LIGHTHOUSE PROJECTS IN THE DANUBE REGION – POLICY PAPER

Main Conclusions
Of the EUSDR PA 8 Project Study

Identification of Lighthouse Projects in the Danube Region and Implementation of Communication Measures to ensure Competitiveness of Enterprises

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on behalf of
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The policy paper at hand is a shortened version focusing on framework and recommendations.

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INTRODUCTION

This paper details background, methodology, policy recommendations and main conclusions of the EUSDR PA 8 Study on lighthouse initiatives from the Danube Region. The full version of the study can be accessed here. The purpose of this shortened policy paper is to place a spotlight on the policy character of the study's findings, which is why this shortened version does not include the detailed description of all 30 chosen initiatives/projects/best practices that can be found in the full version.

The purpose of the study on lighthouse projects is, in a nutshell, to showcase just how innovative and multi-faceted the Danube Region is. By identifying lighthouse projects/initiatives/institutions and best practices (to be called Danube "Lighthouses") in sectors that can be considered most relevant for the future of the competitiveness of enterprises in the Danube Region and beyond, the visibility of exactly this character should become more accessible to stakeholders and those in search of matchmaking options and inspiration for own solutions. This effort is not conducted just because it is one that makes us all feel more optimistic in times of multiple crises and transformation requirements facing companies and their employees to equal degrees – but because looking at best practices that resent and push back negative consequences of crises, that show or lay the foundation for resilience because they are sustainably innovative; allows for learning, inspiring, adapting and adopting. Such inspiration by best practice, aiming at a more widespread use of innovative and effective solutions, is what is intended to increase competitiveness of enterprises in the Danube Region in the frame of this endeavour. All 14 countries of the EU Strategy for the Danube Region (EUSDR) are covered in this study (EU countries: Austria, Bulgaria, Croatia, Czech Republic, Germany (Baden-Württemberg and Bavaria), Hungary, Romania, Slovakia, and Slovenia; non-EU countries: Bosnia and Herzegovina, Moldova, Montenegro, Serbia, and Ukraine).

This goal has been incorporated in the way that this study searched for potential lighthouse projects, best practices and initiatives in the Danube Region. First, many kinds of initiatives can help the (future) competitiveness of enterprises, which is why the search was not limited to either companies, EU projects, funding instruments or such like, it did not even define any types of projects beyond that. Instead, filtering the lighthouse projects presented in this study out of the list of identified options was based solely on how innovative these projects are, very importantly, if they are in fact something that learning from may work in practice (replicability) and under different circumstances (scalability) and whether they are sustainable in the sense that even if the effort would be stopped, there would be lasting benefits. Moreover, alignment with the EUSDR Priority Area 8 focus on strengthening the competitiveness of enterprises was ensured.

The policy paper at hand is structured to provide readers with a clear and logical overview on key learnings collected during the study implementation phase. It begins with further introductory comments outlining the study's purpose and scope, followed by background information on the current state of the region and the study's alignment with EU and EUSDR priorities. The methodology section briefly explains how projects were identified and evaluated. The Danube Lighthouses catalogue, grouped by the three thematic fields, is displayed but without detail, as the policy paper concludes with and focuses on policy recommendations, a discussion of future trends, and a summary of key findings.

In a different style and format, the individual lighthouse project descriptions can also be accessed on the website of EUSDR PA 8, where short descriptions and presentations on all 30 projects are available. Also, all basic project data like running timeframes, funding amounts and sources as well as partnership lists can be found there.

BACKGROUND

CURRENT STATE OF PLAY IN THE DANUBE REGION

There is no clear tendency which could be drawn from the process and results of this study that shows in what ways the Danube Region, or specific parts of it, is lacking development in fields of the future in general. Promising and innovative activities could be identified in each and every EUSDR member state – importantly, many more than presented here. Still, it must be stated that especially in the most contemporary fields of digitisation and its many application possibilities, there was a considerable lack of uptake and widespread industrial or application-related use of these technologies apparent when scanning for lighthouses.

This becomes more visible when looking at the number of projects identifiable within limited time, and when looking at how outstanding or common they are for a certain region. Exceptionally innovative single projects may sometimes raise a misguided interpretation of how strong the landscape in the respective field might be overall. However, this should not make one refrain from making these approaches visible, as they may lead to more widespread use of new technologies.

The sheer tempo of developments in sectors such as AI, Industry 5.0 and Metaverse is something that all kinds of actors in the Danube Region have trouble adapting to some degree, including SMEs as well as clusters and the public sector. Financing/funding and other support systems therefore are becoming ever more relevant. This topic will be tackled further in the chapter on policy recommendations.

EU AND EUSDR POLITICAL PRIORITY ALIGNMENT

In the autumn of 2024, Mario Draghi released his landmark report on European competitiveness. In it (Draghi 2024), among many other issues, he criticises the relative weakness in Europe, compared to global competition with the US and China, when it comes to investing in disruptive innovation and making sure that knowledge and innovation are being successfully transformed in replicable and constructive business models – what we basically frame as technology transfer. Lighthouse projects are based on both of these issues. On the one hand, they make use of the uptake of (be it incremental or far-reaching) innovation and – at the same time – apply it in a way that makes it very practical for people, for businesses, for innovation ecosystems in the lighthouse project regions and beyond.

Identifying lighthouse projects is a promising strategy in order to allow for other actors to find reference points and benchmarks for developing new models of business cases and innovative projects – while the idea of this study is of course based on making these lighthouse projects seen and letting them serve as models for innovation and best practices. Visibility, communication and dissemination activities therefore are a key effort in ensuring relevance of the study project as a whole. Past experience has shown that especially with regard to fast-transforming sectors like the ones requested for this study (green tech, circular economy & circular bioeconomy; digitalisation, artificial intelligence, metaverse & virtual worlds and supply chains & finance), there is ample need for not only visibility, but also user-friendly description of the core added value and applicability of the development at hand so that others can identify the relevant parts for own future projects.

The Danube Region under the EUSDR strategy is, in a positive and challenging sense, a high-contrast area that brings regions in Western Europe, such as Baden-Württemberg, together with regions that are right at the Ukrainian border, where Russia is leading a war of aggression. Different schools and

ideas of politics, society and history, different natural resources and conditions, and of course, means of economic development and potential come together. That is why this consortium, right from the start, strongly appreciated the request to find lighthouse projects from all the member countries and several tech/industry fields, as the plurality of these factors can lead to a very multifaceted catalogue of projects, laying the basis for applicability and replicability for almost any interested party.

Throughout the project implementation phase, alignment with PA 8 priorities, but also overall EU policy strategy in times of multiple crises and political as well as economic challenges were and will continue to be provided. The challenges we face hit all the regions, but not symmetrically, as some industries and innovation bases are more vulnerable to external issues. Solutions regarding innovation, technology transfer and entrepreneurship are needed promptly in the Danube Region and beyond and are, wherever supporting competitiveness, not only in line with PA 8 priorities, but also the mainstream of policy direction in the EU at the moment – which is why this endeavour came at the right time.

METHODOLOGY

STUDY BACKGROUND

The now implemented idea of this study was to identify a total of 30 projects in the EUSDR Danube Region that serve as examples for developments that help increase the competitiveness of enterprises as envisioned and supported by PA 8 of EUSDR. In making projects in the strongly and contemporarily important fields / focus of action areas

(1) green tech, circular economy & circular bioeconomy,
(2) digitalisation, artificial intelligence, metaverse & virtual worlds
(3) supply chains and finance

visible for a wider audience by producing a study document (which this document is the final version of) on the projects as well as online presentation files for a well-sorted way of informing, the goal is to spread best-practice and, consequently, increase innovation and technology uptake as core drivers for the competitiveness of enterprises in the Danube Region.

Please note that by using the links in the list above, you will be able to directly access the respective section in the full study document.

The applied method relies on combining the assessment of the project representatives of the (at first) potential lighthouse projects themselves with the assessment made by a team of evaluators based on information gained by desk research, business contacts and information requests. This way, information and experience that only the project's own managers have and that can potentially not be identified by basic desk research could be collected and included to get a full picture on how innovative the project actually is. The ratings by the project managers of potential lighthouse projects were used in calculating as well as the ratings by evaluators of the lighthouse project identification consortium – just like applying a self-assessment of oral grades that has become a mere standard in modern teaching as well.

EVALUATION

How was the information for receiving two different assessments of potential lighthouse projects acquired? After a much longer list of project options in all Danube Region countries had been identified,

project representatives which in that way had been considered received a digital questionnaire for self-evaluation, followed by consortium evaluation. Find more on the methodology process here.

According to the following five indicators, the eligibility as a lighthouse project that makes a difference for the overall goal of competitiveness of enterprises in the Danube Region was checked.

- **Innovation & Differentiation:** High scores could be achieved if the project is highly innovative in the sense of it involving new ideas in a manner that shows practical benefits. The utilisation of technology or processual development for all kinds of use cases is essential here.
- **Replicability & Scalability:** High scores could be achieved only if the project tackles a problem in a manner that is not only useful in a specified use case (one-time use). The project should use an approach that can not only be replicated at a different place and time.
- **Measurable Impact:** High scores could be achieved if the projects show impact, and, preferably, if this impact can not only be assessed but brings measurable (quantifiable) benefit.
- **Sustainability:** High scores could be achieved only if the project fulfilled more than one type of the many dimensions of sustainability (not only environmental, but long-term impact).
- **Alignment with Strategic Goals:** High scores could be achieved if many of the PA 8 strategic goals are tackled in the project, among them the overall goal of competitiveness.

CATALOGUE OF DANUBE LIGHTHOUSES

For details on the projects themselves, see the full study document. For details on any of the three sectors and to access the presentations on projects of these sectors, use the respective link in the first line of the table below, directing you to the EUSDR PA 8 website.

Green Tech, Circular Economy, Circular Bioeconomy (Link)	**Digitalization, AI, Metaverse & Virtual Worlds (Link)**	**Supply Chains & Finance (Link)**
Innovation Hub CCU_{BIO} BW (Baden-Württemberg)	Croatian Artificial Intelligence Association (CroAI, Croatia)	Master Study Programme Supply Chain Management, Logistics, Production – DHBW (Baden-Württemberg, Bavaria)
Neo-Eco (Ukraine)	Optimization of manufacturing and transportation infrastructure processes through artificial intelligence methods – OPTIMUM (Slovakia)	global verantwortlich BW – Lieferketten nachhaltig gestalten (Baden-Württemberg)
RECONOMY Program – Circular business models and resource efficiency in the textile and apparel industry (Moldova)	DIH AGRIFOOD Demonstration Farms (Slovenia)	Digitalna firma - ONEX DIH Bosnia & Herzegovina (Bosnia & Herzegovina)
GreenTech BW Platform - Platform for future technologies and sustainable economy (Baden-Württemberg)	Innovative system of virtual reality and simulated model cases of security character facilitating training and treatment of police officers in risky situations (Czech Republic)	Supply Chain Intelligence Institute Austria – ASCII (Austria)

Empowering Central and Eastern European countries to develop circular bioeconomy strategies – CEE2ACT (Hungary & more)	Industry 5.0: Operator 4.0 (Hungary)	Rethinking Global Supply Chains: measurement, impact and policy – RETHINK-GSC (Hungary, Austria)
CCRI pilot region Podravje (Slovenia)	Circular DigiBuild (Bulgaria & more)	KMU.DIGITAL & GREEN (Austria)
Green Up Hub (Serbia)	Virtual Diagnostic Tool for Neurological Examinations – VIRADIA (Slovakia)	Enhancing MSEs sustainable Growth and Competitiveness – EmBRACE (Croatia, Bosnia & Herzegovina, Montenegro)
Empowering bioeconomy projects by deploying Technical, Business, Regulatory and Social assistance services – ToBeReal (Slovakia, Slovenia)	Cultivating Industry 5.0 Talents – CITADELS (Serbia & more)	Slovene Enterprise Fund Vouchers (Slovenia)
Bioeconomy Cluster (Serbia)	EuProGigant (Austria, Baden-Württemberg)	Western Balkans Green Growth Alliance (Montenegro, Bosnia & Herzegovina, Serbia)
Slovenian Center for Circular Economy (Slovenia)	Creation, introduction and testing of digital tools in agriculture – DAP (Bosnia & Herzegovina)	Interregional Funding Mechanism of the Vanguard Initiative – VInnovate (Romania, Austria)

POLICY RECOMMENDATIONS

Looking at the catalogue of lighthouse projects and initiatives presented, a number of first conclusions can be drawn with regard to common schemes, common benefits and the resulting common factors that make these initiatives successful. There are certain issues that policymakers should consider as they allow and incentivise market actors, regional public institutions and groups of stakeholders to develop beneficial solutions for the challenges at hand. A list of them is condensed below.

- **Design funding instruments in an open, but targeted way**
  Funding instruments should be designed in a way that embraces ideas – in a most pragmatic way, and also for smaller-scale projects. Reduction to pre-tested impact reliability can cause a significant and harmful limitation that may provide productivity and relative success of funded endeavours but may at the same time limit groundbreaking innovation. Openness to new approaches is essential not only when evaluating proposals, but also when designing a funding instrument and choosing how to evaluate.
- **Still, design calls for proposals in a way that includes future funding perspectives**
  Nevertheless, including requirements in calls that are aimed at securing that project applicants include work in their project on the follow-up of developed solutions and the financing of those on the public and especially on the private side is essential. Uptake of innovative solutions is crucial, and capital too often is the limiting factor.

- **Actively enable innovation**
  Innovation should be enabled. Many of the projects mark, for the region they were implemented in, strategies that are of pioneering value. In that sense, they can be considered sandboxes – only that most of the time, they did not have any simplifying context elements that would classify them as a regulatory sandbox. Regulatory sandboxes, as pushed by the European Commission on several levels, would allow generating innovation faster, identifying bottlenecks more precisely, and enable SMEs and start-ups to use test-before-invest solutions in order to prove the validity of their investment strategies. Particularly with regard to the topics which the lighthouse projects in the area of AI showed, the transformation leeway in the Danube Region is long, and cooperation with regulatory sandboxes therefore imperative.
- **EU Danube Region Strategy: Keep looking out for future cross-sectoral/technology fields**
  For the EUSDR strategy, it can be stated that the challenges innovators and enterprises in the Danube Region face of course are not new and have been identified before. However, with this study, certain patterns of innovation hubs could be observed – for example, in AI development, there could be strengths observed in the traditionally more advanced parts of the EUSDR Danube Region, whereas regarding circular economy, many shining examples, more than elaborated on in this study, could be observed towards the Southeastern parts of the region. It is integral for the benefit of enterprises to enable cross-sectoral matchmaking of enterprises, authorities and other kinds of providers. Other sources show the future relevance of combining Circular Economy and AI within the concept of Industry 5.0, which further asserts this point.
- **Foster technology transfer and capacity-building**
  Building on these previous insights, the next recommendation emerges: the need to foster regional knowledge transfer and capacity-building networks. To maximise the impact of lighthouse projects and ensure their benefits are scalable and replicable, policymakers should establish and support structured mechanisms for knowledge exchange. This includes regional innovation hubs and competence centres that act as intermediaries between successful previously implemented projects and emerging initiatives, capacity-building programs for local authorities and SMEs, peer-learning platforms and cross-border mentoring schemes, and digital repositories documenting project outcomes and lessons learned. Such efforts would help bridge the gap between innovation leaders and lagging regions, reduce duplication of efforts, and accelerate the uptake of transformative solutions – especially in areas like AI and Circular Economy where regional disparities are evident. Necessarily, this involves multiple political and organisational levels within the Danube Region actively engaging with *all* quadruple helix actors throughout the entire process.
- **Strengthen transnational and cross-sectoral collaboration platforms**
  The study highlights that some of the most resilient and innovative lighthouse projects emerged from strong transnational and cross-sectoral partnerships. Policymakers should invest in and facilitate platforms that enable enterprises, research institutions, public authorities, and civil society from different countries and sectors to collaborate on shared challenges. This includes supporting Danube Region-wide cross-learning, matchmaking events, digital collaboration tools, and joint project development workshops, especially for SMEs and emerging innovation hubs – just like it was part of many of the projects presented in this study.
- **Promote demand-driven and user-centric support mechanisms**
  Many successful projects in the catalogue of this study were characterised by their responsiveness to the real, day-to-day practical needs of enterprises and communities. Policies should prioritise support instruments that are demand-driven, allowing for bottom-up

identification of challenges and co-creation of solutions, especially in the Danube Region's more local levels. This includes flexible funding calls (as mentioned above, but it does not only refer to financial funding alone), open consultation processes, and the integration of user feedback into policy and program design and evaluation.

- **Facilitate knowledge transfer and replication of best practices**
  The replicability and scalability of lighthouse projects are central to their impact. Policymakers should establish structured mechanisms for knowledge transfer, such as open-access repositories of project methodologies, toolkits, and legal studies, as well as peer-learning networks and study visits. This study is an exemplary approach for that directed to the Danube Region. Special attention should be paid to supporting lagging parts of the region in adapting proven models to their local context.
- **Invest in skill development for digital and green skills**
  A recurring barrier identified in the study is the lack of digital and green skills among Danube Region SMEs, local administrations, and communities. Policy should support targeted capacity-building programs, including vocational training, digital literacy initiatives, and sector-specific upskilling, ensuring that all can participate in and benefit from innovation-driven transformation.
- **Encourage the development of regional innovation hubs and clusters**
  The emergence of and integration into regional innovation hubs and clusters – especially in bioeconomy, circular economy, and digitalisation – was a key success factor for a number of projects. Policymakers should incentivise the creation and strengthening of such hubs throughout the Danube Region, ensuring they are inclusive, multi-actor, and connected to both local needs and international networks. Support should include funding, infrastructure, and facilitation of stakeholder engagement.
- **Simplify access to funding and reduce administrative burdens**
  Several projects noted that simplified, low-threshold funding instruments (such as voucher schemes and small project funds) were highly effective in mobilising SMEs and fostering innovation. Strategists and public officials in the Danube Region should streamline application and reporting procedures, provide clear guidance, and ensure that funding is accessible to a wide range of actors, including micro and small enterprises. Although this is a sufficiently discussed multi-level problem at the moment, it needs to be mentioned.
- **Integrate monitoring, evaluation, and adaptive learning**
  The study's methodology emphasises iterative feedback and continuous improvement. Policy frameworks should require robust monitoring and evaluation mechanisms, including stakeholder feedback loops, to ensure that programs remain relevant and effective. Adaptive learning should be built into policy and project cycles, allowing for adjustments based on real-world outcomes.
- **Support the creation of open data and transparency initiatives**
  Projects like ASCII (Supply Chain Intelligence Institute Austria) demonstrate the value of open, data-driven approaches to complex challenges and allowing the general public to profit from scientific insights. Danube Region policymakers should promote the development of inter-operable, open data platforms, transparency tools, and public reporting standards to empower enterprises, researchers, and the public with actionable information.
- **Learn and understand on-site**
  Even though most of the information for this study was gained by desk research and email exchanges, personal interactions with lighthouse representatives were most fruitful. Exchange with those most experienced is and remains crucial – even in an almost fully digitalised world.

All in all, the prioritisation of these recommendations depends on the recipient – European policymakers will have a different take as opposed to local ones, private actors or business support organisations. What these recommendations should have in common is that they, if implemented, support the competitiveness of enterprises in the Danube Region. This is an endeavour including many kinds of stakeholders and screws to be turned – single actions might, even though intended the right way, not reach their desired effect. All involved must collaborate on a vertical and horizontal line to make it easier to innovate, invest, grow – and still move the economy in the Danube Region towards a climate-neutral and environmentally sustainable basis.

FUTURE TRENDS

Globalisation is seen by many to be a potentially retreating or at least troubled phenomenon – speaking as of the turbulent year of 2025, even more so. However, the conclusion that transnational cooperation of enterprises, universities, public authorities and all other stakeholders should somehow be reduced in order to be less dependent on external factors would be profoundly wrong.

On the contrary, some of the most vibrant examples of the lighthouse projects in the Danube Region show us that in seeking for cooperation partners, resilience can be laid a basis for – but not by cutting ties with other actors. This marks a future trend that is part of the largest one of all: Increasing global competition and, not to mention, an overall situation that is branded by a race on the higher scale between powers, companies and countries that is less focused on beneficial cooperation and more on gaining strength in own – and only own – interests. In these times, efficient use of technology, effective clustering and cooperation as well as targeted support for private actors by the public side, especially on the regional level, become ever more essential.

Focusing strength and capacity on the regional and interregional level on areas, industries and technologies of the future is clearly the way forward in the Danube Region. Artificial Intelligence and all industries and adoptions surrounding it is clearly an example for that, as is the overall area of circular- and bioeconomy, which can be thought of as providing benefits not only in terms of saving climate and environment but also creating jobs, supply chains and new, added value. Finally, all these endeavours, especially on the private and MSE/SME-based side, need pragmatic financing options that consider the realistic situations and capabilities that potential mobilisers of private capital find themselves in. This study has presented a few of a long list of examples for such initiatives.

The analysis of lighthouse projects reveals a clear shift toward more integrated, collaborative, and adaptive innovation systems. Funding instruments should evolve to become open yet targeted, lowering entry barriers for SMEs while embedding pathways from pilot to market uptake through commercialisation plans, blended finance, and innovation procurement. Regulatory sandboxes and test-before-invest infrastructures – linked across borders and aligned with EU frameworks – are one cornerstone in order to accelerate responsible experimentation, particularly in AI, data, and energy.

A major thematic trend is the convergence of AI and Circular Economy within Industry 5.0, leveraging regional strengths and enabling applications such as resource efficiency, digital product passports, and supply-chain transparency. To scale these solutions, institutionalised knowledge transfer will be essential, supported by competence centres, peer-learning networks, and open repositories that allow replication and adaptation in diverse contexts/diverging means and needs.

Regarding AI in the human-centric context specifically, across the ten lighthouses in this thematic field, digitalisation is being leveraged to create human-centred, data-driven and interoperable solutions. Three converging trends are visible: (1) the shift from technology-first pilots to ecosystem and talent programmes (CroAI, CITADELS); (2) embedding AI for predictive, resilient operations in industry and infrastructure (OPTIMUM, EuProGigant, Operator 4.0); and (3) using living labs and VR/AI interfaces to accelerate adoption and access in safety, health and agriculture (VR Police Training, VIRADIA, DEMO FARMS, DAP). Circular DigiBuild, for example, highlights the power of open tools and identifiers to connect upstream material circularity with downstream smart operation – a template that other sectors can adopt through standards and data spaces. Common barriers – interoperability, data access, cultural inertia, fragmented governance – are best mitigated via trust-building, open standards, and co-created roadmaps that align incentives across stakeholders.

Overall, collaboration should and will increasingly operate on a multi-actor, transnational and cross-sector basis, with challenge-driven calls, living labs, and user-centric design ensuring relevance and adoption. Human capital development – especially in digital and green skills – will be a critical enabler, alongside the creation of regional innovation hubs connected to international networks. Simplified access to funding, streamlined administration, and adaptive program management will further enhance participation and impact in terms of public support for private initiatives, big or small.

Finally, open data and interoperable data spaces will underpin transparency, research, and new AI-driven, trustworthy services, while hybrid engagement models should combine digital efficiency with the trust-building power of on-site interaction. Together, these trends point to an innovation agenda that is collaborative, mission-oriented, and inclusive – designed and ready to use in order to incentivise technology uptake, strengthen competitiveness and accelerate the transition to a vibrant, yet ever more climate-neutral, just and sustainable economy in the Danube Region.

CONCLUSION

This study set out to make visible the breadth and depth of innovation across the Danube Region by identifying lighthouse projects that visibly and understandably strengthen the competitiveness of enterprises. It applied a simple but targeted methodology that combined project self-assessments with independent scoring against five criteria – innovation and differentiation; replicability and scalability; measurable impact; sustainability (in several dimensions); and alignment with EUSDR PA 8 goals – culminating in a catalogue of 30 Danube Lighthouses across the thematic fields of Green Tech/Circular Economy & Bioeconomy, Digitalisation/AI/Metaverse and Virtual Worlds, and Supply Chains & Finance. In total, more than 160 candidate projects, initiatives and best practices were researched and examined to ensure quality, geographic balance, and contemporary relevance.

Across this information basis, a consistent picture emerges: the Danube Region possesses a vibrant, though uneven, innovation landscape that is strongest when public enablers, intermediaries and private actors work in close collaboration, coordination and alignment. The most effective initiatives lower entry barriers for SMEs, offer clear-to-navigate support, and build explicit bridges from early pilots to sustained market uptake. Voucher schemes, small-project funds, dual education formats, and pragmatic acceleration services have proven especially beneficial for first-time innovators and micro enterprises, while demand-side tools such as innovation procurement and challenge-led calls help create realistic pathways to adoption.

As a first cross-cutting conclusion, the lighthouse examples show that openness and targeting are not in tension but mutually reinforcing. Instruments that welcome experimentation – rolling calls, lump-sum or voucher-style grants, and modular technical assistance – achieve the best participation and diversity of solutions when coupled with clear thematic focus, outcome metrics, and credible plans for follow-up finance. Conversely, narrow ex-ante proof requirements risk optimising for incremental improvements at the expense of breakthrough innovation and scale.

A second cross-cutting conclusion concerns "scale by design." Successful projects, and this does not regard any specific field of the lighthouses presented here, embed downstream adoption from day one: they require commercialisation and financing strategies, build consortia around demand, and leverage blended finance to move from prototype to procurement – even if projects themselves only coordinate such processes in an overarching way. Where this continuum exists – test-before-invest infrastructures, regulatory sandboxes, competence centres, and replication playbooks – the "pilot graveyard" shrinks markedly and innovations transition faster into supply chains and public services. This applies especially to circular economy, where there is a never-ending list of potentials and scales of usage on private and public levels.

Third, the Danube Region's comparative edge will come from the convergence of digital and green capabilities, particularly the coupling of AI with Circular Economy under the Industry 5.0 paradigm, as stressed by several EU strategy initiatives. The portfolio points to an emerging pattern: traditionally more advanced parts of the region concentrate AI capacity, while other areas furnish strong circular economy exemplars. Cross-regional matchmaking that fuses these strengths – e.g., AI-enabled resource efficiency, digital product passports, traceability and transparency in supply chains – promises impact and might be pursued as a strategic priority for EUSDR PA 8. Regarding AI as the central future level playing field, it must be added that investment in the research and roll-out of AI adaptations is not only too slow in the Danube Region, but, in global comparison, in Europe generally.

Fourth, institutionalised knowledge transfer is crucial. The initiatives that travelled furthest beyond their original context do not rely on ad-hoc dissemination; they created competence hubs, peer-learning networks, legal and technical toolkits, and open repositories of methods and outcomes that are partly available for others. These structures reduce duplication, shorten learning curves, and help those that are lagging adapt proven models to local constraints. Strengthening such "scale-out" infrastructure at Danube Region level will accelerate convergence across the macro-region.

Fifth, people and skills remain the binding constraint. Many SMEs and local administrations still lack the digital and green competencies required to absorb innovation. Dual and work-integrated programmes, micro-credentials, modular upskilling for public procurement officers, and targeted training for cluster managers repeatedly emerge as game changers. Future program cycles should treat skill formation not as an adjunct but as an equal priority alongside technology and infrastructure.

Sixth, data openness and interoperability multiply return. Where projects created open datasets, indices, or sectoral data spaces – and complemented them with clear governance and FAIR-aligned standards – secondary use flourished, research intensified, and policy targeting improved. This applies as much to supply-chain intelligence as to circular construction, agriculture, and digital health. The Danube Region strategy can increase dividends by promoting shared schemas, reference architectures (which this study can be an element of), and public dashboards for monitoring and evaluation.

Seventh, administrative simplicity can be considered competitiveness policy. Low-threshold access, first-come/first-served micro-supports, standardised templates, and clear guidance significantly broadened participation and sped up project delivery. Coupling these with robust, iterative monitoring – and the willingness to adapt within project and initiative running timeframes – proved more impactful than elaborate ex-ante gatekeeping. An “evaluate as you go” culture might be mainstreamed in future instruments and project designs.

Eighth, transnational and cross-sector collaboration is now the default. The strongest lighthouses (even if local) mobilised multi-actor, cross-border associations and coalitions that reached minimum viable scale for testing and adoption, often leveraging Digital Innovation Hubs, cluster-to-cluster platforms, and living labs. Beyond grantmaking, one should continue to invest in orchestration capacity – matchmaking, joint workshops, and sandbox mutual-recognition – so that collaboration becomes even more of a routine.

Limitations and Lessons for Future Updates

Two methodological boundaries of this study call for some more emphasis. First, the catalogue of lighthouses reflects active participation: non-respondents, including potentially excellent initiatives, could not be assessed with equal depth, introducing a participation bias. On the other hand, only this way forward could ensure excellence in the information basis for the projects described in this document.

Second, the portfolio captures a time-bound snapshot (projects running since 2023 and no experiences past 2025), which emphasises contemporary information and prioritisation over historical continuity. These choices were deliberate – to favour present transferability and relevance – but they argue for rolling updates and ideas for additions, including future impact checks, especially for projects described here that had a running time (so far) of less than a year.

A shared Mandate going forward

The Danube Region’s innovation capacity does not hinge on discovering isolated “unicorn” projects; it depends on making it easier for many actors to innovate, adopt, and grow. That, in turn, requires vertical and horizontal alignment: European, national, and regional policies must converge on open-but-targeted funding, clear pathways, enabling regulation, and investment in people, data, and collaboration platforms. The lighthouses in this study show that when these pieces come together – often in very modest, but highly practical instruments and contexts – the region can translate experimentation into competitiveness at pace.

In conclusion, the study affirms that the Danube Region is innovation-ready: it has the talent, institutional scaffolding, and a growing stock of replicable models. The task now is to mainstream what works – to institutionalise replication, use these results, kick-off testbeds and sandboxes, align finance with uptake, and keep administrative doors wide open for SMEs. If stakeholders sustain this collaborative, mission-oriented approach, the Danube Region can accelerate its twin transition, build more resilient value chains, and turn its diversity into a lasting competitive advantage – delivering growth that is both climate-neutral and widely shared.