SONNET – Social Innovation in Energy Transitions

Co-creating a rich understanding of the diversity, processes, contributions, success and future potentials of social innovation in the energy sector

GA#: 837498 / Funding type: RIA

Research report on financing and subsidies for renewable energy in Poland

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 837498

About SONNET: SONNET is a research project that aims to develop an understanding of diversity, processes, contributions and future potential of social innovation in the energy sector. It is co-funded by the European Commission and runs for three years, from 2019-2022. The SONNET consortium consists of 12 partners across Europe, including academics and city administrations. For more information, please visit our website: https://sonnet-energy.eu

Suggested citations:
Dembek, Agata and Stasik, Agata (2021): Financing and subsidies for renewable energy in Poland. Research Report, SONNET: EU Horizon 2020 Grant agreements no: 837498

Acknowledgements:
We would like to thank all interviewees who kindly agreed to take part in this research.

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1 FORWARD

SONNET (Social Innovation in Energy Transitions) brings diverse groups together to make sense of how social innovation can bring about a more sustainable energy sector in Europe. The project aims to co-create a rich understanding of the diversity, processes, contributions, successes and future potentials of social innovation in the energy sector (SIE). We define SIE as combination of ideas, objects and/ or actions that change social relations and involve new ways of doing, thinking and/ or organising energy. As part of this work, we make use of an embedded case study approach to build a better understanding of the development of diverse SIE-fields (e.g. participatory incubation and experimentation, framings against specific energy pathways, local electricity exchange) over time. Our research questions that frame the case study work are:

- How do SIEs and SIE-fields emerge, develop and institutionalise over time?
- How do SIE-field-actors and other field-actors interact with the 'outside' institutional environment and thereby co-shape the SIE-field over time?
- What are the enabling and impeding factors for SIE-field-actors and other field-actors to conduct institutional work and change the 'outside' institutional environment?

A SIE-field is an arena/space that includes a specific SIE as well as SIE-field-actors working on it and other field-actors enabling and/or impeding it. In this arena/space these actors take one another and their actions into account and have a shared (but not necessarily consensual) understanding of a SIE and of their relationship to other actors. They recognise (but not necessarily follow) shared norms, beliefs and rules. SIE-fields are often not homogenous but are composed of actors with diverse and contradictory aims and interests. An example: The UK cooperative energy field includes SIE-initiatives and SIE-field-actors (e.g. Brighton Energy Co-op, Cooperative UK, Community Energy England, UK Government, City of Brighton), who have a shared understanding of an SIE, which exists as 'organising under cooperative principles to generate renewable energy'.

The structure of this report is as follows. Section 2 provides a summary of the SIE-field relevant for this report and lists some key insights. Section 3 outlines the boundaries of the SIE-field and shows how it has been studied in the country context. Section 4 shows a visual development of the SIE-field. Section 5 tells the historical development of the SIE-field over time, including analytical/ interpretive reflections from the SONNET researchers and quotes from the actors involved in the field developments. Section 6 outlines key research findings, providing answers to the three research questions. Section 7 outlines recommendations for policymakers based on the findings. Finally, Section 9 outlines the methodological approach and includes a more detailed timeline of the SIE-field and its actors.

2 Financing and subsidies for renewable energy in Poland

In SONNET, we explore the development of SIE-field "Financing and subsidies for renewable energy". We investigate its evolution in three countries: Poland, the Netherlands, and the UK. We define it as the arena/space that includes the following SIE: multi-actor (from government, municipalities to charities, banks, investment funds, firms) activities and practices that develop and implement (innovative) financial instruments to facilitate financial resources for investment in renewable energy. This means that we focus on different financial instruments – such as grants, awards, subsidies, crowdfunding, community bonds, ventures, social investment, 'pay as you save', membership fees, as long as these funding instruments finance sustainable energy infrastructure and activities. The extent to which this SIE is changing social relations and comes with new ways of doing, thinking and/or organizing is an empirical question to be addressed in each of the countries.

The access to the different financial and investment mechanisms allows various actors, such as households or co-op members, to undertake new roles in the energy sector. This way, it changes the relations between actors, infrastructure, and institutions governing the energy system. By facilitating

this change, it also poses a challenge and creates a pressure on incumbents in the energy sector, forcing them to redefine their strategies in face of newcomers discovering new niches in previously homogeneous systems. The most important example is the new role of individuals who turn from passive consumers of electricity to prosumers engaged both in consumption, production, and exchange of the electricity. This change demands not only access to the appropriate technologies and enabling legislation, but also the access to the financial resources necessary to cover the investment costs. The form and scale of these financial mechanisms has a decisive impact on who can take part in the transformation and who remains excluded. The evolution of these mechanisms provides important insight on the role of both outside institutional pressures and the local institutional work.

Key insights

For the SONNET project, finance and investment mechanisms are particularly interesting because better understanding how securing the access to the financial capital allows different actors to take new roles in the energy sector reveals a number of important issues for social innovation in energy transitions.

In particular, it illustrates that:

- The available forms of financial mechanisms are strongly dependent on state policy and specific legislation. It has the direct impact in case of mechanisms using public funds, such as RE auction mechanisms and net-metering, and different forms of public subsidies and loans. In case of innovative forms created by entrepreneurs and social entrepreneurs, such as energy co-ops, the legislations' impact is also very strong, as the energy sector is highly regulated and regulations influence which actions are possible and profitable. As a result, the involvement in developing innovative financial mechanisms often demands institutional work, such as lobbying, education, and campaigning.

- The growing ambition of climate and energy in EU policy, such as targets set by RED I and RED II directives, influences the Polish energy policy and indirectly impacts the available financial mechanisms.
- The main mechanisms supporting RES development introduced in 2015 are RE auctions and net-metering for prosumers. The use of these mechanisms is expanding year-to-year.
- The main stream of fund supporting investment in renewable energy sources comes from the dedicated public institutions. They distribute funds for RES development through various programs to different types of recipients (from individuals to communities, as well as firms and organizations). The forms of the subsidy and of preferential loan are dominant.
- The rapid rise in the number of prosumers observed from 2019 shows the impact of the subsidy program “My Electricity” addressed to the individual households. For the first time, Poles on a mass scale decided to get involved in energy prosumerism.
- There is a growing number of actors who try to introduce new and innovative financial models, such as energy investment cooperative or Energy Performance Contracting (EPC). Rising energy prices and transposition of RED II directive are likely to strengthen this trend in 2021 and beyond.

3 Introduction to financing and subsidies for RES in Poland

The case looks into the SIE-field “Financing and subsidies for renewable energy in Poland" and investigates its potential in facilitating new ways of thinking, organizing, and acting about energy, and particularly changing social relations in the context of energy transition. This SIE-field includes main institutions engaged in distribution of funds, the recipients of funds, policy-makers responsible for regulation of the area, key field incumbents, different lobby groups trying to influence the field, and the field institutional entrepreneurs struggling to introduce new solutions. All these actors take one another and their actions into account and have a shared (but not necessarily consensual) understanding of financing and investment mechanisms and of their relationship to other actors. They recognise (but not necessarily follow) shared norms, beliefs and rules. SIE-fields are often not homogenous but are composed of actors with diverse and contradictory aims and interests.

Our review introduces the history of this SIE-field in Poland from 1989, but focuses mainly on the period of 2015-2020: the time of a relative acceleration of the investment in RES in Poland, resulting in the growing proportion of energy from renewable sources in the national energy mix. We identified two main types of the SIE-intiatives in the field of financing and subsidies: (1) traditional financial mechanisms employed for the new goal, that is, enabling newcomers to conduct investment in RES and thus engage in energy transition, and (2) innovative, market-based financial mechanisms. The former type (1), playing a key role in the discussed SIE-field, consists of traditional financial mechanisms, such as subsidies and preferential loans, that are used to develop and support new energy sources, energy efficiency, and to enable new actors to get involved in energy production. Their social innovativeness resides in the effects - creation of a more dispersed and decentralized energy system - rather than in their modes of functioning. Their prevalence in Poland results from a

relative underdevelopment of the SIE-field (compared to NL and UK case studies), relatively low level of financial saturation and, above all, still quite restricted regulatory conditions in the Polish energy sector. Simply put, investing in RES can be perceived as socially innovative, to a certain extent regardless of the form and model of investment. The latter type (2), innovative financial and investment mechanisms, is still marginal within the Polish SIE-field, but its emergence is attracting public attention and - we believe - marks a growing axiological and social change. What is more, we can see that its development is enabled by the changes in the outside environment, mainly regulatory policies of the EU. Below, we provide a short characteristic of these two types of SIE-initiatives and key SIE-actors shaping them.

1. Traditional mechanisms employed for new goals

In Poland, since 2004, public funds dedicated to energy-related goals to a great extent have come from different European funds: starting from 2004-2006 with funds dedicated to meet EU environmental norms, through the perspective 2007-2013 and 2014-2020 under the Operational Program "Infrastructure and Environment". The programs included: "Limiting the negative industry influence", "Environment-friendly energy infrastructure" (in perspective 2007-2013) and "Support for low-emission economy" (in perspective 2014-2020). We can see that the role of emission reduction gained higher priority in the successive programs. Additionally, mechanisms of Iceland, Lichtenstein, Norway contribution in 2014-2021 offered financial support (subsidies and loans) for programs related to the development of RES and energy efficiency. Plans for European Green Deal are likely to sustain the trend of growing allocation of EU funds for climate and energy related goals.

Key SIE-field-actors consist of public institutions from different levels of government offering grants and subsidies for individuals, companies, municipality-owned institutions such as schools or libraries, and other entities. Among them, (1) state-level public institutions managing public funds, such as The National Fund for Environmental Protection and Water Management (NFEPWM), and respective Ministries; as well as (2) regional and local public institutions managing public funds on the level of voivodeships, cities, and municipalities. Significant proportion of the subsidies and loans for RES, especially for the companies and municipalities, are distributed through the Regional Operational Program and managed on the level of voivodeships. However, The National Fund for Environmental

Protection and Water Management is the most important SIE-field actor (although not the only one) responsible for management of these funds.

Another important source of capital for RES support, next to European funds, also managed by NFEPWM, comes from the Green Investment Scheme, connected to the EU ETS (European Union Emission Trading System). That is, GIS is a mechanism linking sales of Assigned Amount Units (AAUs) of GHG to investments that reduce GHG emissions through dedicated projects and programs[1]. Under GIS, the selling country assures buyers that the funds from the sale of AAUs would be used to finance agreed projects and programs. In return the buying country would provide financing for the GIS under the terms of a negotiated contract. Poland has participated in the system since 2009, and since the beginning NFEPWM operates national GIS.

Good example of the public subsidy program is "Mój Prąd"[2] (My Electricity), launched in July 2019 by NFEPWM, funded through GIS, which allows the individuals to receive the subsidy for installation of PV on their own houses or grounds. Due to its high impact on the total number of prosumers in Poland, we will analyse it closely as one of specific SIE-initiatives.

Another important RES financing mechanism is bank loans, including dedicated loans supported by public funds and fully commercial loans for investments. Such loans are granted by both commercial and special banks, such as Bank Ochrony Środowiska (BOŚ) (Bank for Environmental Protection). BOŚ major shareholder is the National Fund for Environmental Protection and Water Management (NFEPWM) (holding 56.62% of the total number of votes).

The above-mentioned initiatives are rather traditional when it comes to the mechanisms they employ; nevertheless, they support the new ways of thinking, acting, and organizing about energy by enabling new actors to take new roles in the energy system, but also by forcing incumbents

[1] https://ec.europa.eu/clima/policies/ets_en
[2] https://mojprad.gov.pl/

(mainly, energy producer and grid operators) to redefine their strategies in face of newcomers' actions.

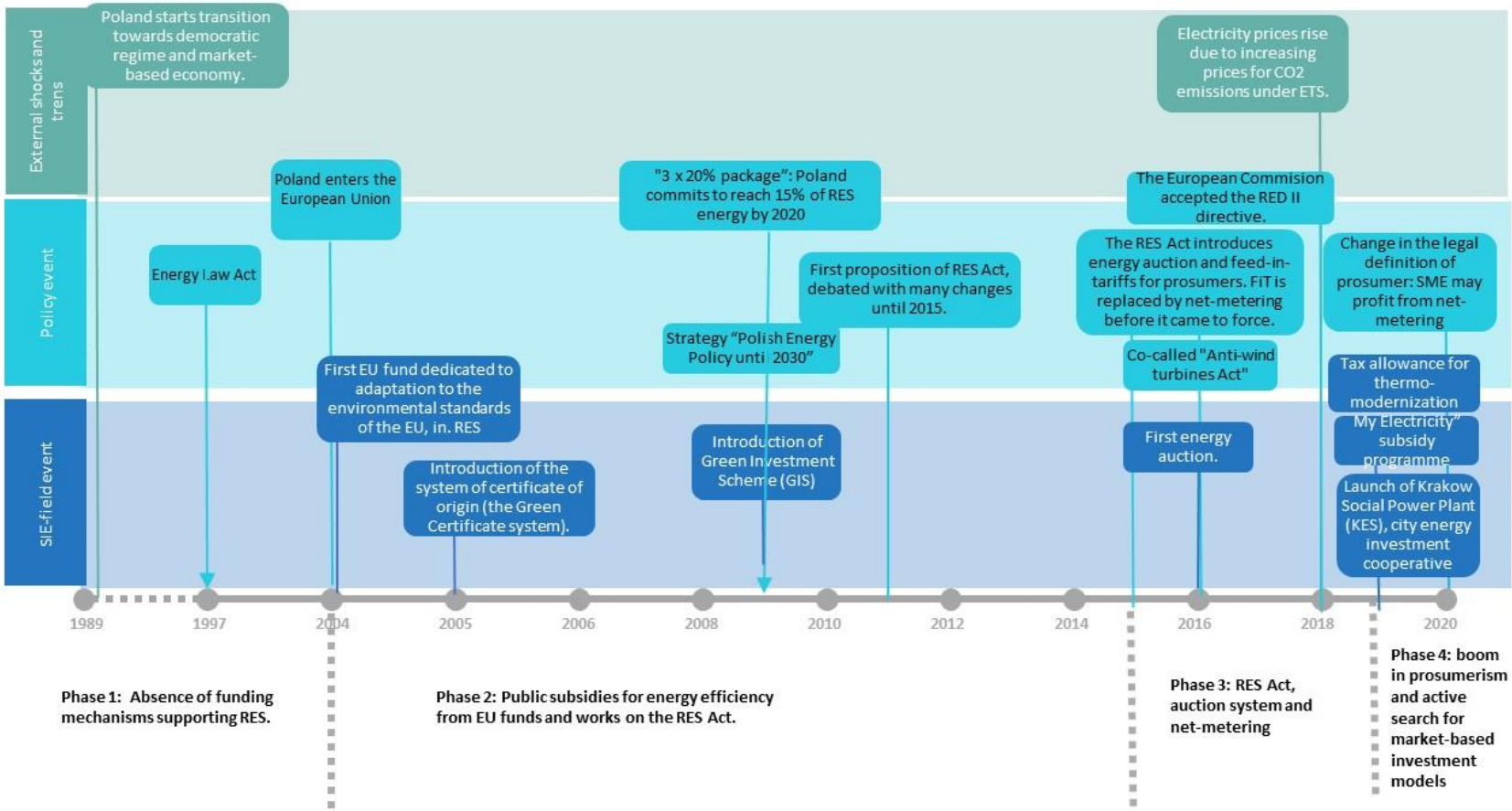
2. Innovative financial mechanisms

The accelerating energy transition in Poland that we can see in the last years - that is, the growing proportion of renewable energy sources in energy mix and growing participation of prosumers in energy production, mainly through PV micro-installations - creates the need for more innovative financial mechanisms. Entrepreneurs and social innovators are struggling to address this need. Oftentimes, new mechanisms aim at enabling a new type of participant in the energy sector. For example, Krakowska Elektrownia Społeczna (KES)[3] (ang. Krakow Social Power Plant) struggles to create the model for energy investment co-operative, to allow investment in roof PV not only to owners of real properties, but everybody willing to invest at least PLN 2000 zł (~ EUR 500). As the model it develops represents the ambition to surpass the limitation of the currently dominant model focused on investments of individual households/real properties owners and create opportunities for collective investment, we will analyse it closely as the second specific SIE-initiative. The company OZE-rentier[4], offering shares in middle-scale PV installations (400 do 500 kW), represents another example of innovative mechanisms aimed at broadening the pool of potential investors beyond homes and ground owners. Although these initiatives are marginal at the moment, they represent the quest for new business and financial models and are likely to expand when legal conditions become more supportive. For example, there is an ongoing discussion on legal changes enabling "collective prosumers", such as in apartment buildings, or "virtual prosumers", owning installations in distant locations.[5] In this report, we are going to analyze KES in detail, as an example of innovative SIE-initiative at the field of financing RES, which struggles due to regulatory obstacles.

[3] https://elektrowniaspoleczna.pl/inwestuj-w-oze/
[4] https://oze-rentier.pl/
[5] https://wysokienapiecie.pl/32760-prosumenci-czekaja-na-zapowiedziane-zmiany-prawne-bedzie-mozna-zbiorowo-nawet-wirtualnie/

4 Timeline of financing and subsidies for RES in Poland

The timeline below presents most important events related to the development of financing and subsidies for RES in Poland, divided into three categories: SIE-field events, policy events, and external shocks and trends. Most important policy decisions on the EU level are interpreted as “policy events” close to the “external shock”, as they provide strong impulses for the governing energy system against the dominant internal tendencies As the the field started to develop more dynamically after 2015, and especially after 2019, we can see that the events grid becomes more dense each year.

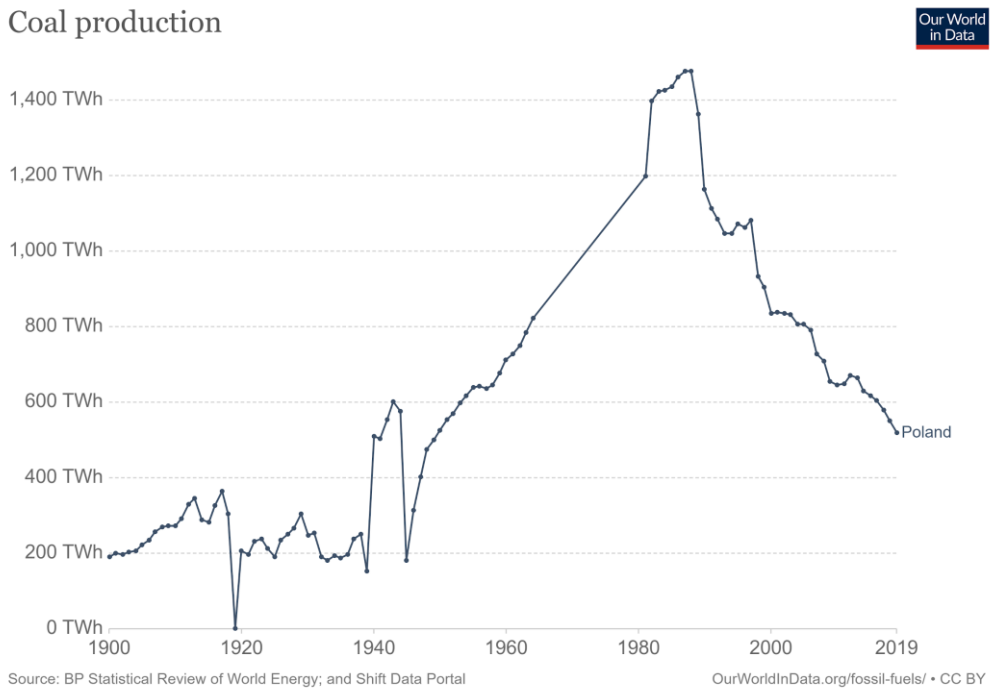

External shocks and trens
Policy event
SIE-field event
Poland starts transition towards democratic regime and market-based economy.
Electricity prices rise due to increasing prices for CO2 emissions under ETS.
Poland enters the European Union
"3 x 20% package": Poland commits to reach 15% of RES energy by 2020
The European Commision accepted the RED II directive.
Energy Law Act
First proposition of RES Act, debated with many changes until 2015.
The RES Act introduces energy auction and feed-in-tariffs for prosumers. FIT is replaced by net-metering before it came to force.
Change in the legal definition of prosumer: SME may profit from net-metering
Strategy "Polish Energy Policy until 2030"
Co-called "Anti-wind turbines Act"
First EU fund dedicated to adaptation to the environmental standards of the EU, in. RES
Tax allowance for thermo-modernization
Introduction of Green Investment Scheme (GIS)
First energy auction.
"My Electricity" subsidy programme
Introduction of the system of certificate of origin (the Green Certificate system).
Launch of Krakow Social Power Plant (KES), city energy investment cooperative
1989
1997
2004
2005
2006
2008
2010
2012
2014
2016
2018
2020
Phase 1: Absence of funding mechanisms supporting RES.
Phase 2: Public subsidies for energy efficiency from EU funds and works on the RES Act.
Phase 3: RES Act, auction system and net-metering
Phase 4: boom in prosumerism and active search for market-based investment models

5 Emergence and development of financing and subsidies for renewable energy in Poland over time

PHASE 1: from 1989 to 2004. Absence of funding mechanisms supporting RES.

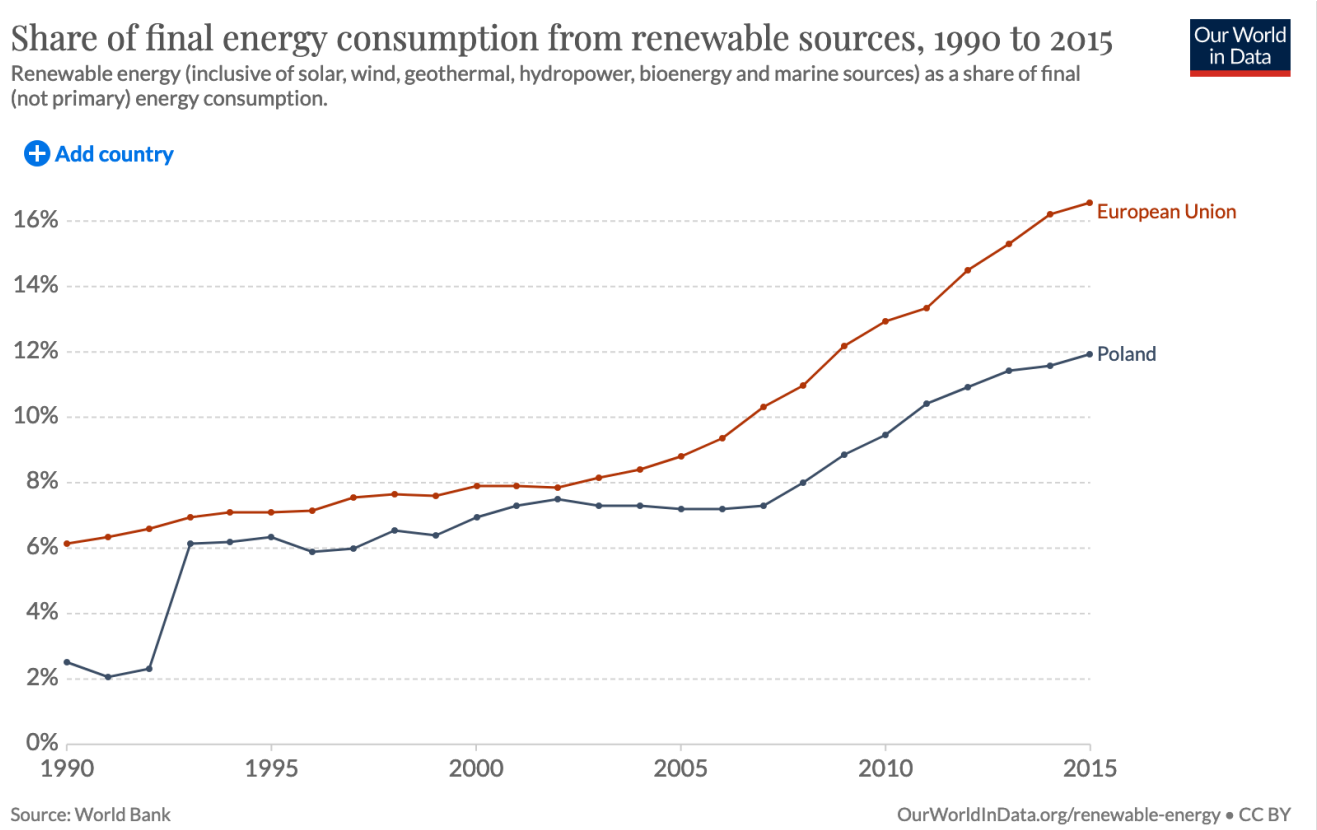
Available funding mechanisms for RES are closely connected to the state energy strategy. Before 1989, Poland was proud of its coal-based energy system, even if it faced serious problems in 1980'. The project of building the first Polish nuclear power plant was abandoned in 1989, leaving the coal power plants almost the sole source of electricity. In 1989 negotiations that started the process of political and socio-economic transformation in Poland, within the so-called Roundtable Talks, a dedicated working group focused on ecology (ecological sub-table) was set. The group developed recommendations for energy decentralisation and support for small, renewable energy producers. However, due to challenges of the economic and political crisis of the early 1990s, these recommendations have not been implemented. However, in this period, Poland's CO2 emissions dropped significantly: from 464 mln tonnes in 1987 to 376 mln tonnes in 1990 and record low 306 mln tonnes in 2003[6]. That was due to the collapse of heavy industry and coal mining and rise of energy efficiency, not the explicit energy and climate policies.

[6] https://ourworldindata.org/co2-emissions



As our interviewees point out, for ca. twenty years following the 1989 transformation, the official, political and legal actions towards energy transformation and decarbonisation were almost totally absent. For years, energy was publicly and politically perceived as a key national safety issue, hence public debate focused mainly on the problem of energy dependence (namely from Russia). The funds for renewable energy were virtually inaccessible. The RES topic re-emerged in a discourse along with Polish efforts towards access to European Union, alongside regulations focused on the protection of the environment, including air quality. In 2004, the share of renewable energy in the energy mix was 7,3% (as indicated by Renewable energy as a share of final, not primary, energy consumption)[7].

[7] https://ourworldindata.org/renewable-energy



source: https://ourworldindata.org/grapher/renewables-share-final-energy?tab=chart&country=POL~European%20Union

Policies and policy making

One of the SONNET's research questions is which role policy mixes play in SIE processes. The following definition has been adopted: Policy mixes of relevance for SIE encompass policy strategies and instrument mixes at different governance levels and policy fields which enable or impede the development of SIE, and have developed incrementally over many years through

policy processes. Particular attention is paid to the co-evolution between policy mixes and SIE within the energy system, as well as to the multi-level nature of policy mixes and the role of SIE in policymaking (D1.2, 49-50).

Public policies are crucial for the enabling or impeding of the new financial mechanisms supporting the development of RES. As Polish energy system is dominated by state-owned energy companies which rely on energy from fossil fuels, many experts and researchers stress that energy policy often protects their interest. So-called "Anti-Wind Turbine Act" from 2016, setting unparalleled standards of the distance between human settlements and wind turbine locations, which virtually stopped the dynamic development of wind turbine power plants provides a glaring example of this dynamic. This is only strengthened by the "revolving door" mechanism between politics and state-owned energy companies, as this pan-European problem is also serious in Poland(Szulecki 2018).

The main mechanisms supporting RES development, such as auction mechanism or net-metering, are established by the Law on RES and are fully dependent on the state regulations. In the same vein, the public subsidies, such as the "My Electricity" programme, or other programmes addressed to different recipients are introduced by the government regulation. Both types of policy measures are intended to implement government energy strategy. However, as we explain below ["outside institutional environment" box], the emissions reduction targets set by Polish government are strongly dependent on EU climate policy. In such a context, we can see the particular importance of policy impulses from the level of the EU on the state level policies. That is, the financial instruments supporting the growth of renewable power in the energy mix are pushed by the acceptance of the EU energy targets. Similarly, the actions of NFEPWM, which are to the large extent dedicated to the efficient and effective use of the EU funds under the Infrastructure and Environment Operational Program, represent the overlapping influence of the EU and state policy.

Public policies play a different role for the market-based solutions, such as in case of the model of investment/energy cooperative developed by Krakowska Elektrownia Społeczna and EPC (Energy Performance Contracting) model. Here, the actors from beyond the energy field try to use the conditions set by the policy to propose their own financial and investment mechanisms in order to enter this field. However, regulations may impede the development of SIE. The fact that in Poland in 2021 there is no single energy cooperative able to produce power, despite the attempts of entrepreneurs and social entrepreneurs to establish them and the social willingness to invest in renewable energy clearly signals that the regulative barriers are difficult to overcome.

An example of the barrier is the fact that under current legislation, energy cooperatives are allowed to operate only in rural areas. The Client Earth states that the lack of an effective support system for energy communities in Poland is the greatest failure of national public policies in this area[8]. This is likely to change with the full transposition of RED II directive, expected in June 2021. Apart from higher targets regarding the proportion of renewable energy in the energy mix for 2030, RED II guarantees more favorable conditions for prosumers and energy communities. That may start the new era in development of innovative organizational and financial models for energy production from RES in Poland. The number of local actors representing social movements (e.g. "Więcej niż energia" - "More the energy" coalition), businesses connected to RES development (e.g. Institute for Renewable Energy connected with the PV sector), and energy experts focused on dispersed energy (e.g. expert involved in "KlastER" project) are attempting to influence the policy to ensure better conditions for prosumers and collective prosumers.

PHASE 2: from 2004 to 2015. Public subsidies for energy efficiency from EU funds and debate on the RES Act.

After Poland joined the EU in 2004, the issues of environment and climate protection slowly started to take more prominent place in public discourse and in policy-making. The main stream of funds devoted to this goal came from dedicated EU funds. The most important institution responsible for management and distribution of public funds for renewable energy and energy efficiency projects is The National Fund for Environmental Protection and Water Management (NFEPWM) (PL: Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej, NFOŚiGW). It has been operating since 1989, first as a special purpose fund, and since 2010 as a state legal entity. Its main objective is to provide financial support to large projects aimed at environmental protection and water management. Central NFEPWM, along with 16 independent (subordinated to voivodship administration) sub-funds with similar goals (Provincial Funds for Environmental Protection and Water Management, PFEPWM), constitutes the core of the Polish system of financing environmental protection projects.

The expansion of the NFEPWM's role is tightly connected to Poland's access to the European Union. It resulted both in new legal obligations regarding the level of environmental protection, and the

[8] https://www.documents.clientearth.org/wp-content/uploads/library/2020-05-08-od-zera-do-gigawata-ewolucja-polskich-regulacji-prosumenckich-ce-pl.pdf

emergence of the new financial means for this goal. Thus, one of the main tasks of the National Fund is the efficient and effective use of the European Union funds (mainly under the Infrastructure and Environment Operational Program), the Norwegian Financial Mechanism, the Financial Mechanism of the European Economic Area, the National Green Investment Scheme (GIS) and the EU Instrument Financial LIFE +. The main objective of these financial instruments is the expansion and modernization of the infrastructure for environmental protection and water management. One of the NFEPWM's priorities is climate protection, which results in support for actions aimed at improvement of energy efficiency, development of renewable energy sources, and development of intelligent energy networks. It grants both returnable and non-returnable financial support, such as subsidies, interest-bearing loans, low-interest preferential loans (partially redeemable in some programs), subsidies to bank loan interest, or partial repayment of the principal of bank loans.

The scope and scale of NFEPWM actions has steadily grown over time. After Poland joined the EU in 2004, in the 2004-2006 period the programs were focused on adaptation to the environmental standards of the EU with the budget of PLN 730 mln. Starting from the 2007 period, Poland benefited from Operational Programme Infrastructure and Environment (OPI&E). In perspective 2007-2012, NFEPWM actions were focused on limiting the negative environmental impact of the industry, with the budget of PLN 1 007 mln, and building the environmental-friendly energy infrastructure (PLN 1 514 mln). In both of these programs, CO2 reduction was one of the goals, achieved mainly through energy efficiency programs.

Since 2010, NFEPWM has also organized the Green Investment Scheme (GIS), a derivative of the Emissions Trading System (ETS). Until 2019, it granted PLN 530 mln. in loans and PLN 586 mln. in subsidies, resulting, among others, in termo-modernization of 1700 public buildings, construction of 17 biogas power plants, and connection of 7 wind power plants to the network.

Starting from 2005, the main RES support system in Poland was based on "Green Certificates", or certificates of origin. The system was based on the obligation imposed on energy sellers to obtain and submit to the President of the ERO (Energy Regulatory Office; pl: URE, Urząd Regulacji Energetyki) a certain number of certificates of origin of electricity generated from renewable energy sources (so-called "Green Certificates"), or to pay a substitute fee. That is, producers of energy from renewable sources had guaranteed the purchase of the energy they produced. The system was regulated under Energy Law. In this period, there was no dedicated act regulating specifically the

development and operating of RES. First project of Renewable Energy Sources Act was proposed in 2011[9] and were debated for years, while civic interest and pressure to allow investment in RES grew.

PHASE 3: from 2015 to 2019: RES Act: auctions, net-metering, and rising electricity prices.

After years of discussion, RES Act was finally accepted in February 2015. It introduced the number of new funding mechanisms. First of all, the auction system replaced the Green Certificates system. Second, the Act enabled prosumerism. In its first version, it introduced the feed-in tariffs system. However, feed-in tariffs never started to be in force because the next government, that took over from November 2015, withdrew this policy measure and replaced it with net-metering. The RES Act came into force on January 1, 2016; since then were amended several times. To a certain extent, the RES Act finally responded to a growing interest and lobbying towards creating conditions for prosumers in energy (a category nonexistent in Polish system before). Below we describe the most important funding mechanisms introduced by the RES Act.

'Outside' institutional environment shaping the development of the SIE-field
The SIE-field and its actors are nested within an outside institutional environment linked to an energy system that is constituted by formal and informal institutions. These institutions shape the activities of SIE-actors and other field-actors within the SIE-field. One of the SONNET's objectives is to investigate the 'outside' institutional environment that surrounds and penetrates the SIE-field (D3.1, 17-18). Climate and energy-related actions of Polish government are reactive towards EU policies, which are also often contested by Polish politicians who see the sustaining of coal-based energy system as a base for national energy security[10]. We consider pressure from the EU the main outside factor shaping the financial mechanisms for the development of RES. In this context, the financial mechanisms supporting the development of prosumenet mico-installation of RES and the acceleration observed

[9] https://magazynfotowoltaika.pl/historia-ustawy-o-oze/

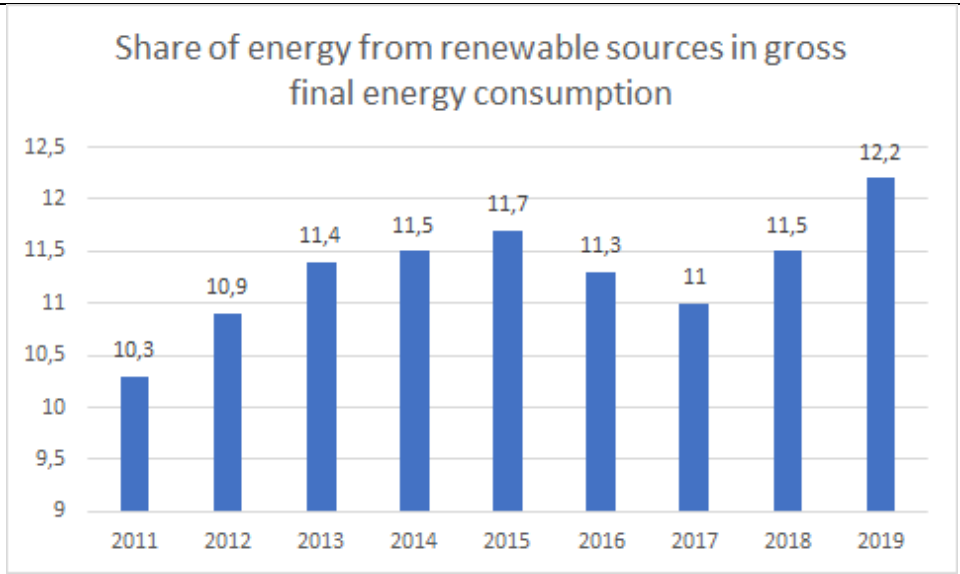
[10] Szulecki, Kacper, Poland's Renewable Energy Policy Mix: European Influence and Domestic Soap Opera (April 28, 2017). CICERO Working Papers 1/2017, Available at SSRN: https://ssrn.com/abstract=2964866 or http://dx.doi.org/10.2139/ssrn.2964866

since 2019 can be interpreted as an answer to the delay in reaching the target of 15% of renewable energy in Polish energy mix in 2020 (according to RED I directive 2009/28/WE). In 2018 Najwyższa Izba Kontroli (NIK, Supreme Audit Office)[11] issued a report warning that if the previous policy continues, Poland will be forced to pay as much as PLN 8 bln through the mechanism of "statistical transfer" to European countries which managed to provide the surplus of the green energy. In 2017 only 11% of energy mix was secured by RES. Taking into account the duration of the cycle of investment in RES, reaching 15% target in just 3 years was considered highly unlikely; still, among different available options, PV micro-installations which bloomed in Poland from 2019, have the shortest investment cycle. At the end of 2019 (what is the last available data from Statistics Poland) the indicator "share of energy from renewable sources in gross final energy consumption", used in implementation of RED I directive, reached 12,18%[12], demonstrating the progress toward the target; the dynamic raise of prosumer's microintalation in 2020 will further impact the indicator. At the beginning of 2019, the Polish government admitted that the target 15% will not be reached, but they assumed 13,8% at the end of 2020.[13] Thus, despite the fact that reaching 15% target in 2020 remains not attainable, the new funding mechanisms and accompanying policies initiated the rise of RES after years of stagnation.

[11] https://www.nik.gov.pl/aktualnosci/zielona-energia-dostala-zadyszki.html

[12] https://www.gramwzielone.pl/trendy/104216/w-polsce-wzrosla-produkcja-zielonej-energii-ale-nadal-daleko-do-celu-na-2020-r

[13] https://wysokienapiecie.pl/16129-cel-polski-oze-2020-nie-zrealizujemy-rzad/



Source: GUS

Another important factor from the outside institutional environment which impacts the profitability of different financial mechanisms results from the rise of the energy prices. The rising price for emission under ETS is one of the main factors affecting rising energy prices in Poland, particularly for the non-residential sector. That motivates bodies such as enterprises and local government entities to look for alternatives such as prosumption, and create space for market-based solutions. At the same time, to prevent social discontent, the government blocked the rise in energy prices for households. The "My Electricity" program, discussed in detail below, is the aftermath of the act on energy prices intended to compensate the households for the increase in energy prices. The Minister of Energy negotiated the consent of the European Commission to this governmental intervention in energy prices, but in return he had to allocate the one

billion PLN from GIS to RES. Hence his idea of the "My Electricity" programme.[14] Here again, the specific policy came in place as a result of negotiation between Polish government and the European Commission. “My Electricity” may be therefore seen through the lens of the ‘doing’ aspect of SIE, undertaken under pressure of EC, to a certain extent a side effect of quite conservative policy of intervening in energy prices. In this light, success of the “My Electricity” programme is even more significant.

Finally, recently introduced EU regulation on the establishment of a framework to facilitate sustainable investment is expected to significantly impact upcoming developments of financing and investment mechanisms, particularly market-based ones. On June 18, 2020, the regulation establishing the world's first classification system - a "green list" for sustainable economic activities, or taxonomy, was adopted by the European Parliament and the Council. The taxonomy regulation provides a general framework that will allow the gradual development of an EU-wide classification system for environmentally sustainable economic activities[15]. It may be expected that taxonomy will create economic and institutional conditions favourable to new financing and business solutions, innovative particularly in the Polish context, that would display ‘doing’ and ‘organising’ aspects of SIE.

It is interesting to note that according to several of our interviewees, Polish government is often reluctant to actually adapt to EU regulations and requirements regarding sustainable transitions. External pressures, as well as “external” expertise, are approached with distrust. As one of the interviewees ironically stated, *“the Polish government, in such matters, is very resistant to external arguments. In fact, a medium-quality analysis prepared by the employees of the ministry has a much greater impact on reality than even the highest-quality expertise prepared by an external, God forbid, a foreign institution".* On the other hand, it is impossible to just ignore political and economic pressures on the legislators and politicians. A compelling example of “facade-like” practices may be inviting the World Bank experts to conduct evaluations and

[14] https://biznesalert.pl/program-moj-prad-spor-ministerstwo-energii-przedsiebiorczosci-i-technologii-energetyka-oze/

[15] https://www.gov.pl/web/rozwoj-praca-technologia/zrownowazone-finansowanie

formulate recommendations for the developments in the RES sector in Poland. The cited interviewee perceives it as an attempt to *"build an institutional environment to force the minister to agree on taking particular steps"*. It can be said that SIE-field actors, interest groups and citizens interested in speeding and enabling institutional and legal changes towards transition, refer to and "use" external, European and global, trends to strengthen their position in internal Polish political debate. It can be discussed whether such practices are rather adaptive or innovative in nature.

From 2015, medium-scale RES installations started to be supported by **the auction mechanism**. Under the auction mechanism, the Energy Regulatory Office allocates fixed amounts of support for each energy source. Thirty days before the auction day, the President of ERO sets the date and time of the auction for a given energy source. Bids can be submitted from opening to the announced date and must include the amount of electricity offered in MWh as well as the price per MWh in the bid. At auctions held several times a year, operators of wind farms and photovoltaic systems can submit bids for a selected form of support for their energy source - the lowest price is paid extra. The intention was to ensure that the operators of onshore and offshore wind turbines and solar PV systems will receive steady, continuous income and can plan their long-term investments. As a rule, the RES Act allows for a start-up period of 36 months - but each energy source has its own deadlines. Thus, onshore wind turbines must be able to produce electricity 33 months after receiving the subsidy, photovoltaic installations 24 months after receiving the subsidy, and offshore wind turbines 72 months after receiving the subsidy[16].

First auction was held 30.12.2016. The rules of the auction mechanism, along with successive updates of the RES Act, changed with time. One of more important changes concerned the division into the so-called "Auction baskets", which include estimation of the volume and value of energy for sale, along with the correct calculation of reference prices. The method of resolving auctions has also evolved over the years. In 2016 and 2017 auctions, the winners were the participants who offered the lowest selling price - until the quantity or value of this energy specified in the auction announcement was exhausted. The amendment to the RES Act of 2018 introduced the so-called "rule of forcing competition". According to this rule, the auction is won by the participants who offered the lowest selling price of energy and whose offers in total did not exceed 100% the value or amount of energy

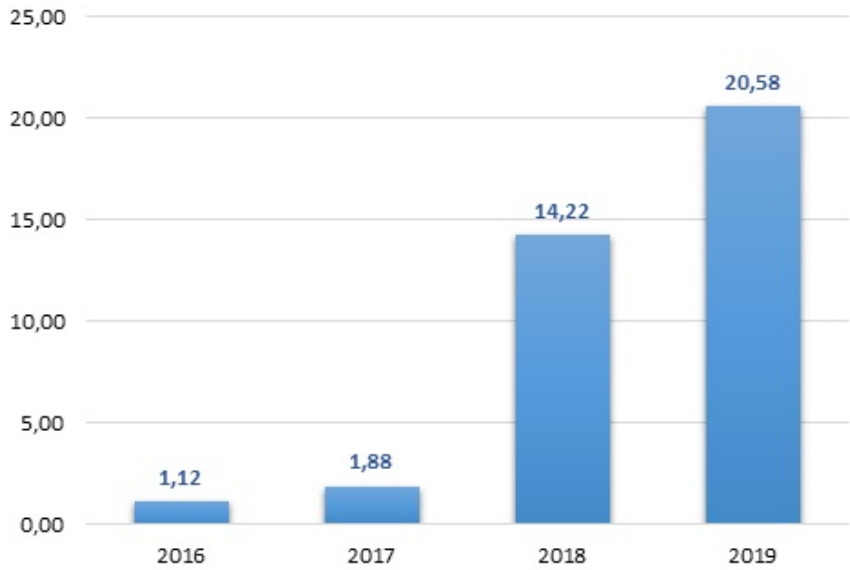
[16] https://www.next-kraftwerke.pl/leksykon/system-aukcyjny-oze

specified in the auction notice and 80% the amount of electricity covered by all submitted bids. Such a provision allows to avoid a situation in which all bids win the auction, even if the amount or value of electricity submitted bids does not cover the entire volume or values indicated in the announcement.

To sum up, 5 years of energy auctions in Poland (2016-2019) brought the following results:[17]

- More than 2,000 supported installations
- Almost 154 TWh sold
- Approx. 3.4 GW of new capacity in wind technology, approx. 1.7 GW in PV technology and less than 70 MW of new capacity in other RES technologies will be created.
- The total value of energy covered by the winning bids was over PLN 38 billion.
- The vast majority of support - i.e. nearly PLN 37 billion - went to new installations, i.e. those in which electricity will be generated for the first time after the closing of the auction session.
- We can see the decrease in the costs of energy generation from photovoltaic installations: the average price from the winning offers in 2017 was PLN 372 / MWh, in 2018 it was only PLN 352 / MWh, and in 2019 - PLN 317 / MWh.
- The lowest average price from the winning bids in a given basket was recorded in the auction dedicated to wind farms and amounted to less than PLN 200 / MWh (2018), which was caused by strong price pressure resulting from a relatively small - compared to market needs - volume of electricity allocated to sale. This situation was additionally aggravated by the fact that it was the first auction since the launch of the support system, i.e. from 2016, intended for new wind projects with an installed electrical capacity greater than 1 MW. This change resulted in only 31 offers submitted.
- The beneficiaries of the auction system are mainly producers that use the energy of solar radiation and wind on land to generate electricity. Other technologies are marginal, although the potential is still in the projects based on biogas technologies.

[17] https://www.ure.gov.pl/pl/urzad/informacje-ogolne/aktualnosci/8739,System-aukcyjny-dla-odnawialnych-zrodel-energii-ma-5-lat.html

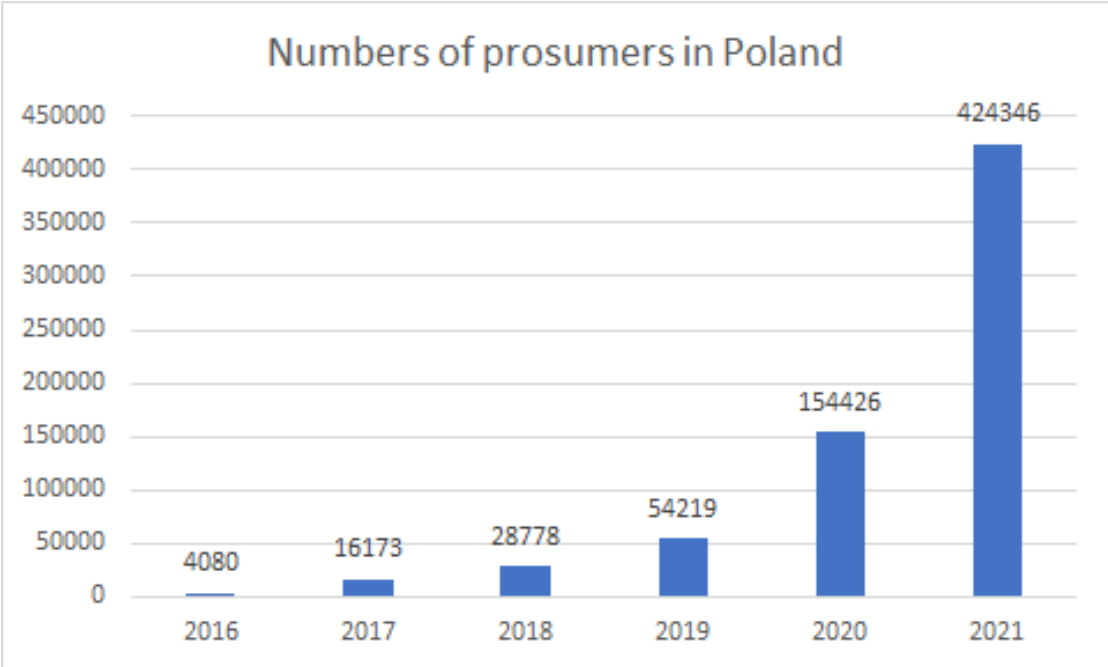


Value of the energy contracted under auction mechanisms in 2016-2019 [PLN bln]

The RES act also introduced **the system of net-metering** for energy prosumers. The details of net-metering, together with energy prices and costs of micro-installations, have a decisive impact on whether the investment in small-scale RES installation is economically profitable or not, thus impacts available financial mechanisms and citizens' willingness and capacities to invest in RES. Under net-metering mechanism, the surplus of energy produced by the prosumer may be stored in the power grid and then used by the presumer during periods of lower production. That is, renewable energy prosumers can use all the energy they produced (which is the most advantageous option) or put it into the grid where it is stored and then receive a discount. Thanks to the net metering system, the surplus of produced energy can be stored in the power grid for a period of 365 days. The size of the discount depends on the size of the installation. In the case of micro-installations up to 10 kW - the discount is 0.8 kWh for each 1 kWh of energy fed into the grid; above 10 kW - the discount is 0.7 kWh for each 1 kWh of energy fed into the grid.

The net-metering system is a support offered to prosumers and an incentive to invest in PV installations. However, it is less lucrative than the system of feed-in tariffs introduced by the first version of RES Act and never came to force; it's also less expensive for the budget. In Poland, anyone who is a prosumer can use the discount system. Between 2015 and 2019, only a natural person could act as a prosumer.

The introduction of the prosumer to the Polish legal system opened the door for individual investments in micro-installations. However, as we can see in the chart below, in the period 2016-2019 the progress was relatively slow, to speeded up after introduction of additional financing mechanisms, which set the next phase described in this report.

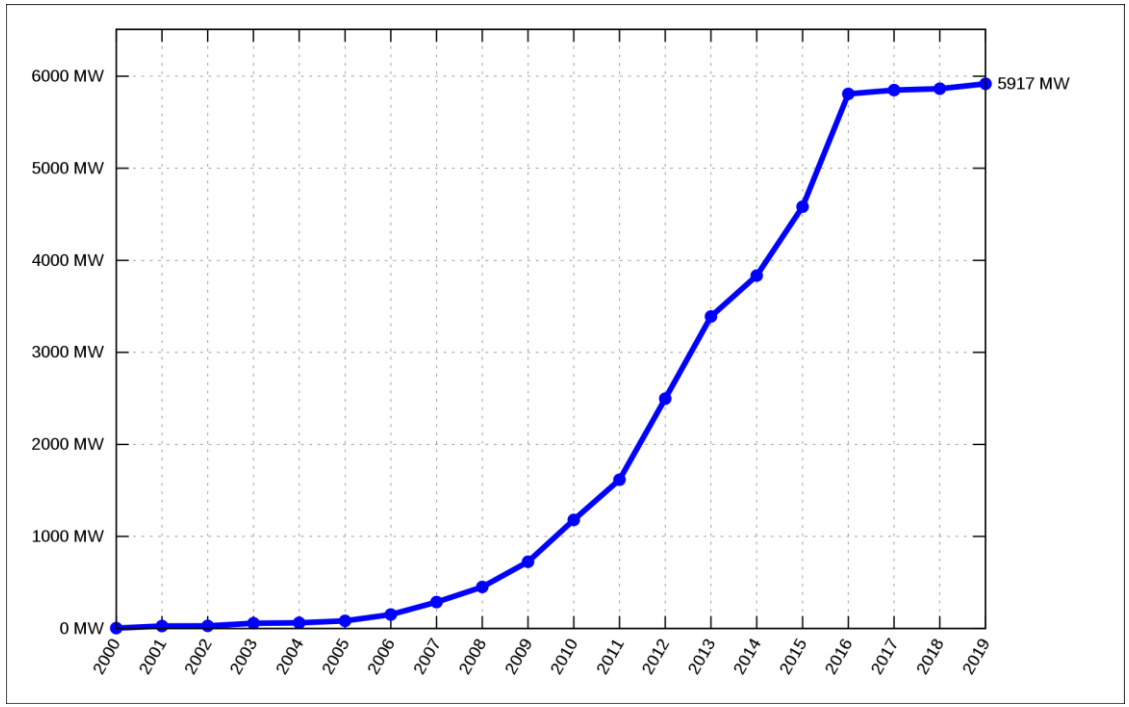


Source: http://www.ptpiree.pl/energetyka-w-polsce/energetyka-w-liczbach/mikroinstalacje-w-polsce

historical data + estimation for 1 January 2021.

While the RES Act opened the system for prosumers' participation, it is worth stressing that another governmental regulation from Phase 3, the Act on Investments in Wind Farms, called "the anti-windmill law" by the wind industry, accepted in 2016, virtually frozen the sector of wind power plants. According to the act, it is possible to build a new wind farm at a distance of not less than 10 times its height (including blades) from residential and mixed buildings and areas particularly valuable from the natural point of view (e.g. national parks, landscape parks, reserves). It is not possible to expand the existing windmills that do not meet the distance criterion - only their renovation and works necessary for their proper use are allowed. The act also introduced an increase in taxation of new and existing wind farms. The new regulations did not apply to wind farms with a capacity of up to 40 kW, i.e. they do not apply to micro-installations, and also do not apply to offshore wind farms[18]. The new law was officially motivated by the health and safety concerns and the public protests against wind turbines in the neighbourhoods. However, the social protest had very limited scale. It seems likely that the growing wind capacity was difficult to absorb by the grid operators, while the low electricity prices in windy periods posed unwanted competitions for incumbents.

[18] https://www.gramwzielone.pl/energia-wiatrowa/22472/ustawa-antywiatrakowa-wchodzi-w-zycie



Poland wind power capacity 2000-2019. Source: https://commons.wikimedia.org/wiki/File:Poland-wind-power-capacity.svg

At this stage, the subsidies and loans distributed by NFEPWM continued. In 2014-2020, in the priority "Low emission economy" under the Infrastructure and Environment Operational Program, the following actions were supported through different instruments:

- Renewable Energy Sources - PLN 644 mln
- Energy efficiency in companies - PLN 388 mln
- Energy efficiency in public buildings - PLN 913 mln
- Energy efficiency in residential buildings - PLN 897 mln
- Modernization/construction of heating networks - PLN 1 337 mln

- Cogeneration and networks - PLN 1 127 mln

The overall budget reached PLN 5 300 mln.

Between 2014-2023 NFEPWM also launched programs funded from domestics sources dedicated to energy efficiency and renewable energy sources. These include programs:

- Polish Geothermal Energy Plus - PLN 600 mln
- Energy Plus - PLN 4 000 mln
- Municipal Heating - PLN 500
- Agroenergy - PLN 200 mln
- SOWA - energy efficiency in public lightening systems - PLN 100 mln

Furthermore, as a follow-up to the "Support for distributed, renewable energy sources" programme, which ended in 2014, NFEPWM introduced the new program for prosumers. The aim of the program "Supporting distributed, renewable energy sources: Prosumer - co-financing line for the purchase and installation of renewable energy micro-installations" is to increase energy production from renewable sources, and as a result - to reduce or avoid CO2 emissions. The Prosumer program offers funds for the production of electricity or heat for individuals and housing communities or cooperatives. The budget of the program is PLN 800 million for the years 2014-2022 with the possibility of concluding loan (credit) agreements with a subsidy until 2020. The program finances installations for the production of electricity or heat using: 1) biomass-fired heat sources, heat pumps and solar collectors with an installed thermal capacity of up to 300 kWt; 2) photovoltaic systems, small wind farms, and micro cogeneration systems (including micro biogas plants) with an installed electrical capacity of up to 40 kWe[19].

Even if the scale of the NFEPWM actions expands, public institutions, municipalities, and companies - not the individuals or cooperatives - remain the main beneficiary. In accordance with its mission, NFEPWM helps to fund environmentally-friendly infrastructure. Its potential to enable social innovation - new ways of acting, thinking and organizing in energy - is rather limited, although we can assume that it helped to introduce the issue of energy efficiency to the institutions which were

[19] https://www.nfosigw.gov.pl/oferta-finansowania/srodki-krajowe/programy-priorytetowe/prosument-dofinansowanie-mikroinstalacji-oze/informacje-o-programie/

entitled to use its support. Programmes My Electricity and - on the smaller scale - Agroenergy dedicated to farmers, started in 2019, changed the situation.

Phase 4: from 2019: boom in prosumerism and active search for market-based investment models

Year 2019 signals the new phase in the field of funding and investment mechanisms in RE in Poland by introducing the number of incentives for individuals willing to invest in PV micro-installations[20]. First, since 2019 (i.e. in settlement from 2020) 20% expenses for thermo-modernization has been deductible from income. The **tax relief** can be spread over 3 years, and the total cannot exceed PLN 53,000.

Second, in July 2019 the Ministries of Energy and of the Environment launched the program "My Electricity" dedicated to households who want to become prosumers[21]. Thanks to this programme, for the first time Poles became RES investors on the mass scale. We describe the program in detail as one of our SIE-initiatives.

Furthermore, the act of 19 July 2019 amending the RES act and some other acts, included clarified and expanded rules of organization and operation of energy cooperatives in the areas of rural-urban and rural communes. The provision supports the development of civil society through the cooperation of residents, farmers, entrepreneurs and local government to ensure the greatest possible energy self-sufficiency of this community. At the same time, it facilitates the implementation of the commune's own tasks in the field of energy, which were described by the legislator in the Energy Law[22].

Below, we discuss several examples of mechanisms and endeavours, socially innovative in the Polish context, representing a noticeable change in an energy production and energy efficiency sector, that were to a certain extent enabled by the abovementioned regulatory changes.

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[20] https://www.documents.clientearth.org/wp-content/uploads/library/2020-05-08-od-zera-do-gigawata-ewolucja-polskich-regulacji-prosumenckich-ce-pl.pdf

[21] https://www.gov.pl/web/srodowisko/rusza-program-moj-prad

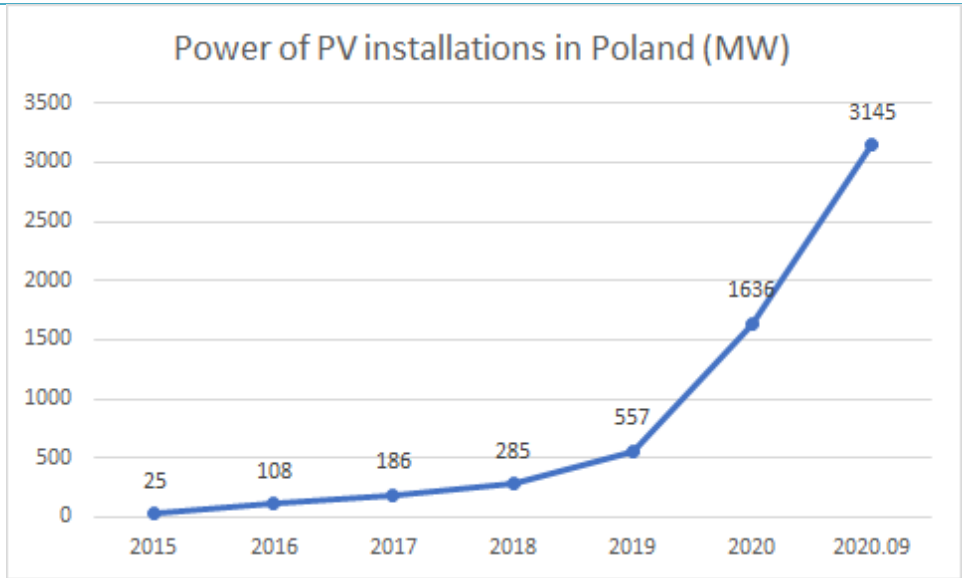
[22] https://energyre.pl/pl/2019/09/nowelizacja-ustawy-o-oze-co-warto-wiedziec-na-temat-zmian/

Introduction to SIE-initiative

"My Electricity" is a public subsidy programme managed by NFEPWM and funded through the Green Investment Scheme. It has been operating from July 2019 until December 2020 and will likely be prolonged. It allows individuals to receive the subsidy of PLN 5000 (~1200 EUR) for a small (2kW to 10kW) installation of PV on their own roof or grounds. The applications, approved by NFEPWM, are examined on an ongoing basis.

The introduction of the "My Electricity" program is recognized as one of the main reasons for the skyrocketing growth in PV power in Poland in 2019 and 2020 due to prosumers engagement. Until October 2020, 173 000 applications have been submitted, with an average number of 800 applications per day.[23] Between January 2019 and September 2020, the number of PV micro installations connected to the distribution network reached the number of 303 000 and 2,01 GW. Despite economic troubles caused by COVID-19 pandemic, the growth reached on average 8% m/m to bring more then 3GW of PV power at the September 2020[24] (including both micro installation up to 10kW and larger PV power plants operating under auction system): in three quarters of 2020, more than twice as many micro installations were connected to the DSO (Distribution system operators) grid than in the entire 2019.

[23] https://wysokienapiecie.pl/33094-fotowoltaika-w-listopadzie-koniec-budzetu-moj-prad-bedzie-bonus/
[24] https://wysokienapiecie.pl/33493-moc-fotowoltaiki-w-polsce-przekroczyla-3-gw/



Source: https://wysokienapiecie.pl/33493-moc-fotowoltaiki-w-polsce-przekroczyla-3-gw/;

It is estimated that in 2020 alone, prosumer spend as much as PLN 5 billion on small investments in PV, leveraged by PLN 1 billion of public subsidies[25] distributed under "My Electricity". As a result, in November 2020, the overall number of prosumers in Poland reached 357 000[26]. As the cost of an average investment reaches PLN 25 000, subsidy covers 20% of the investment.[27] Individuals benefiting from the program become prosumers: they use the energy produced by their PV to cover their own energy needs, and they pass the surplus energy to the network, basing on a net-metering system. That is, for each 1kW passed and stored in the network, they receive 0,8kW in the convenient

[25] https://wysokienapiecie.pl/32271-polacy-wydali-5-mld-zl-z-wlasnych-kieszeni-na-fotowoltaike/
[26] https://www.gramwzielone.pl/energia-sloneczna/104268/liczba-prosumentow-w-polsce-przekracza-357-tys-pora-na-magazyny-energii
[27] https://wysokienapiecie.pl/21408-program-moj-prad-dotacje-instalacji-fotowoltaicznej-przewodnik/

moment. For an average house and installation of 5kW, the yearly saving on electricity bills reaches PLN 2.700 and is expected to grow with the rising electricity prices.

"My Electricity" is accompanied by other financial preferences for individual investors, such as **tax allowance** which allows to deduce expenses on PV installation (as well as expenditures on energy audit, termoisolation, etc.). These two programmes allow to lower the average costs of investment for 5kW installation from PLN 28.000 to PLN 19.000 (as for December 2019[28]). With this support, the return from investment can be reached in the seventh year after initial investment.

The impressive effects of "My Electricity" programme demonstrates that the Poles' declaration on the willingness to invest in RES[29] expressed in public opinion polls were genuine; where the opportunity presented itself, they invested their own resources in RES. For the first time, Poles became investors in energy production on a mass scale. The goal of reaching the number of 1 million prosumers in 2030 set in the state energy strategy (PEP 2040, currently under discussion) not only seems to be realistic, but likely will be reached earlier if the current trend continues.

The growth in the number of prosumers mobilized by the "My Electricity" programme had an impact on the number of SIE-field actors. First, it led to the fast development of the PV installation sector in Poland, creating the number of "green jobs" dispersed through the country. Second, the raising power in the low-voltage network poses the challenges to distribution system operators and motivate them to introduce broader changes in the grid management system, that is: mechanisms encouraging the use of energy at the place of its generation, e.g. energy storage, or creation of the market mechanisms for the purposes of balancing on the local energy market and flexibility services market[30].

[28] https://wysokienapiecie.pl/21408-program-moj-prad-dotacje-instalacji-fotowoltaicznej-przewodnik/
[29] https://www.cbos.pl/SPISKOM.POL/2016/K_036_16.PDF
[30] https://globenergia.pl/szymanski-milion-prosumentow-do-2030-roku-to-nie-jest-ambitny-cel/

""My Electricity" is an attempt to democratize energy in very unfavorable circumstances" (Interview)

According to our interviewees, “My Electricity” programme resulted in a revolutionary change in the Polish energy landscape, but its success was neither easy nor obvious to achieve. As we were told, actors from the coal sector and large energy corporations, even though they see the upcoming twilight of the fossil fueled power, are unsupportive towards the decentralisation trend. They would probably prefer to maintain a current non-inclusive oligopoly, and “just” change the energy source from coal to RES. Having strong political influence capacity, key sector players are able to lobby for their agenda. Hence, as one of the interviewees assessed, we observe a certain *“schizofrenia”* in the Polish government’s actions and policies - “*pushing towards the green* [RES] *with one hand, and towards the black* [coal] *with the other*". Political influence of the coal sector is reported to be still strong within the relevant ministries, and until some time ago even in the National Fund for Environmental Protection and Water Management. It was unlikely that the change would be developed from within of those, somehow stiff, institutions. As one of our interviewees explained, an “external” agent of change was necessary to “shaken” the petrified institutional structures. This agent was, arguably, Piotr Woźny, in 2017-2019 an adviser to the Minister of Development, and to the Prime Minister, on the Clean Air program. Between 08.2019 and 05.2020 he was a chairman of NFEPGW, and until 09.2020 - a government plenipotentiary for the Clean Air program. According to our interviewee, Mr. Woźny, with support of a small team, and with the Prime Minister’s backing, acted as a *spiritus movens* of “My Electricity” programme development and implementation.

Although, based on the data collected, it is difficult to assess an actual personal impact Mr. Woźny had in this story, it is worth recognizing a significant pattern displayed in “My Electricity” as a SIE-initiative example. Along with external institutional (e.g. EU) and social (e.g. civic and protest movements) pressures on the incumbents and established institutions governing the given field, the change often requires an “institutional entrepreneur”, an agent carrying on the change-oriented actions *within* those institutions. Such an agent, somehow “carrier of SIE”, is often a partner for other field actors, providing them with access to decision makers (or at least introducing their

narrative and/or agenda to the existing structures). A similar pattern was also reconstructed in the interviews' analysis on policy networks in SONNET WP2.

Another important change brought the new, broader definition of prosumer[31]. With the amendment of RES Act from 25.06.2019, prosumers entitled to benefit from net-metering can be both a household and entrepreneurs for whom energy production is not the subject of their predominant economic activity, if they generate electricity from renewable sources in an installation up to 50 kW. This change partly transposes the RED II directive.

SIE changing social relations

In the SONNET's terminology, social innovations in the energy sector (SIE) are combinations of ideas, objects and/or actions that change social relations and involve new ways of doing, thinking and/or organising energy (D1.2, 4). Since energy systems do not only consist of techno-economic features but also various socio-cultural processes, the SIE development contributes to shifting social interactions between actors who have to undergo changes concerning their roles, practices and beliefs (Schmid et al. 2016).

According to SONNET's conceptual framework, the field of Financing and subsidies for RE in Poland is clustered at the intersection of social interaction based on "exchange" and "organizing" manifestation. Within this frame in the Polish context, a key change in social relations is without a doubt an emergence of the legal and empirical notion of prosumer. Referring to social interaction's type variable, a role of prosumer reshapes the meaning of energy end consumer, and changes his/her relation with an incumbent energy provider/distributor. A prosumer, generating his/her own energy supply becomes to a certain extent independent from an incumbent monopoly. Furthermore, storing a surplus of generated energy in the grid, relying on a net-metering mechanism, prosumer enters in relation with an incumbent energy provider/distributor that is now

[31] https://globenergia.pl/prosument-dla-mikro-malych-i-srednich-przedsiebiorstw-wyjasniamy-niepewnosci/

based literally on a mutual exchange. That shift has the potential of broadening the function of energy from a “narrow” form of commodity to more “complex” form of commodity/asset. A prosumer’s energy use practices would then be potentially shaped by not only consumer’s, but also entrepreneurial objectives (“organizing” manifestation’s variable). The level of understanding of various energy use practices’ impacts is likely to rise, incentivising more efficient use of energy. What is more, it has a potential of rising awareness and understanding of the broad energy system’s organization and functioning. Sharply growing number of prosumers in Poland, likely being more knowledgeable and attentive than “passive” energy consumers, emerge as a group with particular interests and political (voting) capacity. However, we should consider *"high barriers of entry to the* [“My Electricity” - Prosumer] *program, which require a certain level of competencies" (Interview).*

Relative empowerment of a role of prosumer, who from 2019 can be either a household or an entrepreneur for whom energy production is not the subject of their predominant economic activity, may also be expected to further a push towards decentralisation of energy generation system, or even to challenge energy incumbents’ oligopoly in the future. *"Individual prosumers will probably engage more in energy efficiency, energy storage, etc." (Interview)* It is also likely to lead towards an increase of public interest in development of organisational models (new in the Polish energy context) based on grassroot cooperation and clustering, to expand the scale and/or to address needs of communities (e.g. apartment buildings residents, neighbourhoods, larger districts, but also small scale investors). Our interviewees underlined ever more urgent need for regulatory solutions allowing communities and/or multi-actors entities to benefit from prosumer’s status.

Despite the introduction of effective incentives for individual prosumers, collective prosumption remains very difficult under current legislation, which hampers the development of more sophisticated organizational and investment models.

Consequences of lack of the collective prosumer legal form can be illustrated by the following example. On March 1, 2020, a pilot program called “Solar Roofs” for co-financing of photovoltaic installations for cooperatives and housing communities was launched in the Greater Poland Voivodeship. The budget was set at PLN 100 million, of which PLN 80 million were funds from the National Fund for Environmental Protection and Water Management (for preferential loans, up to 10% redemption, but no more than PLN 1m), and PLN 20 million came from the Provincial Fund for Environmental Protection and Water Management in Poznań. Co-financing, for the purchase and installation of solar micro-installations with an installed electrical capacity of up to 50 kW, was granted in the form of loans (interest at the WIBOR rate, not less than 2% per annum). Support within the program could cover not only the installation of photovoltaics on the roofs of multi-family buildings, but also other activities related to the energy modernization of buildings, including the installation of solar collectors and heat pumps.

"The success of the My Electricity program and the interest of Poles in subsidies for home photovoltaic micro-installations aroused our appetite for more" (Michał Kurtyka, Minister of Climate and Environment)

NFEPWM declares that “Solar Roofs'' program was actively and widely promoted by conferences and meetings with potential beneficiaries, mailings sent to communes, poviats, communities and cooperatives, disseminating information through their websites and social media profiles, etc., as well as radio and TV broadcasts and other media publications. However, despite the intensive promotion of the pilot, only 3 applications were submitted to the Provincial Fund for Environmental Protection and Water Management in Poznań, and only one of those obtained a positive decision on co-financing for the amount of PLN 815.400. Due to a low level of response to the program among communities, “Solar Roofs'' will not be prolonged. Nevertheless, NFEPWM plans to develop two new pilot programs supporting PV installations and energy efficiency in apartment buildings.

“The analysis shows that the reason for the low interest in the “Solar Roofs'' program is primarily the limitation of using the generated electricity only for the needs of common parts of buildings, excluding the individual needs of owners of apartments, which has a significant impact on the extended period of return on investment - explains the National Fund for Environmental Protection and Water Management.” According to the NFEPWM, in order to increase the publicly funded support’s effectiveness for this type of projects, it is necessary to amend the RES act and introduce solutions to facilitate the use of the prosumer system by residents of multi-family buildings, through the collective prosumer mechanism.

In the collective prosumer mechanism, those co-users who co-financed the installation (up to 500 kW), could use the generated energy under a dedicated contract. The generated energy would be "assigned" to investors and then distributed in proportion to the shares in such installation. This "attribution" would fall into the prosumer model, i.e. the renewable energy consumer assigned to the installation would in fact become a virtual prosumer of the installation within the meaning of the regulations, thus gaining all rights and privileges related to the prosumer status, not necessarily being directly connected to the installation[32].

An inspiration for the "Solar Roofs" pilot program was the first PV installation on the roof of an apartment building in the city of Wrocław. In 2016, as a pilot project under NFEPWM's "Prosumer" program, 153 photovoltaic roof panels with a total power of almost 40 kW were installed. The Fund paid approximately PLN 240,000 for the implementation of this project, of which 40% was a non-returnable subsidy. 60% of this sum was a low-interest loan that is to be repaid over 9 years. The electricity generated by the installation was used to illuminate the common parts of the building, including corridors, elevators or engine rooms. The building consists of 70 apartments.

Since then, the project expanded into **Wrocław Solar Power Plant**. As for 2017, almost 3,000 photovoltaic panels on the roofs of 35 high-rise apartment buildings were installed. It is the largest distributed power plant in Poland, generating electricity for common parts of buildings of ca. 15000 residents. The total power of the power plants is nearly 0.75 MW.

"Energy produced by photovoltaic panels in nearly 30% is used immediately for the needs of a given building. It is possible thanks to special converter devices, the so-called inverters. The rest of the energy is sent to the power grid, which is used by all residents of Wrocław. On the other hand, at night, when energy is not produced, residents of buildings with photovoltaic installations can buy electricity from the grid with a 70% discount."

Wrocław Solar Power Plant is an investment of Wrocław-Południe Housing Cooperative. It was

32 http://zielonainfrastruktura.pl/pilotaz-nowego-programu-rzadowego-sloneczne-dachy-doplaty-do-fotowoltaiki-dla-spoldzielni-i-wspolnot-mieszkaniowych/; https://globenergia.pl/sloneczne-dachy-kontynuacja-spoldzielnie-fotowoltaika-nfosigw-wfosigw-w-poznaniu/; https://globenergia.pl/prosument-zbiorowy-w-nowelizacji-oze-czyli-uzytkownik-wirtualnej-elektrowni/

developed with the support of the National Fund for Environmental Protection and Water Management and the Provincial Fund for Environmental Protection and Water Management in Wrocław as part of the Prosument program.

The year of Wrocław Solar Power Plant in numbers:

- 760 000 kWh of electricity production from RES - forecast: 700,000 kWh,
- 600 tonnes a year less CO2 emissions - projected: 557 tonnes less CO2,
- PLN 120 000 annual energy costs vs. PLN 425 000 annual energy costs before installation of the power plant,
- PLN 303 000 annual loan repayment with interest,
- 15 000 residents of cooperatives using clean energy in the common parts of their buildings.

sources: https://www.wroclaw.pl/biznes/wroclawska-elektrownia-sloneczna-juz-dziala; https://www.wroclaw.pl/biznes/wroclawska-elektrownia-sloneczna-spoldzielnia-mieszkaniowa-wroclaw-poludnie

OTHER EXAMPLES:

Bydgoszcz: “The EU-funded project of the Housing Cooperative "Budowlani" assumes the installation of 36 photovoltaic installations on the roofs of apartment blocks - all managed by the cooperative, with elevators. The value of the entire project "Construction of photovoltaic installations on 36 buildings", co-financed in 43% from the EU subsidy, amounts to PLN 2.5 million,

with eligible costs amounting to PLN 2.32 million. The remaining costs will be covered by the residents - members of the "Budowlani" Housing Cooperative, paying contributions under the renovation fund."

source: https://www.gramwzielone.pl/energia-sloneczna/101468/spoldzielnia-mieszkaniowa-z-bydgoszczy-wykona-36-instalacji-pv

Warszawa: "Five roof-mounted photovoltaic installations were installed by Spółdzielnia Budowlano-Mieszkaniowa "West". PV systems are set on the roofs of buildings located in the center of Warsaw, on two buildings at Złota Street and three at Daleka Street. The power of the installations will be about 20-25 kW. (...) Photovoltaic installations are financed by Spółdzielnia Budowlano-Mieszkaniowa "West" with subsidies offered by the City of Warsaw. In the case of investments in photovoltaics carried out by housing cooperatives, the granted subsidies could so far cover up to 40% eligible costs, but not more than PLN 15,000 for installation."

source: https://www.gramwzielone.pl/energia-sloneczna/101417/warszawska-spoldzielnia-inwestuje-w-fotowoltaike-kiedy-sie-zwroci

The growth potential of micro-installations:
According to More than Energy coalition's assessments, the technical conditions for installing renewable energy micro-installations in Poland have at least 4 million buildings.

Financing sources for photovoltaic installations (micro-installations):
• Residents' own funds
• EU subsidies for RES: Subsidy programs financing projects of renewable energy installations appear periodically in Regional Operational Programs
• Subsidies from the commune (gmina) from the "Program for the elimination of harmful gas and substance emissions" (including renewable energy installations as a way to reduce the GHG emissions).
• Preferential loans for the installation of photovoltaic panels from the NFSPWM's "Clean Air" program. Commercial banks also offer loans for RES installations on preferential terms.
• Leasing of photovoltaic panels: Financial institutions offer panels under operating lease.
• Subscription panels. The investor pays 10% of the investment value, and the rest is repaid in the so-called subscription.

In recent years, along with an increase in the number of individual prosumers and efforts towards collective, cooperative solutions, we have also observed a growing interest in market-based mechanisms for RES funding. We describe several relevant ones below. Furthermore, the market for RES-related services, from PV installations' developing and maintenance to energy auditing and consultancy, is also on the rise.

In search of financing mechanisms with no or limited use of subsidies, **Energy Performance Contracting (EPC)** is recently gaining more attention. Such projects are often financed by local authorities in cooperation with **ESCOs (Energy Service Company)**. Energy Performance Contracting (EPC) is a form of Public-Private Partnership for energy efficiency projects, renewable energy installations, etc. It has several important advantages, making it a potentially attractive alternative for local authorities and other public investors. First, it offers access to funds without being limited by the dates of calls for proposals, as is the case in most grant and subsidies schemes. Second, it guarantees the effectiveness of the introduced solutions (which is a key role of an ESCO firm). Third, it shifts the risk to the private partner and it incentivises application of modern solutions (applied by an ESCO firm to increase effectiveness and to mitigate the risk).

Construction of photovoltaic systems, improvement of energy efficiency in private buildings, including multi-family buildings may be the examples of such projects. "Currently, despite rather good regulatory conditions in Poland for Public-Private Partnership (according to a recent assessment by the World Bank), local authorities still fear potential complications they associate with long-term cooperation with private partners. The local authorities often mention that the difficulty to forecast future energy prices and its negative impact on correct estimation of the target savings is among their main concerns. They also have doubts regarding the length of the partner selection process, as compared to obtaining grants and traditional tenders, and its impact on the expected schedule of implementing energy saving measures."

Investments carried out in the ESCO model creates an opportunity for buildings' owners to conduct their thermal modernization (and thus reduce energy consumption) thanks to the financial contribution of the energy services private company ESCO. After verifying the achievement of the assumed savings, the ESCO resells its receivables to the building owners. In this way, the financial

capacity of the ESCO is freed allowing it to be involved in further projects.[33] In principle, as part of ESCO / EPC project, the private party provides financing for most of the expenditure allocated to energy efficiency investments, and the savings generated as a result allow public entities to remunerate the private partner for making these investments and actions ensuring their effectiveness in the area of energy efficiency.

It is worth acknowledging that key SiE-field institutional actors recently joined forces to support and promote alternative models of financing RES and energy efficiency. By the end of 2020, the agreement signed by the National Fund for Environmental Protection and Water Management and the Polish Development Fund aims to enable the implementation of the ESCO model in Poland. For the first pilot stage of the program in 2021, the NFEPWM will allocate PLN 10 million, offering communities, housing cooperatives and local government units their own contribution to the thermo-modernization project and covering the costs of energy consultancy. Cooperation with the Polish Development Fund, which will ensure the purchase of ESCO's debts, is a key element of investments carried out in this model.

We can also identify hybrid projects implemented in the formula of public-private partnership, in which EU funds from the European Structural and Investment Funds were used. In this model, the resources of the structural funds and the Cohesion Fund complement private financing. The hybrid project is different from the partnership project. Among the numerous differences between the two types of projects, the main one is that the private partner of a hybrid project receives remuneration from the public entity[34].

According to our interviewees, EPC mechanism is a promising addition, if not alternative, to subsidy-based solutions in RE-related investments. They indicate two key obstacles for this model. First, availability of subsidies discourage local authorities to commit to EPC; being experienced with acquiring the subsidy funding, they may be reluctant to try new models. Second, there is still a relatively low level of trust in PPP, especially requiring long-term commitment. Hence, it can be expected that the popularity of EPC would grow gradually.

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[33] http://nfosigw.gov.pl/o-nfosigw/aktualnosci/art,1695,nfosigw-i-pfr-s-a-beda-wdrazac-model-esco-pilotaz-z-budzetem-10-mln-zl.html; https://nape.pl/wp-content/uploads/2021/01/Poradnik-ESCO-poradnik-plus-dokumentacja-dla-PPP-ESCO-i-PPP-PZP.pdf

[34] https://www.ppp.gov.pl/laczenie-ppp-ze-srodkami-ue/

Finally, it is worth mentioning financial mechanisms such as green bonds and preferential bank loans as tools allowing for substantial investments in RES without necessarily relying on subsidies. Green bonds, however still not common, are becoming present in an expert and public discourse about financing sustainable and just transition. One of Instrat report's recommendations on developing Green Fiscal Package in Poland, states: "In order to finance the Green Fiscal Package, Poland should appoint Just Transition Bond issue program. Within it, there should be an increased issue of green bonds and the issue of sustainable ones bonds in accordance with the ICMA standard." (Czyżak et al. 2020)

The purpose of the bonds' issue differentiates green bonds from their traditional counterparts. They shall have a positive impact on the natural environment, e.g. to increase the production of energy from renewable sources or reduce the emission of pollutants. Green bonds can finance various types of goals, e.g. installations using RES, public transport, sustainable management of water resources and wastewater, green construction, protection of biodiversity[35]. "One of the most important barriers to the development of the green bond market in Poland is transaction costs, that are higher than for standard bonds. The greenness of the emission target and the process of monitoring should be validated by an independent verification, conducted by an external and independent body, and possibly by certification provided by a recognized organization that sets green emissions criteria (e.g. Climate Bonds Initiative)."

CURIOSITY:

"Polish State Treasury was the world's first issuer of Green Treasury Bonds and inaugurated the emergence of a dynamically developing market for this type of "green" instruments. The first issue of Polish Green Treasury Bonds was carried out on December 20, 2016 (EUR 750 mln) and so far there have been a total of four issues (2nd issue 2018: EUR 1 bln; 3rd issue 2019: EUR 1,5 bln; 4th issue 2109: EUR 500 mln). (...) The funds from the issue of Green Treasury Bonds were used for projects related to sustainable agriculture, low-emission transport or renewable energy sources. The funds obtained from the issue were also used to finance the implementation of key environmental objectives described, among others, in the National Renewable Energy Action Plan. (...) The method of disbursement of funds was consistent with the role of the State Treasury in stimulating the

[35] https://alebank.pl/grudziadz-pierwszym-polskim-miastem-ktore-wyemitowalo-zielone-obligacje/

development of the green financing market and mainly consisted in providing indirect financing or support in the form of subsidies, but not direct financing of environmental projects."

source: https://www.efcongress.com/wp-content/uploads/2020/10/Zielone-obligacje-w-Polsce_ebook.pdf

Regulative, normative and/ or cultural cognitive institutions

According to Scott, institutions are „multifaceted, durable social structures, made up of symbolic elements, social activities, and material resources" and they „comprise regulative, normative and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life." (2014, 56-57). In SONNET we aim to understand how regulative, normative and cultural-cognitive elements of the dominant outside institutions influence the emergence and development of SIE, i.e. their social relations and patterns of doing, organising and thinking. (D3.1, 18) The 'doing' aspect of a SIE is defined in SONNET as referring to practices related to the physical composition of the energy system. 'Organising' relates to governance and organisational structures within SIE-initiatives and the energy system. Finally, the 'thinking' aspect refers to all forms of knowledge and normative framings, including values and perceptions (D3.1, 15).

The regulative pillar of institutions relates to rules, laws, policies, standards, and sanctions that are the key elements and mechanisms of compliance in these institutions (D1.2, 21). The regulatory context for financing and investment in RES in Poland displays as key to understanding the conditions of this SIE-field. For decades, energy production was almost exclusively reserved for state owned energy companies, closely entangled with the coal sector. Along with exposition to European regulations, and in order to get access to substantive European funds, Polish legislators gradually introduced laws allowing for alternative mechanisms for RES financing to emerge (from public subsidies, through auctions, net metering, tax deductions, to the legal notion of prosumer). In

response to those changes in the regulatory environment, private SIE-field actors, such as banks and private companies (e.g. ESCO) got engaged in developing and offering RES investment mechanisms. However, those mechanisms remain constrained by (still relatively "conservative" in terms of business models and funding instruments) legal regulations (e.g. notion of collective prosumer, that would likely open doors for cooperative solutions, is still not existent in Polish legal acts).

It is worth acknowledging, that public opinion in Poland (that can be perceived as the other field actor, given its potential impact on politicians and decision makers through voting and social pressure) considers RES as the safest and most perspective energy source among all other energy sources (over 80% declares trust in RES in respect to both those criteria). The polls indicate that the vast majority of the Poles consider RES development to be in favour of increasing social and civic influence on energy related decisions. Poles also believe that Polish energy sector should develop through an increase in investment in RES. The most prominent (50%) view is that energy policy should focus on developing energy based on renewable energy sources[36].

It seems likely that those tendencies in public opinion have been (and will be) gradually influencing a normative landscape for the SIE field institutionalization. The normative pillar of institutions takes the „form of rules-of-thumb" (Hoffman 1999) with regard to values, social norms, duties, and role expectations in a particular field (Scott 2001). Actors adhere to these guidelines, as their actions and beliefs are guided forms of social obligation and professionalization (D1.2, 21). Abovementioned expectations of greater civic engagement in RES development and energy policies correspond with normative attitudes of the Poles towards environmental challenges and climate crisis. As early as in 2016, nearly three-fourths of respondents estimated that environmental threats related to global warming and carbon dioxide emissions to the atmosphere are a very important problem, 17% of respondents consider them to be a "medium serious problem". Only 5% of Poles downplay this issue, considering it a "minor problem"[37]. The same polls indicate a high level of public concern regarding issues of air pollution and

[36] https://www.cbos.pl/PL/publikacje/diagnozy/034.pdf
[37] https://www.cbos.pl/SPISKOM.POL/2016/K_032_16.PDF

smog. That concern manifests itself in emergence and ever increasing popularity of Smog Alarms and other grassroots and civic movements lobbying for undertaking decisive actions towards solving the air pollution problem (on the local/city level, but also at the national level; i.e. 'organising' aspect of SIE).

Finally, the cultural-cognitive pillar of institutions refers to the socially constructed, shared conceptions of reality, binding expectations and common beliefs with which the world is interpreted or meaning is given, such as symbols, discourses and cultural categories (D1.2, 22). An institutionalisation of a status of prosumer may further reshape social understanding of energy production and consumption as an area of social life where rules could be negotiated and various interests could be confronted. As we mentioned earlier in this report, acquiring the status of prosumer incentivises people to adopt a more entrepreneurial approach towards their everyday energy-related practices and habits. It also likely enhances ecological awareness. Various financing and investment mechanisms discussed in this report can be perceived as forms of operationalisation of those changing social attitudes, providing tools to actively reconstruct the Polish energy institutional field towards gradual decentralisation, supported by strong normative, economic and institutional influence of European Union.

Also commercial and special banks offer financial instruments enabling individuals and companies to invest in RES. Bank for Environmental Protection (Bank Ochrony Środowiska S.A., BOŚ), Bank Gospodarstwa Krajowego (BGK), as well as several commercial banks in Poland, offer various types of preferential loans and other instruments supporting pro-ecological investments, including investments in RES. Below, we name just a few examples.

BOŚ has a dedicated offer for RES financing for different types of clients: special purpose companies, acting entrepreneurs, and individual customers. Investment loans for companies, financing up to 80% of the value investment for up to 20 years, allow funds to be allocated for the following purposes (among others): purchase of land, real estate, fixed assets (in the case of renewable energy only new devices); construction, expansion, modernization; investment loan refinancing granted by another bank; refinancing of expenditure incurred on implementation of investments from own funds. Additionally, supplementary investment loans and bridging loans offer financing complementary to

projects co-financed from national funds, EU, NFEPWM or PFEPWM, up to 20 years. EkoKredyt PV, BOŚ's loan dedicated for individual customers, offers long loan period (up to 10 years or up to 20 years when purchasing devices from of the Bank's partner company), loan amount up to PLN 250 000, simplified forms of security, and a possibility of using the thermo-modernization tax relief. In 2018, investments in RES consisted of 46,09% of pro-ecological debt in BOŚ.

Since 2019, BOŚ has been offering financial support for municipalities in the implementation of activities complementary to the government's Clean Air program, including thermal modernization and replacement of heating systems with ecological ones.

Furthermore, BOŚ and the Polish National Energy Conservation Agency S.A. (KAPE) started cooperation aimed at supporting investments enabling the installation of renewable energy sources in schools administered by Local Government Units. In order to finance the construction of photovoltaic installations on the roofs of schools and school grounds, the Bank will provide special loans. These funds can be used by local government units to directly finance photovoltaic installations. Preferential loans can be used to implement such investments in cooperation with KAPE in the ESCO (Energy Saving Company) formula, consisting in the repayment of debt from energy savings after the investment is completed.

Bank Gospodarstwa Krajowego offers the Biznesmax Guarantee, that secures the loan repayment for entrepreneurs from the SME sector. This warranty is available for loans in many commercial banks operating on the Polish market. The Biznesmax Guarantee is a free loan repayment guarantee granted from the Guarantee Fund for supporting innovative enterprises of the Smart Growth Operational Program (FG POIR). Obtaining a guarantee entails the possibility of obtaining an interest subsidy on the loan covered by the guarantee. It is a subsidy reimbursing the interest paid. The Biznesmax Guarantee is implemented from the Intelligent Development Operational Program (POIR), which is financed from European Funds. Biznesmax may cover a new loan, intended for financing of eligible costs owned or contracted by a third party, an investment project of an ecological innovation character with an ecological effect (e.g. photovoltaic installations, energy efficiency, cogeneration, energy storage).

Introduction to SIE-initiative

Krakowska Elektrownia Społeczna[38] [KES; Krakow Social Power Plant], an initiative launched in January 2020, provides a good example of a search for a new financial mechanism enabling broader participation in energy transition in the cities. It also shows how the lack of dedicated legislative solutions for collective prosumers hamper these efforts. Initiators stress that energy co-ops functioning in Western Europe inspired them to develop the project. The goal of this initiative is twofold: to offer electric energy at a competitive price and to fight climate change. To do that, it enables natural and legal persons to take part in energy transition by investing their money or lending their roofs/grounds.

KES is a cooperative and it finances its operation from members' contributions. It operates on the basis of the cooperative law, while its investments are based on the Energy Law and the RES Act, which results from the distinction between clients as prosumers and non-prosumers. In the case of the latter, the cooperative is to conclude a classic on-site PPA contract for part of the energy that the consumer will consume. Initiative is not designed to expand geographically beyond Kraków; as an entity of the social economy, it assumes the participation of local investors and the local community. However, KES wants to share its experience and its business model and is ready to make it available to interested parties in other parts of Poland who would like to build a similar cooperative.

KES wants to invest in PV installations on the roofs of buildings and municipal land, selling their owners only energy without forcing them to buy the installation. This offer is addressed to legal persons, i.e. entrepreneurs, housing communities, cooperatives, local government units that do not want or cannot invest in the installation themselves. KSE takes responsibility for the construction, operation, and maintenance of the

[38] https://www.gramwzielone.pl/energia-sloneczna/103317/krakowska-elektrownia-spoleczna-czyli-tanszy-prad-z-fotowoltaiki-dla-mieszkancow-miasta; https://smoglab.pl/instalacja-paneli-za-darmo-a-potem-tani-prad-powstala-krakowska-elektrownia-spoleczna/ https://elektrowniaspoleczna.pl/; https://krakow.wyborcza.pl/krakow/7,44425,25741868,oto-elektrownia-spoleczna.html

installation or removal of failures throughout its life, while remaining its owner. Energy is sold to the recipients of energy or, in the case of a prosumer, KES leases the installation. Therefore, revenues are to be generated from the sale of energy or the lease of installations.

Additionally, KES acts in the field of climate and energy education and lobbying for change in regulations into more supportive ones for energy cooperatives. For example, according to Polish law, energy cooperatives cannot operate in cities, but only in rural areas. That is why KES is not formally registered as an energy cooperative, but as a cooperative investing in renewable energy.

In 2020, KES was rewarded by Koźmiński University Business Hub in the "Positive Influence Start-Up" competition[39].

"We can replace the investments of the entities such as small and medium enterprises or housing cooperatives when they do not have funds for investments, or do not want to take the risk or do not want to enter a new area of competence, but want to allow us to invest on their roof to get energy that is slightly cheaper or not more expensive. This also applies to companies of municipal units." (KES representative)

KES is an example of a financial mechanism which develops innovative ways of doing, thinking, and organizing energy. As KES activity focuses on building new investment mechanisms, it is involved in the "organizing" dimension focused on exchange. At the same time, in the "doing" dimension, it tries to build cooperative relationships between actors which are not connected in the individualistic model of prosumerism, currently dominating in Poland. That is, it wants to connect owners of the space with the potential for energy production from PV micro installations with individual investors interested in participation in the local, city-level energy transition. The decision to operate as a cooperative stresses the importance of the creation of the community. In the "thinking" dimension, KES is engaged in actions based on cooperation through advocacy for specific energy pathways and engagement in the process of shaping new regulations as a stakeholder in public consultation processes and through engagement in "KlastER"

[39] https://elektrowniaspoleczna.pl/wyroznienie-od-kozminski-business-hub/

project aimed at creating recommendations regarding regulation of dispersed energy. KES is also engaged in exchange relationships through its action on energy education and willingness to share the model with others interested in creation of the cooperatives in different cities and towns. Stressing that it operates as a social economy entity, it rejects framing of market-based competitions as its *modus operandi*. At the same time, KES wants to provide competitive offers regarding the energy prices and return on investment to its clients and to its investors.

The KES's struggles to successfully launch the initiative demonstrates how the SIE are dependent on other actors who influence the field. Here, the current Polish regulations are very unfavorable for the similar initiatives and virtually block their development. In this situation, KES focuses on institutional work at the policy level; that is, it lobbies for more supportive regulation e.g. through submitting its opinions in public consultation processes, as well as through engagement in "KlastER" projects. It also tries to build good relationships with the local municipality, stressing that close cooperation between energy co-op and the local government is necessary for a broad adaptation of the model.

Key changes in the SIE-field over time

An overview of changes within the "Financing and subsidies for renewable energy" field in Poland allows to name a few milestones that determined the direction of the fields' evolution. For the SONNET's focus, two key ones would be: 1) gaining access to European funds through Poland's joining the EU; and 2) introducing a legal status of prosumer within the RES Act (2015) and its further amendments (esp. 2019), and launching "My Electricity" programme.

An importance of EU access consisted of, on the one hand, an exposition to progressive European regulations and requirements, that pushed subsequent Polish governments towards creating (initially modest) legal and institutional conditions for RES development. On the other hand, it would be hard to overestimate the role of European funding (through different programs, including Regional Operational Programs). It

would be fair to say that especially in the first decade ("Phase 2" in this report), RES investments were a direct consequence of having access to the dedicated funds. Funds' availability was not only an enabling condition for SIE (considering, at this stage, any investment in RES as innovative in its outcome, even if quite traditional as a mechanism); but actually a determining condition.

Growing awareness of the climate crisis, air pollution related health issues, and of vibrant development of RES technologies, created certain public and civil pressure on Polish governments and legislators. External (EU) and internal (public opinion, grassroots civic movements) stress undoubtedly played a role in the process of RES Act development and negotiating. Auction mechanism, tax reliefs, net metering and finally prosumerism, all new in the Polish energy context, created opportunities for new SIE-actors (e.g. prosumers, first attempts to establish energy cooperatives) and SIE-field actors' (e.g. ESCO firms, PV service providers) emergence. Sharp growth of the number of prosumers in Poland since 2019 (resulted from the success of the "My Electricity" programme) indicates that the trend will likely continue.

Subsidies are still the dominant financing mechanism and Polish RES market is still dependent on them. As one of our interviewees observed, except for legal and political constraints, we may identify several social and economic factors that impede investment (relative to NL and UK) in RES installations and initiatives among Poles. Firstly, Poles still have relatively little surplus funds to invest. Along with relatively low levels of trust and social capital, investing in RES, especially community-based ones, is still an unpopular option (compared to e.g. investment in real estate). It could be said that this relative weakness of civic ties is an impeding factor for SIE development. Secondly, profitability of RES investments such as biogas, windmills and small hydro turbines is scale dependent. Hence, on the small scale, PV installations remain the only alternative. However, along with the bettering of the economic situation, environmental awareness is on the rise. That, combined with low interest rates, motivates people to invest in RES. Increase in awareness can be to a certain extent credited to popularity of Smog Alarms and other initiatives drawing public attention to entanglement of

ecological and health issues. It may also be seen as a business opportunity, leading to fast growth of PV service companies' market.

Institutional work conducted by SIE-field actors and other field-actors
One of the SONNET's aims is to gain a deeper understanding of sustainability transitions in which actors create, maintain or transform dominant institutional arrangements within the energy systems to prevent threats such as climate change and resource deprivation (D1.2, 20). As Alicja Dańkowska pointed out in her SONNET report on Participatory experimentation and incubation in Poland: "One of the examples of the institutional work conducted through the active and successful lobbying is done by the Krakowska Elektrownia Społeczna (Krakow Social Power Plant), which one of the main aims is lobbying for the energy transformation. They already have several successes in their efforts to change the law. For example, they tried to extend the period for settling discounts for individual prosumers from 15 years to 25 years, which they managed to achieve. In the context of energy cooperatives, they also sought to formally introduce the definition of collective prosumers and to amend the law so that it is possible to establish energy cooperatives also in cities (current definition of energy coops applies only to initiatives in the countryside). It has already been announced that these changes will be introduced in the next amendment to the RES Act." Another important example discussed in our report is involvement of Piotr Woźny's team in development of "My Electricity" programme within related ministries and NFEPWM [see: first SIE-Initiative box]. Seen as institutional entrepreneurship, those efforts were aimed at creating a new financing program for prosumers within quite unfavourable context of incumbents dominated energy-related institutions. Although the financing mechanism itself is not particularly innovative, building such a support program for prosumers (new institutional status) is perceived as a break-through in Polish energy landscape. Hence, it can be analysed in terms of boundary work, i.e.

reshaping an understanding of the relationship between energy producer/provider and a consumer.

Yet another example is a new NFEPWM's endeavour (starting from February 2021) combining the subsidy, available under the Clean Air program, with the financing of the investment from a bank loan.[40] It is also the implementation of the recommendations of the World Bank. The aim is to significantly broaden the outreach of the Clean Air program. "An important aspect of this offer will be the coverage of loans with Bank Gospodarstwa Krajowego guarantees, which will allow the program to be extended. Thanks to BGK guarantees, the loan availability will be much greater. Banks will be able to propose better investment financing conditions. For example, by resigning from the requirement to use additional security." Many commercial and cooperative banks have already announced their interest in joining this initiative. Such an alliance bears features of a strategic institutional work, bringing together different institutional logics in order to make a desired outcome more effective.

Finally, it is worth acknowledging the attempts to transform an existing institution of prosumer by introducing a collective prosumer legal status. This process is ongoing and involves various actors, such as think-tanks, NGOs, independent experts, as well as established public institutions and energy incumbents. The plans focus on designing models of consulting and models of investments that would lead to creating energy cooperatives/communities models with the greatest potential.

Contestations and relations between actors

The introduction and evolution of different financial and investment mechanisms for RES depends on the evolving public policies, which often provoked heated debates and

[40] https://magazynbiomasa.pl/czyste-powietrze-program-z-nowymi-partnerami-to-banki/?fbclid=IwAR2mIVjw-EhdcDA_GQWY24Adh3_RJabfo8FbQko9YlepIiPJOEp5AYpXyGM

contestation. Two most important voices in these debates represent, on the one hand, advocates of sustaining the status quo - both in regards of dominant fuel type and organizational structure of the energy system, and on the other hand - advocates of evolution towards decentralized and low-carbon energy systems. For decades, the first position was dominant, which was reflected in the limited support for RES development.

The struggles for the final shape of the RES Act in February 2015 represents this tension well. After years of delay under the government of liberal-conservative Civic Platform (PO) party in coalition with the agrarian Polish People's Party (PSL), the Act was accepted months before the next election, in October 2015, and were to come into force in January 2016, after the election. The Act provided the legal definition of prosumerism. The system of the prosumers' support raised controversies. Supporters of decentralization of the energy system lobbied for FiT (feed-in tariffs) as the best system of encouraging private investments in RES.; Greenpeace was one of the organizations engaged in campaigning for this solution. Broad coalition of social actors, such as NGOs, agriculture and rural organizations, Association of Rural Municipalities, and Polish Economic Chamber of the Electromechanical Industries supported FiT, while incumbent energy companies were against it[41]. The main ruling party, Civic Platform, did not support this solution and proposed net-metering instead. However, its coalition partner PSL voted together with opposition to pass FiT. The main author of the critical amendment (so-called "Bramora's Amendment"), PSL MP Artur Bramora, presented this financial mechanism as an opportunity for wide civic participation in energy production, particularly attractive for residents of rural areas, that is, PSL traditional electorate. FiT with guaranteed prices for 15 years was intended to enable prosumers to use traditional bank loans to cover investment costs[42].

Assuming that law would have come into force as planned, some land owners decided to invest in the PV micro-installations. However, after the parliamentary election in 2015, conservative- populistic party Law and Justice formed the new government and, despite

[41] https://www.greenpeace.org/poland/aktualnosci/3719/wyciekly-zalozenia-kampanii-przeciwko-obywatelom/

[42] http://odnawialny.blogspot.com/2014/11/poprawka-prosumencka-do-ustawy-o-oze.html

the fact that they supported FiT while in parliamentary opposition, few months later they withdrew their support and enacted a net-metering system instead of FiT[43]. That undermined the trust of the actors connected and dependent on the SIE-field of finance and investment mechanisms, such as potential prosumers, firms from the sector, and commercial banks granting loans for PV micro- installations. Lack of trust and transparency in the process of policy-making remains an important problem in the relations between policy-makers and other actors in the field.

Power and power relations (power to + power over + power with)

In SONNET, power is understood as the relational and structural (in)capacity of actors to mobilise resources and institutions to achieve a goal. Power relations in SIE refer to (a) actors having different kinds/levels of power to mobilise SIE-related resources and/or to achieve SIE-related goals, (b) actors having power over others in SIE-related processes, and (c) actors having power with other actors to achieve collective goals (D1.2, 44).

Within the field under study, the key factor in power distribution seems to be an access to the funding and investments mechanisms, in other words: an issue of who (what entities) are allowed to become investors, under what conditions, and with what benefits (*power to*). Inclusivity of the funding programs is still relatively restricted to certain legal entities (e.g. energy companies, local government units). The status of prosumer, as was elaborated in detail in this report, still does not include collective prosumers. It was argued that the analysed policies were set in their essence in the interest of large energy incumbents (*power over*). We observe certain resistance towards attempts to energy decentralisation, that displays in slowness of changes introduced and their limited scope, as well as instances of withdrawal (e.g. "Anti-wind turbines act", story of FiT). Furthermore, changes in the Polish energy sector result indirectly (and often directly) from the power-saturated relations with the EU. Hence, the power perspective in the official narrative on energy and transition is very present, e.g. "Coal as Polish gold", "We have coal reserves for 200

[43] https://www.rynekinfrastruktury.pl/wiadomosci/bramora-pis-zapomnial-ze-popieral-poprawke-prosumencka-53636.html

years". It also displays very strongly in political entanglement of energy with a conceptualisation of national security.

Large energy incumbents (Tauron, PGE, Orlen, Enea) have been often perceived by ecological activists as main brakemen of RES development. Although it was a case for the first three decades after the 1989 transformation, in recent years those SIE-field actors have been more openly acknowledging the dead end of the carbon-dependent economy. Observing large increases in fossil fuels' costs (strengthened by UE Taxonomy Regulation) and sharp decrease of RES costs, large energy companies are aiming to push against the political influence of the coal sector. Being state-owned companies, the energy incumbents are often (politically) forced to invest in highly unprofitable mines and coal-fueled power plants. However, there are limits to those practices, as shown in the example of Ostrołęka C investment in 2020, when two state-owned energy companies, Enea and Energa, after long negotiations and political dispute, withdrew their support for the new coal-fired block of the power plant[44], because they were not willing and able to secure financing of investment (see also: "Participatory experimentation and incubation in Poland" case study, pp. 7-8).

EU policies, forcing Polish governments towards green solutions, create favourable conditions for important shifts in political power between sectors. The Polish RES landscape is now dominated by large incumbents' investments, such as wind farms. But, the change in political perspective also creates opportunities for prosumers and smaller investors, and SIE that they carry. Slowly, prosuments become actors to be reckoned with (ca. half a million of voters), and their interests shall be addressed by politicians.

6 Summary, synthesis and conclusions

[44] https://smoglab.pl/nie-bedzie-nowego-weglowego-bloku-elektrowni-w-ostrolece/

6.1 How do SIEs and SIE-fields emerge, develop and institutionalise over time?

The relation of the development of the finance and subsidies for RES in Poland to the concept of social innovation in energy has two main aspects.

First, it impacts the spreading of energy innovations in the system, often through traditional mechanisms, such as loans and subsidies - and through its innovative form. The growing access of financial capital for RES development for different actors - other the traditional energy companies - slowly but steadily change the structure of the ownership of the energy sources, and enabling the individuals and organizations previously excluded from the processes of energy production to take this new role. The specific rules assigned to the given financial instrument critically impact who can take this new role in the energy system. We can see that with the passage of time, the possibilities for the individuals / house-owners to finance RES are much more accessible. At the same time, it is still difficult for groups such as energy cooperatives or other forms of community energy to enter the system due to regulatory obstacles. This area is almost entirely shaped by the policies on different levels (European, state, and regional), and public institutions play a dominant role in shaping and supervising the SIE. At the same time, other actors - such as banks, households, and firms from the PV sector - play an active form as intermediaries, receivers of subsidies and loans, or contractors building the actual RES installations. These relations are based on cooperation. However, in the crucial moment when the direction of the policies were decided, like during the time when RES Act was accepted in 2015, the involvement of different parties in the public discussion included the elements of conflicts.

Second, we can see the on-going search for innovative financial mechanisms for RES development; such as green bonds, Energy Performance Contracting (EPC), or energy investment cooperatives. Contrary to the effects described above, the dominant role is played by entrepreneurs and social entrepreneurs, in many cases inspired by the model widespread in other countries. They stress both the environmental benefit and financial profits as the rationale for the participation in the schemes under development. Efforts to establish and promote such mechanisms become more dynamic after 2019, that is, in the last of the fourth phases we identified in our analysis. We can see the signs

suggesting that in the near future, these innovative financial mechanisms will be more popular.

6.2 How do SIE-field-actors and other field-actors interact with the 'outside' institutional environment and thereby co-shape the SIE-field over time?

The development of the SIE field finance and subsidies for RES in Poland is strongly dependent on the climate and energy policies decided on the level of the state and of the European Union. The state regulations have a decisive impact on what kind of finance mechanisms is accessible - and for what types of actors. It has both direct impact, when it decides about the rules of the distribution of the public funds, and indirect, when it sets the rules which impact the profitability and the very legality of various market-based solutions which do not rely on public funds. At the same time, the state policy is under the strong influence of the European Union energy and climate policies. One example of this impact provides the Operational Programmes supporting RES development. Another, fact that the very energy strategy accepted by Poland has to accommodate the RE targets accepted in RED I and RED II directives. The EU policy also shapes "external" factors, such as the rising price of electricity from coal resulting from the ETS system. The SIE-field under investigation developed under the very strong influence of these signals. In effect, the most important SIE actors represent public institutions, such as The National Fund for Environmental Protection and Water Management (NFEPWM), or private and special banks. Bottom-up initiatives, such as energy cooperatives, still struggle to have an impact on the field, but we can see the signs showing that they are likely to be more significant in the near future.

In the first phase - before the Poland accession to the EU in 2004 - the financing for RES was virtually inaccessible. In the second phase, from 2004 to 2015, the access to the financial mechanisms - mainly subsidies and prefencial loans - was shaped by the EU Operational Programs, including Regional Operational Program. That shows the impact of both the EU policy and state and regional government who decided on the details of the specific programmes. The system of the Certificate of Origin (so-called Green Certificates) offered limited support for new RES. At this period, the discussion

on the shape of the more systemic support for RE on the state level started, but policy-makers were not able to agree for the specific solution until 2015, when the RES act was finally accepted. That happened with the heated public debate on the best system of prosumers' support: at the first version of the RES Act, they were supported through FiT, which was changed into net-metering before the Act came into force. Next phase, from 2015 to 2019, is marked by the introduction of two main mechanisms: auctions for middle-scale RES and net-metering for prosumers' micro-installations. At this period, the electricity prices have risen significantly, especially for enterprises and municipalities (due to the special policies protecting households from rising energy prices). Together with the decreasing prices of devices for energy generation (mainly PV), that created strong incentives for investment in RES. What is more, at this period, thanks to the relentless work of activists, the issue of adverse effects of fossil fuels use - both for air quality for heating and climate in energy production - started to be recognized by the public as an issue of grave concern. Public opinion polls showed the positive image of low-carbon energy sources and the willingness to invest in RES and energy efficiency. All these trends participated in creating the enabling conditions for more innovative forms of financing for RES, which started to be considered at this period, to become more mature at the next stage. The fourth and last phase started in 2019. It is marked by the introduction of highly popular public programs of public subsidies and tax allowance, which encouraged the record number of individuals to invest in PV. For the first time, the individual prosumers become a significant part of the Polish energy system. What is more, at this period the top-down initiatives based on market mechanisms started to be offered. Energy Performance Contracting (EPC) and energy investment cooperative provide important examples. However it is important to stress that so far they did not have significant impact, their existence illustrate the search for new, more innovative financing models of more innovative organizational forms of developing RES. The regulative changes currently under discussion, such as allowing for operation of virtual and collective prosumers, are likely to strengthen this trend.

6.3 What are the enabling and impeding factors for SIE-field-actors and other field-actors to conduct institutional work and change the 'outside' institutional environment?

For finance and subsidies for RES, the regulative environment is of crucial importance. As the energy sector remains highly regulated, it is a decisive factor which impacts whether specific actions are economically profitable or even legal. For that reason, actors interested in the broader accessibility to more diverse sources of capital for RES often decide to engage in lobbying, trying to impact the outcome of legislative processes. It is a widely shared belief that regulations in Poland often are shaped to support the position of incumbent in the energy sector. To counter this impact, social movement, NGO, and industries supporting low-carbon energy transition lobby for solutions profitable for newcomers, such as FiT in 2015 or possibility of collective prosumption in 2020.

7 Recommendations for our city partners, national and EU policy makers and SIE practitioners

SONNET city partners

- Cooperation with municipalities is crucial for social entrepreneurs who work on the new financial models enabling the broad range of actors to participate in energy transition in the cities. Examples from Poland include Krakow Social Power Plant who hope for cooperation with the City of Krakow, or the mechanisms such as green bonds or Energy Performance Contracts. The active involvement of the municipality can help social entrepreneurs to build trust and scale-up its activity, while the municipality may profit from lowering both its GHG emissions, air pollution, and energy prices.
- Municipalities may also support innovative financial and investment mechanisms by facilitating exchange and dialog between social entrepreneurs interested in novel solutions, local energy companies, researchers, local firms from different sectors, citizens, and activists of social movements focused on clean air or climate change mitigation.
- Being aware of legal barriers impeding the development of innovative, inclusive financial mechanisms supporting RES, municipalities may use their influence to lobby for favorable policy decisions, both on national and European level, and both individually and through the

network of the cities (such as ICLEI or Energy Cite).

National and EU policy makers

- Regulations are crucial for the development of financial and investment mechanisms supporting RES. We recommend policy makers to develop a transparent and inclusive process of policy-making, to make sure that the interests of newcomers in the energy sector, such as prosumers, collective prosumers, or municipalities, are given a fair consideration. The past experience shows that too often, the regulations protect first of all the incumbents' interests. That does not allow to use the full potential of financial and investment mechanisms for RES.
- Policy makers should specifically look into how finance and investing mechanisms can change social relations and evaluate the effect of specific instruments taking this into account (apart from other goals the mechanisms serve).

SIE-field-actors

- As finance and investment mechanisms strongly depend on the national and European policies, SIE-field actors should monitor the changes and try to influence them by lobbying, campaigning, and education.

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9 Annex 1

Methodology

Neither of the two researchers investigating this case study was formally related to the field being investigated. Prior to the study, our knowledge of the field was relatively narrow, however Agata Stasik has simultaneously conducted a study on crowdfunding mechanisms in energy. Due to the case study scope, i.e. focus on subsidies and financial mechanisms, rather than business models, and due to the Polish energy sector's context, we tried to reach out to SIE-field actors who had an overreaching view of the field. We also focused on the legal documents analysis, as well as policy reports and press reports, to develop a historical account of the field.

In order to find appropriate persons to conduct the interviews with, we mainly used the snowball sampling, asking interviewees for further recommendations. It is worth acknowledging that we struggled a little bit with recruiting our interviewees, since some people were reluctant to devote their time and quite a few attempts of establishing contact remained unanswered. The festive period of December and January, in which we were conducting our study, was likely to impede the process of interviewing. Finally, we managed to conduct six interviews with various SIE-field actors, that allowed us to collect enough data to meet the report's objectives. Furthermore, Agata Stasik participated in four hybrid- and online sector conferences and webinars, that provided rich materials

for analysis. Considering the specificity of the field under investigation, that was focused on financial mechanisms rather than practices and business models, we relied heavily on secondary data analysis.

Analysing the data collected we paid particular attention to the roles played by different actors within the field, and their relations and mutual impacts. We considered broader institutional context (e.i. EU regulations) and its interplay with local, national one. We made an effort to reconstruct and understand formal and informal power relations between those actors. Next to few dominant financial mechanisms in RES investments in Poland, we also tried to purposefully look for alternative ones, even though of a niche outreach, to illustrate, what we believe to be, an emerging change within an SIE-field under investigation.

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List of interviewees

Code interview	Empirical description of case	Date of interview	Duration of interview	Interviewer
Interviewee 1	Instrat Foundation expert	04.12..2020	1 h 26 min	Agata Dembek
Interviewee 2	Journalist specialised in energy sector	11.12.2020	1 h 08 min	Agata Dembek
Interviewee 3	Head of RES department at NFEPWM	14.01.2021	58 min	Agata Dembek
Interviewee 4	Consultant and evaluator	18.01.2021	1 h 05 min	Agata Dembek
Interviewee 5	Consultant and activist	19.01.2021	55 min	Agata Dembek
Interviewee 6	Specialist, energy consultant, NFEPWM	22.01.2021	1 h 05 min	Agata Dembek

List of meetings and events attended

Event name	Event organiser (name or description)	Type of event	Date of event	Who attended
II Forum Energetyki Rozproszonej Czysta Energia dla Każdego [Second Forum for Dispersed Energy - Clean Energy for Everyone]	Akademia Górniczo-Hutnicza w Krakowie	Hybrid conference (online+offline)	25.11..2019	Agata Stasik
POLECO Conference	The Ministry for Climate and Environment and partners	Online conference	9.-10.11.2020	Agata Stasik
"Polityka Insight" Webinar on energy policy and just transition plans	Polityka Insight - think tank	Webinar	9.12.2020	Agata Stasik
Seminar "Regulacje prawne ułatwiające rozwój energetyki rozproszonej w Polsce" [Regulations supporting development of dispersed energy in Poland]	Akademia Górniczo-Hutnicza w Krakowie	Seminar - hybrid event	25.06.2020	Agata Stasik

10 Annex 2

Detailed SIE-field timeline

Please provide 1-2 sentences about how you have chosen the events (for instance over others) and what they represent. Please stick to the format... Please do not just name the event but provide some context to it. See Swiss coop example in the table...

DATE	TYPE OF EVENT	DESCRIPTION OF EVENT	QUOTE & SOURCE e.g. document, interviewee
Historical background: 1945-1989		After the Second World War Poland became a communist country. It developed mining for the hard coal and centralized energy sector based on coal power plants. The attempt to develop a nuclear power plant was abandoned in 1989.	
PHASE 1: from 1989 to 2004. Absence of funding mechanisms supporting RES.			

1989	External shock and trend	Poland starts transition towards democratic regime and market-based economy. Following the collapse of the heavy industry, mining and energy sectors diminished, but remain centralized and based on coal as a dominant fuel.	
1997	Policy 'event'	Energy Law Act	
2004	Policy 'event'	Poland enters the European Union	
PHASE 2: from 2004 to 2015. Public subsidies for energy efficiency from EU funds and works on the RES Act.			
2004-2006	SIE-field event	First EU fund dedicated to adaptation to the environmental standards of the EU	
2007-2012	SIE-field event	Poland takes part in Operational Programme Infrastructure and Environment (OPI&E). In perspective 2007-2012, NFEPWM actions were focused on limiting the negative environmental impact of the industry, with the budget of 1 007 mln zł, and building the environmental-friendly energy infrastructure (1 514 mln zł).	
2005	SIE-field event	Introduction of the system of certificate of origin (the Green Certificate system).	
2009	Policy 'event'	The so-called "3 x 20% package" is adopted, committing Poland to reach 15% of RES energy by 2020	
2009	Policy 'event'	Strategy "Polish Energy Policy until 2030"	

2009	SIE-field event	introduction of Green Investment Scheme (GIS)	
2010	SIE-field event	NFEPWM becomes responsible for the organization of the Green Investment Scheme (GIS), a derivative of the Emissions Trading System (ETS).	
2011	Policy 'event'	First proposition of RES Act, debated with many changes until 2015.	
PHASE 3: RES Act, auction system and net-metering			
2015	Policy 'event'	The RES Act introduces energy auction and feed-in-tariffs for prosumers. FiT is replaced by net-metering before it came to force.	
2016	SIE-field event	First energy auction held on 30.12.2016.	
2016	Policy 'event'	The government introduces a law that hinders investments in wind energy, the so-called "Anti-wind turbines Act"	
2018	External trend	Electricity prices rise due to increasing prices for CO2 emissions under ETS.	
2018	Policy 'event'	The European Commision accepted the RED II directive. Member states have time until June 2021 to transpose it into state legal systems	

2016-2018	SIE-field event	Moderate rise in PV prosumers micro-installations	
PHASE 4: from 2019: boom in prosumerism and active search for market-based investment models			
2019	SIE-field event	Introduction of tax allowance for thermo-modernization expenses, including PV micro-installation	
2019	SIE-field event	Introduction of highly popular “My Electricity” subsidy programme	
2019	Policy ‘event’	Change in the legal definition of prosumer: small and medium companies may act as prosumers and profit from net-metering system	
2020	SIE-field event	Krakow Social Power Plant (KES), city investment cooperative, starts its actions.	
2019-2020	SIE-field event	The historical rise in prosumers’ number and installed solar capacity	