



Responsible Innovation for the Energy Transition

Documentation of the

European Expert Workshop

**An Indicator System for Responsible Innovation
for the Energy Transition** 30. September 2021, online

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Introduction

The V4InnovatE research team conducted the European Expert Workshop on “An Indicator System for Responsible Innovation for the Energy Transition” on the 30th September 2021.

The expert workshop was organized as an online event and brought together 19 experts¹ mainly from academia but also from practice (technical-scientific association) from a range of European countries.

This workshop documentation provides an overview of the most important program points and main outcome of the event. In particular, it summarizes the considerations and suggestions from the plenary and group discussions which will be taken into account in the further research activities of the V4InnovatE project.

1 One expert sent his feedback via email due to internet connection problems; another expert could only participate in the final round for personal reasons.

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01 Workshop purpose

The purpose of the workshop was to obtain the views and feedback of a range of experts from academia and practice in Europe on a draft concept for an indicator system that can be used to align technical energy transition innovations more strongly and in a forward-looking manner with societal goals and needs. More specifically, the system of indicators shall be used for the initiation, selection, conduct and monitoring of research and development (R&D) projects concerning energy transition technologies. The indicator system will be informed by Responsible Research and Innovation (RRI) approaches. V4InnovatE sees potential in these approaches, when applied by the R&D system, to support innovations for the energy transition. The main product of V4InnovatE will be a guide that will illustrate how to apply the indicator system, targeted at R&D funding and performing actors.

The feedback and input received from the workshop participants will be used for the further development of the indicator system. The fields of expertise of the workshop participants comprised responsible (research and) innovation, innovation research, technology (impact) assessment, actors in socio-technical transformation processes, networked energy systems, and energy transition and societal acceptance (see the list of participants at the end of the document).

The workshop was structured into two main parts. In the first part, the V4InnovatE team gave presentations on the project's research purpose and design and the state of development of the indicator system, that were each followed by Q&A sessions for clarifications. In the second part, the draft concept of the indicator system was discussed in breakout-groups, followed by harvesting of the main points of the group discussions in the plenary.

02 Presentation

The draft indicator system

After a short introduction by the event host², that contextualized the workshop in terms of V4InnovatE as a research project, the project coordinator³ explained the draft concept for the RRI-informed indicator system in a slide presentation (> **Download** *presentation slides*).

The presentation:

- Outlined the rationale for applying RRI to technical innovations for the energy transition (need for societal acceptance and support)
- Specified the purpose of the intended indicator system (assessment and monitoring of the degree of alignment of R&D on emerging energy transition technologies, or technologies being further developed, with regard to the essential RRI aspects in the energy transition context)
- Described the target groups of the indicator system (R&D funding organizations and R&D performing organizations)
- Provided an overview of the main sources of the development of the indicator system (literature search; energy transition case studies; workshops), and the steps that had been taken in the production of the draft concept to be discussed at the workshop (extensive literature search)
- Explained the draft ideas on indicator selection, clustering and weighting

In advance of the workshop, the participants had received a written outline of the draft concept (> **Download** *input paper*).

² The workshop was organized and hosted by V4InnovatE partner DIALOGIK non-profit research corporation.

³ V4InnovatE is coordinated by Centre for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW).

03 Discussion

Expert feedback and input

The slide presentation and the input paper that the participants had received in advance of the workshop were the basis for a facilitated discussion of the draft concept of the indicator system in two breakout groups.⁴ The discussion in both groups was guided by pre-defined questions which were the same for both groups⁵. The questions were:

- Is there anything you would like to suggest to us, for example for the further steps in developing the indicator system, that we should definitely consider?
- What are your views on the connection between Responsible Research and Innovation (RRI) and societal acceptance of innovations, or more concrete, energy transition innovations? How do you see this connection?
- Do you have any ideas/suggestions which information or advice we could include in our planned guide (that will illustrate the intended users how to apply the indicator system) to reduce the risk of ticking of boxes – or would you say that it is a risk that we cannot influence through the guide?

In the following, the feedback and suggestions by the invited experts are presented across groups and sorted according to five topics: General project approach (1); Indicator reference point, specificity and weighting (2); User orientation (3); Societal acceptance (4); Inclusion and co-crea-

⁴ The discussions in the breakout groups were recorded and transcribed to facilitate the analysis of the workshop results as presented in this documentation.

⁵ One group dealt with all three questions. The other group discussed one of the first two questions quite intensely, therefore the third question could not be dealt with in the time allotted.

tion (5). The comments and suggestions on these topics, as noted below, should not automatically be taken as group opinion. They can also be opinions of individuals or several individuals that were not contradicted in the group. If the feedback and suggestions were made outside of the group discussions (see footnote 1), this will be noted.

General project approach

> Applying RRI to the energy transition

V4InnovatE sees a role for RRI not only in relation to new technologies with great transformation potential such as nanotechnology or synthetic biology, but also in relation to the use of technologies for complex socio-technical transformation processes such as those represented by the energy transition. When asked, the participating experts confirmed that they find it useful to apply RRI approaches to energy transition technologies and associated business models. Thus, they supported the general research approach of the project. Several participants also stated that they found the proposed assessment procedure and the criteria and indicators of the assessment tool convincing. One expert⁶ noted that the procedure's main value was transparency and commensurability of corresponding results of evaluating R&D programmes, proposals and finalised projects. More transparency and commensurability might help to legitimise decisions regarding funding and any actions following evaluated R&D results.

The workshop participants advised the V4Innovate team to consider a number of points when further developing the indicator system. These are outlined below.

⁶ This was part of the written statement that was sent via email to the project team and was not part of the group discussions (see footnote 1).

> Link with similar concepts and projects

Some experts noted the importance to set out in the description of the indicator system and the specification of its purpose the roots of RRI as a research approach and its relationship with similar concepts that emerged more recently in policy and academic circles. Important roots of RRI are considered to be, for example, technology assessment, social life cycle assessment, transdisciplinary research or social-ecological research. More recent concepts that RRI can be linked with and that have gained increasing prominence at EU-level recently include open innovation or inclusive innovation.

The project team was also advised to consult and link with research projects with similar topics and research questions in the further development of the indicator system. Example projects that were mentioned include the EU-funded project RIPEET that is concerned with responsible research and innovation policy experimentations for energy transition, and the nationally funded (German Federal Ministry of Education and Research, BMBF) project LeNa concerned with sustainability management in non-university research organisations.

Indicator reference point, specificity and weighting

There were several commentaries and suggestions about the reference point and the selection and weighing of indicators.

> Clarify reference point of the indicator system

One comment put forward in the plenary and group discussion was that the reference point(s) of the indicator system were not sufficiently clear in the draft concept. It would need clarification whether the indicators are related to the research and development process, or to the technology itself as a product of R&D, or to infrastructures, business models, and social innovations needed to implement the technology, or to all of this. In this context it was emphasized, that the question of whether the

indicator system needs to distinguish between process-related and product-related indicators would depend on the definition of the reference point(s) of the indicator system.

One expert⁷ noted that the current list of assessment criteria reflected mainly the process dimension of RRI while the product dimension of RRI should preferably also be reflected in the RRI-informed assessment tool. While the process dimension mainly referred to the legitimacy of R&D decisions, the product dimension mainly referred to the desirability of the technological innovation. In regard to the user-oriented product dimension of RRI, this expert suggested considering adding criteria for the scientific-technological success conditions, for instance in R&D for new battery technologies.

Other experts stressed in this context that the indicator system should refer to both technology development and implementation. They pointed out that also small-scale energy transition technologies should be designed in such a way that they can be applied in different social contexts. It was important to think about technology implementation already in technology design, so that the technologies could be used easily and widely. Photovoltaic, which is not too heavy for lighter balconies in apartment buildings, for example, was given here as an example. The request of one expert to bring energy justice and social sustainability issues more to the forefront of the indicator system fits into this discussion context. How do we make it possible for everyone to participate in the energy transition? It was pointed out that this is a central question in the current energy transition process.

> Elaborate on case-specific use of the indicators

Another comment expressed the need for clarification as to whether the list of indicators used to design or monitor R&D funding programmes and research proposals and projects on energy transition technologies

⁷ This was also part of the written statement sent via email (see footnote 1).

should be adapted to the respective technology/technologies dealt with, and also possibly to the level of technical readiness of these technologies. It was stressed that the importance of indicators was likely to change with the respective case and its context⁸. The current concept seemed to provide that the respective type of technological innovation and the associated varying importance of individual indicators would be only taken into account in weighting the indicators. However, it should be considered whether the selection of indicators should already be adapted to the respective case. In project tenders, the selected indicators should be clearly communicated, thus creating full transparency for applicants.

> Elaborate on the weighting procedure and acknowledge inherent subjectivity

There were some remarks on the methodology of the indicator weighting process. The draft concept illustrates this process using the analytical hierarchy process in which the individual indicators are evaluated in terms of their relative importance. One suggestion was to consider defining minimum/maximum values linked to the knowledge basis underlying the assessment of each indicator for transparency on the quality and robustness of the assessment.

The project team was also asked to clarify whether the concept sees a role for co-design in the weighting procedure. Some of the invited experts suggested that technology experts but also organized groups and individuals that are affected by implementation and use of the energy transition technologies should be involved in the weighting process.

One expert⁹ stressed that it needs to be reflected and pointed out that the proposed evaluation procedure will not reach 'true' objectivity of related assessments due to principle reasons but also for reasons of in-

trinsic subjectivity of the necessary weighting and valuation procedures. This was no disadvantage, but each assessor should be aware about the fact that his/her assessment could not overcome residual subjectivity - even when using the V4InnovatE tool.

User orientation

Some workshop participants stressed the importance of taking the user perspective into account in the further development of the indicator system. If funding agencies and research organisations were to use the system, it needed to be user-friendly and not overly burdensome for these target groups. High entry barriers would discourage use of the system. Therefore, the guide on the indicator system, that the project will produce, should explain how the use of the indicator system is intended and also offer suggestions for ways to help the target groups put the system into practice. One expert stressed the importance of distinguishing between the use of the indicator system at the levels of research programs and call objectives on the one hand, and its use for evaluation of project proposals or finished research projects on the other.

One idea, put forward in this context, was to design the indicator system in research funding programmes or calls as an opt-in/opt-out instrument. Applicants could choose to opt-out, i.e. to not use the indicator system in their project proposal and project implementation, without this having any influence on the evaluation of their project proposal. There would then be no obligation to apply the indicator system. This could have the consequence that initially mainly research institutes that attach value to RRI and the indicator system based on it will use it. Their experiences with using the indicator system could spread over time as inspiring or good practice examples and motivate other research organisations to use it too. It was noted that it is likely that it will take some time before the practical value of the indicator system as a tool for a more society-oriented implementation of the energy transition becomes clear. There

⁸ The draft concept of the indicator system distinguishes, for example, between technological innovation based on 'analytic knowledge', technological innovation based on 'synthetic knowledge', technology-based services.

⁹ This was also part of the written statement sent via email (see footnote 1).

was also scepticism expressed about designing the indicator system as an opt-in/opt-out instrument. This would reduce the chances of the indicator system contributing to a successful energy transition.

Societal acceptance

A number of experts warned against giving the impression in the description of the goal associated with the indicator system that it is primarily about establishing social acceptance. It was emphasized that the idea of RRI was not purely instrumental in terms of organizing research and innovation in a way that leads to societal acceptance and then adoption of, for instance, a technology. The indicator system should not be presented or misunderstood as an instrument to push technologies on the market. The project team was asked to be sensitive to a possible misuse of RRI in the sense of 'Responsiblewashing'¹⁰, i.e., public relations methods that aim to give organisations for applied research or technology development companies a responsible image in the public eye without there being a sufficient basis for this.

The advice to the project team was to consider a different framing of the goal of the indicator system. For example, the following suggestions (slightly paraphrased here) for alternative framing were made.

The RRI-informed indicator system is about:

- Pursuing the societal goal of creating ways for acceptable solutions as regards energy transition technologies for a broad part of society¹¹

¹⁰ *Responsiblewashing' is borrowed from the term greenwashing or greenwash. Greenwashing denotes a strategy by which actors seek to create an image of ecological responsibility through public relations methods without there being a sufficient basis for this.*

¹¹ *In this discussion context, one expert pointed out that the goal should not be to make everyone happy. There were too many different perspectives, interests and value preferences for the design and implementation of a technology to satisfy everyone equally; that was not a*

- Helping society to better benefit from energy transition technologies
- Taking that on board in the technology development process what creates a large overlap with what society wants and needs
- Changing the mindset of researchers and technology developers so that they recognise, for example, that cooperation with social scientists is useful, that it is important to be sensitive to social-ecological impacts, etc.

In this discussion context it was also emphasized that 'passive' societal acceptance alone was not enough to achieve the energy transition. Active involvement was necessary to realise renewable energy prosumer models¹², for example. Citizens may be fine with solar photovoltaic, for example, but not sufficiently motivated or equipped to install it in their home.

Inclusion and co-creation

Some experts advised that the focus should not be on societal acceptance, but rather on inclusion and co-creation. They stressed the need to further specify the dimension 'Diversity and inclusion' in the indicator system. Does the indicator system, for example, assign a role to co-design regarding this dimension, and if so, in which phases of technology research and development? Several experts suggested to include as indicators for this dimension the use of new co-creation methods that include citizens, consumers, societal actors such as consumer or environmental organizations, or practice actors from the renewable energy sector, for instance, in the design and development of energy transition technologies.

realistic goal to pursue with the indicator system.

¹² *Prosumers are active energy users who both produce and consume energy from renewable sources.*

One expert emphasized in relation to the dimension of inclusion the importance to create spaces for people to experiment with a technology and experiencing it practically, such as open innovation labs.

Experimenting with a technology would influence the way people see it and what they feel about it and, in this way, help them to recognize what would make it beneficial for them, easy-to-use, or how it could be improved. Another expert stressed the importance of communicating in such inclusive processes in a way that makes the technology understandable for non-expert people.

The project team was advised to consider whether an inclusive process of tailoring the V4InnovatE indicator system to a particular technology, technological readiness level, or energy transition context should be included as an indicator of the inclusion dimension. A technology-related R&D project that uses the indicator system could organize this adaptation exercise as a multi-stakeholder process, for example.

04 Next steps

The workshop results will be used to further develop, sharpen and concretize the indicator system. This includes, for example, formulating the motivations for applying the RRI concept more clearly to the effect that it is not primarily a matter of social acceptance, but rather a multidimensional societal benefit of energy transition technologies, and that the development of the methodology is geared toward the intended users.

The next major step in the project is to use three case studies in the context of the energy transition (batteries, biomass, prosumer services) for selection of indicators relevant to this socio-technical transformation. Application of the resulting set of indicators to the three cases including application of a weighting procedure will be discussed at a series of workshops in the summer of 2022 with different actor groups including economic actors, organised civil society, and policy makers/policy-support organizations.

What is V4InnovatE?

The V4InnovatE collaborative research project is funded by the German Federal Government (Federal Ministry for Economic Affairs and Energy, BMWi) under the Energy Transition and Society funding programme within the 7th Energy Research Programme of the federal government and has a duration of three years (October 2020 to September 2023).

V4InnovatE addresses the question of how to align technical innovations for the energy transition and business models based on them with societal values, goals, and needs, and uses the Responsible Research and Innovation (RRI) approach for this purpose.

RRI approaches deal with the question of a socially responsible design and governance of research and innovation processes. We apply RRI approaches to technical energy transition innovations and develop a set of indicators for responsible technical innovation from these approaches and from case studies, simulations and evaluations of online text documents, and with the help of workshops with experts and practitioners.

We will produce a guide for actors in the research system that will illustrate how the indicator set can be applied.

Project partners



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