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The 'social potential' of Europe's energy transition

Policy insights for unlocking citizen-financed community renewable energy across the EU

WHAT'S AT STAKE?

The investment requirements to realise Europe's 2030 climate and energy targets¹ are substantial and currently not being met. Late estimates indicate a need of around €380 billion annually throughout the 2020s for their realisation (Williams et al. 2018). This represents almost double the 2018 investment of €201 billion, resulting in an 'investment gap' of €179 billion for that year (European Commission 2018a, 2018b). Furthermore, no less than 9% of the foreseen investments, at least €34 billion annually, will have to finance the deployment of renewable power capacity to reach a 32% share of the EU's final energy use by 2030 (Williams et al. 2018). This translates into a cumulative investment of €340 billion in renewable power capacity over 2020-2030.

At the same time, the EU ambitions a greater participation of European citizens in its clean energy transition efforts, moving beyond their traditional 'end-user' role. In that respect, citizen participation in community-based renewable energy (CRE) generation through collective investment and shared ownership schemes emerges as an innovative tool to unlock citizens' potential to contribute to a) bridge the existing investment gap and b) expedite the diffusion of RE.

However, concrete policy mixes addressing the dual challenge of RE underinvestment and citizen-financed CRE remain elusive. This is partly due to a lack of an evidence-based, comprehensive understanding of Europe's 'social potential', understood here as the aggregated financial participation of all European citizens in community-based forms of RE generation across the EU-28.

Assessing the extent to which Europe's social potential can contribute to reach the EU's 2030 climate and energy targets thus stands as a necessary pre-requisite for informing citizen-centric policy mixes that contribute to bridge Europe's investment gap by means of citizen-financed CRE.

To this end, this brief first summarises the findings of an international [survey-based choice experiment](#) conducted to estimate Europe's 'social potential' for investing in CRE schemes and, in doing so, contribute to realise its 2030 climate and energy targets. A number of policy insights are then outlined for calibrating more citizen-centric support frameworks to uphold the diffusion of CRE developments across Europe.

KEY FINDINGS

- European citizens willing to invest up to €176 billion for financing community-administered wind farms across Europe. This would halve the EU's investment needs of €340 billion in renewable power capacity needed to achieve a 32% RE share by 2030.
- Europe's social potential of €176 billion could finance the development of 91GW of installed wind power capacity, and generate up to 196 TWh of RE annually across the EU. This would in turn trigger an average increase of 8.3% in Europe's RE consumption.
- Ultimately, the RE generated from Europe's social potential would abate over 103 MtCO₂eq annually and result in a 2.4% annual reduction in GHG emissions from 2018 levels.
- In light of this huge potential, policy mixes that reach out to and unlock the financial participation of European citizens should be carefully considered for a timely, cost-distributive, and participatory implementation of a decarbonised energy system.
- The increased revenue uncertainty brought about with the progressive evolution from fixed Feed-in-Tariffs, to market premiums, and ultimately towards RE auctioning – runs diametrically opposite to the pre-requisite of a risk-minimised regulatory framework conducive for citizen-financed CRE formats across the EU.

*Cover photo by 'zero take' (2021), retrieved from Unsplash.

¹ These currently stand at: a 32% share of RE in final energy use, a 32.5% improvement in energy efficiency, and a 40% reduction in greenhouse gas (GHG) emissions.



METHODS

The data used to estimate Europe's social potential was collected through an international survey-based choice experiment (CE) distributed to citizens across all the EU-27 + UK. Around 600 individuals completed the survey in each country, with a final sample of 16,235 respondents. These were drawn through a quota sampling procedure to ensure representativeness of national populations across age, gender, and income distribution.

The purpose of the CE survey was to identify respondents' interest in partaking in a community-based investment scheme to finance solar or wind projects, and to investigate what set of investment attributes of RE initiatives drive citizen co-investment. CE participants were presented with different investment options to co-finance a RE project; each option displaying a unique combination of different capital requirements, profit rates, pay-back periods, RE technologies, visibility features, and project administrators. Respondents were tasked with selecting their most preferred option. This resulted in 129,880 investment decisions made by the CE participants.

A probabilistic model was then estimated to examine the relative influence that different investment attributes had on the likelihood that the respondents would choose to co-invest in any of the investment options presented to them. This allowed to identify the most preferred investment attributes, which were then combined under one 'optimal' investment offering to maximise the investment in a RE generation scheme made by the representative

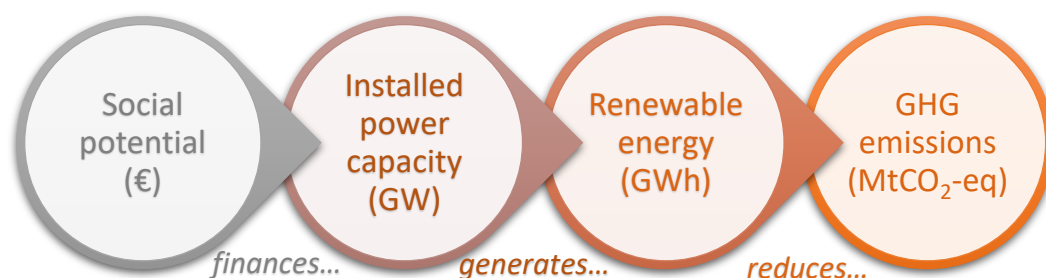
individual citizen in each sampled country. The optimal investment offering consisted of:

« a 20-year investment into a visible wind farm managed by a community administrator and with a market-based profit rate »

The resulting capital investment provided by the representative individual citizen in each country was then aggregated across a country's population with a reasonable expectation to invest (aged between 25-64). With this, the 'social potential' of each EU MS for investing in CRE schemes was obtained.

As a second step, the total volume of individually committed investments in community-administered wind farms was used to quantify the installed wind power capacity that could be financed with the social potential of each country. Country-specific wind power capacities were then combined with national capacity factors to quantify the RE generated annually from the installed wind power capacity obtained for each MS and across the EU. This allowed to assess the extent by which the RE generated from citizen-financed CRE schemes could increase the share of RE within each country's final energy use and, by doing so, assess their contribution for realising national and EU-wide 2030 RE targets.

Finally, national RE generation profiles were combined with the net carbon intensities of national energy portfolios to quantify the GHG emissions that could be abated annually through the generation of wind energy collectively financed by individual citizens across Europe.



RESULTS

European citizens willing to invest up to €176 billion for financing community-administered wind farms across Europe.

The EU hosts a substantial social potential from its citizens – over €176 billion – to collectively finance community-based forms of wind energy across Europe. This reflects the high interest expressed by the European population, with about one in five European citizens willing to invest in community-administered wind farm developments.

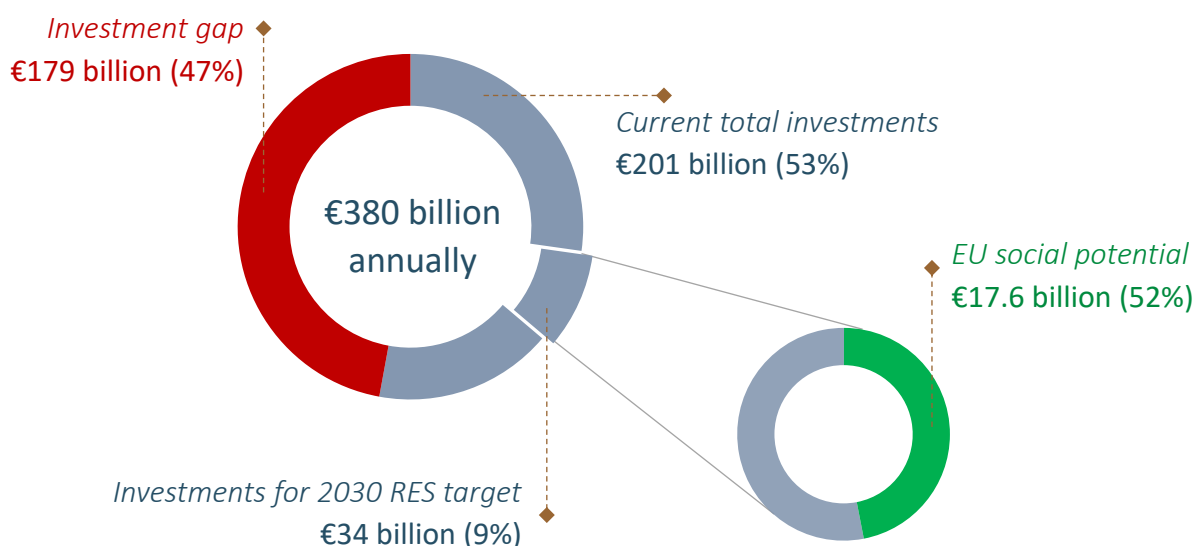
Interestingly, nations with a higher observed interest in financing CRE initiatives (e.g. Bulgaria, Croatia, Romania, Slovenia, Hungary, Estonia) correlate with lower installed wind power capacities per capita, while countries expressing a lower interest (e.g. Denmark, Sweden, Germany, UK, Spain, Finland) have higher wind capacity installations per capita, indicating a potential trade-off between installed capacity and investor acceptance levels. It further suggests that collective investments on RE initiatives are seen favourably as viable financial instruments in countries where public acceptance issues accompanying new

energy infrastructure are not yet strongly rooted (Cohen et al. 2016).

Europe's social potential of €176 billion would halve the EU's investment needs of €340 billion in renewable power capacity needed to achieve a 32% RE share by 2030.

This positions European citizens as a critical resource to bridge the EU's current investment gap of €179 billion. When evenly distributed throughout 2020-2030, Europe's social potential would translate into annual investments of €17.6 billion, enough to halve the investment requirements foreseen to achieve a 32% RE share in final energy use by 2030.

In light of this huge potential, the EU's energy-related carbon mitigation efforts could greatly benefit from the proactive financial participation and involvement of European citizens. Policies that reach out to and unlock this potential are therefore desirable and should be carefully considered for a timely, cost-distributive, and participatory implementation of a decarbonised energy system.



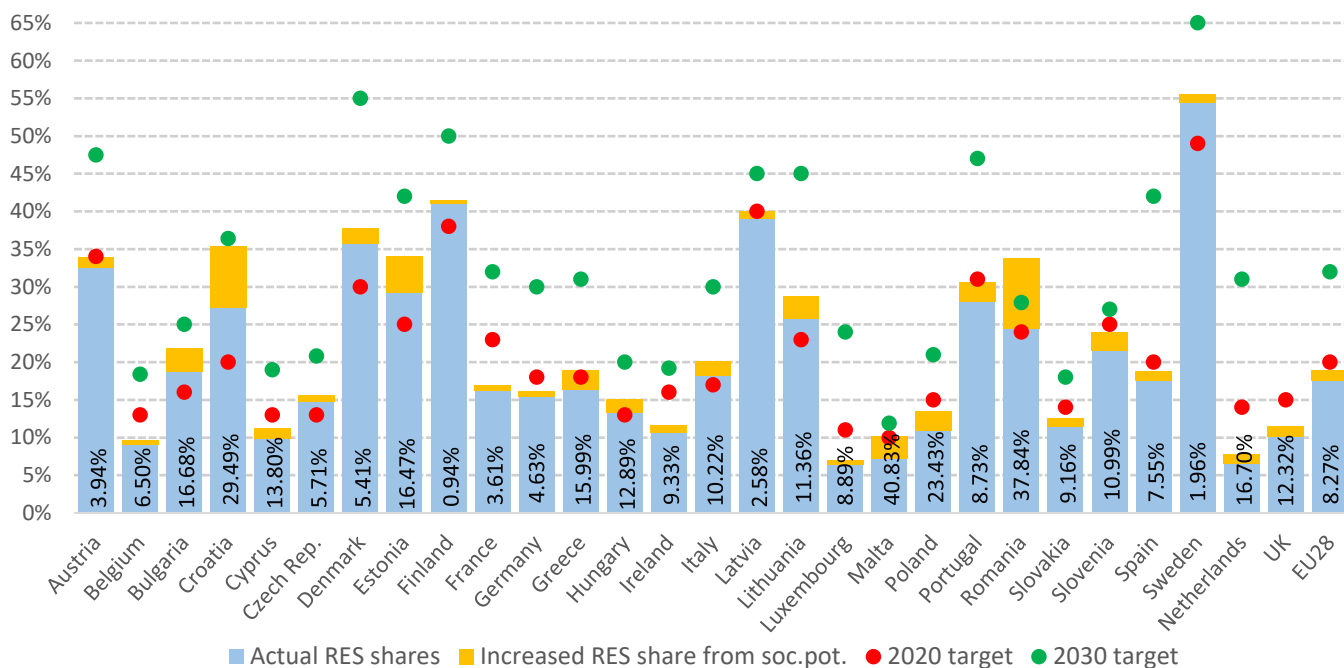
Estimated annual investments between 2019-2030 to achieve EU 2030 climate & energy targets, with specific investment requirements to reach 2030 RES target, plus annual contribution from EU social potential.



Europe’s social potential could finance the development of 91GW of installed wind power capacity, and generate up to 196 TWh of RE annually across the EU. This would trigger an average increase of 8.3% in Europe’s RE consumption and translate into a GHG abatement potential of over 103 MtCO₂eq annually; resulting in a 2.4% annual reduction in GHG emissions from 2018 levels

These findings suggest a tangible relationship between financial participation and co-ownership,

and increased acceptance for localised forms of RE generation from European citizens. Critically, they substantiate the need to ensure that easily accessible, trustworthy, and risk-insured community investment options are available across EU MSs to unlock their respective social potentials for investing in CRE. Policy mixes forwarding a risk-minimised regulatory environment for citizen-led RE finance should therefore be carefully considered by policymakers across Europe.



Renewable energy shares (2017) and percentage increase from social potential under current market conditions (subsidy-free) in every Member State and aggregated at EU level; plus 2020 & 2030 national and EU-wide renewable energy targets.

INSIGHTS FOR POLICYMAKERS

In light of the substantial social potential attributed to European citizens for collectively financing community-based forms of RE generation, legislative efforts should attempt to calibrate stable regulatory frameworks that minimise investment risk for citizen investments while ensure profit-guaranteed financial returns for more socially innovative but also risk exposed RE initiatives. Specifically, actor-specific RE support schemes tailored according to different actor groups’ singular material, financial, and operational capabilities

could help advance a low-risk, stable regulatory framework conducive to the necessary revenue stability to incentivise citizen investments in CRE formats.

Oposedly, unstable regulatory frameworks imposing retroactive modifications to previously approved RE support schemes would likely increase regulatory risk and reduce the market acceptance for RE investments, a situation already experienced in some EU MSs (e.g. Spain) with ruinous consequences in terms of RE investor confidence (Couture, 2013; Radowitz, 2013;



Winkler and Ragawitz, 2016). Similarly, uncertain revenue streams stemming from volatile electricity prices and fully exposed citizen investments to market risk would substantially challenge the business case for local scale RE developments and likely reduce investor appetite for CRE. Both policy and market risks would add significant uncertainty to citizen investment schemes and result in reduced citizen participation.

Critically, the progressive evolution towards more stringent remuneration mechanisms across the EU – culminated by the latest policy trend to substitute Feed-in-Tariff (FiT) schemes for competitive tendering in the form of RE auctions – runs diametrically opposite to the pre-requisite of a risk-minimized regulatory framework conducive for citizen-financed CRE formats across the EU. The disruptiveness of such a policy shift for citizen-financed CRE can be observed in countries with long-standing traditions on cooperative association such as Denmark and Germany, often considered frontrunners in fostering CRE-based developments (Danielsen, 1995; Jørgensen, 1995; Kemp, Rip and Schot, 2001; Debor, 2018; Roberts, 2020) yet with increasingly challenging policy mixes hindering – rather than supporting – the participation of its citizens in financing renewables-based national energy decarbonisation efforts (Gsänger and Karl

2020; Mendonça, Lacey, and Hvelplund 2009; Roberts 2020; Wierling et al. 2018).

Indeed, Denmark's and Germany's experiences offer a stark reminder of the increasing policy risk derived from competition-inducing regulatory frameworks for fostering a more actor-diverse clean energy transition based on the participation of citizens as co-investors of socially-innovative RE generation concepts locally embedded around participatory practices.

The increased price volatility and revenue uncertainty brought about with the progressive evolution from fixed FiTs, to market premiums, and ultimately towards auction schemes imposes too high a barrier for unlocking citizen-financed CRE formats, as these do not tend to be driven entirely by profit-seeking enterprises but by communal initiatives with other social and environmental motivations (Bomberg and McEwen 2012; Breukers and Wolsink 2007; Rogers et al. 2012a, 2012b).

EU MSs with limited experience in CRE-based policy development may thus find the Danish and German experiences instrumental in their legislative efforts to design responsive policy mixes tackling the dual challenges of RE underinvestment and citizen participation in the energy transition.



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Cris is a PhD student in the Department of Wind Energy at the Technical University of Denmark (DTU), where he investigates the socio-politics of market-based renewable energy diffusion processes and its implications for a societally just clean energy transition.



He is particularly interested in the role of citizen-led renewable energy initiatives within Europe's energy decarbonisation efforts, as well as on the suitability of different support schemes to facilitate their market participation and expedite their diffusion.

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