

Building Roadmaps to Industrial Decarbonisation and Green Economy through EU-China Cooperation

D_{1.1} – Stakeholder Engagement Plan with detailed process design

WP1 – Co-creation Process with Stakeholders (EU and China)

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1. Changes with respect to the Description of the Action (DoA)

[Describe here any changes made with respect to the DoA with justification or insert the following phrase in case there are no changes:]

No changes with respect to the work described in the DoA.

2. Dissemination and uptake

[Explain here who will/could use this deliverable, within the project or outside the project.]

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Preface

EU-CHINA BRIDGE will support the transition to a climate-neutral and resilient society in both Europe and China by jointly advancing knowledge on technology innovations and roadmaps for decarbonising energy intensive industries, co-creating innovative modelling by combining cutting-edge bottom-up and integrated assessment modelling to quantify net-zero sustainable pathways, and developing the most updated and comprehensive emissions data. It will intensively engage relevant stakeholders from both regions, enhancing dialogues, and fostering mutual learning among policymakers, industries, and experts. It will deliver two opensource EU-China joint technology inventories of promising net-zero emission technology options for the iron & steel and chemical industries, two co-implemented demonstrations of promising technologies in China, and co-created scale-up paths and roadmaps of the selected industrial technologies in both regions. It will also develop the most up-to-date, high-resolution, multi-sectoral, national and regional GHG and short-lived climate pollutant emission inventories as well as dynamic monitoring of key emission sources at high spatiotemporal granularity. A state-of-the-art modelling framework will be developed, exploiting and advancing cutting-edge and established modelling tools for EU and China, using the latest emissions data, representing technology and policy options, enabling assessment of socioeconomic impacts, covering multiple economic sectors and regions, and offering high spatial and technology detail. The enhanced models will be used to co-produce net-zero pathways for the EU and China, explicitly assessing co-benefits and trade-offs of climate policies with other societal goals while exploring cooperation policies and governance to drive the global transformation and assessing the distributional and global-level implications of the two regions' decarbonisation. The pathways will be documented in new workspaces in the I²AM PARIS platform.

WI – Wuppertal Institut fuer Klima, Umwelt, Energie gGmbH	DE	Wuppertal Institut
E ₃ M – E ₃ -Modelling AE	GR	E: Modelling
IIASA – Internationales Institut fuer angewandte Systemanalyse	АТ	International Institute for Applied Systems Analysis
UoB – The University of Birmingham	UK	UNIVERSITY ^{OF} BIRNINGHAM
ICCS – Institute of Communication and Computer Systems	GR	
HOL – HOLISTIC IKE	GR	%HOLISTIC
ITE – University of Kassel	DE	UNIKASSEL VERSITÄT
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RUC – Renmin University of China	CN	
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CHINACOAL – China National Coal Group Corporation	CN	中国中煤能源集团有限公司
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FULONG – Inner Mongolia Fulong Heating Engineering Technology Co., LTD	CN	
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Executive Summary

The EU-CHINA BRIDGE project aims to advance decarbonisation strategies for energy-intensive industries by fostering collaboration between EU and Chinese researchers. It focuses on developing technology roadmaps, modelling net-zero emission pathways, and creating updated emissions data.

A central component of the project is a stakeholder engagement strategy, which seeks to bridge the gap between research and real-world application through three co-creation cycles. The co-creation activities facilitate interdisciplinary exchanges between different stakeholders like researchers, policymakers, and industry experts, providing a platform for sharing results and refining research questions to ensure practical, policy-relevant outcomes.

The co-creation activities follow principles of credibility, relevance, and legitimacy, ensuring high-quality stakeholder participation. Methods like the Power-Interest Matrix help prioritise stakeholders for engagement based on their influence and interest in the project. With regard to the organisation of the workshops, various co-creation techniques, including strategic frameworks like the "Three Horizons" method and foresight tools like the "Future Wheel," can be used to encourage creative, collaborative problem-solving.

The design of each co-creation session follows a structured process, starting with defining the purpose, objectives, and expected outcomes. Clarifying roles and responsibilities early ensures smooth organisation, and selecting a diverse group of stakeholders helps encourage broad discussions. Agendas are created to provide a clear structure, and background materials are shared in advance to prepare the participants. Engagement techniques are carefully chosen to foster innovative thinking and inclusive discussions, ensuring that all voices are heard. After each co-creation activity, documentation is compiled, including key insights and decisions. Feedback is gathered from participants to continuously improve the co-creation process. Finally, the results are shared not only with project stakeholders but also with a broader audience, using tools such as newsletters, social media, scientific conferences, and publications.

An initial capacity-building workshop, held online in September, served to prepare all project participants for the co-creation process by introducing the methodology, key tasks, and best practices. To improve the process, a reflection session among leading researchers from both regions will be held after each co-creation cycle, allowing for the exchange of ideas and experiences. This approach will help refine the activities and ensure alignment with the project goals.

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1 Introduction and objectives

In EU-CHINA BRIDGE researchers from the EU and China work together on advancing knowledge on technology innovations and roadmaps for decarbonising energy intensive industries, co-creating innovative modelling by combining cutting-edge bottom-up and integrated assessment modelling to quantify net-zero sustainable pathways for the EU and China, and developing the most updated and comprehensive emissions data. EU-CHINA BRIDGE will deliver two open-source EU-China joint technology inventories of promising net-zero emission technology options for the iron & steel and chemical industries, two co-implemented demonstrations of promising technologies in China, and co-created scale-up paths and roadmaps of the selected industrial technologies in both regions.

By engaging relevant stakeholders from both regions and enhancing dialogues, mutual learning among policymakers, industries, and experts will lead to a better understanding of technological options in different sectors.

The objective of this stakeholder engagement plan is to support the co-creation in organising the co-creation activities in a way that stimulates exchange between different disciplines within the EU-CHINA BRIDGE consortium and external participants, in order to help us discover and exploit synergies between our respective research activities.

The purpose of the co-creation is to provide an opportunity to share (interim) results and a space for inter- and transdisciplinary exchange within the EU-CHINA BRIDGE project and with project-external experts. Their feedback might help to hone research questions and reconfigure ongoing analyses so that they speak to each other, thus maximising their policy and academic relevance.

The co-creation shall encourage an open and transparent research process in a trustful environment. It should NOT constrain research in any of the subsequent work packages. Nor should the other work packages focus their research activities exclusively on providing inputs to the co-creation.



2 Co-creation and Stakeholder Engagement

Stakeholder engagement will enhance the quality, relevance and impact of EU-CHINA BRIDGE project's research by ensuring that it is grounded in the real-world needs and perspectives. The stakeholders help to cocreate a better understanding of open research questions, barriers, needs and possible solutions.

2.1 Objective, purpose and principle of stakeholder engagement

Co-creation activities are crucial for bridging the gap between research and real-world policymaking, especially in complex fields such as climate policy and industrial transformation. However, there are still many research activities that do not use participatory methods (within energy system modelling and planning research) (McGookin et al., 2021). Insufficient stakeholder engagement can lead to research outcomes that are disconnected from practical applications, resulting in suboptimal solutions. As (Doukas & Nikas, 2021) highlighted, the lack of stakeholder integration in climate and energy policy modelling has hindered the effectiveness of initiatives. Co-creation activities aim to address this gap by actively involving stakeholders in the research process, ensuring that the resulting models and strategies are both relevant and actionable. Different stakeholders bring diverse disciplines and perspectives to the table, particularly regarding the five elements of complexity: the problem's connections with other issues, various ways to define the problem, key uncertainties and unknowns, real-world constraints, and criteria for what constitutes a good solution. By embracing these varied perspectives, co-creation workshops can develop a more comprehensive

understanding of the challenges at hand, leading to more effective and practical solutions (Bammer, 2019).

The primary objectives of co-creation activities are:

- **Gaining Valuable Insights**: Engaging stakeholders provides access to crucial insights and data that might not be obtainable through traditional research methods. Stakeholders offer direct feedback on research methodologies and outputs, enhancing the relevance and applicability of the findings.
- Knowledge Exchange and Transfer: Co-Creation promotes the exchange of knowledge between
 researchers and stakeholders, such as those involved in decarbonising energy-intensive industries. This
 mutual understanding is essential for effectively applying modelling research findings, as stakeholders
 gain a clearer grasp of the modelling process, including scenario development and policy
 representation.
- Validation and Refinement of Research: By continuously presenting, reflecting on, and refining insights from various work packages, Co-Creation activities ensure that assumptions and results are validated and checked for appropriateness and usability.
- Building Consensus and Support: Early and consistent involvement of stakeholders fosters a sense of
 ownership and commitment to the project, leading to stronger support for the research outcomes.
- Effective Dissemination and Utilisation of Findings: Co-creation activities facilitate the sharing and exploitation of research findings, ensuring they are effectively communicated and applied in relevant contexts.
- Ensuring Transparency and Accountability: Transparent stakeholder engagement enhances the credibility of the project. Open dialogue and documentation create an environment where stakeholders can monitor progress, provide feedback, and hold the project team accountable. This transparency helps build trust and minimises the potential for conflicts or misunderstandings (Kujala et al., 2022; McGookin et al., 2021; Süsser et al., 2022)

In summary, co-creation activities are essential for aligning research with real-world needs and ensuring that the outcomes are practical, credible, relevant for stakeholders, and widely supported. By involving stakeholders throughout the research process, these workshops help develop a unified vision for addressing complex

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challenges and translate this vision into actionable steps.

Stakeholder processes should be designed according to specific principles. In scientific research, the CRELE framework is a proven concept, which outlines the principles of credibility, relevance, and legitimacy (Cash et al., 2003; Sarkki et al., 2014)

- **Credibility**: The stakeholder process should be implemented with high-quality, goal-oriented concepts and scientifically recognised methods. Stakeholder selection should be based on transparent criteria.
- **Relevance**: The results of the stakeholder process should be useful for further work. Expectations should be clearly defined in advance to ensure that the outcomes are valuable for the target audience. Particularly for policymakers, a foundation should be established to advance the development of transformation strategies. Research questions should be continuously referenced and, if necessary, reformulated or adjusted to ensure that the results are applicable to the target audience.
- **Legitimacy**: The entire process should be fair and respectful, especially when differing opinions arise. This can be achieved by considering diverse stakeholder groups. The greater the transparency of the process and the more involved the stakeholders are, the higher the level of legitimacy.

2.2 From stakeholder participation to co-creation

2.2.1 From Stakeholder Participation to co-Creation

Stakeholders are typically involved at various stages of a project to provide feedback, share insights, and voice concerns. Their involvement often takes the form of consultations, surveys, focus groups, or public meetings where they are invited to share their perspectives.

There are several frameworks available to describe the engagement level of stakeholders like Arnstein's 'latter of participation' (Arnstein, 1969). How deep stakeholders should be involved depends on several aspects like the goals, time, resources and level of concern (Bammer, 2019). The following figure is based on (McGookin et al., 2021) and the research in the Horizon Europe project TRANSIENCE (Ikenze & Rizos, 2024) and illustrates different dimensions of stakeholder engagement. It ranges from simple one-way flow of information and dissemination (e.g., through newsletters) to data collection (e.g., in the form of surveys), consultation (e.g., during project meetings), and finally to co-creation, where stakeholders are actively involved and workgroups or partnerships are formed. This scheme is well suited to illustrating the levels of engagement in the EU-CHINA BRIDGE project. It illustrates that in the evolving landscape of project management, the role of stakeholders has shifted from mere participation to active co-creation. This shift reflects a deeper understanding that the value of stakeholder involvement lies not only in their contribution, but also in their collaborative engagement throughout the process. It goes beyond traditional methods of stakeholder involvement by fostering an environment where stakeholders and organisations work together as partners to design, develop, and implement solutions.

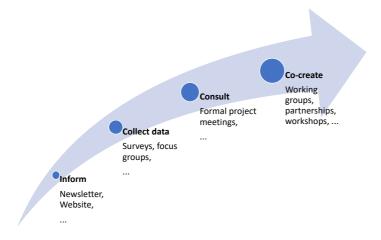


Figure 1: Levels of Engagement and Example Techniques (based on (Ikenze & Rizos, 2024))

In a co-creation framework, stakeholders are not just consulted but are actively involved in the creation process from the very beginning. This collaborative approach blurs the boundaries between the organisation and its stakeholders, treating them as equal partners working toward a common goal. While stakeholder engagement is a broader concept that encompasses various interactions, co-creation implies a more active and collaborative role for stakeholders in the development process.

The co-creation approach invites stakeholders to become active participants in the creation process. Key elements include:

- Collaboration: Working together to achieve a shared goal;
- Value Creation: Generating new value for all parties involved; and
- Innovation: Promoting creativity and new ideas through shared knowledge.

In summary, co-creation is a collaborative process where multiple parties work together to create value. Stakeholders are actively involved in the development of solutions.



3 Conceptual framework

3.1 Stakeholder Mapping

Stakeholder mapping is an essential process before a co-creation activity takes place. It involves identifying and analysing the individuals, groups, or organisations that have an interest in or are affected by EU-CHINA BRIDGE project.

The first step in stakeholder mapping is to identify all potential stakeholders. This involves brainstorming all the individuals, groups, and organisations that may be impacted by the project or have an interest in its research and outcome. Comprehensive stakeholder identification ensures that no key player is overlooked in the engagement process. Potential stakeholders in the EU-CHINA BRIDGE Project can be summarised with the following table that categorises and sub-categorises different stakeholder groups.

Table 1: Stakeholder categories and sub-categories (examples)

Policy makers	Industry	Research	Civil society
EU institutions	Industrial associations	University	NGOs
National governments and authorities / Central government	Private companies	Think tanks	Consumers' organisation
Regional / local / provincial government	Financial institutions	Project consortium	Labour union
International institutions			

Once stakeholders are identified, the next step is to analyse their characteristics. One tools for conducting stakeholder mapping is the Power-Interest Matrix (Bourne & Weaver, 2010; Mendelow, 1981). This tool helps categorise stakeholders based on their level of power and interest, guiding the selection of appropriate engagement strategies.

- Power refers to the stakeholder's ability to influence the project or its outcomes.
- Interest refers to the stakeholder's level of concern or involvement in the project. High-interest stakeholders are those who will be significantly affected by the project or have a strong personal or organisational stake in its outcome.

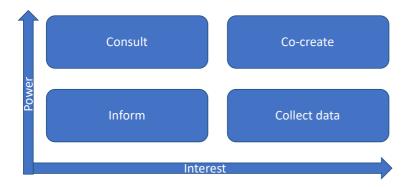


Figure 2: Power-interest matrix with levels of engagement

The Power-Interest Matrix is a simple yet effective tool that helps categorise stakeholders into four quadrants based on their power and interest:

- High Power, High Interest: Stakeholders in this quadrant are key players who need to be closely managed. They have significant influence over the project and are highly invested in its outcomes.
 These stakeholders should be engaged regularly, involved in co-creation activities, and kept informed of all significant developments.
- **High Power, Low Interest**: These stakeholders have substantial influence but are less interested in the results of the project. They need to be kept satisfied and should be engaged strategically to ensure their support. Regular updates and involvement in critical decisions are essential, but they do not need to be involved in every aspect of the project.
- Low Power, High Interest: Stakeholders in this category are highly interested in the project but lack the power to influence its outcomes significantly. These individuals or groups should be kept informed and engaged to ensure their concerns are addressed, as they can become strong advocates for the project.
- Low Power, Low Interest: Stakeholders with low power and low interest require minimal attention. They should be monitored to ensure that their engagement levels do not change, but they do not need to be actively managed. Basic information sharing is usually sufficient.

In the template for the pool of experts (see ANNEX, and the internal project cloud), there are two questions to address these aspects (1. interest in engagement and 2. level of influence/power). Stakeholder positions and levels of influence can change over time, especially as the project progresses. It is important to regularly review and update the stakeholder map and adjust engagement strategies accordingly. When organising co-creation activities, a stakeholder mapping should be carried out in advance. This should identify the stakeholders who are particularly relevant for the workshops and contribute to the success of the project.

Stakeholder engagement is a broad term that encompasses various activities aimed at understanding, involving and influencing stakeholders. It involves building relationships, communicating effectively, and considering stakeholder perspectives throughout a project or initiative. Key aspects include:

- Identification: identifying and mapping relevant stakeholders;
- Analysis: understanding stakeholder interests, expectations and influence;
- Communication: establishing effective communication channels;
- Involvement: actively engaging stakeholders in decision-making processes; and
- **Feedback**: gathering and incorporating stakeholder feedback.





3.2 Designing a co-creation activity

3.2.1 Organising a co-creation activity

A co-creation activity should be well-planned to ensure that relevant stakeholders are involved, the appropriate engagement methods are selected, all organisational issues are addressed, and the content and open questions are adequately prepared. This is crucial for making the workshop successful and for leveraging its outcomes for further project work. Given the complex nature of the project, which encompasses aspects of policy-making, modelling, industrial transformation, and the development of innovative technologies, it is essential to plan co-creation activities in a way that effectively engages relevant stakeholders, supports research efforts, and moves closer to the goal of supporting the transition to a climate-neutral and resilient society in the EU and China. Depending on the (sectoral) focus, the methods and the participants, the process from initial planning steps to the final minutes can vary significantly. For the EU-CHINA BRIDGE case, especially for the co-creation activities, it is recommended to follow 9 steps, as illustrated in the following figure.

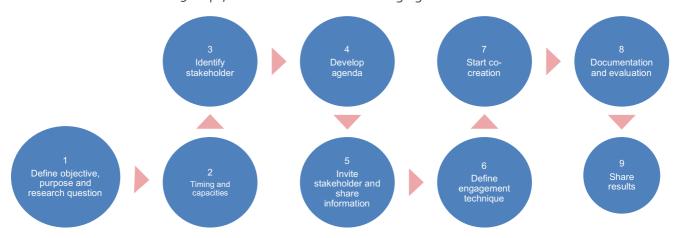


Figure 3: Co-creation: 9 steps

These steps are specified and described in more detail for the specific case of project design in the EU-CHINA BRIDGE project in chapter 5.1.

3.2.2 Engagement techniques

A co-creation activity differs significantly from other traditional formats because participants are actively involved in discussions and work alongside researchers to tackle challenges and develop solutions to current issues. Therefore, a method should be chosen that fosters creative engagement from all participants. Some selected examples of engagement techniques are briefly introduced below. The responsible team may decide whether to use these methods and how to adapt them with regard to specific needs or circumstances.

Engagement technique	Three Horizons
Short description	The Three Horizons Method is a strategic framework used in co-creation workshops to help a diverse group of stakeholders to envision long-term goals and plan steps to achieve them. It is especially useful for initiating the co-creation process, although it can
	 also be used for an in-depth discussion. It involves: Horizon 1 focuses on current activities and challenges, optimising existing processes. Horizon 2 addresses transitional innovations and changes for the mid-term.



	 Horizon 3 looks at long-term visions, exploring future disruptions and opportunities. This method fosters a shared vision and actionable steps for future success. Specifically, the procedure can be divided into five steps: What are current problems? What are the key elements/technologies we need for a sustainable and decarbonised industry?
	 3. What already exists and is useful for achieving the goal? 4. What innovations can connect the present with the future? 5. Which features of the past should be maintained in the future? A poster with post-its, group work or a joint discussion on the questions can be used to implement this method
Further information	Sharpe, Bill, Anthony Hodgson, Graham Leicester, Andrew Lyon, and Ioan Fazey. "Three Horizons: A Pathways Practice for Transformation." Ecology and Society 21, no. 2 (2016). http://www.jstor.org/stable/26270405

Engagement technique	Future Wheel
Short description	The Future Wheel is a strategic discussion and foresight technique used to explore the potential consequences of a particular event, decision, or trend. This method helps participants visualise and analyse the effects of a central change or innovation, making it a valuable tool in decision-making, strategic planning, and scenario analysis. - Central Event: The process starts with identifying a central event, decision, or trend that will likely impact the future. This key idea is placed at the centre of the diagram. - First-Level Consequences: Participants then brainstorm the immediate, direct consequences of the central event. These are represented as spokes radiating out from the centre, each labelled with a specific outcome or effect. - Second-Level Consequences: For each of the first-level consequences, participants explore further implications, considering how these outcomes might lead to additional effects. These second-level consequences are connected to the first-level outcomes with additional spokes, creating a wheel-like structure. This process can continue to third and fourth levels, depending on the complexity of the discussion. - Visual Representation: The resulting diagram provides a visual map of the potential future landscape, showing how a single event can trigger a chain reaction of outcomes. This helps participants understand the broader implications of their decisions or actions. The Future Wheel method encourages critical thinking, collaboration, and long-term planning by allowing participants to consider multiple possibilities and perspectives. It helps uncover potential risks, opportunities, and unintended consequences, enabling more informed and resilient decision-making.
Further information	Benckendorff, P. (2008). Envisioning Sustainable Tourism Futures: An Evaluation of the Futures Wheel Method. Tourism and Hospitality Research, 8(1), 25–36. https://doi.org/10.1057/thr.2008.2



Engagement technique	Fishbowl
Short description	The Fishbowl Method is an effective discussion technique designed to foster open dialogue and encourage inclusive participation in group settings. It is particularly where diverse perspectives and active engagement are valued. The method involves two distinct groups: - Inner Circle (Fishbowl): A small group of participants sits in the centre and engages in a focused discussion on a specific topic. These participants explore the subject matter in depth, sharing their insights and experiences Outer Circle: Surrounding the inner circle, the outer group observes the discussion attentively. They listen to the exchange of ideas and are given the opportunity to join the conversation by replacing someone in the inner circle when they feel they have something valuable to contribute. This dynamic structure not only encourages active listening but also promotes a continuous flow of fresh perspectives, ensuring that a wide range of voices and ideas are brought into the conversation. This method is particularly effective in settings where it is important to balance speaking and listening roles, as it naturally limits the dominance of any single voice while giving everyone a chance to participate meaningfully.
Further information	Flor, Patricia & De Meulemeester, Ann & Allen, Tomas & Isaksson, Karl. (2013). Use of the fishbowl method for a discussion with a large group. Journal of EAHIL. 9. 24-25.

Engagement technique	Information board / mind-mapping
Short description	A mind map or information board is a powerful discussion and participation method that can be used to visually organise ideas, concepts and information. It is particularly effective for brainstorming sessions, project planning or exploring complex topics that require a structured yet flexible approach. - Central idea: The process begins with a central idea, topic or question placed in the centre of the board or paper. This serves as a starting point for the discussion. - Branches: Participants then contribute related ideas, topics or information that are connected to the central idea by lines or branches. These branches can further divide into sub-branches to explore related sub-topics or detailed aspects of the main idea. - Keywords and Visuals: Keywords, phrases or even images are often used to label the branches and sub-branches to make the mind map visually appealing and easier to understand at a glance. Mind mapping is an inclusive technique that encourages contributions from all participants as ideas are developed collaboratively. It encourages creativity by allowing the free association and connection of ideas in a non-linear way. Mind maps can be carried out both on site in a group with a large piece of paper in the middle and as an online format.
Further information	Crowe, M., Sheppard, L. Mind mapping research methods. Qual Quant 46, 1493–1504 (2012). https://doi.org/10.1007/s11135-011-9463-8 Davies, M. Concept mapping, mind mapping and argument mapping: what are the differences and do they matter?. High Educ 62, 279–301 (2011).



https://doi.org/10.1007/s10734-010-9387-6

Engagement technique	Bilateral or multilateral interviews
Short description	The interview method is a versatile qualitative research approach to gain deep insights from the participants. The process begins with thorough preparation, where clear objectives are defined and tailored questions are developed. During the interviews, which are conducted either individually or in small groups, the interviewer encourages participants to openly share their experiences, thoughts and ideas. Active listening and targeted questions help to gain valuable insights. After the interviews, the responses are analysed to identify common themes, patterns and perspectives. There are different types of interviews that can be used depending on the objective. Each of these interview types serves a specific purpose: in-person interviews provide depth and nuance, telephone interviews provide convenience and accessibility, focused interviews provide targeted insights, and unstructured interviews facilitate broad, exploratory data collection.
Further information	Buriro, Abdul & Awan, Jawad & Lanjwani, Abdul. (2017). INTERVIEW: A RESEARCH INSTRUMENT FOR SOCIAL SCIENCE RESEARCHERS. International Journal of Social Sciences, Humanities and Education. 1. 1-14. DiCicco-Bloom, B. and Crabtree, B.F. (2006), The qualitative research interview. Medical Education, 40: 314-321. https://doi.org/10.1111/j.1365-2929.2006.02418.x

Engagement technique	Field trip
Short description	Field trips are a method of getting participants out of traditional meeting rooms and into the real world relevant to the research questions. By visiting industrial companies, research institutes or political institutions, participants gain first-hand insights into practical applications, challenges and innovations in a particular field. Field trips promote active learning, reflection and joint problem solving by creating shared experiences. They are usually well suited for interdisciplinary projects as they often provide a holistic view that combines different perspectives. Structured debriefings and discussions following visits help participants integrate their observations into broader co-creation activities to ensure that insights from the field make a meaningful contribution to project goals.
Further information	The Community Engagement Network (2005): Book 3 the engagement toolkit. Effective Engagement: building relationships with community and other stakeholders https://www.betterevaluation.org/sites/default/files/2022-07/effective%20engagement%20book%203.pdf

4 "EU-CHINA BRIDGE" approach

4.1 Three cycles in EU-CHINA BRIDGE

Stakeholder engagement will form the backbone of all project activities and will take the form of three cycles with in-depth co-creation activities. In a set of small-scale, targeted, and well-structured co-creation workshops, stakeholders will be involved intensively to co-create knowledge and build trust with EU-CHINA BRIDGE researchers throughout the project. It starts with co-creating scaling-up paths of Industrial Waste Heat Utilisation (IWHU) and specific technology options for decarbonising the iron and steel and chemical industries – iron and steel and chemicals- (Cycle 1, Task 1.2 / 1.3); the result will feed into the development of technology roadmaps of IWHU and for decarbonising the two key industries (Cycle 2, Task 1.4 / 1.5); they will then be integrated into the co-creation of comprehensive net-zero emission pathways for the EU and China, including their potential collaboration towards climate resilient, and Paris-aligned global transformations (Cycle 3, Task 1.6 / 1.7).

The next figure illustrates the structure of the project including the co-creation cycles and the connections with other work packages.

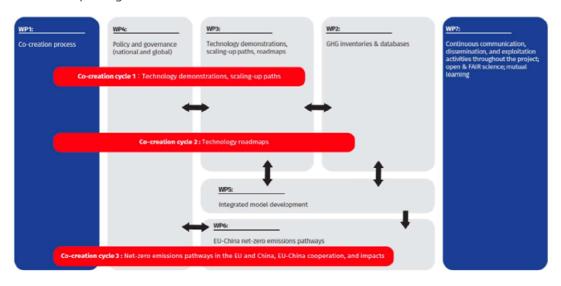


Figure 4: Structure of the EU-CHINA BRIDGE project

4.1.1 Co-creation Cycle 1

The first co-creation cycle will focus on the scaling-up path of specific technology options in the EU and China. The workshops held in China will concentrate on the use of green hydrogen in the chemical and steel industries, as well as on IWHU. Meanwhile, the workshops conducted in the EU will focus on green hydrogen in steel-making and chemical recycling. The objective of the first co-creation workshops is to discuss the outline of the scaling-up path developed by researchers, including the enabling conditions and potential barriers (Task 3.2-3.2 and Task 4.1-4.3). As the events take place at an early stage of the project, initial results will be presented and discussed, and fed back to the project team working on the respective tasks. These results will provide important insights for gathering feedback and further input.

The co-creation workshop, like all workshops, is designed to allow for intensive discussions on specific research questions with experts and relevant stakeholders. Therefore, it will be held in person to enable participants to get to know each other and create a good working atmosphere for future work. The number of participants will



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be kept small, with about 10 experts per workshop to facilitate focused discussions.

The co-creation workshop, like all workshops, is designed to allow for intensive discussions on specific research questions with experts. Therefore, it will be held in person to enable participants to get to know each other and create a good working atmosphere for future work. The number of participants will be kept small, with about 10 experts per workshop.

In the first cycle, one workshop each on steel and chemical recycling will be held, with parallel events in China and the EU. Additionally, another workshop on IWHU will be offered in China. The project partners responsible for organising the workshops are Tsinghua-SA, BIT-ME, CHINACOAL and Fulong for the workshops held in China and WI and ITE for the workshops held in the EU.

After approximately eight months, further workshops will be held online. As in the first round, a co-creation workshop on steel and chemicals will take place in the EU, and there will be workshops on steel, chemicals, and IWHU in China. Again, around 10 experts will participate. The aim is to build on the first workshop, present and discuss new results from the project developed in the meantime, refine the issues, and develop implications for further project work.

4.1.2 Co-creation Cycle 2

The second cycle is structured similarly to the first, with the same responsibilities assigned: Tsinghua-SA, BIT-ME, CHINACOAL, FULONG on the Chinese side, and WI, ITE on EU side. The planned time is the end of the year 2025. The co-creation workshops in China and the EU are to be conducted in parallel. The thematic focus of the second cycle is on technology roadmaps for decarbonising the overall chemical and steel industries in the EU and China. The resulting up-scaling paths of selected technologies (Tasks 3.1-3.3) and bottom-up modelling will be used to develop a zero-draft of technology roadmaps (Tasks 3.5-3.7). Stakeholder meetings for the steel and chemical technology sectors will be organised in both China and the EU. In addition to the technical focus, enabling policies and governance will also be discussed during the meeting (Tasks 4.1-4.3). Consequently, the scope of stakeholders will be expanded to include more governmental stakeholders and policymakers. It is planned that approximately 20 experts will participate in each workshop. Stakeholders' inputs will then be used to improve the drafted paths, which will be presented in the 2nd Workshop round about six months later. As in the first cycle, this workshop will also be held online to enable flexible participation and avoid the challenges of long travel distances.

4.1.3 Co-creation Cycle 3

The third cycle aims to develop net-zero emission pathways in the EU and China for key emitting sectors, including energy-intensive industries (Ells), based on co-designed, model-based pathways using insights from the previously developed technology roadmaps. This co-creation cycle builds directly on the results of the first two cycles. Therefore, the first round of co-creation cycle 3 will take place shortly after the initial workshops from cycle 1, and the second round will follow shortly after the initial workshops from cycle 2. However, the focus will be expanded to include the transport, agriculture, energy supply, and building sectors required to develop economy-wide net-zero pathways for the EU and China.

In the third co-creation workshop of cycle 3, discussions will focus on several key areas. Participants will coprioritise research questions and identify the underlying factors influencing decarbonisation efforts. They will work on linking the visions set in pathways with specific actions required to achieve net-zero emissions. This includes reflecting on existing and potential decarbonisation options, technologies, policies, governance frameworks, and market dynamics. The workshop will also cover the identification of key short- and mediumterm milestones and the enabling conditions necessary to reach these goals as well as the barriers that should be overcome to enable the required transformation. Additionally, there will be a discussion on the key

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assumptions of scenario modelling, particularly concerning the technology roadmaps for Ells.

The methodology includes conducting interviews with experts, allowing for in-depth discussions and detailed questions that may not fit into a larger event. This approach enables deeper expert involvement in the project work. This method complements two workshops planned to run in parallel in the EU and China, with around 20 participants each, focusing on the above-mentioned questions and priorities. The results will feed into the first modelling round. Responsibility for the interviews and the workshops lies with SDU and BIT-ME on the Chinese side, and E3M and IIASA on the EU side.

The second round of the co-creation workshops in cycle 3 aims to validate the modelling results for the net-zero, sustainable pathways of the EU and China and discuss possible improvements for the second modelling round. These will be conducted as online workshops, with around 20 participants.

Finally, the entire co-creation process will conclude with a joint in-person workshop. This workshop will discuss the improved net-zero, sustainable pathways, including those specific to the EU and China, as well as the cooperative EU-China pathway and their socio-economic impacts. Approximately 40 participants are expected to attend this workshop, with a location to be determined.

4.1.4 Summarising table of the co-creation cycles

The following table provides an overview of all three cycles and the corresponding workshops planned within each cycle. It also outlines the responsibilities and initial organisational details. In addition to the main partners named below, ICCS, who have proven expertise and extensive experience in co-creation and stakeholder engagement, are also involved in the planning and implementation of the European workshops.

	UNTIL WHEN	WHERE	WHO	WHAT IS NEEDED
	1st round: MARCH 2025	CHINA	Tsinghua-SA BIT-ME CHINACOAL FULONG	In-person workshops (10 stakeholders) Technology: Green hydrogen (steel and chemical industry); IWHU Organisation, presentation, documentation (minutes, participant list)
Co-creation cycle 1: SCALING UP PATH	1st round: MARCH 2025	EU	WI ITE	In-person workshops (10 stakeholders) Technology: Green hydrogen (steel), chemical recycling Organisation, presentation, documentation (minutes, participant list)
	2nd round: SEP 2025 (EU) / JAN 2026 (China)	EU and CHINA	WI ITE Tsinghua-SA BIT-ME CHINACOAL FULONG	Online workshops (around 10 stakeholders): 1 in EU, 1 in China, 1 on IWHU in China Organisation, presentation, documentation (minutes, participant list)



Co-creation cycle 2: TECHNOLOG	1st round: DEC 2025	CHINA	Tsinghua-SA BIT-ME CHINACOAL FULONG	In-person workshops (20 stakeholders); 1 on steel and 1 on chemical industry Organisation, presentation, documentation (minutes, participant list)
Y ROADMAPS incl. ENABLING	1st round: DEC 2025	EU	WI ITE	In-person workshops (20 stakeholders): 1 on steel and 1 on chemical industry Organisation, presentation, documentation (minutes, participant list)
POLICIES AND GOVERNANC E	2nd round: APRIL 2026	EU and CHINA	WI ITE Tsinghua-SA BIT-ME CHINACOAL FULONG	Online workshops (around 10 stakeholders): 1 on steel and 1 on chemical industry in both the EU and China Organisation, presentation, documentation (minutes, participant list)
	Round 1: JAN 2025	CHINA	SDU BIT-ME	Interviews with stakeholders to identify pressing questions;
Co-creation	Round 1: JAN 2025	EU	E ₃ M IIASA	In-person workshops (around 20 stakeholders): 1 in the EU and 1 in China Results feed into the 1st modelling round Organisation, presentation, documentation (minutes, participant list)
cycle 3: NET- ZERO SECTORAL	Round 2: JAN 2026	CHINA	SDU BIT-ME	Online workshops (around 20 stakeholders): 1 in the EU and 1 in China
EMISSIONS PATHWAYS	Round 2: JAN 2026	EU	E ₃ M IIASA	→ Validate the modelling results and discuss possible improvements for the 2nd modelling round Organisation, presentation, documentation (minutes, participant list)
	Round 3: SEP 2026	EU and CHINA	SDU BIT-ME E3M IIASA	Joint online EU-China workshop (around 40 stakeholders from the EU and China) → Discussion and presentation of the improved net-zero, sustainable pathways Organisation, presentation, documentation (minutes, participant list)

4.2 Internal capacity building workshop and reflection session

An initial capacity building workshop took place as an online workshop on the 18th of September and served as a foundational session to prepare all project participants for the co-creation process. During this workshop, this guidebook was presented in detail, meaning that the key principles, methods, concrete tasks, and best practices for co-creation were explained.



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The goal was for the participants to have a clear understanding of the co-creation process by the end of the internal workshop, to be equipped with the necessary skills and knowledge, and to be ready to actively contribute to the workshops within the three cycles. It was also an opportunity to align on the project timeline, set expectations, and clarify roles and responsibilities.

In this regard, first, the relevance of co-creation workshops was highlighted. Additionally, the workshop provided a detailed introduction to the co-creation methodology and demonstrated how it could be effectively implemented within the framework of EU-CHINA BRIDGE. Best practice examples from other EU-projects were presented and discussed. During the workshop, sufficient time was given for questions and discussions. Members from each relevant work package (WP 3, WP4, WP5, WP6) were invited. In total, 16 people participated the internal capacity building workshop.

In addition to the internal workshop and to gain valuable insights that could improve the co-creation methodology, a half-day internal reflection session among the leading researchers of WP 3, WP 4, WP 5 and WP 6 from both regions will also be organised after each co-creation cycle to share experiences and discuss new ideas for the next cycle.

4.3 Exchange between EU and Chinese partners

In the EU-CHINA BRIDGE project, multiple cycles of co-creation workshops will be conducted in both China and the EU. While these workshops are held independently within each region, with participants from the respective regions, the focus and the research questions are (with the exception of IWHU which is relevant only for China) very similar. This offers a unique opportunity for collaboration and mutual learning between project partners in China and the EU. By sharing insights and findings from their respective workshops, the partners can gain a broader perspective on the challenges and opportunities related to the use of green hydrogen and chemical industry / chemical recycling. Cross-regional cooperation can facilitate the exchange of innovative solutions, enabling each region to benefit from the other's experiences and expertise. This collaborative approach not only enriches the project outcomes but also fosters a deeper understanding of the diverse contexts in which models for these technologies are being developed. Such cooperation is essential for driving forward the global transition to sustainable industrial practices.

Collaboration is ensured through regular meetings within the project team and standardised and detailed documentation tools.

5 Designing a co-creation session in "EU-CHINA BRIDGE"

5.1 Steps to co-creation

Against the background of the conceptual framework and the specifics of EU-CHINA BRIDGE, this chapter presents the concrete implementation of co-creation activities. It is intended to serve as a guideline that can be flexibly adapted. This chapter includes the 9 steps that were presented in chapter 3.2.1 that are necessary to plan and organise a co-creation activity. The following steps have a focus on workshop formats that are conducted on site with a limited number of participants. However, recommendations and tips are also given for other co-creation methods, such as interviews or field trips.

5.1.1 Step 1: Define purpose, objectives and expected output

The main priorities of the individual co-creation workshops, field trips and interviews are outlined in Chapter 4.1. However, for the practical implementation of specific co-creation activities, it is crucial to clearly define during the planning phase how the work in the three cycles should proceed. In the initial activities, a shared vision and a positive working atmosphere should be established between the project partners and the invited stakeholders/ participants. It is important to clarify the specific research questions, which stakeholders from diverse backgrounds will collaboratively work on. This is important to develop solutions and strategies that address the project's key challenges. This also directly relates to the purpose of the event.

To this end, the project team should derive significant value from the participants' ideas and suggestions to start and continue the work effectively. Stakeholder mapping (see Chapter 3.1) identifies the background, expectations and concerns of the stakeholders. Additionally, the expected output should be defined in advance, ensuring that the activity provides genuine value for the participants. The workshop should also be meaningful for the invited experts and beneficial for their future work. Therefore, experts should be selected based on specific criteria. Ideally, these experts also bring concrete questions to the table, which can be discussed with the project team. This involves good communication before, during, and after the workshops about the direction, topics, and research questions to be addressed.

This step should start a few months before the workshop date. Ideally, there should be 3 to 4 months between the definition of the goals and the co-creation activity. To systematically capture these points, the responsible project partners should complete a document for organising and planning the activities (see ANNEX).

5.1.2 Step 2: Clarify responsibilities / roles /time & place

Once the priorities and objectives of the activity have been clarified, the responsibilities should be defined. Who will lead the workshop session? Who will conduct the interviews and plan the field trips? Each co-creation activity requires careful coordination to ensure success. Researchers working on the research content play an important role in the preparation of the workshop, by identifying research questions and engagement methods. The logistical aspects, such as venue arrangements, catering, and travel, must also be assigned to specific team members. Similarly, for interviews, there should be a person that leads the interview, that is responsible for the recording and minutes and that is responsible for the organisational issues (invitation, communication platform, etc.). Field trips, which may involve visits to research institutes, industries, or policy-making bodies, require separate coordination. Someone must handle scheduling, site selection, and participant management. For all activities, a timeline is crucial. Clarifying responsibilities, roles, time and place early prevents last-minute confusion and ensures everybody is on the same page.



5.1.3 Step 3: Identify and choose stakeholders

In Chapter 3.1, we defined the process for screening and selecting stakeholders. We will begin with stakeholder scoping in each region (EU and China), systematically identifying stakeholders for each of the three cycles mentioned before. A template (see ANNEX) assists in the stakeholder mapping process and can be used for workshops, interviews, field trips, discussions and other co-creation activities. All project partners are encouraged to regularly review and update the expert pool. A brainstorming will provide a basis for the initial engagement process. This step builds upon contacts established in the research projects and networks of all partners. The list will be further complemented and updated throughout the duration of the project. Importantly, only (EU-) stakeholders who formally consent by signing a GDPR-compliant form will be included in the EU-CHINA BRIDGE expert pool and considered for engagement (see chapter 5.2).

It is crucial to ensure that stakeholders in each cycle bring diverse backgrounds and perspectives, enabling broad discussions. For interviews, the project team should aim to engage stakeholders who can provide deep insights and who have many years of experience with the specific research questions. As field-trips are designed to be user-oriented, stakeholders should be selected so that they are interested in relevant, practical experiences.

In general, the activities should be designed as transdisciplinary as possible, which is why stakeholders from government (policymakers from China and the EU), industries (companies, industrial representatives, and associations), academia, and civil society from both China and the EU should be invited.

For the co-creation workshops in WP1, the plan is to engage 10–40 stakeholders as participants. For the larger stakeholder dialogues (Task 7.2), aimed at discussing and validating project results, approximately 50–80 participants are planned.

Stakeholders have already expressed strong support for the EU-CHINA BRIDGE project through Letters of Intent, informal exchanges, and by acting as project partners in other research projects. These actions form the basis for stakeholder mapping and are prioritised for inclusion in the project's internal expert pool.

5.1.4 Step 4: Develop an agenda

Creating a well-structured agenda or guideline is crucial for the success of co-creation activities. It provides a clear roadmap for participants and ensures that the objectives are met efficiently. Start by outlining the goals of the co-creation activity and key topics to be covered. With regard to field trips, there should be sufficient time for key points of the observation, for questions and answers, and for refection after each trip. With a focus on workshops the allocation of specific time slots for presentations, group discussions, and interactive sessions are essential to foster active participation. Some ideas for engagement techniques are listed in chapter 3.2.2 and can be used and adapted to the specific focus of the workshop. Include breaks to maintain engagement and energy levels. Additionally, ensure the agenda reflects the diversity of stakeholders and incorporates time for cross-sector dialogue. Finally, circulate the agenda or interview guide in advance to all participants, allowing them to prepare and contribute effectively. This structured approach facilitates a productive and inclusive cocreation process.

5.1.5 Step 5: Invite stakeholder and share information

Engaging the right stakeholders is vital for meaningful co-creation. Begin by identifying and inviting a diverse range of participants from different sectors, including government, industry, academia, and civil society (depending on the research question and focus of the co-creation activity). Clearly communicate the purpose,

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objectives, and expected outcomes in the invitation, ensuring all invitees understand the value of their contribution. Provide background materials, such as reports or summaries, ahead of time to give stakeholders sufficient context and enable informed discussions. This preparation helps build trust, encourages active participation, and sets the stage for a collaborative and successful event. For the field trips, provide logistical details, including travel issues, and schedules and an overview of the planned activities, ensuring participants know what to expect and how to prepare.

5.1.6 Step 6: Define method and tools / engagement techniques

Begin by choosing engagement techniques that align with the objectives of the activity and the backgrounds of participants. There is a wide range of possible methods, that can be used to encourage creativity and a comprehensive discussion. Examples are structured brainstorming, interviews, mind mapping, Future Wheel and Three Horizons. For a list of potential engagement techniques, please check chapter 3.2. Utilise digital collaboration tools like virtual whiteboards and survey platforms to gather real-time feedback and insights. Ensure that the tools are user-friendly and accessible to all participants. It's important to also consider cultural sensitivities and varying levels of technical proficiency when selecting methods. Clearly communicate the purpose and expected outcomes of each technique, providing guidance and support as needed. This careful selection and preparation will enhance engagement, foster innovative thinking, and ensure a smooth and inclusive co-creation process.

5.1.7 Step 7: Start co-creation

Launching the co-creation process requires careful preparation and clear communication. Begin by setting a welcoming and open environment where all participants feel comfortable sharing their ideas. Start the session with a brief introduction, outlining the objectives, agenda, and expected outcomes of the co-creation activity. Establish ground rules to ensure respectful and productive discussions. Use icebreakers or introductory activities to help participants get to know each other and build rapport.

Kick off the co-creation activities by presenting the main challenges or topics to be addressed. Encourage collaborative brainstorming and use facilitation techniques like breakout groups or interactive discussions to explore different perspectives. For interviews, begin by exploring individual perspectives in depth and allowing participants to share their unique insights. During field trips, encourage participants to actively observe and transfer practical insights to the broader research questions. Establish a working routine and ensure that everyone has the opportunity to contribute and that diverse viewpoints are valued. Throughout the process, keep the focus on generating innovative solutions and strategies that can be realistically implemented. This proactive approach helps build momentum, fosters creativity, and lays the foundation for meaningful outcomes from the co-creation activity.

5.1.8 Step 8: Documentation and evaluation

A first step is to assign dedicated note-takers to capture key discussions, decisions, and insights during the sessions. Use audio or video recordings (especially with regard to interviews and field trips), if appropriate and GDPR-compliant, to ensure no important detail is missed. Compile these notes into a comprehensive report, including summaries of key points and visual aids. Share this report with all participants promptly after the cocreation activity.



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For evaluation, collect feedback from participants at the end of the workshop/interview/field trip/... or through surveys or interviews, focusing on the content, structure, and facilitation of the activity. Assess the effectiveness of the engagement techniques used and identify areas for improvement. A potential question is: "What did you like / dislike about the co-creation activity? What would you like to see next time?" This feedback not only helps in refining future co-creation activities but also ensures that the outcomes align with the project's goals. For field trips, specific feedback can be gathered on the relevance of the side visit and how it contributed to the successful implementation of the research project.

5.1.9 Step 9: Share results

The final step is to make the results public and accessible to a broad audience. Especially when insights have been gained from the co-creation activity that could be valuable for other projects or for a broader group of people, these should be communicated externally. Tools like newsletters or social media are ideal for this purpose. Additionally, academic conferences or scientific publications can also be suitable for sharing relevant findings from the workshops and interviews with the public. During excursions, photos, maps or diagrams should be included to visualise the knowledge gained.

5.2 Data protection / ethical considerations / gender approach

Begin by clearly outlining the data protection policies that will be followed, ensuring compliance with relevant regulations like the EU General Data Protection Regulation (GDPR)¹. Inform participants about how their data will be collected, stored, and used, and secure their consent. Contact data will be added to the joint stakeholder list only after obtaining prior consent from the data subject (opt-in approach). Emphasise the importance of confidentiality and safeguard all personal information shared during the activities. All partners ensure that data protection is taken into account when collecting data. The stakeholder list is stored on the project's internal data exchange system. All data contained in the EU-CHINA BRIDGE expert pool is only accessible to the project partners and will neither be made publicly available nor passed on to third parties. The stakeholder list serves the sole purpose of facilitating interaction between the stakeholders and the consortium.

Ethical considerations should guide every aspect of the co-creation process. This includes ensuring transparency, respecting participant privacy, and maintaining an open and non-judgmental environment. Interact with all stakeholder non -discriminatory in terms of race, gender, age, income, language, literacy, disability. Address any potential ethical dilemmas and establish protocols for resolving them.

Furthermore, adopting a gender-sensitive approach is crucial to promoting inclusivity. Ensure balanced representation and strive to achieve a gender balance with at least 50% representation of women in stakeholder groups. Be mindful of gender-specific needs and perspectives, and actively work to eliminate biases. This has to be considered as a part of the design, planning and organisation of these events (e.g., attendance at events, keynote addresses, setting agendas, etc.).

¹ See https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R0679







6 Conclusion and next steps

These guidelines provide a basis for conducting co-creation activities within the EU-CHINA BRIDGE project. They offer a structured framework that outlines the relevance of co-creation processes with relevant stakeholders and details the underlying principles. By following these guidelines, all project partners can develop a shared understanding of the specific approaches and processes. Specific methods and concrete implementation steps have been defined for the three co-creation cycles of the EU-CHINA BRIDGE project, ensuring a consistent and goal-oriented approach.

However, these guidelines are designed to be flexible. While they provide a solid basis, they can be adapted according to the specific focus of the activity, the target audience, and the particular research questions. The adaptability of this guideline ensures that it can be applied to a wide range of topics and different cultural and organisational contexts within the project.



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ANNEX

6.1 Checklist and templates

All the checklists and templates are available in the project-intern data exchange system.



6.1.1 Expert Pool

VARIABLE	CATEGORIES
Name	
Position	
Organisation	
GDPR form signed (only for EU partners)	- Yes - no
Stakeholder category	 Policymaker Industry / private sector NGO Academia Civil society
Field of activity / sector / Focus area	
Interest in engagement	- High - Average - low
Level of influence / Power	- High - Average - Low
EU-CHINA BRIDGE cycle	- 1 - 2 - 3

	A	В	C	D	E	F	G	H	1	J	K	L	M	N	0	
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6.1.2 Stakeholder engagement plan

The stakeholder engagement plan includes 1) strategic issues, 2) documentation and 3) practical issues.

1. Strategic issues

Background / Work Package

Please include information on the background of the cycle / work package, if needed

Objective and purpose of the workshop (linked to EU-CHINA BRIDGE)

Please include some information on the existing challenges / research questions etc.

Engagement techniques / tools

Please include some information on the engagement techniques used.

Examples are:

- On-site survey
- Interviews
- Three horizons
- World Cafe
- Mind mapping
- Fishbowl

Targeted stakeholders

Please include some information on potential stakeholders

Required research output

Please include some information on research output that is needed to implement an effective workshop or other co-creation activity.

Expected / desirable output

Please include some information on the expected or desirable output of the workshop or other cocreation activity.



2. Documentation	
Annala	
Agenda	
List of participants	
Name	Organisation
Name Minutes	Organisation
Minutes Please include here the minutes of the co-creation	
Minutes	
Minutes Please include here the minutes of the co-creation	
Minutes Please include here the minutes of the co-creation	

Please include here the feedback from the participants and implications for future workshops or

Key findings for the future EU-CHINA BRIDGE activities

What are key findings from the workshop/ activity that are helpful for the future work in the project

3. Practical issues

Responsible partner



D_{1.1} – Stakeholder Engagement Plan with detailed process design



Please include some information on the project partner that is responsible to organise the workshop or other co-creation activity.

Resources (financial / non-financial)

Please include some information on financial and non-financial resources that are needed to organise the workshop or other co-creation activity.

Venue

Please include some information on the venue (in person / online)

Time schedule

Please indicate when the workshop/ co-creation activity will take place including a time schedule

Accommodation

Please include some information on the accommodation (if needed)

Travel issues

Please include some information on travel issues (if needed)

Catering

Please include some information on the catering (if needed,