Task 3.2 Design a portfolio of interventions

Task 3.2.3 Develop a portfolio of innovation actions

What is this task about?

This task aims to identify a portfolio of innovation actions to support and accelerate the impact of your adaptation pathways. Effectively addressing adaptation and climate resilience requires a holistic approach that considers a broad spectrum of innovations, ranging from technical solutions to changes in institutions, norms, values, and behaviours. The purpose of these innovations is to drive the implementation of the pathways and to develop them into comprehensive, whole-of-system climate resilience strategies.

Innovation actions are those social, public and technical innovations that can support and unlock the associated short, mid and long-term changes needed to implement the adaptation pathways, all the while maximising co-benefits for citizens and communities. These actions differ to adaptation options in that they complement, facilitate or enable these options, but do not directly address risks in the same way. Innovation actions are organised around your region's shared goals, resources, and activities identified when developing your shared vision (Task 2.3.1) and Theory of Change (Task 2.3.2). Taken collectively, they are called innovation portfolios or innovation portfolios – logical sets of innovation actions expected to work and be managed together. Innovation portfolios are supported by an innovation policy mix, skills and capability building, regulatory changes, etc. The design and implementation of an innovation portfolio is an iterative process, whereby the portfolio is implemented and assessed against a specified set of innovation objectives and metrics, revised and realigned to the context of new knowledge and understanding of your adaptation challenge.

Explainer: Innovation portfolio

An innovation portfolio is a document and a strategy to identify, support and scale key innovations that can help a region to achieve a specific set of objectives. In the context of Pathways2Resilience, it refers to a strategic document that identifies a series of innovation actions that can be supported by your region to supplement the implementation of your adaptation pathways, and to enhance the co-benefits and outcomes emerging from these pathways. It also refers to the process of defining, activating and sustaining the implementation of these innovation actions in the short and longer term. Importantly, it seeks to mobilise the goals and activities of the private sector and citizens, identifying opportunities to innovate where outcomes might benefit many stakeholder groups.

Innovation portfolios as we use them in Pathways2Resilience, are inspired by the concept of Transformative Innovation (TI), which seeks to reorient innovation policy, away from solely economic growth and towards addressing societal challenges (Schot & Steinmueller, 2018). This approach is being implemented in the EU at various levels, under the label of "missions", "mission-oriented innovation policy" or "challenge-oriented innovation policy". This framework recognises that to address societal challenges, research and innovation should be combined with broader changes in the economy and society. Transformative Innovation policies are highly aligned with regional and place-based approaches to innovation, since they

Task 3.2

Design a portfolio of interventions

Task 3.2.3 Develop a portfolio of innovation actions

focus on the specific capacities, opportunities and challenges relevant to a specific community.

The European Commission provides several strategic frameworks and programmes that support EU regions to use innovation as a driver of climate resilience. Most saliently, the European Green Deal with multiple targets and instruments to achieve a net zero economy by 2050, National Recovery and Resilience plans (NRRPs) with 37% of the budget focused on climate action; Cohesion Policy Funds including specific objective for investment promotion of climate adaptation and disaster risk prevention. More explicitly, EU Research and Innovation Policy has increasingly focused on climate mitigation and adaptation. Horizon Europe phase 2021-2027 contains a specific pillar on Climate, Energy and Mobility; and supports the new EU Mission "Adaptation to Climate Change" with exclusive focus on this topic (Harding et al., 2024). In addition, Smart Specialisation strategies (S3) can be reoriented to address sustainability and climate challenges. (Reid et al., 2023)

Innovation portfolio thinking responds to the need to consider more transformative approaches to adaptation. This means moving beyond a focus on reducing short term risks towards solutions that reorganise key systems to address social needs and services in new and more resilient ways. Transformative adaptation is a challenging, longer-term process that requires change at many levels, not just implementation of technical or regulatory solutions, but changes in, e.g., the productive base of a region, the phasing out of unsustainable practices and systems, changes in relationships and social norms, as well as understandings of identity and what citizens value. The climate risks that your region needs to address might introduce opportunities to rethink radically new ways of organizing your region and its territory. Taking an innovation perspective in the way you approach your climate adaptation strategy and plan recognises that some of the options to enable your adaptation pathways might not exist today; that they will require experimentation, testing and learning. It also acknowledges that the public sector can benefit from mobilizing the knowledge and resources of the private sector and citizens.

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Task 3.2

Design a portfolio of interventions

Task 3.2.3 Develop a portfolio of innovation actions

Why is it important?

An innovation portfolio enhances the transformation potential of your region's climate adaptation pathways, by enabling a set of supportive innovation actions that seek to expand the potential co-benefits of the selected adaptation options. It complements your adaptation pathways by identifying specific technological, social, environmental, and economic innovations to catalyse transformation. It can also help to address any shortcomings your adaptation pathways may have in achieving your secondary resilience objectives.

Each individual and combination of innovation actions within the portfolio can bring concrete, short, mid- and long-term co-benefits to citizens and communities, and thereby sustain momentum for the implementation of the adaptation pathways. For instance, if a region selects to 'establish early warning systems', then it could identify innovation actions that create business opportunities around early warning systems, and/or businesses that benefit from the technological developments and upgraded skills required to implement these systems, in other areas.

How can you complete it?

This task benefits from the inputs and ideas of stakeholders both on the supply side (innovators, in the broad sense, including social and public innovation) as well as demand (potential users). While this task is not meant to be as participatory as those of Phase 2, it's good to identify a small, representative group of stakeholders to work with you through the process, including business representatives, investors, academia, NGOs and citizens organisations, and a good representation of different public sector agencies involved in the Regional Resilience Journey process.

The innovation portfolio is generated based on inputs from various steps along the Regional Resilience Journey.

- **Identify innovation actions to build up your portfolio.** Using your preferred adaptation pathways as a basis (Task 3.2.1), commence building up the innovation portfolio for your region. The innovation portfolio supplements the adaptation options selected. Innovation actions are identified through an open call, where your region's local government defines which options of your adaptation pathways to cover, and what information you are seeking to gather from other stakeholders. The innovations identified through the call are then selected through a collaborative, multistakeholder workshop, in which participants define the right composition of the portfolio based on the potential innovation synergies.

Task 3.2 Design a portfolio of interventions

Task 3.2.3 Develop a portfolio of innovation actions

Installation of groundwater storage tanks for irrigation. © Sanliurfa, Turkey

- **Assess the quality of your portfolio.** To assess whether the mix of innovation actions is the right one, you would need to define a small (i.e. 2-3) set of criteria that help you understand its performance. Note that these criteria are different from the assessment and evaluation criteria defined for your pathways. They refer instead to aspects of innovation per se, such as the criteria exemplified below:
  1. ***Amplification Potential (Scaling)***: assess whether the innovations in your portfolio are scalable and what that would entail.
  2. ***Synergies:*** the main goal of a portfolio approach is to generate results that are broader than those each innovation can achieve individually. In this respect, it is essential to understand whether and how the innovations in the portfolio can pool actor resources to create economies of scale (i.e. reduce the cost per unit associated with an outcome) or increase implementation feasibility.
  3. ***Risk vs Return:*** find a balance of risk vs return suited to your region. While transformational innovations are needed, these may only generate results in the long-term. Often 'quick wins' are needed to create momentum and maintain the legitimacy of your activities.

- **Communicate your innovation portfolio to relevant stakeholders,** indicating what is its goal and how is the portfolio going to be managed.

Further, more detailed technical guidance on how to complete this task, including useful tools and methods, can be found in ***Appendix D15.***

Task 3.2

Design a portfolio of interventions

Task 3.2.3 Develop a portfolio of innovation actions

What are key inputs for the task?

- Shared vision for climate resilience (Task 2.3.1)
- Theory of Change (Task 2.4.1)
- Set of preferred adaptation pathways (Task 3.2.2) and corresponding options (Tasks 3.1.1 & 3.1.2).

What are the expected outputs?

An innovation portfolio that maps a set of innovations actions to support and enhance the implementation of your adaptation pathways, assessed against agreed criteria.

Before moving on, have you...

- [ ] Gathered and selected a set of innovation actions (innovation portfolio) that support at least some of the options of your adaptation pathways?
- [ ] Communicated the selected innovation portfolio to key stakeholders?
- [ ] Identified the policy and governance mix that will support the implementation of your innovation portfolio?

D15. Task 3.2.3 Develop a portfolio of innovation actions – Technical guidance on how to complete

The innovation action is supplemented by input from various steps along at the Regional Resilience Journey.

Identify innovation actions to build your portfolio:

. Following the adaptation pathways that have been formulated in task 3.2.1, you can start building the innovation portfolio for your region. The innovation portfolio supplements the options making up the selected pathways. To structure the different innovation actions in your portfolio, we suggest looking at the different outcomes that are part of your vision, and map within them the innovations actions that can contribute to address them.

The process of defining and selecting the innovation portfolio is often a process where private sector and citizens are invited to contribute with their proposals to address the selected directionalities. In this case, your region's local government does not a priori identify and select innovations, but instead, seeks to provide incentives for these innovations to flourish (through a policy mix). The definition and selection of innovations can be done through an (i) open call for innovations that can contribute to the goals of your climate adaptation strategy, followed by a (ii) collaborative workshop with key and diverse stakeholders in the region where you conduct an 'open peer review' process of the innovations presented and define which ones to support (see Reid et al., 2023 for examples of such process). The innovation portfolio should include innovations as well as those actions required to be able to take advantage and scale those innovations. An example are actions related to skills upgrade or infrastructure development that your region could take to increase the impact of a certain technological opportunity. Some of these innovation actions might only become necessary in the future, including mid- and longer-term plans.

Consider that not all 'innovations' need to deliver concrete products or services in the short run. Following an adapted version of the OECD's facets approach, we suggest considering the following types of innovations:

- ***Enhancement oriented innovation*** that focuses on upgrading, achieving efficiencies and building on existing structures. These innovations might lead to results on the short run but will most likely not enable long-lasting solutions for your adaptation challenge. Also known as incremental innovation. In the example: improved irrigation practices will sustain your vineyards for some time, but not in the long run.
- ***Adaptive innovations*** that allow you to try and test new approaches that will make you capable to adapt to a changing environment. These innovations will help you understand better your challenge and might bring insights that will require you to reformulate your portfolio. For example, innovations related to new climate monitoring systems that collect new data and insights; or innovations in the way in which public sector operates that allows more agile responses to climate emergencies or other public challenges.
- ***Anticipatory innovation*** are innovations that allow you to explore how the future would look like for things that are not yet there. These can be innovation related to frontier research, but also social innovations that seek to explore radically different ways of organising society. These innovations tend to have more transformative potential.
- ***Exnovation***, or the discontinuation or phasing out of unsustainable practices and technologies.

D15. Task 3.2.3 Develop a portfolio of innovation actions – Technical guidance on how to complete

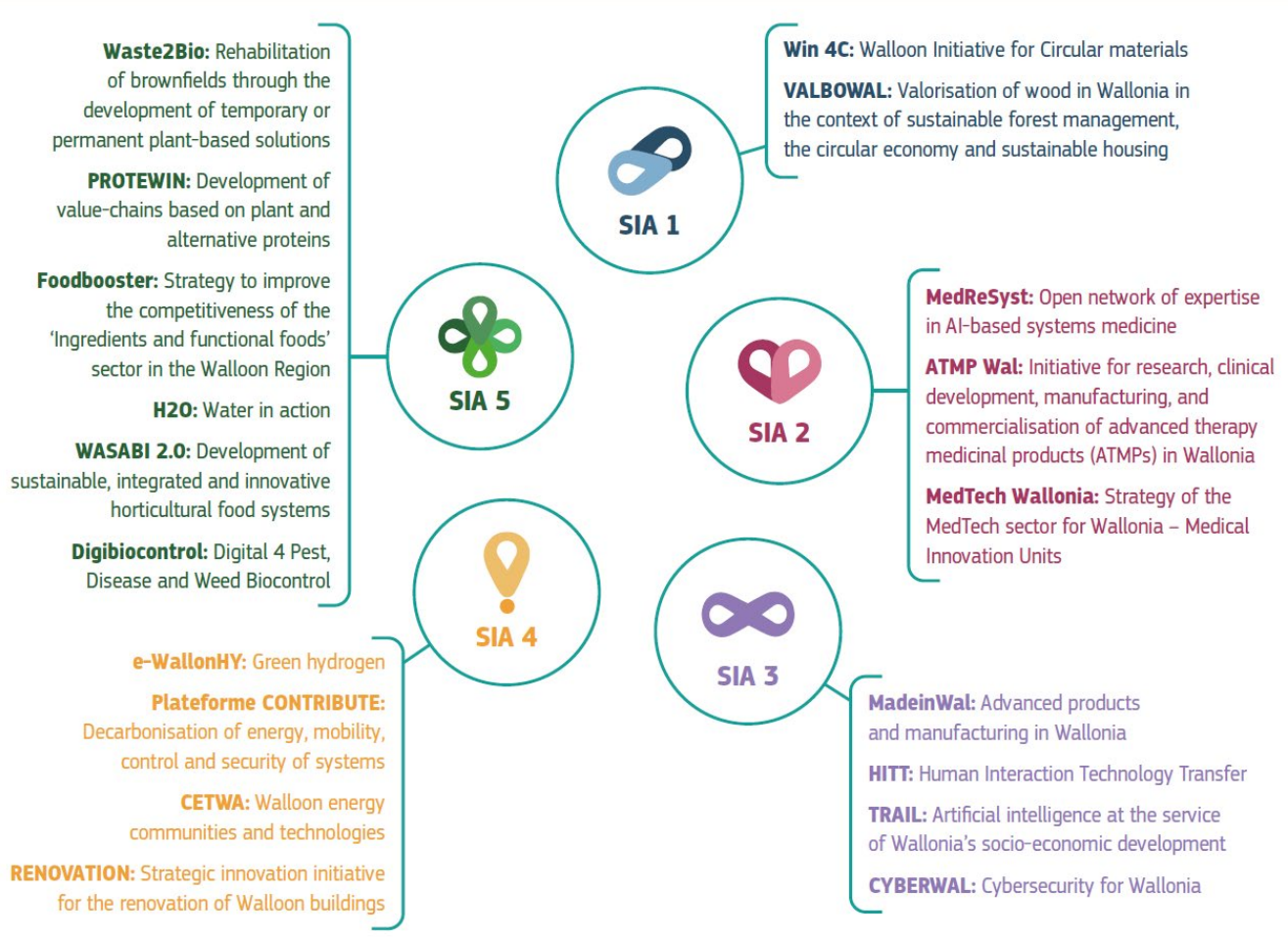

Figure D15.1: Innovation Portfolio of Wallonia. In this case Strategic Innovation Areas (SIA) are SIA1: Circular Economy, SIA2:Innovation for enhanced health , SIA3 Agile and safe design and production methods:, SIA4:Energy Systems and Sustainable Habitats, SIA5: Agri-food chains of the future and innovative environmental management. Source: Reid A., Steward F., Miedzinski M., Aligning smart specialisation with transformative innovation policy. Lessons for implementing challenge-led missions in smart specialisation, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/359295, JRC134466.

Note that these different types of innovation are meant to complement each other in the portfolio and over time.

D15. Task 3.2.3 Develop a portfolio of innovation actions – Technical guidance on how to complete

Assess the quality of your portfolio.

The directionalities linked to adaptation pathways give you a way to 'map' the innovation actions that will constitute your portfolio. You will have different sets of innovation actions that, together, address different aspects of your challenge and intervention and unlock more transformative solutions.

To assess whether the innovations that you have selected for your portfolio are the right ones, we suggest to use the three following criteria:

1. **Potential for Amplification (Scaling):** assess whether the innovations in your portfolio are scalable and what is required to do so. Following Lam et at (2020) classification, we suggest to look at:

a. ***Amplifying within:*** whether the innovations can be conducted for longer term or faster; for example, smarter irrigation systems allow for agriculture to endure droughts more effectively.
b. ***Amplifying out:*** doing the same or a similar (adapted) version of your initiative in other contexts; for example, agroforestry demonstration in one place may allow for replication across the region.
c. ***Amplifying beyond:*** how the innovations in the portfolio change rules (beliefs that we use to define what is the "best way" of doing something) or values; for example, tying agricultural subsidies to environmental performance (e.g. soil health) can lead to generation of completely different business models.

2. **Synergies:** the main goal of a portfolio approach is to create results that are more than the results that each innovation can achieve individually. In this respect, it is essential to understand whether and how the innovations in the portfolio can create dynamics of pooling between actors in such ways that might create economies of scale or increase implementation feasibility. Synergies can be financial, capacities (human resources), improvements in infrastructure, data (collection or quality) and knowledge and competences. For climate adaptation is also essential to consider potential, negative synergies that might emerge from the portfolio (i.e. maladaptations).

3. **Risk vs Return:** We also recommend finding a balance of risk vs return that is suitable to your region at a given time. While transformational innovations are needed, these might take longer term to generate results, and often 'quick wins' are needed to create momentum and maintain the legitimacy of your activities. There will be a balance in risk vs return in your portfolio if you already considered the 4 categories of innovations introduced earlier (enhancement, adaptive, anticipatory and exnovation), but choose a portfolio that reflects the ambitions of your adaptation pathways and also meets the expectations and needs of key stakeholders.

D15. Task 3.2.3 Develop a portfolio of innovation actions – Technical guidance on how to complete

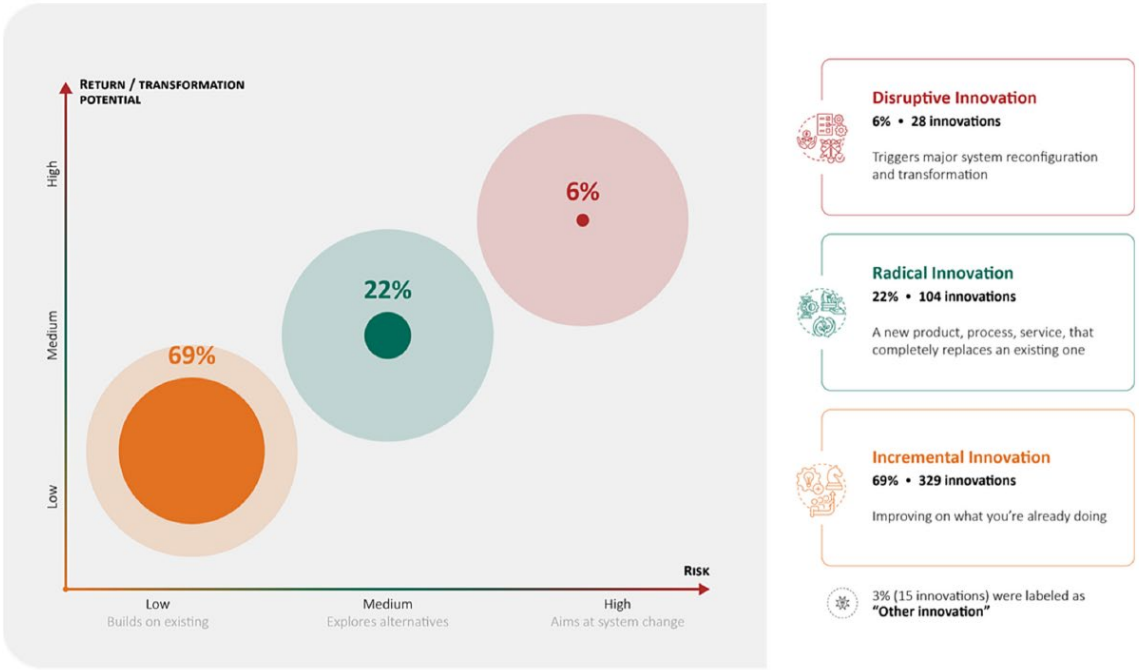

Figure D15.2: Portfolio composition from CGIAR in 2022 (. Source (Schut et al., 2024)

Identify the policy and governance mix that supports the implementation of your innovation portfolio

The public sector has a variety of policy instruments that can be leveraged to support the implementation of your portfolio. Nevertheless, given the multi-agency and long-term nature of your adaptation pathways, a policy mix should not only focus on the instruments, but also the different mandates, logics and strategies of the different agencies involved. Each agency has a different way of 'seeing' and hence targeting a problem, and different ways of assessing success. Hence, a policy mix approach also helps you creating mutual understanding and alignment between the different public sector parties involved. Note that for EU regions it is particularly relevant to consider EU level policy strategies, such as the Green Deal and the EU Missions, as well as Cohesion Policy, Recovery Funds, etc. Overall, embed your policy mix in the different policy development opportunities available. Some regions might have a Smart Specialisation Strategy (S3) in place, which might be a good starting point to envision and articulate regional diversification and climate resilience, but note that the focus of the Regional Resilience Journey is much broader.

D15. Task 3.2.3 Develop a portfolio of innovation actions – Technical guidance on how to complete

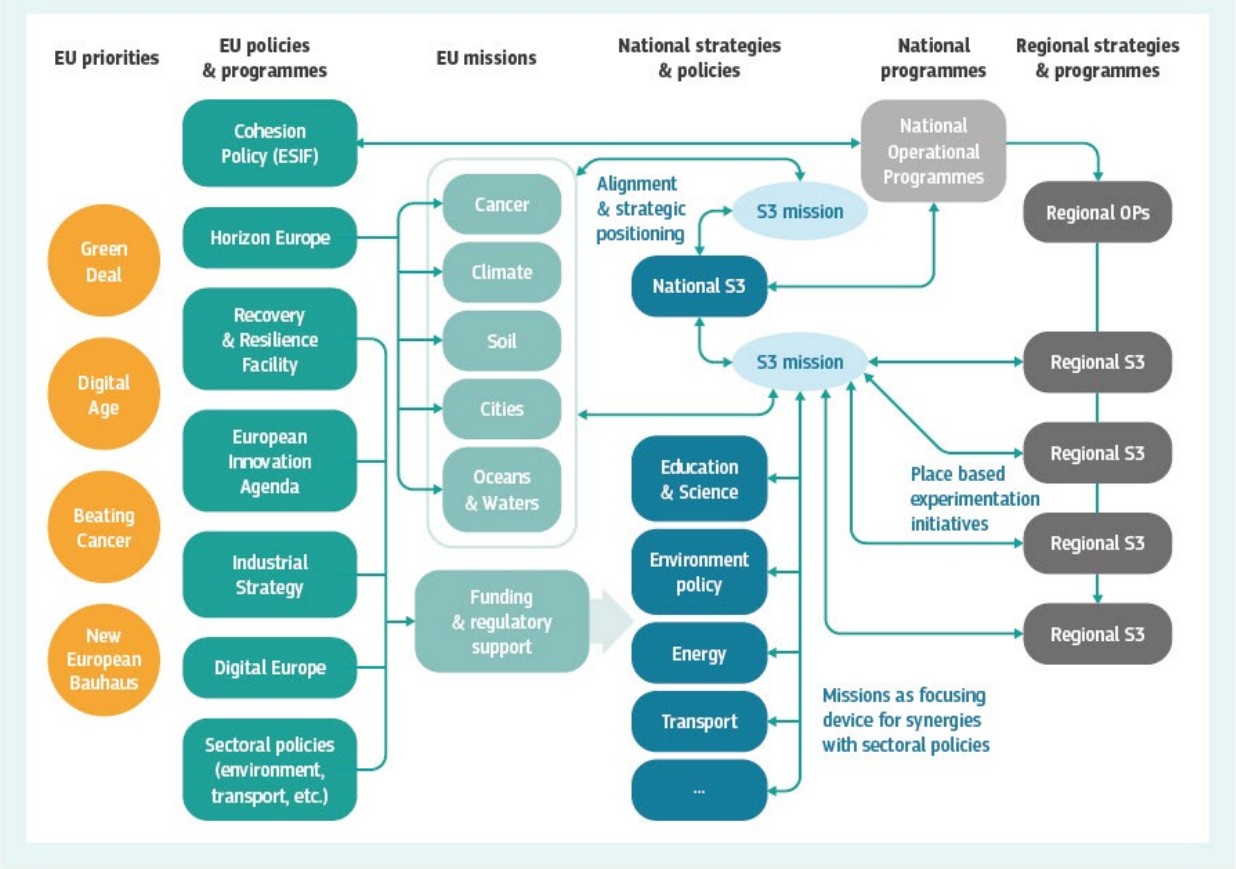

Figure D15.3: Example of Policy mix and multi-level governance of a variety of policy goals and strategies. Source (European Commission et al., 2023)

- Policy strategies include the policy objectives and the plans to materialise them. For European regions, relevant policy strategies can be found at EU (Green Deal), National (Adaptation Plans, Research and Innovation frameworks), and regional level (S3). See Figure .
- Policy instruments associated with a specific goal and design features. Policy instruments can cover (see Table D15.1: Policy instruments to support innovation for sustainability. Note that this list of policy instruments includes both national and regional level instruments. Source: (Adapted from UNCTAD, 2019) for a more detailed overview).
    - Supply: support to R&D, support to venture and seed capital, support to technology transfer, support shared R&D infrastructure, competence building and skills upgrade.
    - Demand: public procurement, living labs, incentives, regulation (inc. sanctions and disincentives), codes of conduct, public communication, etc.
    - Ecosystem instruments: cluster development, innovation platform, flagships or consortiums, support to intermediaries, etc
- Policy processes, which refers to the relationships and decision-making processes that take place to achieve this mutual alignment and architecture of your policy mix. This refers to the "governance" of your policy mix.

D15. Task 3.2.3 Develop a portfolio of innovation actions – Technical guidance on how to complete

Table D15.1: Policy instruments to support innovation for sustainability. Note that this list of policy instruments includes both national and regional level instruments. Source: (Adapted from UNCTAD, 2019)

	Policy instrument	How can they support innovation for sustainable development?
Regulatory Framework	Environmental and health protection regulations	Provide incentives to innovate to comply with regulatory framework (e.g. substitution of harmful chemicals). Provides disincentives for free riders by introducing penalties
	Product and industrial process standardisation	Provide incentives to innovate to comply with environmental and social performance standards for products and processes
	Consumer protection, labels and certification	Promotes innovative products and processes by providing information on environmental and social performance of products and services to customers
	Intellectual property rights	Encourages firms to engage in innovation activity by protecting their knowledge; and opens access to knowledge and technologies contributing to sustainable development
	Competition Law	Prevents the emergence of monopolies or cartels that can stifle innovation and hold back its benefits for consumers or the environment
	Bankruptcy Law	Can help to engender a risk-taking, entrepreneurial culture, protecting investors, firms and consumers against some of the negative effects of failure
Economic instruments	R&D funding	Provides direct support for R&D underpinning sustainable innovation
	Innovation funding for companies	Provides direct support for innovation activities aiming in the areas relevant for sustainable development
	Equity support to venture & seed capital	Provides equity dedicated to innovation; de-risks innovation investments
	Feed-in-tariffs and similar subsidy schemes	Provides financial incentives to adopt and diffuse innovative technologies in selected technology areas (e.g. renewable energy)
	Tradable permit systems (e.g. emissions trading)	Allocates or sells emission rights to polluters which can be traded. The price for emission rights and prospect of reduction of emission rights creates incentives for innovation
	Removal of subsidies for unsustainable activities	Removes distortion from markets that inhibits sustainable innovation (e.g. subsidies for fossil fuels)

D15. Task 3.2.3 Develop a portfolio of innovation actions – Technical guidance on how to complete

	Policy instrument	How can they support innovation for sustainable development?
Fiscal instruments	Tax incentives for R&D for companies	Tax reduction (CIT) for companies undertaking R&D underpinning innovation
	Tax incentives for technology adopters	Tax reduction (CIT) for companies adopting innovations with environmental and social benefits
	Environmental taxation	Tax reduction (CIT) for companies undertaking R&D underpinning innovation
	Removal of tax reliefs for unsustainable activities	Removes distortion from markets that inhibits sustainable innovation (e.g. subsidies for fossil fuels)
Demand support	Sustainable public procurement	Creates markets for goods and services with positive impacts on the local community in the areas relevant for sustainable development (e.g. Green Public Procurement)
	Pre-commercial procurement (R&D and innovation procurement)	Creates markets for innovative goods and services and stimulates experimentation of new application of emerging technologies
	Support to private demand	Provides incentives (e.g. vouchers) for consumers to purchase innovative goods and services with demonstrated positive social and environmental impacts
Education and training	Adaptation of formal education curricula to address the SDGs	Adapting higher education and vocational training curricula to consider sustainable development challenges. The curricula may be developed jointly with industry and other organisations. Provides qualified and skilled workforce
	Placement schemes and staff mobility	Supports learning, knowledge exchange and connections between actors in the innovation system with a focus on actors active in promoting sustainable innovation
Regional Innovation strategy & networks	Clusters, industrial zones, and science and technology parks	Encourages smart specialisation in innovation and technological areas relevant for societal challenges in regions with high potential and/or need for goods and services with environmental and social benefits
	Technology platforms and networks	Promotes information and knowledge sharing on innovation
	Roadmaps and technology foresight	Creates shared vision, commitments and roadmaps for experimentation, investment and development of eco-innovation, “wires up” the innovation system

D15. Task 3.2.3 Develop a portfolio of innovation actions – Technical guidance on how to complete

	Policy instrument	How can they support innovation for sustainable development?
Capacity building and information provision	Business advisory services	Promotes skills and knowledge relevant for innovation
	Local entrepreneurship and business incubation	Promotes local entrepreneurship and local innovation
	Technology transfer and matching	Promotes identification and acquisition of innovative technologies relevant for tackling specific challenges
	Capacity building for governments	Promotes building up government capacity to design, implement, coordinate and evaluate STI policy with a view of its support for sustainable development
	Market intelligence services	Promotes information, data and knowledge sharing on innovation trends related to sustainable development (reduces information asymmetry)
Information and cultural instruments	Education and awareness raising	Campaigns or programmes can 'popularise' science, cooperativism, technology and innovation and – if appropriately designed – enhance democratic inputs to innovation policy
	Network facilitation and enhancement	Aids lesson learning and sharing e.g. events such as Failure Nights, Start-up weekends etc
	Virtual and material infrastructure/ events for innovation network-building	Hackathons, maker spaces, transformation labs

D15. Task 3.2.3 Develop a portfolio of innovation actions – Technical guidance on how to complete

Monitor and evaluate the performance of your innovation portfolio, and adapt accordingly

To monitor the progress and implementation of your portfolio, we suggest to conduct three process.

First, to create a "dashboard" and/or report where you summarise how your innovations individually and as a whole are performing regarding the criteria that you have selected (amplification, risk vs reward, synergies) and in relation to the adaptation challenge and its directionalities. The dashboard will provide you with a picture of the current state of your portfolio and its potential, and should include key metrics that can indicate the performance of the policy instruments that are being used (R&D spending, growth of companies, etc), as well as how they respond to the criteria of your portfolio defined in Step 5 and your adaptation challenge.

Secondly, evaluate whether the policy mix that you have put in place is supporting the implementation of your innovation portfolio in line with its intended outcomes. Questions that can be asked are:

i. Is the policy mix coherent with other interventions within the Regional Resilience Journey/ adaptation pathways?
ii. Is the policy mix efficient in terms of resources? Is it effective to achieve the desired goals?
iii. Does the innovation portfolio have the right support among different public and private stakeholders involved and affected by its implementation, including citizens?

Last, there are many 'learnings' based on experience and insights from those working on the portfolio implementation and how addressing the adaptation challenge. Often these methods are best suited to capture unexpected and unintended (positive and negative) outcomes, given that you involve a diverse set of stakeholders in the process. These "soft" insights are equally relevant and can be triangulated with other forms of data to ensure they reflect real changes. Methods that can be used are 'Most Significant Change' or 'Outcome Harvesting'.

Taken these three inputs together, decide on changes and adaptations to your innovation portfolio and supporting policy mix. Note that it is important that this process is collaborative and transparent, as it will keep the momentum and enhance the mutual alignment between the different agencies and stakeholders involved in the implementation of your innovation portfolio.

D15. Task 3.2.3 Develop a portfolio of innovation actions – Technical guidance on how to complete

Case studies Norther Netherlands Innovation for Climate Adaptation

The Norther Netherlands region (the provinces of Drenthe, Groningen and Friesland – grouped as one for purposes of the RIS3) is an example how multilevel innovation activities can be aligned with Climate Adaptation goals. It shows how national policies such as the National Adaptation Strategy (NAS), Delta Programme (water management) and Mission-Driven Top Sector (innovation strategy) as well as S3 innovation strategies can meet and align with respect to climate adaptation goals, which are also coordinated at the regional and local level.

The NAS has progressively expanded its view on climate adaptation, from a strong focus on water to the inclusion of other climate risks. With its focus on "making room for the river" the NAS has become itself more transformative, starting to include other climate risks besides flooding. This national level strategy has been translated to regional CCA foreach of the 3 provinces, enjoying high profile within regional policy making, with the three regions being signatory of the charter for the EU Mission on Climate Change Adaptation.

With respect to innovation policy at the national level, the Mission-Driven Top Sector and Innovation Policy (in place since 2011, but recently renewed for 2024-2027) guides the development and implementation of knowledge and innovation portfolios, public-private partnerships in "top sectors" with direct funding for innovative research and innovation. At the regional level, the Norther Netherlands region has developed a Smart Specialisation Strategy 2021-2027 (RIS3) that adopts the approach from the Top-sector innovation policy. It includes the following areas innovation portfolios, among others: Agriculture, food and water; energy transition and sustainability; and health and care.

While the RIS3 does not explicitly address Climate Adaptation, it opens room for relevant actions under the "Agriculture, water and food" innovation portfolio. Similarly, the Top Sector policy is not explicit mission on climate adaptation, but several of the mission-drive innovation programmes relate to this theme: Climate-proof rural area: prevention of flood and water shortages; climate-adaptive agricultural and horticultural production systems; water-robust and climate-proof urban area; improve water quality. Since there is no dedicated spending for climate adaptation within these policies it is hard to estimate what is the overall budget for innovation in this respect...

D15. Task 3.2.3 Develop a portfolio of innovation actions – Technical guidance on how to complete

...

Both climate adaptation and innovation strategies operate in a multilevel manner and include several mechanisms for effective citizen engagement. There are increasing cross-domain synergies between climate adaptation strategies and innovation strategies, particularly in the use of inter and transdisciplinary approaches in some of the top-sector innovation portfolios relevant to climate adaptation. However, a strong focus on economic issues remains, overlooking other dimensions of adaptation such as people, culture and nature. These strategies meet in making room for experimentation, for example, experimenting on new business models in large public-private collaborations under the Top Sector Policy. These are not yet mainstreamed to climate adaptation solutions that would benefit from experimentation.

Overall, the way in which Climate Adaptation and Innovation strategies are integrated at different levels in the Norther Netherlands region shows how mainstreaming of climate adaptation can happen within existing innovation strategies, as well as the advantages that this integration brings in terms of experimentation, knowledge co-creation and capacity building for climate adaptation.

Supporting resources:

Useful tools

- Brink guide to Behavioural Innovation
- JRC Action Book

Useful methods

- Portfolio Facet (OECD Portfolio Facets – [note that this is official under a OECD paywall]
- Portfolio approaches (UNDP Guidebook for Adopting Portfolio Approaches)
- Innovation roadmap approach (Inno4SD Innovation Roadmap approach)
- Transformative theory of change (MOTION Handbook – Transformative Theory of Change for Innovation Portfolio