opinion about whether they are willing to share their data and under which conditions. Besides, this prevents unnecessary data storage and data transfers, which in itself is energy costly.

During the discussions it was recognised that digitalising the energy system needs to be balanced with protecting data in accordance with common EU data law. How data will be used, owned, and secured was considered an issue of concern. Currently, smart meter data is generally monitored by (semi-)public actors such as energy agencies, DSOs, and electric vehicle data by private companies. It was proposed that a broad coalition of energy actors from different perspectives should come together to co-design principles for data protection and regulation that allow for a mainstreaming of prosumerism, while safeguarding the rights of citizens. Data collection would ideally be kept on a personal level, where citizens opt in or out on how and when they want to share their data with other actors, through a data communication platform. Improving data literacy would also be required. Apart from data, the use of algorithms and related interventions should also be transparent and made accessible to citizens.

2.6 Determining the role of the broader public

The mainstreaming of prosumerism in society will depend on whether, and how, citizens are able to understand and contribute to the energy system themselves. This affects whether citizens feel empowered and excited to join an energy community, and whether they have the capacities to fulfil a different role in the energy system. First, the need for a coherent vision based on values and related targets was highlighted, which is reflected in the aim of this report. Indeed, many prosumers and other actors long for long-term visions that provide stability for developing their initiatives. If prosumerism is to be a cornerstone of European energy, what targets does that relate to, and what is the energy mix that is worked towards? Also, how would that translate spatially? How will the energy mix be organised between different actors? What are the financial trade-offs considerations for choosing prosumer systems (e.g. possible overall higher labour costs for technical changes to residential energy systems compared to large RES infrastructure)? How will the costs for prosumer energy be redistributed? Apart from visions on these questions, and what it means to have a full prosumer model in terms of technology and regulation, concrete targets would need to be set.

Second, democratic innovation for structural governance reforms and decision-making would have to be initiated. Difficult in this regard is that the electricity system is complex and that it often requires specialist (e.g., technical) knowledge for decision-making. Not only is this knowledge not broadly shared within citizenry nor within municipalities, but also the corporate level is often biased towards profit making. Therefore, there is a need to find a threshold between citizen involvement and strategic and everyday decision-making. A 'neutral' broker at a local level, who has knowledge of both technical and governance issues was suggested to bridge institutions and help set up regulation, coordinate actors, and manage the local hubs. Relatedly, energy communities might be supported formally and informally to take measures regarding inclusion, gender awareness and social justice.

Third, energy education programmes and campaigns with attractive narratives were deemed an important factor to provide basic energy literacy among citizens, awareness of terminology and technology, as well as changing consumption habits to increase energy efficiency. Neutral brokers may support citizens to be informed about their options, and the potential benefits of prosumerism. Municipalities or energy companies may also be involved in this. Authorities can contribute to building narratives in which energy communities are conveyed as reliable actors, and citizens as active energy producers and not just consumers. Showcasing success stories must be done widely, to prime replication, and connect prosumers for collaboration. Schools might be involved with such programmes on the benefits of prosumerism for the overall system, as well as learning about the background of energy bills.

3. Uncovering value tensions for shaping prosumerism

The starting point for thinking about future pathways for prosumerism was a synthesis of currently known legal, technological, and financial factors and structures influencing prosumer mainstreaming[14] . This synthesis identified three themes with conflicting value orientations, which were used to structure the Participatory Integrated Assessment (PIA):

- Business models: community logics vs. market logics;
- Social dynamics: inclusive prosumerism vs. privileged prosumerism;
- Energy systems: energy islands vs. full system interconnection.

These extreme value orientations are 'caricatures' of what the future could look like, rather than predictions of the future. Indeed, they served as conversation starters for unearthing what kind of futures might be possible. Many kinds of prosumerism futures could appear, that lie somewhere between the extremes: 3-4 of such possible futures are identified for each theme in Figures 2-4[15] . These futures are further explored in Section 3.4, where we present 10 roadmaps that each lead to a different future. Based on value prioritisations made, actors can decide what roadmap is relevant for them to develop further.

3.1 Business models: community logics vs. market logics

Exploring the future of prosumer business models means exploring the tension between two extremes: will the future of prosumerism follow a community logic or a market logic? Which side of the spectrum will become dominant depends on societal conditions, such as the actors involved, the project's objectives, energy market regulations, subsidies and taxation, public and private investment, and cultural preferences.

Direction: community logics
The main goal of prosumerism, according to a community logic, is to meet the energy needs of communities. Citizens, households, public institutions, governments and companies invest together in locally situated, collectively owned and managed renewable energy systems. This type of prosumerism may also ensure an equal distribution of costs and benefits between individual members, communities, companies and governments. Already today, there are energy cooperatives with a strong focus on local and/or regional membership which are managed in an inclusive manner. Following a community logic, ownership (of larger wind turbines or collective PV) and decision making (e.g, one member one vote decision making in cooperatives) are more

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14 Pel et al 2019
15 Sections 3.1 - 3.3 have been adapted from Pel et al 2019

distributed. Motives for engagement are creating social value and inclusivity as opposed to only making profit.

Direction: market logics

In this direction, prosumer energy systems are governed largely by market actors – much in the way that liberalised energy markets are governed today: prosumerism is a commercial activity. New market entrants and incumbents drive the adoption of innovative technologies, products and services towards a market logic that is focused on low costs and choices for consumers. The main goal of prosumerism in this direction is to maximise profit and energy cost savings. Thus, large companies may optimise decentralised energy production delivering benefits for wider system stability and to network operators. Here, prosumers are viewed as consumers, who want to make a profit/savings but are not interested in or prepared to spend time on governing energy systems. To a large extent, profits may be primarily captured by private utilities or companies and may be passed on to consumers.

Finding a future that works

Many futures for prosumerism may appear that lie somewhere between the extremes of community and market logic. For example, a social enterprise which combines being for profit with achieving societal goals. Or a local energy company operated in partnership between government, community, and market actors. Although the market logic is currently more dominant, there is also a growing movement of more community-economy based prosumer initiatives in Europe. This will, however, differ between EU countries. Figure 2 below visualises how prosumerism could develop towards different futures. These futures and the associated roadmaps are further explored in Section 3.4.
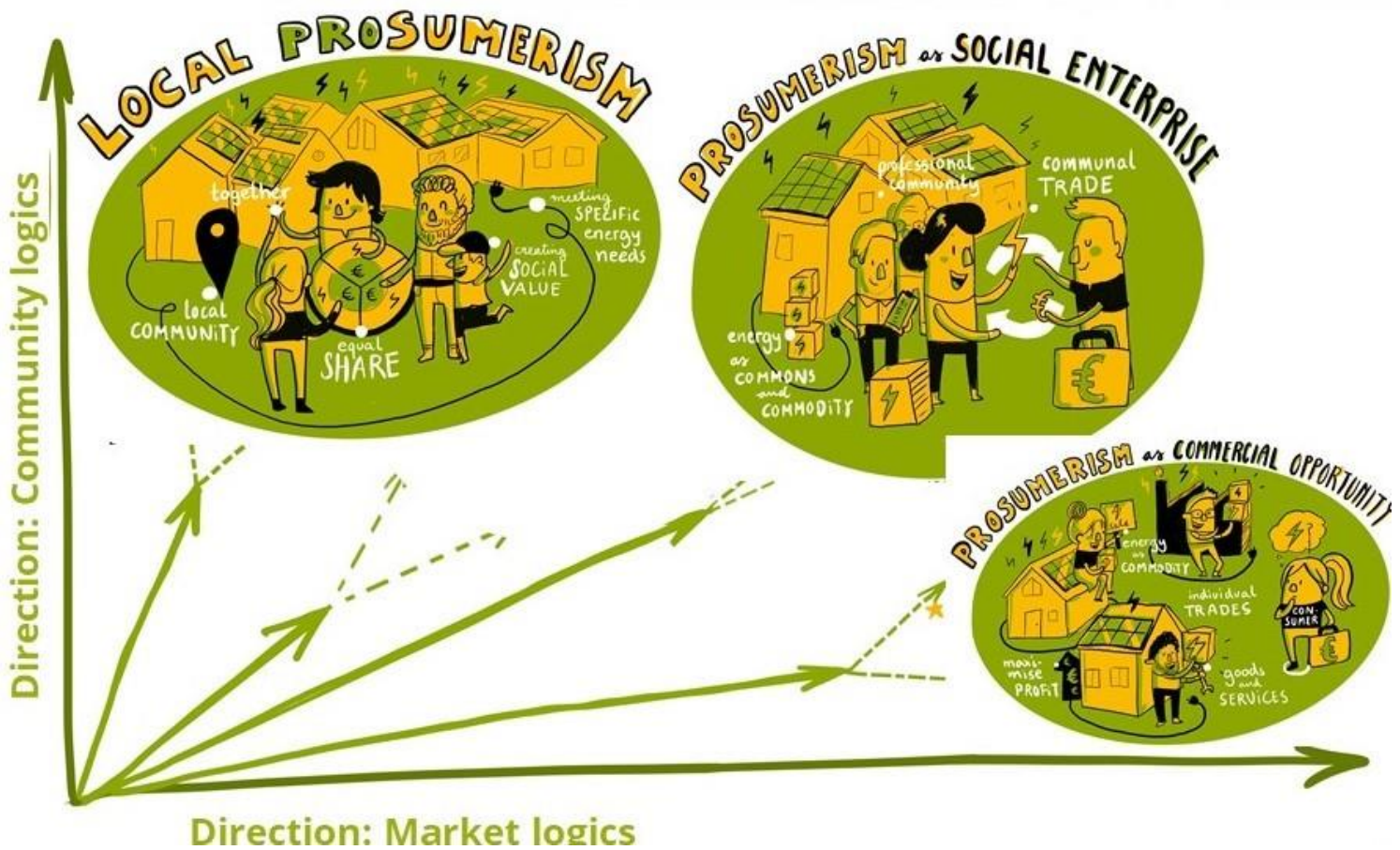
Figure 2. Mainstreaming prosumerism: community logics vs. market logics.

3.2   Social dynamics: inclusive prosumerism vs. privileged prosumerism

Exploring the future of prosumerism for energy inclusiveness means exploring the tensions between two main directions: will the future of prosumerism be inclusive or will it be for the privileged?

Direction: Inclusive prosumerism

This direction envisages collectives, whether public or private, that engage in the production and consumption of energy while taking the public interest as their leading motivation. They ensure that, beyond a narrower circle of initiators and shareholders, a wider community benefits from the activities. Diversity in the composition of the (advisory) board and executive committees are actively encouraged, just as (community) members are empowered to participate and share skills and expertise. There is commitment to democratic decision-making and the inputs of marginalised people are encouraged and amplified. Everyone is deemed worthy of benefitting from the solutions.

Direction: Privileged prosumerism

In this direction, individuals or collectives are primarily interested in their own and/or mutual interest, which forms the starting point for redistributing benefits among themselves. They generally have the financial means, expertise, and social/professional networks that facilitate their venture into prosumerism. When forming alliances, they are meant for mutual convenience, serving as an extension of self-interest: to have access to secure, affordable, and renewable energy supply. The mainstreaming of privileged prosumerism could very well skew the market for a happy few that can afford it, while prices, perhaps even the access to prosumption itself, become inaccessible for others.

Finding a future that works

While the two directions may appear as extreme opposites, inclusiveness remains an elusive dimension of our energy systems. Just as a privileged system may create safeguards to avoid energy poverty, albeit in a top-down manner, an apparently inclusive system can have a number of hidden pitfalls that weaken its intentions. While inclusiveness is a guiding principle in many civic or public-led collective initiatives, from an energy system perspective, it begs the question whether these initiatives may unwittingly be perpetuating some of the exclusionary and privileging tendencies of today's societies, especially in the largely unregulated niche of prosumerism. They may favour participants of a certain gender and of sufficient financial means, as well as participants that have the expertise and time to be more closely involved in decision-making. Cooperatives for example are, after all, private organisations that are free to open their objectives to the public but may also focus exclusively on the narrower circle of their members.

The possible futures for prosumerism will lie somewhere between the two extremes presented here. In the future, municipalities could step up as guarantors of a more inclusive energy future. Prosumer collectives join forces to network and lobby together for their own inclusion in energy systems. Even though, current societal conditions are favouring more exclusive forms of prosumerism and energy futures, initiatives are stepping up in a growing movement for more energy justice. Figure 3 below visualises four different futures that prosumerism could develop into along the axes of privilege and inclusion. In Section 3.4, the roadmaps towards these futures are presented.
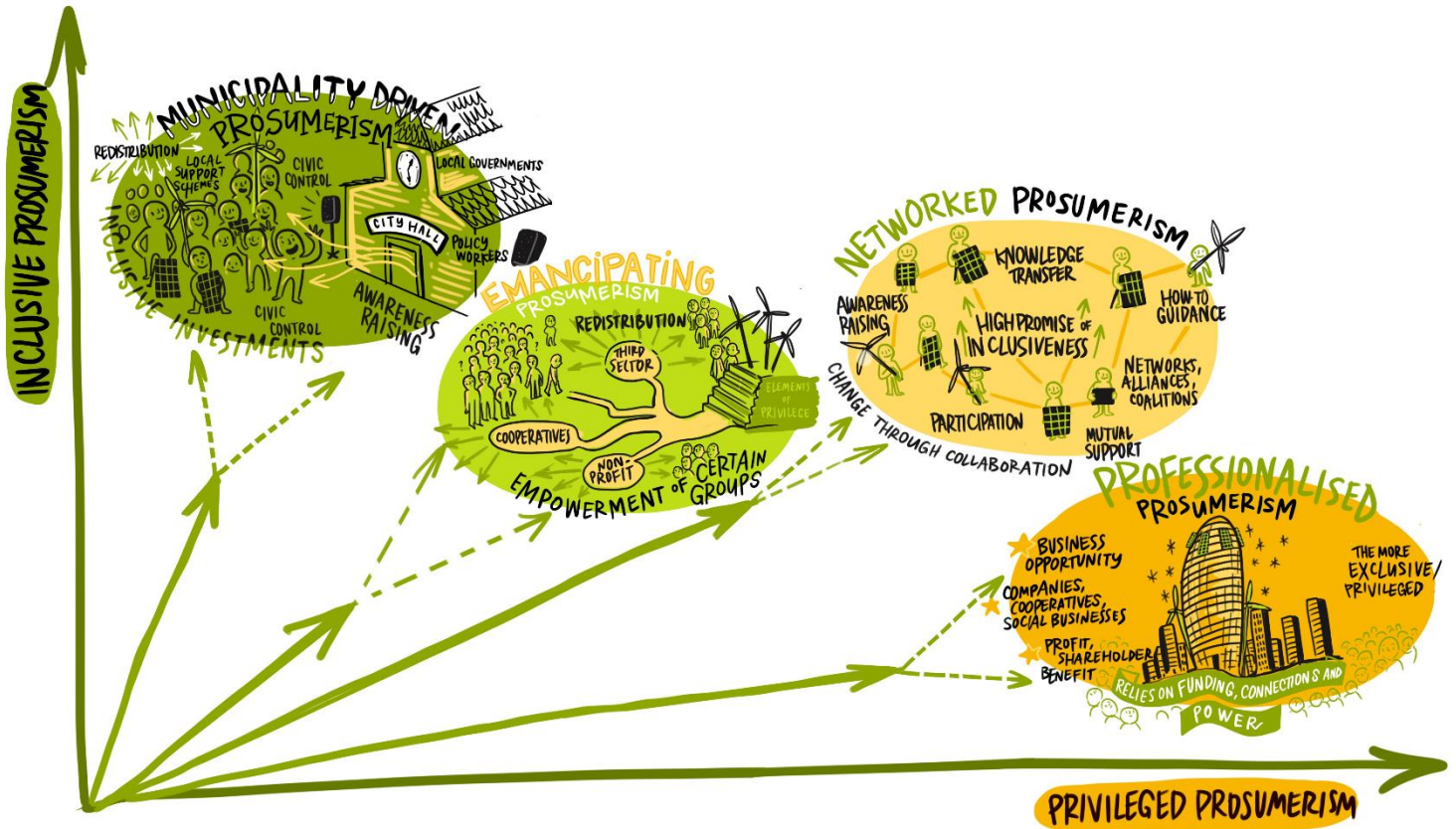
Figure 3. Mainstreaming prosumerism: inclusive prosumerism vs. privileged prosumerism

3.3   Energy systems: energy islands vs. full system interconnection

Exploring the future of energy system configurations for prosumerism means exploring the tensions between two main directions: Will we move towards isolated prosumer systems (i.e., the energy island model), or towards fully interconnected, digitalised energy systems with prosumers and energy communities connected to the public grid?

Direction: Energy Islands

This direction points towards the optimisation of decentralised 'off-grid' energy cells connected to battery storage possibilities (also known as full grid defection). This would lead to isolated, locally confined innovations in 'energy islands', which could be individual buildings, building blocks, a neighbourhood, a village or a district in a larger city. Energy islands allow prosumers to have full control over their system or at least within their 'energy cell' and grid operators, if at all, would have a radically different role. Local communities will be the authors of their own configuration, which serves as good examples of citizens' participation, can speed up decision-making processes and improve fair access. Regions (worldwide) could follow and adopt the knowledge and technology developed elsewhere. The independence from a central grid both decreases (e.g. vulnerability to

extreme weather events) and increases (e.g. no dependence on other entities) resilience. Long- and short-term thermal energy storage systems could play an important role as a cheap form of electrical storage, and as a tool to balance energy production by integrating power to heat technologies.

Direction: Full system interconnection

This direction envisions full integration of prosumers into central energy systems on a national, and even European, or global scale. Prosumers are connected to a central infrastructure and grid, and contribute to large energy networks. While they continue to exist as decentralised arrangements, the installations are not independent in their operations. Prosumer technologies become part of a technological web and are integrated into the main infrastructures, making maximum use of economies of scale, technological efficiency, and synergies with other systems, such as mobility. Based on full data exchange, decisions on whether produced electricity that is not self-consumed will be stored locally or fed into the grid are taken elsewhere. Ownership and governance are shifted away from communities and grassroots level, and vulnerability to power outages, e.g. due to local extreme weather events, can be reduced.

Finding a future that works

The rise of prosumerism, in its different forms, depends strongly on a range of broader changes in the energy system. Renewable energy production technologies have become more efficient and affordable, relevant knowledge has become available, feed-in-tariffs and other policy incentives have been introduced, and solutions for more efficient storage and connection are emerging. Nevertheless, certain limits to growth seem to exist and political will is needed to make necessary adjustments to regulations and infrastructure to carry such changes in the energy system. Connection to the grid needs to be technically, financially, and socially possible and desirable.

Many futures for prosumerism may appear that lie somewhere between the extremes of energy islands and full system interconnection. This includes a future where otherwise autarkic energy islands may remain connected to the grid. A future that additionally creates opportunities for demand response markets to stabilise networks, decrease need for storage (development and investments) and create choices for prosumers. Or a future where the ownership of energy production is organised as decentral as possible and having these production units being fully interconnected through smart technology and democratic facilitation. Figure 4 below visualises how prosumerism could develop towards different futures. Section 3.4 explores further what roadmaps towards these futures might look like.
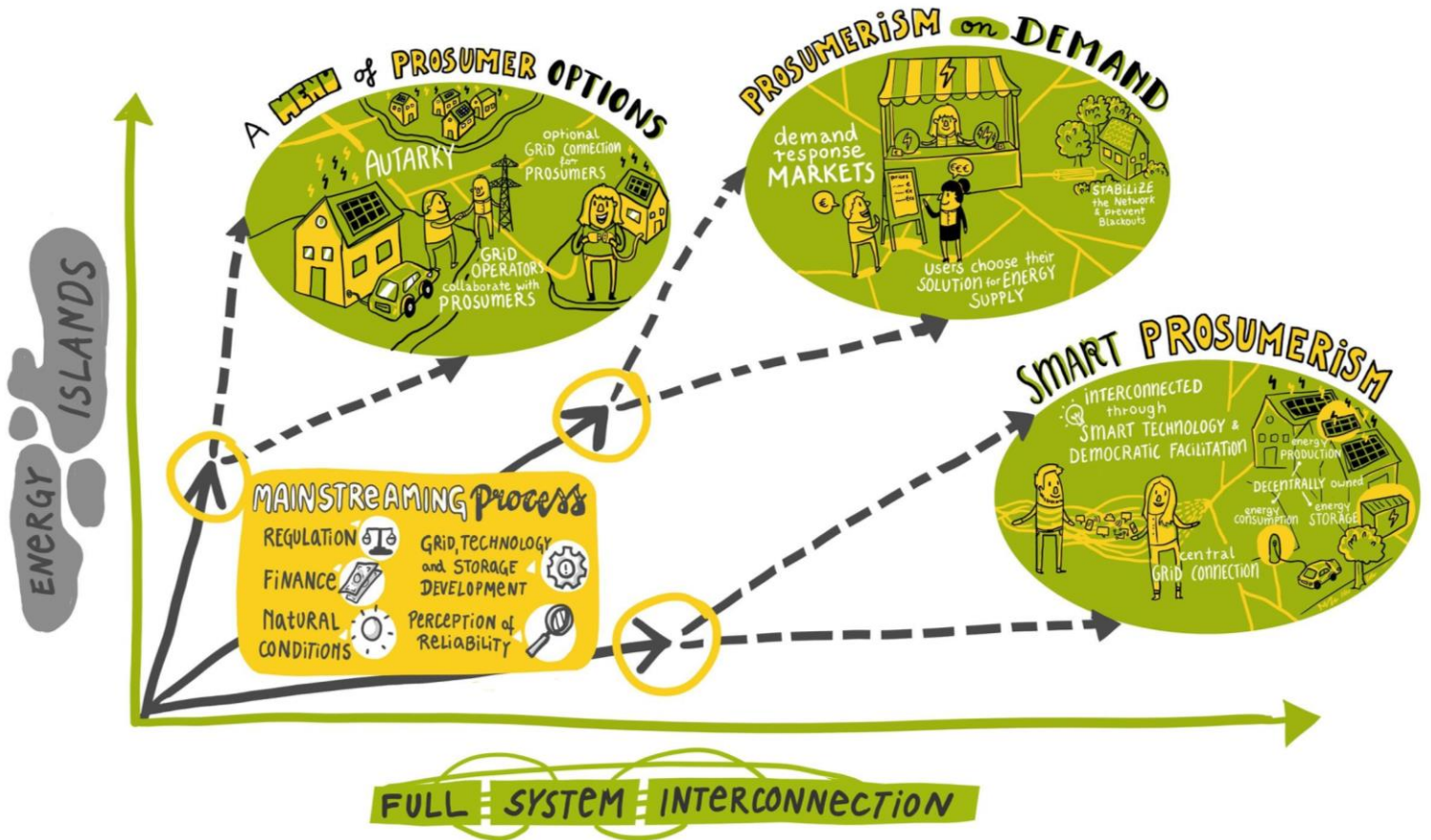
Figure 4. Mainstreaming prosumerism: energy islands vs. full system interconnection.

3.4   10 roadmaps to different futures

The Participatory Integrated Assessment (PIA) confirmed that there is not one singular future for prosumerism which is preferred by all stakeholders. During the PIA workshops, ten key pathways towards 2030 and 2050 were co-created with participants. These pathways were developed by backcasting 10 possible futures, which each prioritise different values and different system aspects. Below, we present each of these roadmaps. Based on these roadmaps, we developed the provocations in Section 4, to navigate what futures might be preferred, and thus, what futures and roadmaps are considered relevant to pursue.

Roadmap #1: Local prosumerism (business models)

This roadmap leads to a future in which prosumerism is managed locally and citizen involvement is ensured. Profit from prosumer energy generation can be used as a local currency, and for making local investments. Key moments in this roadmap include a high reduction in energy consumption, and the introduction of better storage technology. Also, the legal barriers to set up private or community power plants are removed, through which more energy communities emerge, production can be increased, and more local supply chains are developed.

Figure 5. Roadmap #1: Local prosumerism

Roadmap #2: Prosumerism as social enterprise (business models)

This roadmap addresses a future in which prosumerism is approached as a model for social enterprise, in which small actors are well-established in a competitive prosumer market. Prosumers are professionals, and trade their energy commercially and communally. Meanwhile, access to energy is increased and fuel poverty is eradicated through community owned and operated energy. Digitalisation, smart metering and data acquisition plays a key role in the development of this future.

Figure 6. Roadmap #2: Prosumerism as social enterprise

Roadmap #3: Prosumerism as commercial opportunity (business models)

In this roadmap, the future of prosumerism is characterised as a commercial opportunity, in which large companies have a strong market dominance. While prosumers started out as active players, they become increasingly passive as companies step in and out compete many smaller initiatives. While the attractiveness of self-consumption increases, the interest in developing prosumerism as a community project decreases. Energy is offered as a service, and prosumer assets are remotely controlled and managed. The accessibility of consuming renewable energy leads to a sky rocketing number of prosumers.

Figure 7. Roadmap #3: Prosumerism as commercial opportunity

Roadmap #4: Municipality driven prosumerism (social dynamics)

This roadmap leads to a future in which municipalities play a key role in managing prosumerism and ensuring social equity. The municipality is involved in raising awareness, enabling local prosumer initiatives, promoting civic control, and organising redistribution where needed. Key moments in this roadmap are the municipalisation of energy, and the articulation of energy as a basic right. Other aspects include involving communities in the design of technology, and designating all public spaces as places where energy is generated.
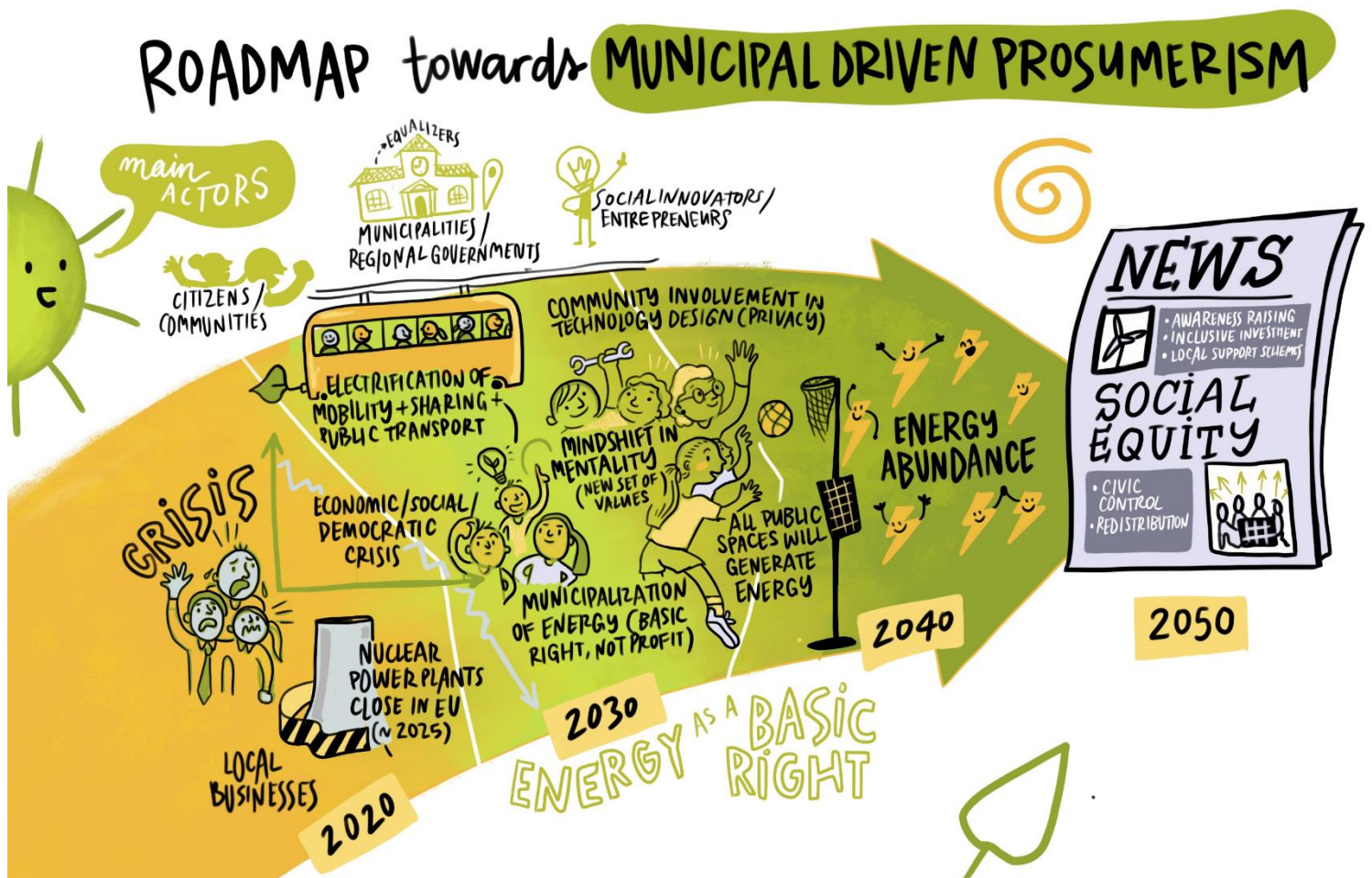

Figure 8. Roadmap #4: Municipality driven prosumerism

Roadmap #5: Emancipating prosumerism (social dynamics)

This roadmap leads towards a future in which prosumerism emancipates certain groups, such as cooperatives and third sector organisations. Through these organisations, citizens are empowered to participate in energy transitions. While the public administration leads by example and steps in to redistribute to groups who may not be served by existing prosumer initiatives, it is less dominant and pro-active compared to Roadmap #4.

Figure 9. Roadmap #5: Emancipating prosumerism

Roadmap #6: Networked prosumerism (social dynamics)

In this roadmap, prosumer initiatives collectively promote knowledge transfer, awareness raising and inclusiveness through networks, alliances and coalitions. Key moments in this roadmap include that the electricity grid is made open to everyone to join as a prosumer, the initiation of financial support for cooperatives, and an increase in energy literacy. Eventually, this democratised grid leads towards an abundance of energy.
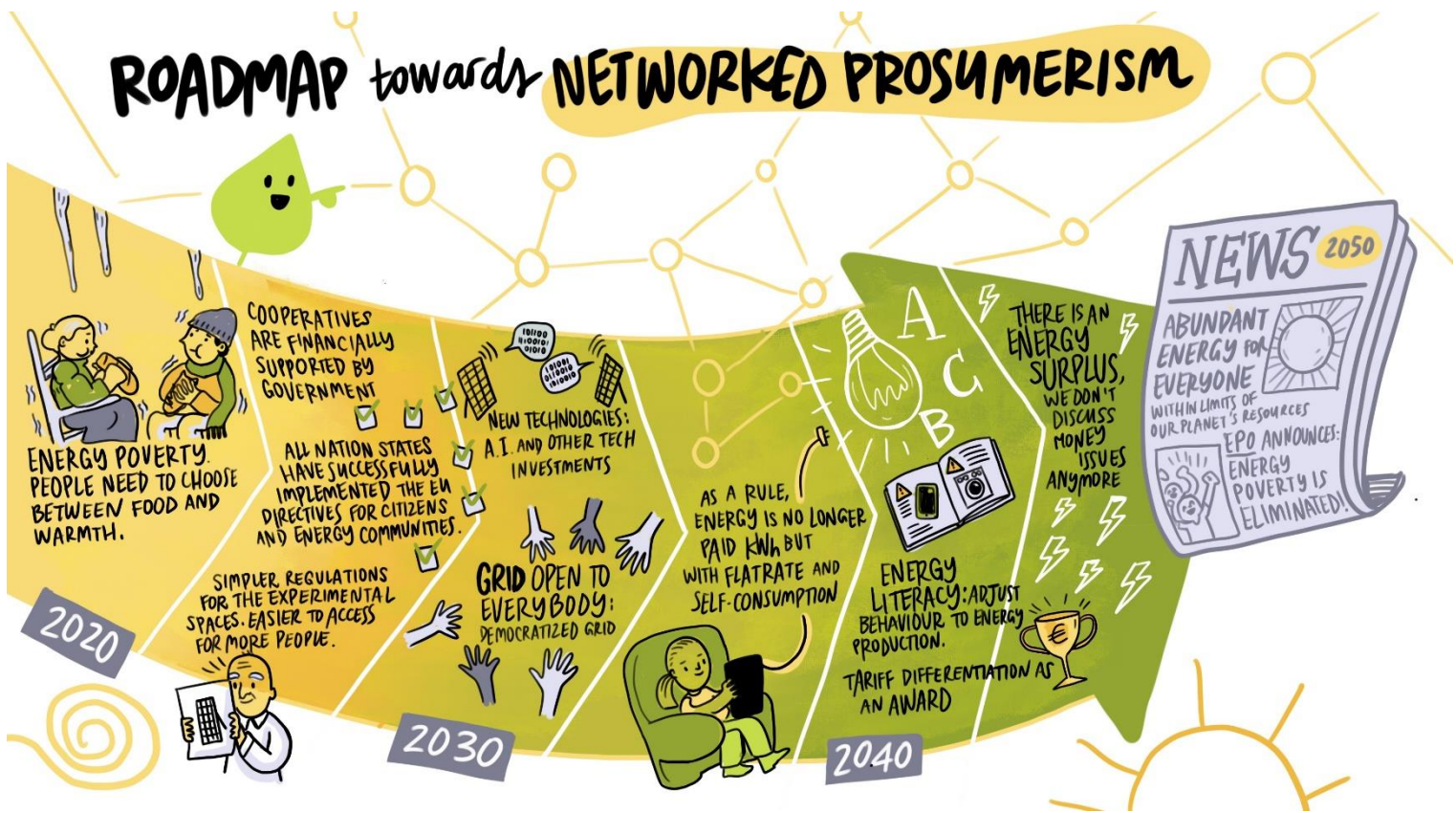

Figure 10. Roadmap #6: Networked prosumerism

Roadmap #7: Professionalised prosumerism (social dynamics)

In the future of this roadmap, prosumerism is professionalised, which means that energy communities are consolidated and are no longer run by volunteers. Power is thus concentrated within a smaller group of people, rather than shared among many people, creating privileged groups of those who are able to engage in prosumerism.
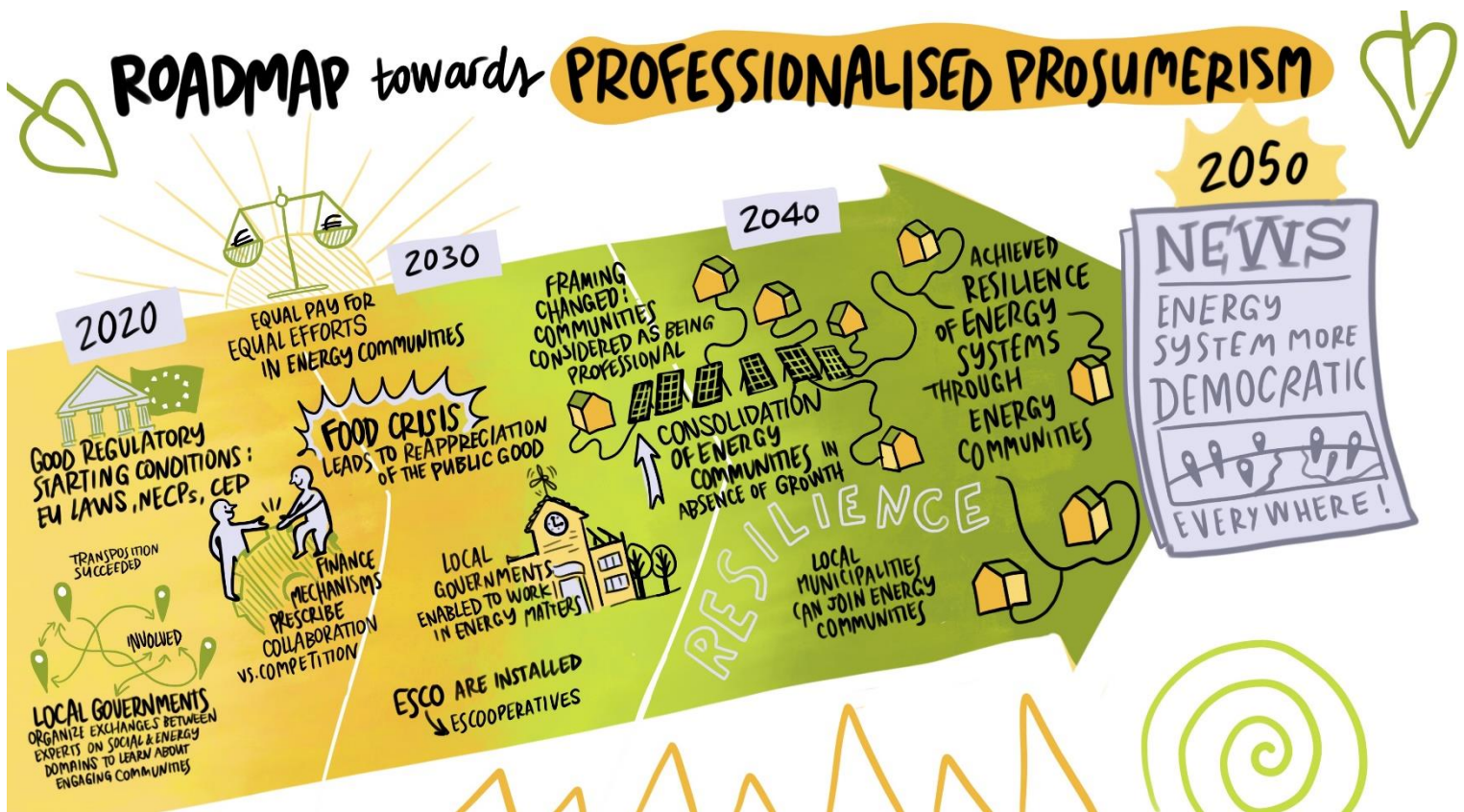

Figure 11. Roadmap #7: Professionalised prosumerism

Roadmap #8: A menu of prosumer options (energy system)

At the end of this roadmap lies a future where a menu of prosumer options is available to energy consumers. They can choose to be autarkic, or to connect to the grid. Besides, they have access to financial schemes, in order to take such ownership of energy. Grid operators are market facilitators and grid ownership is broadened to more actors. Meanwhile, energy systems in the EU are completely digitised. Key moments include a new Clean Energy Package by 2030, which enables this digitalisation.
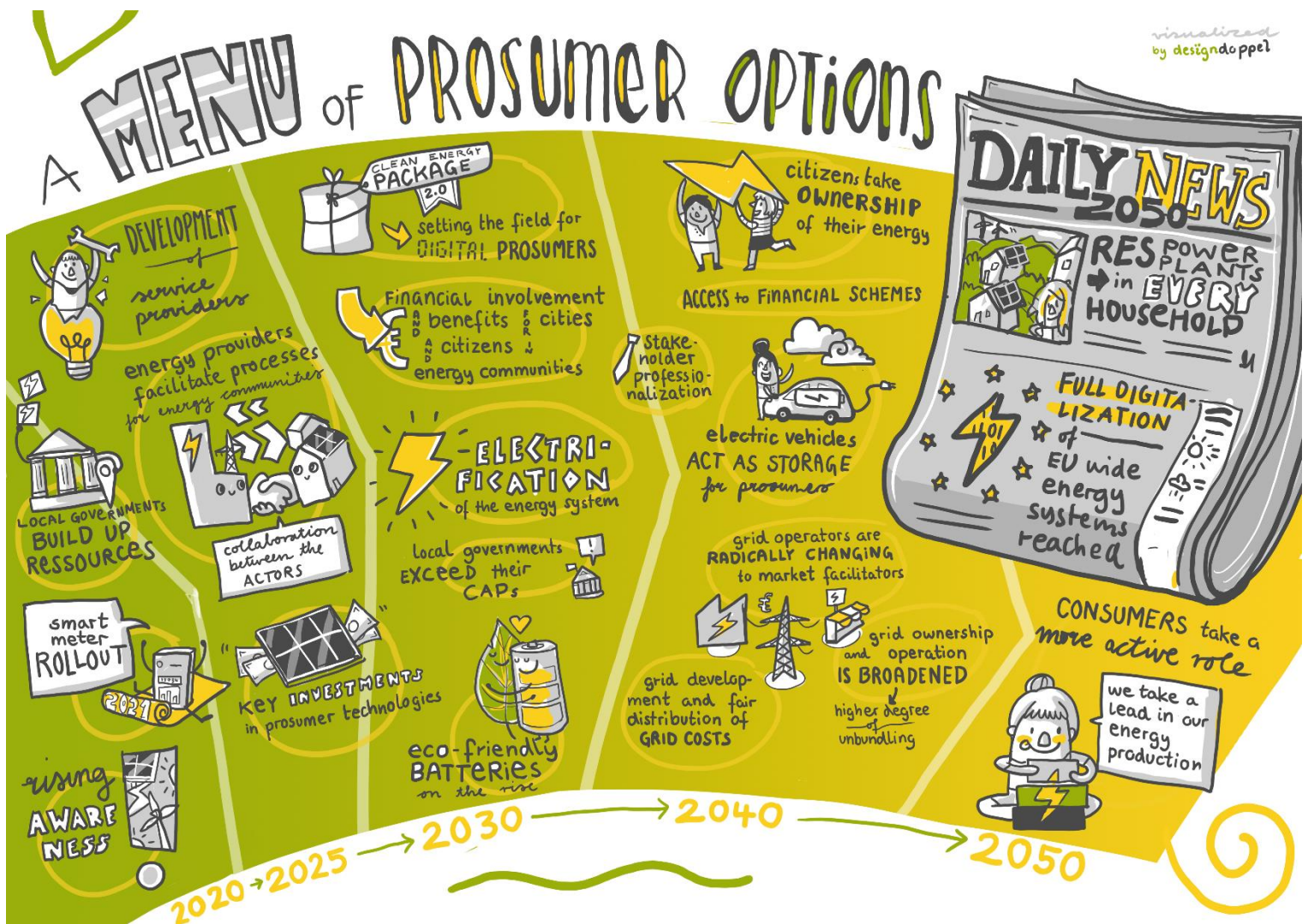

Figure 12. Roadmap #8: A menu of prosumer options

Roadmap #9: Prosumerism on demand (energy system)

This roadmap presupposes an energy system in which users are still connected to the grid. Demand response plays a big role in managing the electricity grid, and the general energy consumption has declined. From 2030 onwards, big investments in energy infrastructure, as well as breakthroughs in battery technologies, enable the integration of prosumer technology and a central grid. Additionally, collaboration between prosumers and other actors in the energy market increased.
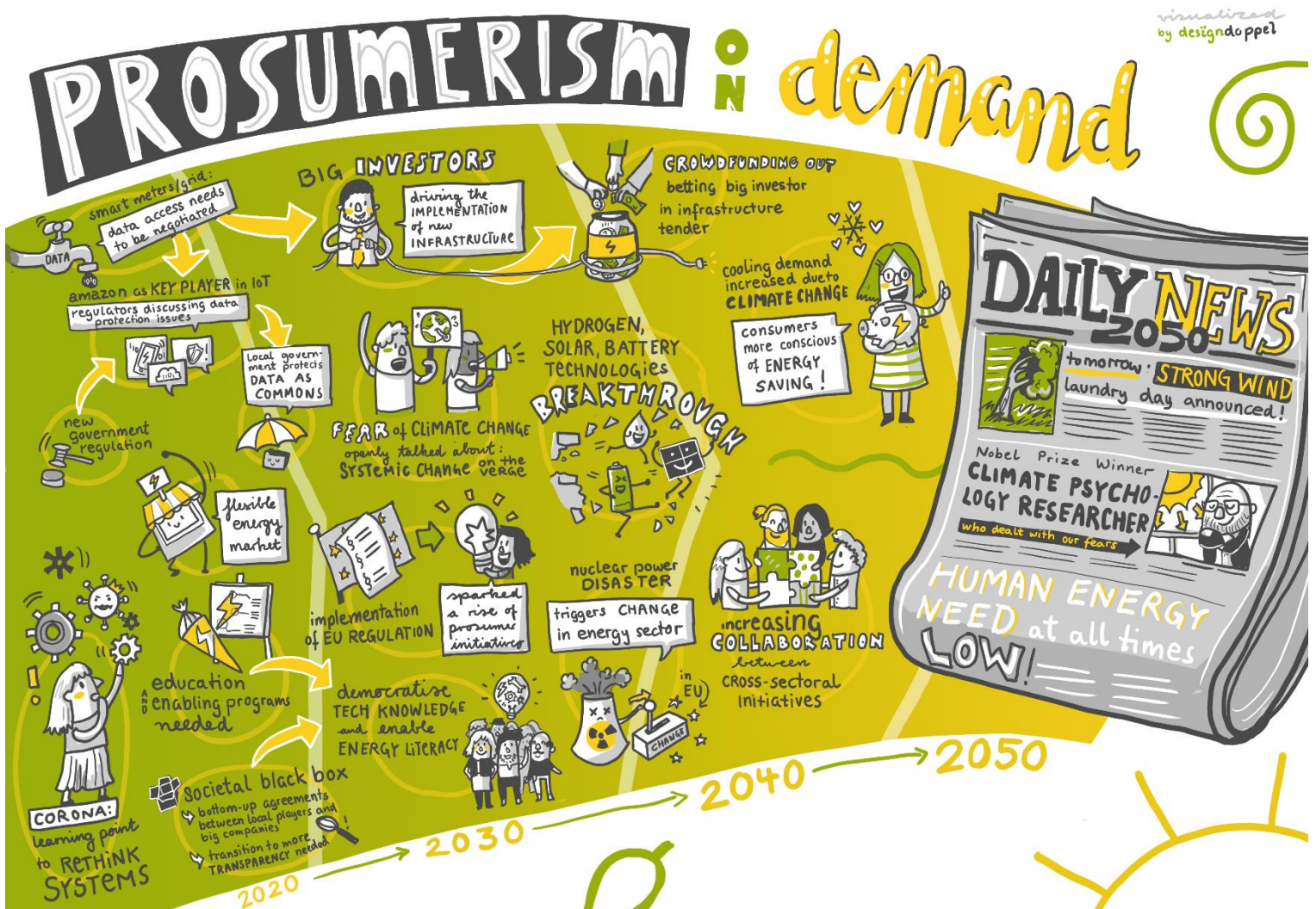

Figure 13. Roadmap #9: Prosumerism on demand

Roadmap #10: Smart prosumerism (energy system)

In this roadmap, prosumerism is highly digitalised and connected, to the extent that a global energy community is enabled. Municipalities, energy corporations and cooperatives collaborate to enable participation for all citizens in energy production. Key moments include privacy optimisation to enable the use of smart meters across households, technological advancements in grid transportation, and combining demand and productions through connecting with electric vehicles.
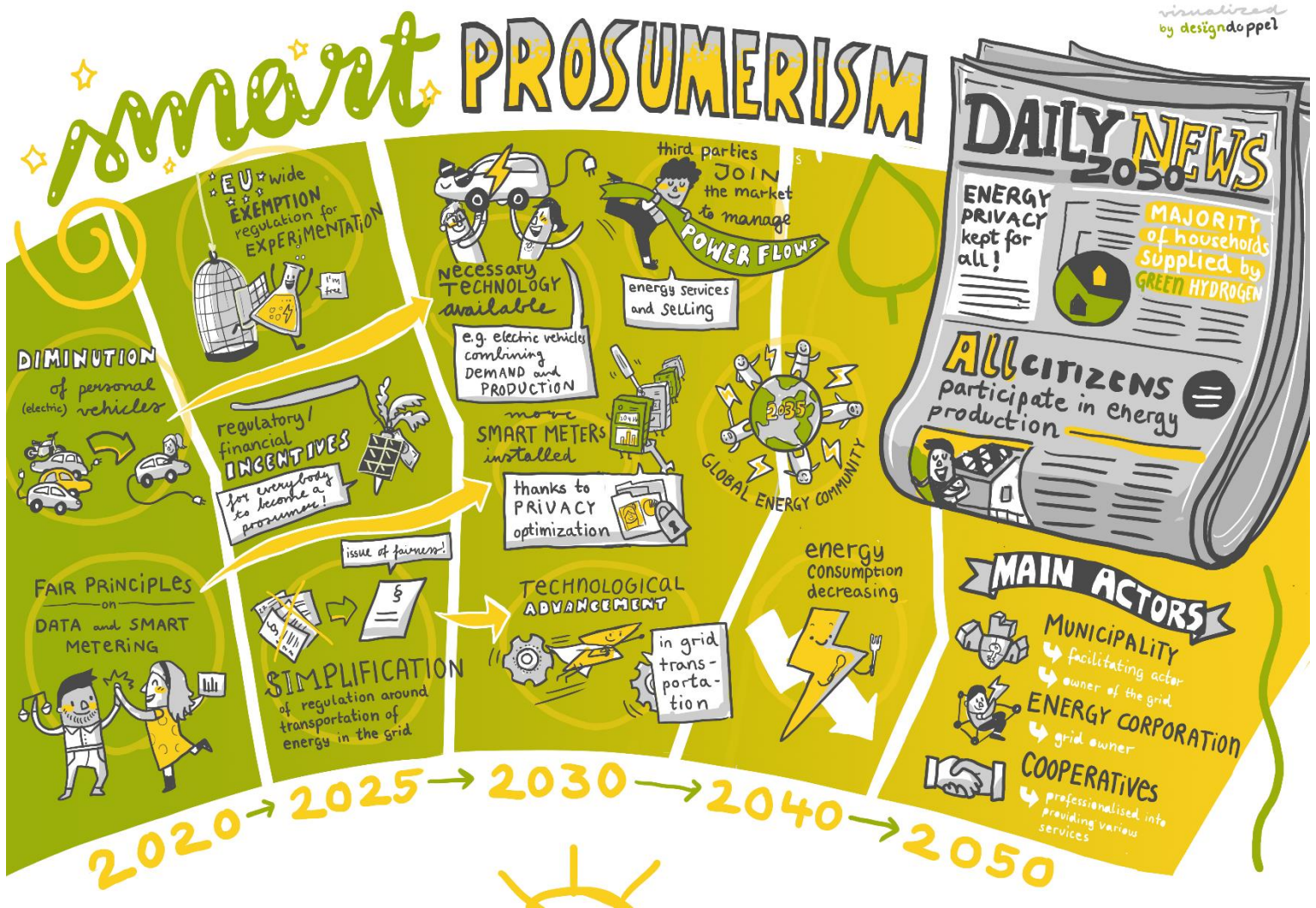

Figure 14. Roadmap #10: Smart prosumerism

4.   Provocations for mainstreaming prosumerism

In this section, we present 10 provocations to spark conversations about the values that need to be prioritised for mainstreaming prosumerism towards 2050, with a focus on institutional change. The provocations are linked to the leverage points which are discussed in Section 2 and have been developed based on the roadmaps discussed in Section 3.4. The 10 provocations are starters for conversations between policymakers, decision-makers, civil society organisations, energy entrepreneurs, prosumers and citizens, about why and how we want to mainstream prosumerism. We invite these actors to use the provocations for interviews, workshops or water cooler conversation. This way, we democratise and explore the road to the future, together.

01 Citizens should be given the choice to become pro-sumers, and governments should provide practical and financial help where needed.

Keywords Governing logics, financial incentives, electricity grid, role of the broader public

02 Private companies should fund and develop prosumer-ism until 2030 for scaling up, after which they should be replaced by non-profit citizen organizations.

Keywords Governing logics, energy markets, electricity grid, role of the broader public

03 Prosumers, such as those in energy communities, need to be protected players in the energy market until they produce the majority of all energy.

Keywords Governing logics, energy markets, financial incentives

04 Prosumer installations should be remotely controlled and managed by external professionals.

Keywords Governing logics, energy markets, electricity grid, role of the broader public

05 By law, municipalities should be obligated to develop local, non-profit energy systems.

Keywords Governing logics, energy markets, electricity grid

06 Municipalities need to play an active role in supporting innovative finance options for prosumers through initiating investment schemes.

Keywords Governing logics, energy markets, electricity grid, role of the broader public

07 All new buildings & residential developments should be designed "prosumer-ready" by default, facilitating energy generation, self-consumption, sharing & saving.

Keywords Governing logics, financial incentives, electricity grid

08 Exclusive experimentation zones for prosumerism should be available across the EU.

Keywords Governing logics, energy markets, financial incentives, electricity grid

09 Energy data should be owned and managed by prosumers themselves.

Keywords Digitalisation and data-use, electricity grid

10 Prosumer collectives must have memberships that reflect their broader community, in terms of gender, ethnicity, income and other characteristics.

Keywords Governing logics, role of the broader public

Figure 15. 10 Provocations for mainstreaming prosumerism towards 2050

5. Tools for dialogue: Appreciative Inquiry

Now that we have introduced the roadmaps and 10 provocations, you know what needs to be discussed. The next question is, how to have these conversations. These conversations are an opportunity to learn collaboratively: after all, governing transitions such as those in the energy system require "*continuous learning and adapting*" [16]. It is through interaction with others that we re-make social realities, that we imagine what is possible and can get into new action. In the next section, we offer some concrete ways on how to use the provocations and dig deeper, to reveal the leverage points discussed in Section 2.

5.1 Starting from a shared interest

The starting point of these conversations is that we are 'in this together': our planet's capacity to provide us with an environment habitable for humanity is at great risk and it is up to us to act upon this. More concrete, to lower CO_2 emissions, we need to stack up renewable energy production and to address social injustices and we need to do so in democratic and just ways. Many recognise these starting points and work on ideas, engage in activities or develop technologies addressing these unsustainability challenges.

This is the point from which conversations can be started - from this common understanding of what is at stake and the willingness and intention to work towards a better future.

> **Tip:** *Invite conversation partners based on your shared recognition of and attempts to address the same societal challenge.*

5.2 Appreciating each other's perspective

This is the common denominator from which to start conversations exploring what this better future looks like for each of us and for the organisations we are working for. This collaborative process of exploration and inquiry can take different forms. To be productive, such processes need to strike the balance between creating meaningful relationships between conversation partners and fostering a critical attitude towards one another[17]. Since it is through appreciating one another that a critical stance can translate into deep conversations and transformative action.

> **Tip:** *Invite someone for an off-the record conversation with the goal to critically explore/inquire underlying values and understandings regarding the societal challenge at hand. Based on the acquired knowledge and insights, transformative action can be sparked.*

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16 Loorbach et al 2017, p. 613.
17 Bartels and Wittmayer (Ed.) 2018

A strength-based approach towards having such a conversation is Appreciative Inquiry[18]. Appreciative Inquiry is a form of inquiry that explores and creates knowledge for transformative action and emancipatory change that is grounded in an appreciative stance[19]). Appreciative stances are outlined in Table 1 and include for example seeing the world as full of potential and questioning taken for granted realities.

A solution-oriented approach

Appreciative inquiry is known for a generative or productive perspective on the world: a perspective that generates possibilities or solutions. It considers inquiry as a questioning of current realities that acknowledges the power of imagination, creativity, and fresh perspectives. The latter are often hidden or underutilised strengths for personal and societal transformation. Rather than problem-solving, it can be considered a solution-oriented approach that taps into a variety of sources of knowledge: imagination, sensory experience, and cognitive analysis[20].

"An appreciative inquiry effort seeks to create generative conversations that break the hammerlock of the status quo and open up new alternatives for organising."

(Ludeman and Fry, 2008: 281)

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18 An appreciative inquiry is one approach to frame a dialogue about provocations - there are certainly also other ways. When you consider organising a dialogue, ensure that you choose a method or approach that fits the cultural context and the expectations towards such conversations in a given milieu. However, do not refrain from also pushing the boundaries of what is considered acceptable. By way of example, you could also think of organising a Socratic dialogue, which is more speaking to rationality and cognition (for example, see Nordquist 2020).
19 Zandee, D.P. and D.L. Cooperrider 2008
20 Ludema and Fry 2008

Table 1. Appreciative stance in inquiry (based on Zandee and Cooperrider 2008)

Appreciative stance	How to use it:	Example based on provocations:
What is considered as 'the truth' can change over time and can have different sides to it	*Question realities that are taken for granted* by acknowledging that perception of social reality differs between people, across time and space.	What are the underlying assumptions that lead to the formulation of each of the provocations? Discussing this question allows you to see that there is not one but many realities.
Appreciate reality as limitless potential	*Envision new possibilities* by engaging in imagination and creating positive images, stories, knowledge and identities.	What are the possibilities that are not mentioned by a provocation? The provocations are an invite to think beyond given confinements.
Appreciate human existence as relational	*Create knowledge together* as a social endeavour by engaging in dialogue and sharing stories and experiences to change organisations, communities or systems.	What is your shared 'basis' in relation to this provocation? By using the provocations in dialogue with others, you are creating new shared realities and understanding as well as forging new relationships.
Appreciate our sensuous participation in a more-than-human world	*Enable just and sustainable co-existence* by reminding us of our bodies and of our rootedness in the earth's eco-system.	What does this provocation sound, look, smell or feel like? The provocations are an invitation to talk about reactions, doubts and concerns that cannot be rationally argued and still have a place in the conversation.
Appreciate life as mysterious	*Illuminate the miracle of life* by focussing on wonder, childlike openness, artful creation of positive images and discourses.	What are the ideal energy futures that you would want to create together? Stepping out of what 'could' or 'should' be, to imagine the impossible is another invitation in a dialogue when using the provocations.

Tip: *Frame the encounter/meeting as one that will use imagination and creativity to explore each other's' understanding of the world, with the goal to generate transformative knowledge and action.*

5.3   Inviting system-builders

There are several interesting practices of appreciative inquiry, but no fixed set of methods[21]. When setting up your conversation as an appreciative inquiry, we suggest starting with a single meeting and to aim for an intimate setting of 2-4 people, or a small-scale workshop of 10-20 people. Invite your fellow 'system-builders': those who engage with you in shaping the energy system in your city, region or beyond. Or those who work towards maintaining, challenging, or altering the status quo. When you are a policy maker in a city - who are those within your administration who shape the urban energy system, who are important industries or businesses, who are civil society or citizen groups? Think about your counterparts in other cities.

> **Tip:** *Invite your fellow system-builders: those shaping the mainstreaming of prosumerism with you. Invite them as individual persons, rather than as representatives of their respective organisation.*

5.4   Example of an agenda

As an example, you can start a two-hour meeting with a short check-in, which establishes a shared starting point. Here you explain the basic assumptions and approach for this meeting: Taking an appreciative stance towards inquiry through which to learn about transformative action and knowledge for the mainstreaming of prosumerism. Then, you can dedicate the bulk of your meeting towards exploring (a selected number of) the provocations. Use these to discover and discuss different realities and their underlying values, explore how these relate to the values of each of the participants. Also, use creative methods to invite both rationality and creativity to the table. You can close the meeting by honouring your participants and yourself for engaging in this journey together and by discussing any next steps. As an outcome, one of the participants could take over and organise another one of those meetings with another group of people.

Other ways of using the provocations could include:

- Invite a colleague or fellow system-builder to a walk through the park to discuss one of the provocations - such conversations do allow for an exchange of knowledge and expertise regarding a certain aspect of the energy system next to exploring where each of you stands in relation to a future mainstreaming of prosumerism.
- Organise a meeting with colleagues in your organisation to discuss in changing sub-groups the provocations and how these relate to their personal imagination and to the organisational identity.
- Interview someone you think has an important role in shaping the energy system about several of the provocations, and how their actions and practice relates to this.

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21 See for example the Appreciative Inquiry Commons with many resources: https://appreciativeinquiry.champlain.edu/ or the International Journal of Appreciative Inquiry: aipractitioner.com

> **Tip:** *You can use the key conclusions from your appreciative dialogue as a sounding board for future decisions: to what extent are your (organisation's) decisions in line with these conclusions? Do you need to change them? If so, why, and how? As such, value discussions become an integral part of your approach for shaping the future of prosumerism.*

Taking the provocations to start dialogues about what each of us values in how energy systems are shaped can sensitise us to the diversity of lived realities. Knowing about these sensitivities can help each of us to sharpen our tools through which we maintain, alter or newly create parts of energy systems. This can help to navigate uncertain futures with an open mind, and democratise the possibilities of energy future.

6. Acknowledgements

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