NET-ZERO INDUSTRIES MISSION

Increasing Productivity with Effective Knowledge Sharing

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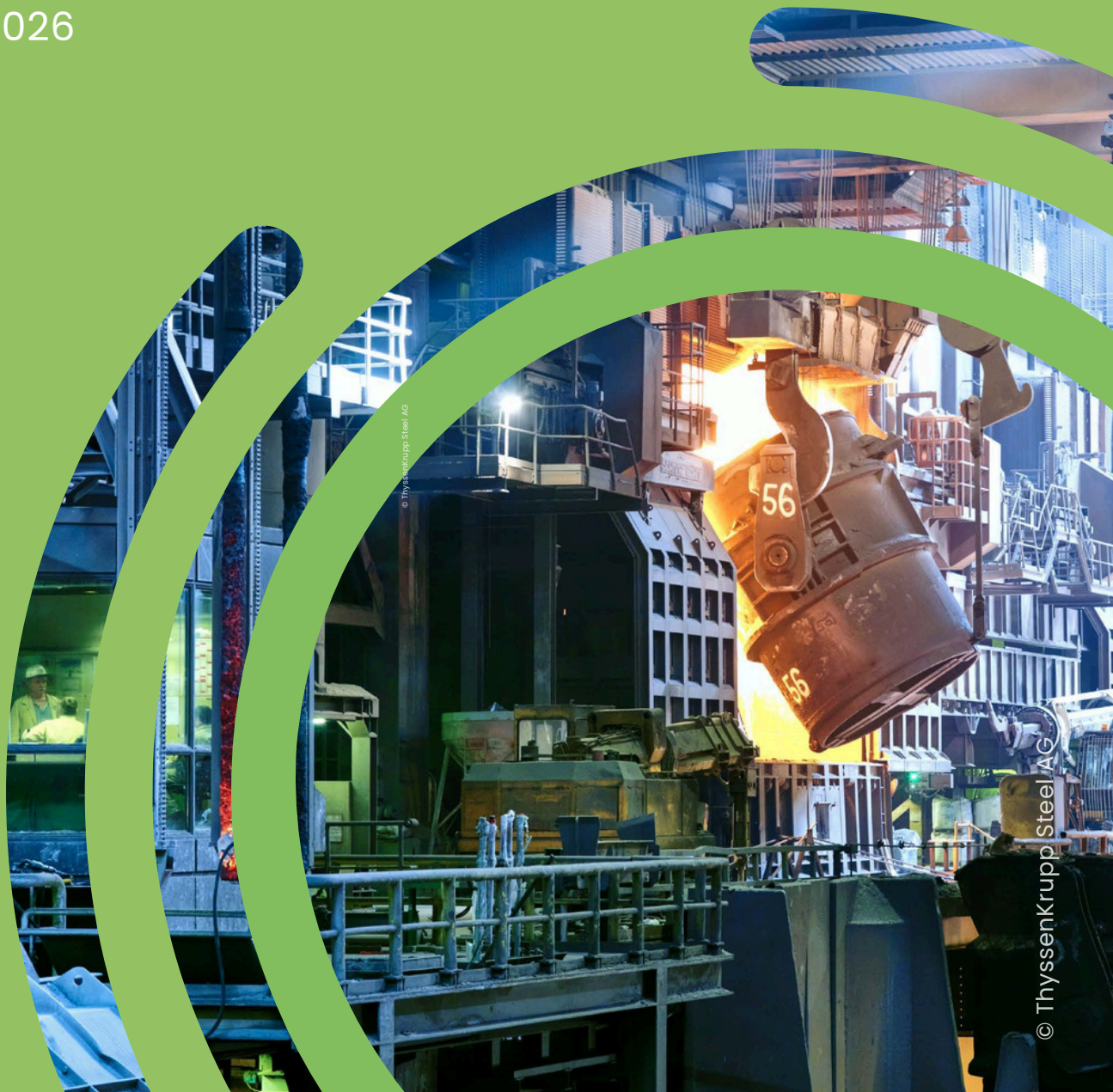

Increasing Productivity with Effective Knowledge Sharing

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About Net-Zero Industries & Mission Innovation

Mission Innovation (MI) is a global initiative of 23 countries and the European Commission (on behalf of the European Union), catalysing a decade of action and investment in research, development, and demonstration (RD&D) to make clean energy affordable, attractive and accessible for all. These efforts accelerate progress towards the Paris Agreement goals and pathways to net zero.

Mission Innovation's Net-Zero Industries Mission (NIM) was established to unify the actions of key stakeholder groups, to support the heavy emitting sectors in **accelerating the adoption of decarbonisation technologies**.

Energy intensive industries are responsible for around 25% of global greenhouse gas emissions. RD&D over the next decade will be critical to develop and validate innovative industrial processes and technologies that enable radical emission cuts beyond 2030 at lowest costs[1].

The current investment from industry is falling behind the rate of change required to meet global emission targets for 2030, let alone 2050. The time required to demonstrate and gain industry acceptance of new decarbonisation technologies is significant and requires immediate action if we are to make a positive change in the industry understanding, confidence and **investability** of decarbonisation technologies in time for 2030.

[1] Action Plan, Net-Zero Industries Mission, 2023

Executive Summary

This paper is written for global initiatives, funding bodies, research programs and collaborative platforms working on industrial decarbonisation. It presents Effective Knowledge Sharing as a practical way to build on the momentum already created by these efforts, by helping align activities more closely with the priority needs of stakeholders responsible for concrete decarbonisation decisions, investments and deployments. As 2030 approaches, this stronger alignment can help increase the impact and usefulness of collaborative efforts in support of our shared goals.

To progress towards our Net-Zero goals in industrial decarbonisation, the sharing of knowledge on critical technologies, and successful operating and regulatory models is a key enabler and accelerator of tangible action and investment.

As 2030 rapidly approaches and our progress towards our goals increases in importance, the time has come for increasing the productivity of our global efforts. There is no question that the global community is committed and active in industrial decarbonisation. The priority now is to convert that momentum into the most productive actions, so every effort delivers greater impact in the sprint to 2030.

The challenge is to define the actions that are the most productive, in order to maximise the impacts we make in the sprint to 2030. This need for productivity is recognised in the COP30 Action Agenda[2] and in the 2026 Breakthrough Agenda report[3].

Effective Knowledge Sharing (EKS) is proposed as a mechanism to assist in both the prioritisation of effort and increase in productivity, by aligning international efforts with the agreed priority needs of the stakeholders responsible for the most concrete and tangible investments and actions in decarbonisation.

The four steps of the Effective Knowledge Sharing process:

1. **Identify the key stakeholders**
2. **Determine and prioritise their real needs**
3. **Cultivate, Curate, and Create knowledge to meet those needs**
4. **Provide the knowledge back to the stakeholders**

The process promotes focus to identify and prioritise activity on the information, knowledge and outcomes which directly enable or accelerate the concrete decarbonisation actions of the key stakeholders responsible for delivering our carbon emission reductions. This will improve our overall productivity, including accelerated progress and greater impact of funds and effort deployed. Implementing the process requires only minor adjustments to current processes over time, and real improvement in productivity can be achieved in a relatively short time frame.

Given the complicated and broad mix of stakeholder needs that will need to be addressed in this process, the paper also proposes the need for and a methodology to define a Knowledge Priority Breakdown Structure (KPBS). This breakdown structure will allow both classification and greater

[2] COP30 Action Agenda Priorities, COP30 Presidency 2025
[3] Breakthrough Agenda Report 2026, International Energy Agency

manageability of this broad collection of needs, as we assess both the priorities within it and progress of actions against the needs it contains.

Other benefits of having a defined KPBS are also suggested, including support for the stated goals of the COP30 Action Agenda in streamlining and merging duplicated or mutually supportive initiatives, and identifying critical gaps in both actions and support required for concrete decarbonisation progress and investment by the central stakeholders.

The paper highlights existing programs of work to demonstrate the value in the principles of EKS, and an AI project[7] undertaken by the Net-Zero Industries Mission which built a demonstration breakdown structure framework to categorise stakeholder needs.

Examples are provided from the Australian government programs of the Cooperative Research Centres (CRCs)[17,18] and the Australian Renewable Energy Agency (ARENA)[20], to demonstrate the benefits of engaging with both operational and government stakeholders when determining needs for prioritising research and demonstration efforts in industrial decarbonisation.

A detailed description of NIM's AI trial program is included in the Appendix, as the modelling previously completed correlates highly with the solution proposed herein for structuring and classifying stakeholder needs. The AI trial program effectively designed a methodology and sample KPBS to map out stakeholder needs for the adoption and investment of industrial decarbonisation technologies. The project undertook this work to both teach an AI what information was most relevant, and as a structured data model to maintain the collected information in a contextual and accessible manner.

This paper also suggests avenues of how the principles of EKS can directly benefit the productivity of the international decarbonisation community, with direct linkage examples of small changes in existing processes that could adopt the principles of EKS described here. This will include utilising the categorisations of a shared KPBS to help consolidate work efforts of the international community. For example, to aid in prioritising both funding and allocation of tasks to initiatives, and improving the curation and management of knowledge generated to ensure its accessibility and delivery to all relevant stakeholders and future work efforts.

The primary conclusion of this paper is that to achieve the productivity gains and return on investment required as 2030 targets approach, efforts and outputs must be more closely aligned with the priority needs of the stakeholders responsible for delivering the essential and urgent emissions reductions. This will require stronger engagement between the global initiative community and these stakeholders, supported by a structured process to ensure that when a priority need is addressed through these initiatives, the resulting outputs are delivered to the relevant stakeholders and the need is formally cleared from the priority list, enabling progress on other concurrent issues requiring attention.

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1. Introduction

In this paper, we introduce Effective Knowledge Sharing (EKS) as a practical philosophy and methodology to help global initiatives, funding bodies, research programs and collaborative platforms increase the impact of their work towards industrial decarbonisation. As 2030 approaches, EKS offers a simple and scalable way to build on existing international momentum by aligning knowledge-sharing activities more closely with the needs of stakeholders whose decisions, investments and deployments will determine the pace of real-world decarbonisation.

As our obligations for 2030 and 2050 become more urgent, it is essential to become more strategic in our deployment of effort and resources. We must maximise the impact and relevance of the efforts towards achieving our goals. How then do we ensure the greatest productivity of these global efforts?

With this urgency in mind, this paper describes the need to prioritise current activities aimed towards one of the largest fields of action required in meeting our global climate targets, that of Knowledge Sharing. Specifically, the sharing of knowledge that is needed by key stakeholders responsible to deliver real change in our emissions and energy consumption.

The challenge for knowledge sharing is both the complexity of stakeholder needs involved and the enormous scale of the task. There are a multitude of different groups of stakeholders at the front line of industrial decarbonisation, and each have their own set of specific needs for knowledge. Some stakeholders may not yet have clarity on the exact knowledge they need in order to enable their actions.

At its simplest, we might suggest that to deploy a decarbonisation solution in industry, we need to have established enough trust[4] and knowledge for an industry operator to invest in the technology solution best suited for their operational and commercial needs. However, that technology might not be sufficiently developed, there might be poor commercial returns for a project, the technology may not be acceptable to a location's regulatory requirements, or a financier or insurer may not consider the risk of the investment and change to be acceptable.

Each of those parties, and more, including the engineers who design the plants incorporating the technologies, and the researchers and technology developers themselves who help define and manage the technical risks, all need to progress their knowledge and trust as we move a technology from concepts to proven and demonstrated solutions that can be invested in with risks considered to be at an acceptable or "business as usual" (BAU) level.

Our global challenge of industrial decarbonisation is not achieved with producing one successful finding, a single milestone being reached, or one invention being made. Real emissions reduction requires dozens of technologies to be proven and investable across thousands of projects and locations around the world. Our problem then is not just meeting the needs of a set of stakeholders involved in one financial and operational decision, but thousands of stakeholders making decisions on many projects in multiple industries and countries between now and each of 2030, 2040 and 2050.

[4] "The Currency of Trust", NIM Whitepaper Series

Given the scale of change required in the limited time remaining, we must prioritise efforts that have a clear and tangible link to making real progress to invest and adopt the technology solutions at the scale required for meeting our global targets.

From this intent, the definition of Effective Knowledge Sharing was born. An intentionally simple process defined to link together the activities of knowledge creation and dissemination, with a clear and justified purpose and target audience.

1.1. Background and history

In September 2025, the Presidency of COP30 invited recognised international programs to share their plans with the Action Agenda. Their aim was to utilise COP as an accelerant to promote and amplify the work of the existing major global initiatives[2]. This plan recognised the outstanding contribution being made by hundreds of current programs across every aspect of our climate challenge. Their primary intents include to help coordinate, to bring greater collaboration, reduce duplication, and find ways to better fund and accelerate collaborative programs that would provide tangible progress towards global targets.

As an invited member, the Net-Zero Industries Mission was keen to investigate how a closer collaboration with the COP Action Agenda could help find partners and funding for a range of our projects, from our knowledge sharing activities derived from our annual awards program[5], to our demonstration project database[6], or our research into the use of AI to curate more relevant and up to date information for stakeholders looking to invest and adopt key decarbonisation technologies[7].

Feedback indicated we needed to approach the problem at a larger scale than individual projects to be relevant in the COP Action Agenda strategy. This candid assessment motivated consideration as to why we structured and implemented the projects included in the NIM Action Plan[8,9].

NIM's strategy has always centred on knowing who our key stakeholders are in achieving industrial decarbonisation, and ensuring we tailor our actions and activities to meet the needs of those stakeholders. From this realisation, the definition of EKS was born, and a simplified process was defined to enable others to both understand and implement its core methodology to their specific target areas.

The principles of EKS were accepted by the secretariat for Activation Group 2 ("Accelerating zero and low emission technologies in hard-to-abate sectors")[10] and requested they be included in the Plans to Accelerate Solutions (PAS) being developed across all key industry sectors. The mapping of all Activation Groups withing the six Thematic Axes is provided in Figure 1.

[5] Net-Zero Industries Awards
[6] NIM Global Knowledge Exchange
[7] "The Application of AI to Improve Technology Demonstration Databases", NIM Whitepaper Series
[8] NIM Action Plan, March 2026
[9] NIM Action Plan, March 2023
[10] COP30 Action Agenda - Activation Groups

Figure 1. The 30 key Objectives of the COP30 Action Agenda, each with an Activation Group. AG2 is the largest group, focused on industrial decarbonisation

2. Defining EKS

Setting a requirement for a scalable yet simple process to help focus effort on tangible actions of industry in achieving emissions reductions, a simple four-step process was defined to link all actions on the creation and curation of knowledge, with the immediate priority needs of stakeholders who must deliver on targeted emissions reductions.

The process should close the loop between identifying and listening to the needs of stakeholders who need specific knowledge to build confidence or trust before they can act, and ensuring when that knowledge is obtained, it is shared quickly and efficiently back to the relevant audience.

With this simple requirement, we can ensure activities we prioritise are timely, relevant and required by real decision makers in the decarbonisation of our supply chains, and we also define the process to link this information directly to the audience that needs it.

The overall process is defined with four discrete steps:

1. **Identify the key stakeholders required to achieve our goals of industrial decarbonisation**
2. **Determine and prioritise their real needs from knowledge and information to enable adoption and investment in solutions**
3. **Cultivate, Curate, and Create knowledge and information that meets those needs**
4. **Coordinate the dissemination of that knowledge back to the stakeholders**

This process is intended to be iterative, and to work away at the large volume of needs of these stakeholders on a priority basis, also allowing for agility, incorporating feedback and changing requirements that were not immediately evident in the first endeavours to determine needs.

Behind its simplicity, lies a powerful means to help classify, prioritise, monitor and ensure compliance with directing efforts towards more effective progress on our shared decarbonisation goals. This is discussed in section 2.2.

2.1. Identifying Stakeholders

With a focus on industrial decarbonisation, the Net-Zero Industries Mission has already identified six critical stakeholder groups required in the delivery of technology solutions, recognising their journey from technical concepts through research & development, demonstration, to their scaled deployment in industry.

These six groups are represented in Figure 2 below. It is immediately apparent that industry operators and technology providers are involved. However, the role of governments and regulators, research providers, financiers of projects and operations, and the engineers who design and build, but also validate the technical and commercial viability of projects to gain investment approval for adoption, should not be understated.

Each will have specific needs for information, both technical and commercial, to make their decisions and approvals in the overall ecosystem of these large-scale and high-risk investment and adoption decisions. It is noted that the public is also a key stakeholder group, able to influence project approvals and government policy. There has been a conscious decision in this paper to exclude their examples from this review, to avoid an oversimplification of their diverse and

Figure 2 The six critical stakeholder groups identified for demonstrating and deploying technology solutions by the Net-Zero Industries Mission

localised needs and perspectives. It is assumed that a summary of their needs is already represented in the United Nations Sustainable Development Goals[11] (SDGs).

For the remaining six stakeholder groups, it is important to identify and engage a suitably representative and unbiased cohort, to gain the best insights into global level and shared needs and priorities when it comes to knowledge and information prioritisation. Helping many with relevant information is preferred to providing perfect or bespoke information to a single person or entity, to maximise the impact made.

2.2. Identifying Needs

Needs identification is critical in the process to remove any suggestion of assumption, bias, or simplification on the part of those who fund or create the information on industrial decarbonisation. It is also a key element of the process to ensure we are closing the loop on creating and disseminating information that is directly linked to a need identified and prioritised by a group of stakeholders determined to be essential in the path to achieving industrial decarbonisation.

To prioritise the needs of a stakeholder group, requires sufficient engagement with that group to collect and learn their needs, and to gain a collective agreement on the priority areas of knowledge that should be addressed. Collecting that information from the stakeholder could be generalised or ad hoc, however it will be more valuable in the global context if we apply a framework to structure the collection of needs.

Indeed, while the concept of EKS is simple, the scale and diversity of the stakeholder needs is such that a secondary solution will be beneficial. Just as the COP Action Agenda has defined 6 themes and 30 priority activation groups to help categorise the global collective of action plans, an even greater advantage will come from applying a similar principal in categorising those diverse stakeholder needs. Such a process is proposed here to supplement the EKS process and its effective adoption.

A Knowledge Priorities Breakdown Structure (KPBS)

A structured framework for the categorisation and prioritisation of stakeholder needs need not be complicated, but like any important and detailed undertaking, a breakdown structure provides both a classification and assessment framework that reduces complexity through compartmentalisation. Any major or complicated undertaking, from managing operational risk[12] to delivery of major capital projects[13], benefits from the application of a breakdown structure to classify and reduce the complexity of an entire environment into distinct and manageable elements.

The categorization of stakeholder needs is complex enough to benefit from a similar approach. While project management standards have applied tools for stakeholder analysis[14], in this situation we have a combination of a stakeholder analysis, and the definition and listing of their needs. This combination requires a bespoke work breakdown structure in order to facilitate the volume and complexity of tasks that will be required across multiple stakeholder groups. A Knowledge

[11] Sustainable Development Goals, United Nations, Department of Economic and Social Affairs
[12] "Use a risk breakdown structure (RBS) to understand your risks" – Project Management Institute
[13] "Work breakdown structure practice standard" – Project Management Institute
[14] "Stakeholder analysis" – Project Management Institute

Priorities Breakdown Structure (KPBS) is proposed as a valuable contribution to delivering both EKS and increased productivity in our current global efforts.

While the exact format of the work breakdown structure is not a critical element of the success of our global decarbonisation challenge, the recent artificial intelligence trial undertaken by the Net-Zero Industries Mission has provided both a relevant and applicable exemplar that could be applied on a global scale. A summary of this work is included here not as a final solution but as a suggestion towards a workable outcome in developing a standardised KPBS. Specific information on this trial and its methodology is included in the Appendix.

At its conclusion, the trial demonstrated a methodology to classify specific stakeholder needs for the adoption and investment in decarbonisation technology, through a structured breakdown structure of knowledge themes and key knowledge question fields. A subset of the trial breakdown structure derived is shown in Table 1. The example in the table highlights twelve key question fields classified under two categorisations of knowledge themes (Value Based and Subject Based).

With a defined baseline structure and demonstrated process for stakeholder engagement and needs categorisation and prioritisation, it is believed that an expansion of this trial to a real-world scale representative model and Knowledge Priority Breakdown Structure (KPBS) is merely a commitment of effort, rather than a technical challenge to overcome.

With an increasing recognition of the need for more tangible action, and initiatives such as the COP 30 Action Agenda's Granary of Solutions[15] asking for increased consolidation, collaboration and acceleration of actions from multiple parallel initiatives and their shared stakeholders, such a

ID	Question	Value	Subject
Q01	Which are the leading (high TRL) commercially available technologies in each field?	Identifying feasible investments	Tech landscape / market analysis
Q02	What other companies utilise this technology? What is their valuation and TRL?	Identifying feasible investments	Tech landscape / market analysis
Q03	What are the latest innovations in carbon utilisation technologies for converting CO2 emissions into valuable products in the cement industry?	Identifying feasible investments	Tech landscape / market analysis
Q04	What is TRL of this technology, are there demonstrators?	Identifying feasible investments	Tech landscape / market analysis
Q05	Where have these technologies been demonstrated, and how have they been approved?	Speeding up development	Deployment and approval
Q06	What are some of the potential issues that can slow down technology deployment? How are producers solving these issues?	Speeding up development	Deployment and approval
Q07	Is there infrastructure in place to support the deployment of this technology?	Speeding up development	Deployment and approval
Q08	Are there policies in place to support deployment?	Speeding up development	Deployment and approval
Q09	Has technology like this received a permit in a similar site, what were the requirements?	Speeding up development	Deployment and approval
Q10	How confident are we in the investability of these technologies?	Identifying feasible investments	Financial analysis and viability
Q11	Is this company engaged in developing the mentioned technology or applying it?	Identifying feasible investments	Financial analysis and viability
Q12	What commercial terms were applied?	Optimise industry funding	Financial analysis and viability

Table 1. The final shortlist of Guiding Questions included in the AI trial project.

[15] Granary of Solutions, Action Agenda, COP30 Brasil Amazonia Belem 2025

classification framework can provide a powerful instrument to assist in grouping actions to meet these objectives.

2.3. Cultivate, Curate, and Create Knowledge

The majority of existing actions being undertaken right now by initiatives and private parties would come under this step in the EKS process. These actions could include generating solutions and policies, funding programs, or research and technology development programs.

The change from EKS comes not in how they do this important work, but in how we choose and prioritise which work is most important, how we ensure the work is aimed at specific stakeholder needs, and empowering the teams working on these tasks with both clarity and responsibility to ensure their work outputs are delivered to the stakeholders who need it. This visibility of specific stakeholder needs brings with it an increased opportunity to engage with those stakeholders during the process to maximise alignment and relevance of their findings.

Adding the EKS concept of ***Curate***, ***Cultivate*** and ***Create*** also provides a balanced perspective on alternative methods to obtain the required information. When faced with an important unanswered question, it is natural for people and organisations to move quickly toward *creating* a new answer. In psychology, this reflects familiar patterns such as “Instinctive Elaboration” or “Cognitive Constraints”[16], where available experience, incentives and problem framing can shape the solutions we consider first. EKS does not diminish the value of new research or innovation; rather, it encourages an earlier check on whether the required knowledge could first be *curated* from existing sources, *cultivated* through better sharing, or *created* where a genuine gap remains.

Lifting the visibility of a classification and prioritisation process to the strategic planning level, and an increased focus on key stakeholder priorities across whole portfolios of action, will allow greater visibility of any potential duplication of initiatives, and can drive greater collaboration on the existing work efforts on common goals. This is a key objective of the COP30 Action Agenda process and strategy. EKS process step 3 is also intended to question if *creation* is required, or if *curation* of existing information and solutions, or the *cultivation* to incentivise the sharing of existing knowledge that is not immediately accessible in the public domain, is a viable alternative.

Curation is an underutilised pathway. Investment in the collation of existing materials and information is not always as exciting or cutting-edge as new research, nor as professionally rewarding to the participants[16]. Nevertheless, it may present a faster and more effective pathway to meeting our urgent stakeholder needs.

In the NIM whitepaper[7] on the application of AI to curate and collate multiple complimentary technology demonstration databases, significant informational gaps were filled using the AI tools from existing public domain information sources. The relevance, source and verifiable quality of the information was assessed before integrating it into the knowledgebase created by the AI. This increased the quality of data available to meet defined stakeholder needs. A stylised graphical representation of this increase in quality, first via collation of existing technology demonstration database content, then by public domain content harvesting, each by the AI tools utilising its KPBS, is shown in Figure 3, highlighted via colour intensity and quality score as the data moved

[16] “The psychology of experimental psychologists: Overcoming cognitive constraints to improve research”, Bishop, D 2019

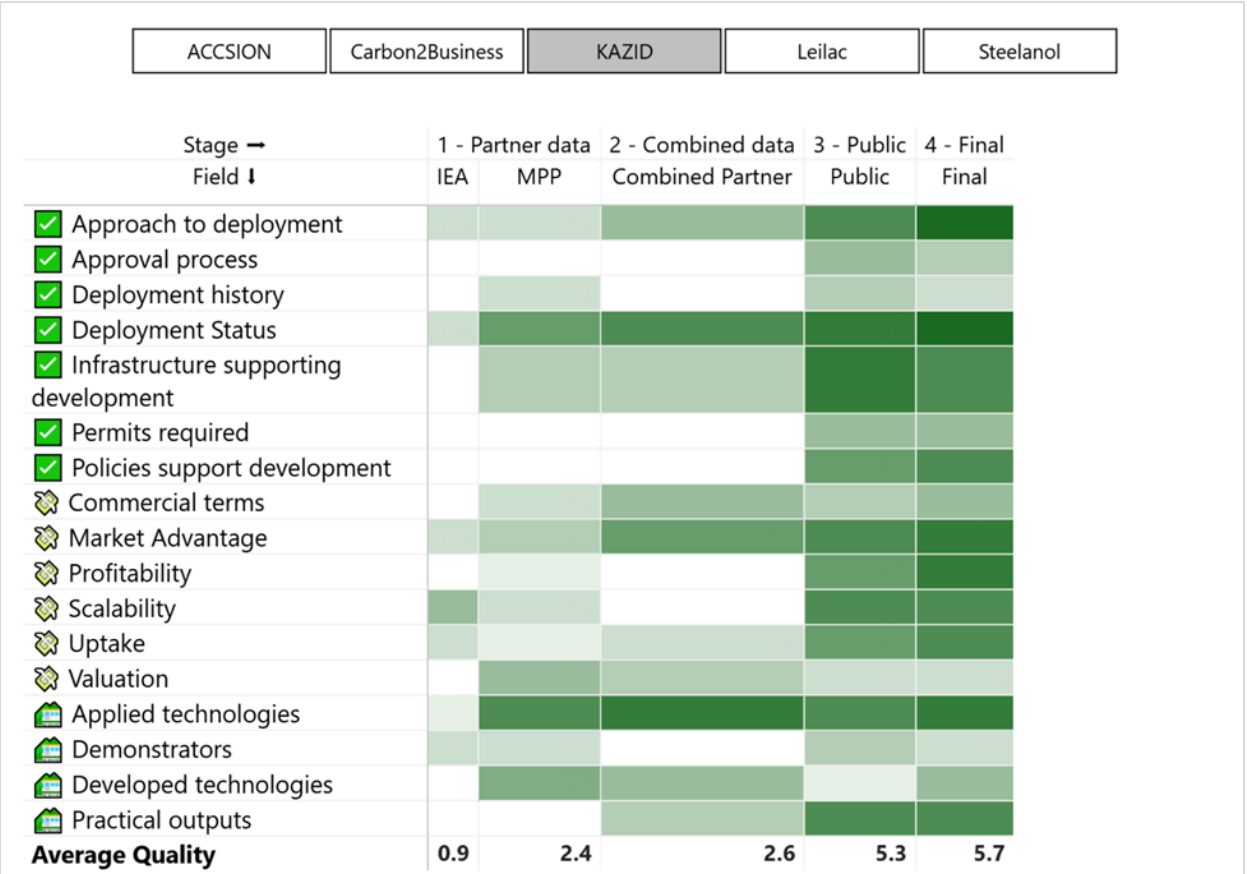

Figure 3. Stylised representation of data quality improvements through database merging and public domain data harvesting against a KPBS structure with AI

from left to right in the AI curation process. First assessing existing shared information from partner databases, then sharing information between partner databases, then incorporating *curated* knowledge from verified public sources.

Almost universally in the pilot examples of that project, the quality and quantity of information was increased either notably or significantly over that currently contained in major existing technology demonstration databases. As the AI solution also incorporated a wider question set of known stakeholder needs than previously considered, it also guaranteed that the information gathered was of greater value and able to meet more stakeholder needs than was traditionally contained in the existing databases.

Cultivation of data can take multiple forms. The examples of incentivisation and subsidisation are called out here for exploration. While incorrect to assume all funding is from public sources, public funding plays an important role in how we prioritise and set expectations for the quality and content of knowledge that is generated in exchange for this funding. Simple priority areas or target topics for funding calls can steer action in the right area, but do not directly link stakeholder needs with research or development activities and their delivery of outputs. The very physical limitation of defining outputs from a three-year research grant at the outset is obvious if you consider the dynamic and urgent market needs we must meet when facing a 2030 target in only four years' time.

Two examples highlighted here from Australia demonstrate how much further this alignment with stakeholder needs can be extended. Regarding early-stage research and development, up to and including pilot-scale demonstrations, the structure of the Cooperative Research Centre (CRC)[17,18] program provides government funding to match industry cash investment on a jointly agreed priority field of study. The program has been in operation continuously across multiple priority topics since 1991. Industry must also contribute and exceed their cash investment with an in-kind contribution towards the research program. This joint investment between governments, researchers and industry, with governance representing all three stakeholder groups at both strategic and operational level, ensures a dynamic environment for both short and medium scale projects that must meet the evolving needs of industry stakeholders in order to be approved.

Operating on a ten-year timeframe, each CRC maintains its relevance and is audited regularly against its industry sponsorship and their active participation. The capturing of stakeholder needs to steer the research and development projects financed by the CRC becomes embedded in the approval process for each project proposed, and in the ongoing engagement and participation in the project delivery by the industry representatives. The CRC program is measured by its longevity and success, with continued collaboration and investment from all stakeholder groups, and many examples of successful research programs evolving into industry accepted technology solutions over the last thirty-five years.

At the latter stages of research and development post TRL 6[19], as we move to commercial scaled demonstrations, the Australian Renewable Energy Agency (ARENA), manages the distribution and administration of large development and subsidy capital funds on behalf of the Australian Government. Primarily these are targeted at priority topics such as renewable power generation, demonstration of critical minerals capabilities, and low-emission technologies for metals production. These project subsidies are often a minority component of the overall project funding, but still a major incentivisation for achieving the Final Investment Decision (FID) for a large-scale demonstration project (i.e. *Cultivation*).

A key principle developed by ARENA in its administration of both applications for funding and distribution of funds, is in its management of knowledge sharing. To apply for funding through ARENA, all applicants must submit a Knowledge Sharing Plan[20] (KSP), highlighting how their project will generate and provide key aspects of the knowledge generated from the project back to ARENA for public disclosure with a wide stakeholder base via its Knowledge Bank[21]. These KSP, and the negotiations held in defining the KSP as part of the final funding agreements, provide the perfect opportunity to capture key stakeholder requirements that will be generated during the execution of the project that is to be subsidised. They also provide a guaranteed mechanism of disclosure and sharing of that knowledge back to ARENA for public dissemination to the wider stakeholder pool that would benefit from the knowledge *creation*, in exchange for continued access to staged subsidy funding from ARENA.

Even at an operational level, simple incentivisation in combination with a clear understanding of stakeholder needs can result in significantly higher levels of disclosure of information than

[17] Heavy Industry Low-Carbon Transition CRC (HILT)
[18] Cooperative Research Centre Program, Cooperative Research Australia
[19] "Technology Readiness Level Definitions", National Aeronautical and Space Administration
[20] Knowledge Sharing Plan Guidance Document, Australian Renewable Energy Agency
[21] Knowledge Bank, Australian Renewable Energy Agency

normally experienced, and a targeting of information that meets specific stakeholder needs. Between 2023 and 2025, NIM has held an annual awards program, with the premier category celebrating Outstanding Projects in Industrial Decarbonisation[22]. In order to be considered for the award each year, both commercially and government funded projects can submit an application for independent jury analysis, answering specific questions on the technology demonstration progress, funding, performance, emissions reduction, and pathways to future commercial application. This information is used not only to allow selection of both global and national winners for this prize category, but also for disclosure on the NIM Global Knowledge Exchange platform and its Demonstration Project Database[23]. These project disclosures are available freely to the public and industry to help with future investment and adoption decisions of these technologies as potential industrial decarbonisation solutions. As of 2025, twenty-seven technologies have been showcased from this program in the NIM database, and additional disclosures made via various seminars, webinars and publications. Figure 4 provides an example of a demonstration project report included in the NIM Project Demonstration Database, and available for download on the NIM website[23].

Notably, the detailed stakeholder needs identified in the NIM AI trial program, are being reviewed to improve the relevance of questions asked in the NIM Award application process, to ensure the information gathered and shared is of greatest value to the wider stakeholder community.

Figure 4. Example of Demonstration Project reporting incentivised by the NIM Awards program.

[22] Net-Zero Industries Awards, Net-Zero Industries Mission, Mission Innovation
[23] Global Knowledge Exchange, Demonstration Project Database, Net-Zero Industries Mission, Mission Innovation

2.4. Dissemination and Feedback

While seemingly redundant, the need to ensure that information funded, created or collected is communicated to those who need it is not a process that can be assumed. The EKS process asks for similar conditions to be added to all step 3 processes (*Cultivate, Curate, Create*), for the targeted dissemination of this knowledge back to the relevant stakeholder pool that was used to justify and prioritise its generation in steps 1 & 2. It is of course recommended that the information and knowledge is also available to the wider community, such as via a public disclosure database or knowledge base, but that special effort is assigned to ensure the requesting stakeholders are made aware of, and preferably can give feedback on whether their needs have been met by the effort invested in step 3.

In the example of the CRC program described above, all participating industry stakeholders are regularly briefed on project progress and final reports, and are actively engaged in planning follow on projects for future work. This includes major progress planning such as collaboration on joint industry and government support to progress from R&D to Demonstration phases for technologies and solutions, which lie outside of the CRC operating environment, and come under later stage programs such as those administered by ARENA.

3. Potential for Future Adoption

With the increased need for productivity from our actions in the coming years[3], efforts to align actions with tangible results will make the greatest impact. At its core, EKS is a structure to help enable this in practice, but changes may be required to what happens today. A greater focus on productivity of our actions and investments is key, and some suggestions are included here to seed thought on how the global decarbonisation community can adapt, and not discard, their current motivations and activities in order to increase that relevance and productivity in achieving our urgent climate goals.

The identification of key stakeholders and both identifying and prioritising their needs for adopting decarbonisation solutions, creates an environment where greater stakeholder involvement and collaboration can become embedded in our decision making and solution development processes. This can be implemented in processes such as:

- Increased stakeholder involvement in research and technology development, across finance, government and industry
- Clearer investment priorities and design objectives defined for technology developers
- Change in specificity and focus for public fund allocation priorities, including defined outputs and defined stakeholders as customers for outputs
- Increased support towards handover between RD&D phases (Research → Developer & Engineering → Industry), with stakeholder involvement from latter phases engaged in earlier programs. (In Engineering, for example, this is called constructability and operability in design)

A framework where stakeholder needs are clearly identified and classified, and prioritised by urgency and impact would provide an assessment tool where:

- Various global efforts and actions can be categorised, then matched, allowing opportunities for collaboration and amalgamation to be identified
- More detailed priorities for research, public funding and action can be assigned, and direct links made from research outputs to their intended customer for progression to implementable solution and more continuous stakeholder involvement
- Information gathered can be classified and compiled, and directly shared with or accessed by relevant stakeholders

Focusing efforts against prioritised needs can:

- Increase productivity of action and investment, with direct linkages demonstrated towards identified stakeholders and their tangible actions and decisions
- Increased stakeholder involvement in both the setting of outcomes from decarbonisation efforts, and closer collaboration to ensure efforts expedite tangible and concrete advantages to those stakeholders
- Minimise green-washing of claims and activities that are related but not contributing to urgent climate action and decarbonisation

EKS envisages an ecosystem where a greater connection and engagement exists between those groups responsible for delivering tangible progress in our decarbonisation challenge, and the community dedicated to assisting with that journey, whether they are publicly or privately funded. It provides a framework of four simple actions where urgent stakeholder needs are identified, and efforts are focused by global initiatives on both addressing those needs and ensuring they have met the needs of those stakeholders. In doing so, it guarantees an increase in productivity of our actions as we close in on the essential 2030 and 2040 climate targets we have set.

4. Conclusion

Effective Knowledge Sharing (EKS) has been proposed as a simple yet powerful process to increase the productivity of global decarbonisation efforts, by aligning global initiative actions with the prioritised needs of key stakeholders, to support or enable their direct and urgent progress against our climate targets.

This whitepaper has presented a structured, yet simple four step process that can easily influence existing processes and decisions in our field, to ensure we both prioritise efforts where they will do the most productive good, and ensure efforts and outputs are both aligned and delivered to the key stakeholders who ultimately need to take the concrete actions that will achieve our urgent climate goals.

The four-step EKS process can be simplified as:

1. **Identify the key stakeholders**
2. **Determine and prioritise their real needs**
3. **Cultivate, Curate, and Create knowledge to meet those needs**
4. **Provide the knowledge back to the stakeholders**

Furthermore, it is proposed a framework or breakdown structure, described as a Knowledge Priorities Breakdown Structure (KPBS), will allow for increased classification of those stakeholder needs proposed in step 2, and as a framework to help map and coordinate all global efforts against these needs in categorising the efforts of all international initiatives working on our the various aspects and elements of our shared global goals.

An example of a working KPBS and the means to help define its content, as created by NIM to facilitate an AI demonstration project that collated technoeconomic data, was provided as an example. The AI demonstration project showed the value and increased ability to cross reference and compare information from various sources against the common landscape focused on stakeholder needs. This also highlighted its value in this application on the larger landscape of all stakeholder needs requiring action in industrial decarbonisation.

Finally, the paper has presented examples in action of EKS, and potential areas to consider small but influential change based on increasing productivity of actions. A clear link between stakeholders' needs and defined actions has been able to prioritise and increase productivity, and apply targeted efforts to incentivise actions that directly meet stakeholder needs and enable accelerated stakeholder action towards our global climate goals.

As 2030 approaches, Effective Knowledge Sharing offers a practical opportunity to build on existing global momentum, increase the productivity of our global collaborative efforts, and helps to transform shared ambition into measurable decarbonisation progress.

About the Author

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Dr Alan Monaghan is the Senior Vice President of the global Technology & Expert Solutions team for Worley's Resources sector, delivering technology reliant and innovative solutions that combine operational improvement and sustainability for industry. He also advises on technology development and commercialisation, including leadership of external technology provider and research relationships.

Between July 2022 and June 2026, Dr Monaghan was the Global Mission Coordinator of the Net-Zero Industries Mission. In this role he led the action plan delivery for the mission and the managed the HILT CRC's external collaboration with Mission Innovation, and represented Australia as co-lead of the mission on behalf of the Australian Government Department of Climate Change, Energy, Environment and Water (DCCEEW).

Appendix: Utilising AI to Structure a Knowledge Priorities Breakdown Structure

An AI System to Curate Stakeholder Information Needs

In 2025, NIM developed a trial AI system to replicate the expertise of compiling knowledge relevant to key stakeholders, in the challenge of assessing technology demonstration projects7. In this process, the AI system had to be trained, or more accurately, configured, to understand what types and specific details of information it should seek and how it should categorise those findings against each stakeholder need. The process incorporated a framework, not dissimilar to a work breakdown structure. In an extension of its application for AI, we propose the model as an effective Knowledge Priorities Breakdown Structure that can be applied to the universal set of stakeholder needs in industrial decarbonisation.

To ensure the AI system produced relevant and trusted knowledge, the first step was to define **what questions matter most** to the people making decisions about industrial decarbonisation. This was effectively a listing of the stakeholder needs for information on this topic. Scaling this step for the needs of EKS is considered one of effort only, not of any technical risk or complexity.

NIM invited their knowledge partners across all stakeholder groups, comprising governments, financiers, industry operators, researchers, engineers, and technology developers to submit critical questions they require answered when evaluating decarbonisation technologies. Ambition was encouraged, as the goal was to capture the full scope of what stakeholders *want* to know, and not be limited by what is traditionally available in technology demonstration databases. It is noted that this full list obtained allowed prioritisation to a smaller scope, as was undertaken in the AI project.

This process yielded **104 distinct questions** representing what stakeholders wish they could know in regards to adopting and investing in decarbonisation technologies. A more extensive process would undoubtably increase this number.

With 104 questions identified, the knowledge framework or breakdown structure was designed to classify and compartmentalise the information, and reference which stakeholder group it supported. In order to prioritise the questions, they were categorised by what they enabled stakeholders to do (11 **Value** categories) and what topics the questions were about (8 **Subject** categories).

- ***Value Questions:*** *What the user is trying to do by asking (e.g. deciding where to invest, speeding up deployment, optimising funding).*
- ***Subject Questions:*** *What the question is about (e.g. technology landscape, policy environment, financial viability).*

This categorisation allowed for prioritisation for questions that are both important to stakeholders and realistically answerable using existing or retrievable data, all stored within a limited and manageable set of categories. In the AI model, these individual knowledge categories were each called a Living Data Field, as they were managed by special AI tools that curated information against each field in real time.

All *Value* and *Subject* categories identified for the 104 questions identified are shown in Figure 5. To achieve a manageable scope for the original trial, a selection was made for three of each

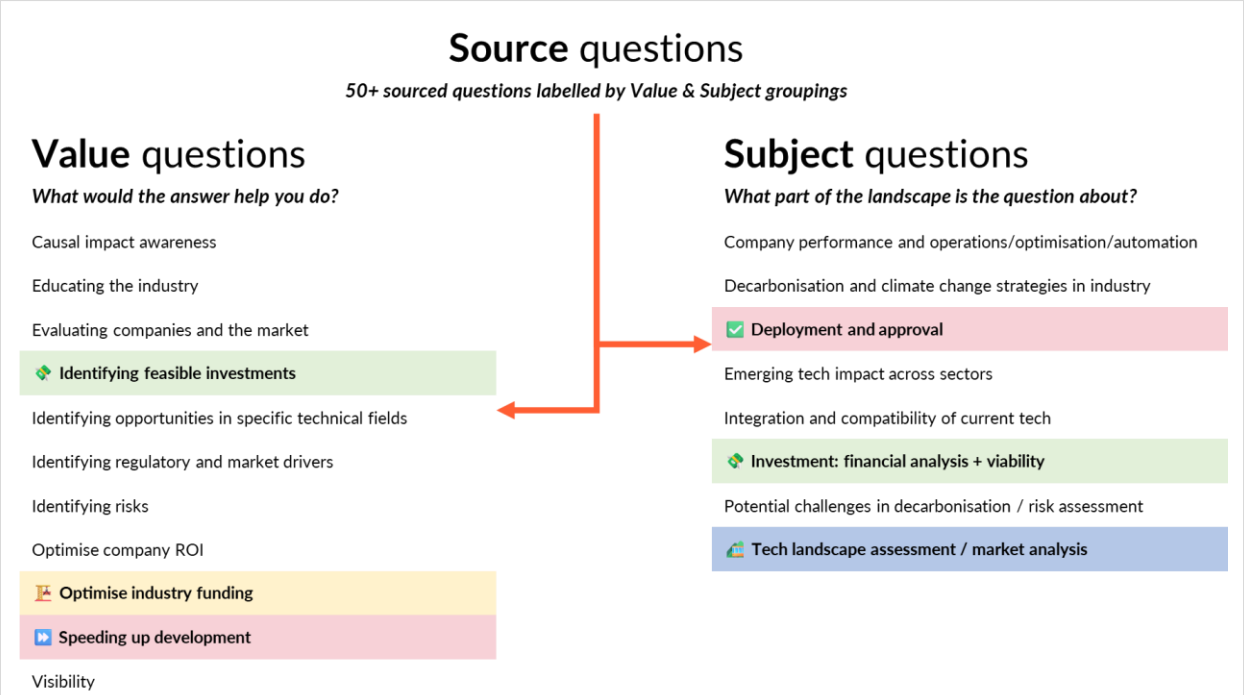

Figure 5. Categorisation of Stakeholder Questions.

category of question to be the focus priority for filtering the full question set. In a real-world implementation, more than the initial 19 categories and 104 questions are anticipated. Such an increase would be manageable by the AI architecture. The limited trial is highlighted here as an example of a breakdown structure methodology that could classify all stakeholder knowledge needs, not the final embodiment of an KPBS that would be applied.

From the six categories used in the trial, the original 104 questions reduced to a focused set of 12 guiding questions. These are shown in Table 1 above.

They are presented as an example of how processes exist to compartmentalise a complex array of stakeholder needs into a manageable and logical structure, based on each parameter of topic, stakeholder and purpose.

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