

Report on R&I Project Cluster Analysis

Mapping and Portfolio Analysis of EUROMED R&I Cooperation – Phase II

JANUARY 2024



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January 2024

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Abbreviations

Abbreviation	Definition
ENI CBC	ENI CBC “Mediterranean Sea Basin Programme”
H2020	Horizon2020
PA	Priority Area
PRIMA	Partnership for Research and Innovation in the Mediterranean Area
TCIP	Theories of Change and Impact Pathways
UfM	Union of the Mediterranean

1 Executive summary

This report presents the findings of an assessment of the technological and innovation potential of the results of a portfolio of R&I projects funded under H2020, PRIMA and ENI CBC programmes. The assessment builds on the results of a previous study that had to evaluate the relevance of a large portfolio of projects to the priority areas and their specific focus areas set in the Theories of Change and Impact pathways as adopted by the Union for the Mediterranean Regional Platform in Research and Innovation.

The categories used for assessing the potential of the results were “very high”, “high” and “medium high”.

A total of 448 results with some level of technological or innovation potential were identified in the portfolio. About 11% of the results were in the highest category, and another 25% were assessed as having a high technological or innovation potential. The other results, 64%, were of medium high potential.

Most of the very high potential results covered topics relevant to two priorities – Renewable Energy and Climate Change and they usually originated from H2020 projects.

A total of 116 specific results with technological or innovation potential were identified within the projects, relevant to priority area “Renewable energy”. Nine projects had 24 results with very high technological/innovation potential while another 39 results were evaluated as having high potential. The very high potential results were in the area of modernization of the electric power systems and the production, storage and infrastructure related to green hydrogen.

There were 21 very high potential results, out of 360 in total, that were relevant to priority area “Climate Change” and another 76 results in this area were identified as high potential. Alleviation of water scarcity and draught in rural areas was often addressed by the very high potential results.

106 specific results with technological or innovation potential were relevant to priority area “Health”. Only 10 of the were in the category of very high potential, and 22 were with high potential.

2 Introduction

This report supports the first pillar of the Implementation Plan of the Union for the Mediterranean (UfM) Regional Platform in Research and Innovation by assessing the **scalability potential** of selected projects. The sample of projects is the result of a mapping and analysis conducted in Phase I on a portfolio of 252 projects funded through Horizon 2020, PRIMA and ENI CBC programmes. Only projects that are research and innovation actions and were assessed as relevant to any of the [Theories of Change and Impact Pathways](#) (TCIP) priorities in Phase I are considered in the current study.

Based on the publicly available data on projects, results with identified technological / innovation potential were identified and were categorized in three groups. The analysis investigated relations between the TCIP priorities and specific focus areas, the number and type of technological / innovation potential of the results, the funding programmes and instruments and budget.

The report is structured in the following way: first, the strategic context is presented, then the applied methodology is outlined, followed by discussion of the assessment results. The last section outlines the conclusions made.

3 Policy Initiatives and challenges

The [Union for the Mediterranean \(UfM\) Regional Platform in Research and Innovation](#)¹ aims to promote dialogue and cooperation between the EU and 16 countries from the Southern and Eastern shores of the Mediterranean in order to tackle emerging global challenges. The UfM agreed on the research and innovation priorities envisioned in the Theories of Change and Impact Pathways Roadmaps and Specific focus areas, developed by the Expert Groups that were assembled by the European Commission and the UfM and were consulted with the stakeholders at large. The [Theories of Change and Impact Pathways](#)² (TCIP) were adopted by the [UfM Regional Platform in Research and Innovation in July 2021](#)³. They were endorsed in the context of the UfM R&I Ministerial of June 2022.

TCIP aims to build up a comprehensive universal ground for the UfM member states concerning the future research and innovation and capacity-building activities in three identified priority areas (PAs) thus securing a stronger regional collaboration in R&I. The PAs are arranged in a hierarchal order from the one with the highest importance as follows: Health, Renewable Energies, and Climate Change. For every PA, the TCIP provides a situation analysis and describes the relevant Specific focus area. The situation analysis provides a brief overview of the current situation in the UfM priority areas in the Mediterranean region that is evaluated using a SWOT analysis. The Specific focus areas outline the specific challenges they address, their links with the SDG, the Research & Innovation agenda and the capacity building agenda, as well as the interlinkages between the Specific focus areas in all priority areas. The document outlines the importance of working towards healthy, resilient, inclusive and secure Euro-Mediterranean societies.

The UfM platform on R&I is developing an Implementation plan, which will emphasize both existing and newly created frameworks and initiatives. This plan envisions to have 4 fundamental pillars as follows: Pillar 1: Mapping/Portfolio Analysis of EUROMED R&I Cooperation which is the leading topic of the project. The aim is to promote already acquired knowledge, foster synergies and prevent duplication. The implementation Pillar 1 is followed by Pillar 2: Integration of needed actions into existing programmes, Pillar 3: Stakeholders' Communication and coordination R&I platform in the region, Pillar 4: Monitoring and Evaluation and Learning (MEL).

¹ <https://ufmsecretariat.org/new-research-and-innovation-agenda/>

² [2021-06-21_UfM-Platform_Theories-of-Change-and-IPs_and_Horizontal-Integration_Final-Version.pdf \(ufmsecretariat.org\)](#)

³ <https://ufmsecretariat.org/what-we-do/platforms/>

4 Methodology applied

A mapping and an analysis of a portfolio of 252 projects were conducted during Phase I. The relevance of each project regarding the three TCIP priorities of the specific focus areas and the corresponding specific focus areas was assessed as well as the type of actions covered by the projects – CSA, R&I and/or Capacity building. Details on the methodology applied and the findings were presented in the [published report](#). The priority areas and their specific focus areas:

- **Health**
 - Towards healthy, resilient, inclusive, and secure Euro-Mediterranean societies (H).
- **Renewable Energy**
 - Overview of Renewable Energy (RE) Scenarios, harmonized RE Smart Database and Communication within the region (RE1).
 - Modernization of the electric power systems (Smart Grid, Smart Cities and local RE generation) (RE2).
 - Distribution system modernization (Energy Loss Management) (RE3).
 - Advanced technologies | Green hydrogen production, storage, and infrastructures implementation (RE4).
- **Climate change**
 - Impact of Water Scarcity and Drought in Rural Areas (CC1).
 - Sustainable Agricultural Production (CC2).
 - Biodiversity in Changing Climate (CC3).

For convenience, Annex 2 replicates the specific topic and technological aspect and the methodological approach of the research for each specific Priority area as outlined in the TCIP.

Focusing only on projects of the research and innovation action type and assessed as relevant to any of the TCIP priorities in Phase I, resulted in a sample of 126 projects funded through Horizon 2020, PRIMA and ENI CBC programmes. These projects were investigated in Phase II. Their distribution among TCIP priorities and funding programmes is presented below.

Table 1. Number of relevant R&I projects per priority area and funding programme

Type of action	H2020	PRIMA	ENI CBC	Total
PA "Health"				
R&I	17	3	3	23
PA "Renewable Energy"				
R&I	13	0	5	18
PA "Climate Change"				
R&I	29	49	7	85

Source: [Phase I report](#), Table 5, p. 15

Based on the information from project descriptions, including project actions and results, as provided in public data sources ([CORDIS](#), [italietunisie.eu](#), [enicbcmmed.eu](#), [era-learn.eu](#)), the research team assessed the project results and identified these results that had technological / innovation potential. The results with potential were categorised in three groups:

- **Very high** – Projects adopting a clearly innovative/disruptive technology or technology-driven approach or method, results, in the field of health, renewable energies and climate change. The results in this group are clearly distinguished, with business ready or tech ready maturity, that can be separately developed further. These include new materials, prototypes, devices, machines/tools/equipment, software tools, prototype systems.
- **High** – Projects adopting and testing an innovative/disruptive technology or approach or method assessing results, uptakes and community responses will be key to understand their business readiness in the field of health, renewable energies and climate change. The results in this group are generally with lower readiness level. They include toolboxes, simulation models, monitoring dashboards, analytical methods and diagnostic tools, testing a new approach or technique.
- **Medium-High** – Projects with no innovative/disruptive technology *per se*, rather with analysis or implementation of already existing practices to be potentially leveraged in an innovative fashion in the future, depending on results. This group of results include structured reviews, description/manuals of best practices, policy tools, strategic/action plans or policy briefs, MOOCs, academic reports, conceptual frameworks, evaluations, datasets, and websites.

The information per project and per result was organised in a standardised electronic table. The variables included in the table, were:

- Project ID, abbreviation, name.
- Funding programme (H2020, PRIMA, ENI CBC).
- Start and end date of the project
- Total budget, funding mechanism/instrument (where available, mainly for H2020)
- Type of action.
- Relevance to TCIP priorities and specific focus areas.
- Identified results with technological / innovation potential – short description (a separate line for each result with potential within a project).
- Ranking of the technological / innovation potential identified.

The electronic table is presented in Annex 1.

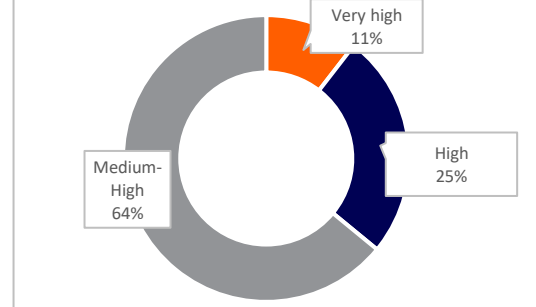
5 Results

A total of 448 results with some level of technological or innovation potential were identified in the portfolio⁴ (see Figure 1). Most of these, 262 results, were categorized as having “medium-high” potential and they came from 103 projects. Nineteen projects produced 47 results with “very high” potential. High potential was identified in 114 project results.

In terms of priority areas and specific focus areas, the results with very high potential were concentrated in Renewable Energy and Climate Change, with 24 and 21 results, respectively. Details on the number of project results by category of results and priority areas are presented in Table 2

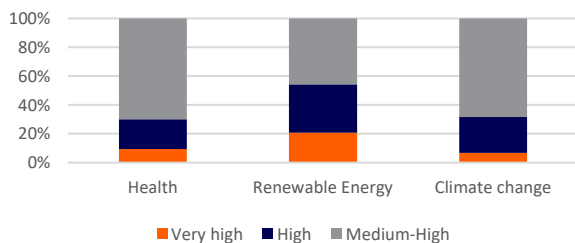
Error! Reference source not found. below. About 30% of the health-relevant results were categorized to be with very high or high potential. This share was similar for Climate Change project results while more than 54% of the results relevant to Renewable Energy were of the highest two categories (see Figure 2).

Figure 1. Distribution of project results by category of technological or innovation potential



In terms of funding programme, results coming from H2020 projects dominated in all categories. That could

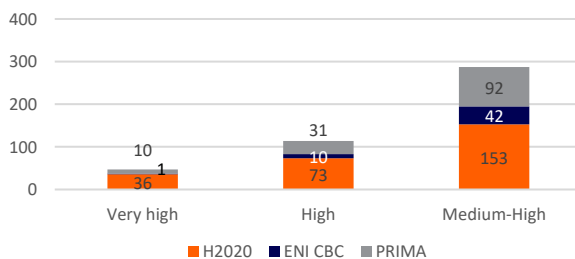
Figure 2. Distribution of project results category per priority areas



be expected as H2020 projects accounted for the majority of the portfolio. A total of 262 H2020 project results were assessed as having technological or innovation potential. Projects supported by PRIMA had 133 categorised results and the results from ENI CBC projects stood at 53 (see Figure 3).

The following presentation of the findings is organised by priority areas. For each priority area, the number of projects, and the number of specific results with technological / innovation potential is presented as well as the categorisation of the results. The funding programmes, instruments and the budget are also discussed.

Figure 3. Number of project results category per funding programme



The last subsection presents the results that were assessed as “very high” together with details on the

⁴ When considering the text and values discussed in the narrative the reader should keep in mind that one project could be relevant to more than one priority area and specific focus areas and that a project could have several results with different degree of technological or innovation potential. This means that often the total differs from the sum of its components.

relevant projects and the priority areas and specific focus areas.

Table 2. Number of results per Priority areas and category of technological or innovation potential

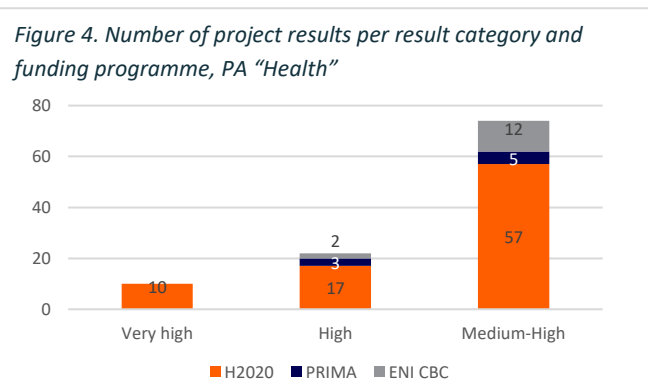
Category	Very high	High	Medium-High	Total
Number of results	47	114	287	448
PA “Health”	10	22	74	106
(H) Towards healthy, resilient, inclusive, and secure Euro-Mediterranean societies	10	22	74	106
PA “Renewable Energy”	24	39	53	116
(RE1) Overview of RE Scenarios, harmonized RE Smart Database and Communication within the region	6	9	19	34
(RE2) Modernization of the electric power systems (Smart Grid, Smart Cities and local RE generation)	16	22	42	80
(RE3) Distribution system modernization		1	6	7
(RE4) Advanced technologies Green hydrogen production, storage, and infrastructures implementation	8	18	13	39
PA “Climate Change”	21	76	209	306
(CC1) Impact of Water Scarcity and Drought in Rural Areas	15	35	63	113
(CC2) Sustainable Agricultural Production	9	36	151	196
(CC3) Biodiversity in Climate Change	2	22	62	86

Note: One project can be relevant to more than one priority area and specific focus area. Also, a project can have several results with different degree of technological or innovation potential. This means that the total number of results, 448, differs from the sum of results per priority area.

5.1 Priority area “Health”

A total of 106 specific results with technological or innovation potential were identified within the projects, relevant to priority area “Health”. The total budget of these projects stood at € 120mn.

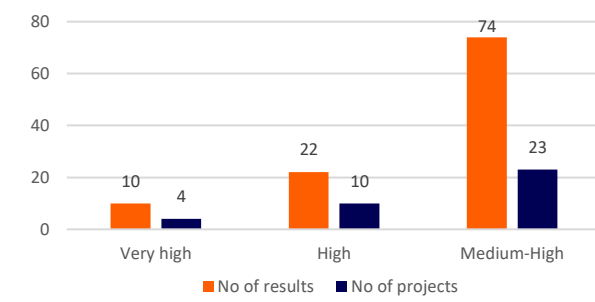
Four H2020 projects had a total of 10 results with **very high potential**. [CLAIM](#) is an Innovation Action (IA) project that focused on the development of innovative cleaning technologies and targeted prevention and marine litter management in the Mediterranean and the Baltic Sea. The five identified very high potential results from this project were various components and devices developed to prevent contamination and pollution, reduce its negative impact and monitor environmental parameters thus contributing to clean and affordable water and food. [GREENSENSE](#), a



Research and Innovation Action (RIA) project, developed a sustainable nanocellulose -based biosensing platform for Drug-of-Abuse analysis as well as nanocellulose -based films, results with business ready maturity. [MedAID](#) and [VIRTIGATION](#) were both RIA projects and their results also work towards food and nutrition security . The first developed new added value fish prototypes at pilot-scale for different fish market channels while the second delivered a novel automated software tool for fast counting of whitefly eggs.

The results with **high potential** were 22. They came mainly from H2020 projects (RIA and IA schemes and two ERA-NET-Cofund projects) that addressed the horizontal issues of the priority areas – most of them were found to be relevant to at least one other area outside “Health”, mainly CC3 and CC2. The results in this group focused on devising methodologies, tools, piloting and exploring various solutions.

Figure 5. Number of projects and project results per result category, PA “Health”



Medium-high potential was identified in 74 results from 23 projects. Most of the results were from H2020 projects funded through RIA and IA schemes, although several projects were supported through ERA-NET and ERC – ADG. Almost half of the projects with results in the medium-high category was relevant only to “Health” priority. The rest contributed to various Climate Change specific focus areas. The results in this category included reports, academic articles, policy briefs/papers, educational courses, descriptions of best practices, and databases.

5.2 Priority area “Renewable energy”

A total of 116 specific results with technological or innovation potential were identified within the projects, relevant to priority area “Renewable energy”. The total budget of the projects stood at € 182,6mn.

Nine projects had 24 results with very **high technological/innovation potential**. Eight if the projects were funded by H2020 (IA or RIA scheme). [BIZEOLCAT](#) developed new processes of light alkanes (methane, propane and butane) conversion to olefins (propylene, butadiene) and to aromatics, resulting in reduction of greenhouse emissions. The processes were piloted and validated and a patent was filed. [GREEN HYSLAND](#) deployed scalable and replicable comprehensive hydrogen network - infrastructure for the production, distribution and end use of hydrogen for transport, heat and power. [intelWATT](#)

Figure 6. Number of project results per result category and funding programme, PA “Renewable energy”

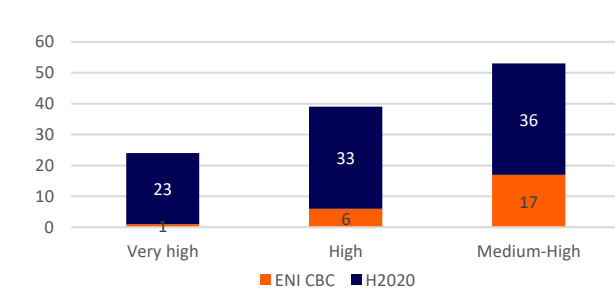
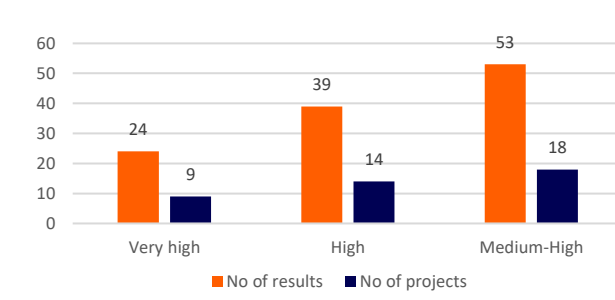


Figure 7. Number of projects and project results per result category, PA “Renewable energy”



addressed the problem of unsustainable use of water resources in the industry by developing cost-efficient and smart separation technologies applied in energy- and water-intensive industries that minimize liquid discharge and allow water reuse. [ORC-PLUS](#) developed an innovative thermal energy storage system, optimised for mid-sized concentrated solar power plants, that extended the power production in solar thermal power plants. [RAISELIFE](#) developed several innovative materials (coatings) with application in the concentrated solar power technologies, as well as an automatic coating machine prototype. [SOLARSCO2OL](#), an ongoing IA project, aimed to facilitate a larger deployment of concentrated solar power by developing innovative materials, tools and devices with applicability in small and medium size plants. [SUPER PV](#) developed a system of five photovoltaic module innovations that reduced the cost of energy. [WASCOP](#) developed technologies and prototypes that supply solutions to reduce water use in concentrated solar power plants. [BEEP](#), an ENI CBC project, facilitated the wider introduction of Building Information Modelling in the public sector by developing an energy efficiency heritage Building Information Model.

In terms of relevance to specific focus areas, the results with very high potential contribute mainly to RE2 and, to a lesser extent, RE4.

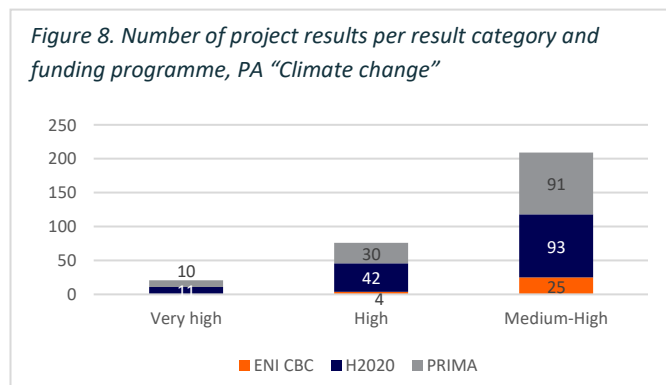
39 results were evaluated to be of **high potential**. They too were relevant mainly to RE2 and usually consisted of piloting or improving solutions, devising toolboxes and optimisation of processes.

The group of results with **medium-high potential**, 53 in total, covered various studies, reports and roadmaps, catalogues and datasets, mainly in the field of modernization of the electric power systems (RE2) and RE Scenarios, harmonized RE Smart Database and Communication within the region (RE1). The results in this group usually contributed to more than one specific focus area or priority area.

5.3 Priority area “Climate change”

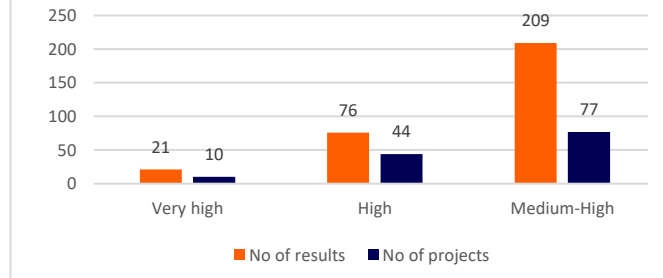
Some 360 results from 85 projects were assessed to have technological or innovative potential. The projects were funded by H2020, ENI CBC and PRIMA and their total budget stood at € 369,3mn.

The group of results with **very high potential** encompassed 21 results from 10 projects. Some of these projects, [intelWATT](#), [WASCOP](#), [MedAID](#), and [VIRTIGATION](#), were discussed previously as they were relevant to the priority areas of health and renewable energy. [HYDROUSA](#), a H2020 project funded through the IA scheme, developed two prototypes of rainwater management systems that can be applied in Mediterranean islands and coastal areas to close the water loops and boost their agricultural and energy profile. [INCREASE](#), a H2020 RIA project, developed genetic resources data on food-legume thus promoting the use of food legumes, improving quality, adaptation and yield.



The other four projects were all funded by PRIMA. [MED-WET](#) developed low-tech, low-energy and easy-to-operate solutions for improving irrigation, wastewater reuse and water desalination. [FRUALGAE](#) developed and tested economic and eco-friendly food processing and food packaging methods and technologies. [Fish-PhotoCAT](#) developed a photocatalytic reactor that can be used in aquaculture to obtain a low-cost filter for fresh and sea water purification. [INTEL-IRRIS](#) developed an open, low-cost and autonomous irrigation control system based on IoT and smart technologies that can improve the irrigation efficiency of small farms.

Figure 9. Number of projects and project results per result category, PA “Climate change”



High potential results relevant for the climate change priority area were 76. These were mainly simulations, tools, concepts, refining and testing methodologies and solutions. Often the results were relevant to more than one focus area.

The results with **medium high potential** were 209 and they consisted mainly of reports and articles, educational programmes, data sets and catalogs.

5.4 Projects with very high potential

The table below presents the results that were identified to have very high technology and innovation potential as well as information on the projects that delivered these results including relevance to priority areas and specific focus areas.

Table 3. Results with very high technology and innovation potential

Project ID	Project title	Funding programme	Start – End date	Total budget, EUR	TCIP PA	Identified results, description
814671	BIZEOLCAT Bifunctional Zeolite based Catalysts and Innovative process for Sustainable Hydrocarbon Transformation	H2020/ RIA	01/2019 – 12/2022	6,571,838	RE4	New hydrocarbons dehydrogenation and aromatization Catalysts granting good activity/selectivity
						Novel catalyst fabrication methodologies for dehydrogenation/aromatization of hydrocarbons
						Novel catalysts for methane conversion
						Published patent filed by the partner Eurecat on Feb 2021, which reference is EP21382154 "Alkane dehydrogenation nano catalyst and process for its preparation" - a catalyst preparation methodology. The obtention of new light hydrocarbon dehydrogenation catalysts. new preparation methodology and new aromatization catalyst supported on different materials with improved performances (activity, selectivity, and stability) at lab scale using as reference other benchmark catalysts and results have been reproduced at pilot plant stage. The proposed new synthetic routes conceived in the context of this project have been validated at TRL5.
774586	CLAIM Cleaning Litter by developing and Applying Innovative Methods in european seas	H2020/ IA	11/2017- 04/2022	6,150,475	H	FerryBoxes: The FerryBoxes are autonomous systems for continuous monitoring of physicochemical and environmental parameters installed in commercial vessels and ferryboats. As the boat travels, the FerryBox collects samplers and monitors environmental parameters such as seawater temperature, salinity, dissolved oxygen concentration, turbidity, chlorophyll concentration, and seawater alkalinity-pH. The data are transmitted in real-time and stored at databases providing the scientific community with a useful research tool and users with a live image of the environmental conditions.
						A passive filtering system that provided information on marine litter distribution in the Mediterranean and Baltic Seas. It has been used on board, on vessels equipped with FerryBox systems or other flow-through seawater pumping systems.
						FLOATING BOOMS – Tactical recovery accumulation system. The innovative formation barrier will have the ability to be placed in any natural or artificial water flow and filter water progressively

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Project ID	Project title	Funding programme	Start – End date	Total budget, EUR	TCIP PA	Identified results, description
						<p>via interchangeable screens of variable meshes, which will withhold various sizes of visible litter, without distributing float and tracking data through monitoring. The Marine Litter Containment Floating Boom can be deployed near known sources of pollutants (river mouths, facility outlets and runoff).</p> <p>PHOLOCATALYTIC DEVICE: a technology for the prevention and degradation of harmless materials; Harnessing the sun's radiation to help rid the oceans of microplastics contamination, a photocatalytic device will be used for speeding up UV-fueled degradation and breaking down microplastics from personal care products into harmless element.</p> <p>PREFILTERING SYSTEM: Technology for a pre-filtration system, placed before the Photocatalytic device in order to retain larger plastics and ensure the smooth functioning of the photocatalytic coatings at a later stage. The system will gather the plastic pieces into a specialized bag inside a cartridge, while simultaneously taking two samplers (before filtration and after the nanocoating devise), to measure effectiveness and inform new strategies.</p> <p>YROLIZER: a small-scale pyrolizer exploits plasma-fueled high temperature for transforming solid waste into a combustible gas, called syngas, and a recyclable solid residue. The process does not produce dioxins and furans, an issue with many thermal processes and the produced syngas, in turn, can be re-used to fuel ships and heat ports. The very small scale, up to 100kg of waste per day, makes the device suitable for mounting on small boats that can work closer to shore and collect marine litter nearer the point of entry.</p>
101007201	GREEN HYSLAND "GREEN HYSLAND – Deployment of a H2 Ecosystem on the Island of Mallorca"	H2020/ FCH2-IA	01/2021 – 12/2025	20,453,569	RE4	<p>H2 infrastructure: pipeline delivery - Operational discharge of the tube trailer into the hydrogen pipeline; Innovative aspects: The connection between a tube trailer with a hydrogen-dedicated pipeline' New services and new value chains, Paving the path to adapt the regulatory framework to facilitate further developments</p> <p>Scale up multi-MW electrolysis interconnections: Large scale hydrogen production plant deployment, to supply hydrogen to multiple end users. This will enable to boost the energy</p>

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Project ID	Project title	Funding programme	Start – End date	Total budget, EUR	TCIP PA	Identified results, description
						transition based on green hydrogen, and to increase of the installed electrolysis capacity on the territory
761000	GREENSENSE Sustainable, Wireless, Autonomous Nanocellulose-based Quantitative DoA Biosensing Platform	H2020/ RIA	01/2018 – 03/2022	7,993,103	H	Drugs of Abuse Biosensor (business ready maturity) - part of the multi-parameter, hybrid-printed biosensing platform to detect drugs of abuse (DoA) Nano Cellulose Based Films (business ready maturity)
776643	HYDROUSA Demonstration of water loops with innovative regenerative business models for the Mediterranean region	H2020/ IA	07/2018 – 12/2022	12,015,449	CC1; CC2	Rainwater management systems: two prototype rainwater management systems were installed and delivered to the project. The intended systems' function is described in a comprehensive report including the technical drawings of the design phase, several photographs of the construction process and a description of the final setup. Upflow Anaerobic Sludge Blanket (UASB) and biogas upgrade system together with the attached equipment. It is used for the treatment of an actual stream of domestic wastewater at a community level.
862862	INCREASE Intelligent Collections of Food Legumes Genetic Resources for European Agrofood Systems	H2020/ RIA	05/2020 – 04/2026	8,826,825	CC2	The first round of the Clean Simple Eats (CSE), designed to test a fully decentralized approach to germplasm conservation, was launched. A tailored CSE App was developed assisting in data collection, ensuring seed exchange with participants under a legal framework. The innovative App is paving the way for future Plant Genetic Resources for Food and Agriculture (PGRFA)-related Citizen Science projects. This first CSE round was a great success with more than 3,000 registered participants overall Europe and more than 2,000 EU citizens receiving seeds, to conduct the experiment
958454	intelWATT intelligent Water Treatment Technologies for water preservation combined with simultaneous energy production and material recovery in energy intensive industries	H2020/ IA	10/2020 – 03/2024	12,515,256	RE1; RE2; CC1	A very robust tubular ultra-filtration polymeric membrane suitable for raw water (brine) treatment Membrane-assisted crystallization for the simultaneous recovery of valuable salts and of distilled water from industrial brines / hypersaline solutions On-line monitoring device for the detection of highly concentrated Chromium /Cr(III)/ dissolved in water streams Scalable graphene oxide (GO)-based ion-selective cation exchange membranes for reverse electrodialysis applications - GO membranes are a promising solution for separation

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Project ID	Project title	Funding programme	Start – End date	Total budget, EUR	TCIP PA	Identified results, description
						technologies, provided that the GO itself and its membrane form can be produced in a sustainable way. For these reasons, the research helped shed light on green and sustainable routes for GO membranes' production.
						Scalable graphene oxide-based ion-selective cation exchange membranes for reverse electro dialysis applications
727315	MedAID Mediterranean Aquaculture Integrated Development	H2020/ RIA	05/2017 – 10/2021	6,999,996	H; CC3	Development of new added value fish prototypes at pilot-scale for different fish market channels; Processing specifications, quality and safety assurance of the prototypes
657690	ORC-PLUS Organic Rankine Cycle - Prototype Link to Unit Storage	H2020/ IA	05/2015 – 10/2019	7,297,149	RE2	Thermal energy storage (TES) systems pilot plant at Green Energy Park constructed in Morocco: capable of extending the power production of an existing solar thermal power plant located in Morocco using linear Fresnel collectors technology as a solar field and an Organic Rankine cycle (ORC) turbine with a rated output of 1 MWel as power unit. The Heat transfer fluid employed by the existing Concentrated solar power (CSP) plant is an environmentally friendly mineral oil that work in the range 180°C -300°C.
686008	RAISELIFE Raising the Lifetime of Functional Materials for Concentrated Solar Power Technology	H2020/ IA	04/2016 – 03/2020	10,368,741	RE2	An automatic coating machine prototype has been built which achieves 4 times lower thickness variation than manual painting and thus reduces possible hot spots in the coating. Design and construction of a composite thin glass heliostat for wind loads >45m/s at low weight and possible cost reductions of 30%, lowering expected heliostat cost from 68€/m ² to about 45€/m ² . Development of weldable protective coatings for ferritic steels in molten salt environment, with high-cost reduction potential compared to nickel base alloys. Stability proved for 10,000h during static and dynamic tests at 580°C in solar salt. Weld joints were tested up to 1,000h performing better than non-coated materials. Improvement of the abrasion resistance of an anti-reflective coating for evacuated line focusing receiver tubes. The coating was deposited in an industrial coating line on a commercial receiver tube and was validated during 12 months of in-service testing. The coating is ready for commercialization.

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Project ID	Project title	Funding programme	Start – End date	Total budget, EUR	TCIP PA	Identified results, description
						Qualification of a novel receiver coating developed by the partner BrightSource Industries (Israel) Ltd. (BSII), which will be employed in the commercial 100MWe DEWA solar tower project in Dubai. The developed lifetime model predicts that the solar absorptance of the BSII coating will remain above 95% for about 7 years on ferritic steel substrate T91 (for steam receivers) and about 15 years on nickel base alloy Inconel 617 (for molten salt receiver). The higher lifetime compared to the state-of-the-art Pyromark coating leads to a Levelized Cost of Electricity (LCEO) reduction of about 1.1%. Validation of durability of solar-cured receiver coatings, opening the possibility of curing the coating directly on the top of the tower. This reduces expensive panel dismantling and furnace curing, fossil fuels (gas burners) as well as down-time of the power plant.
952953	SOLARSCO2OL SOLAR based sCO2 Operating Low-cost plants	H2020/ IA	10/2020 – 09/2024	13,419,701	RE2	<p>Business ready innovations: Thin and flexible all-printed power source-based batteries; Ultrasonic Steering method to avoid phase segregation in Phase Change Materials (PCMs); SensorVeil™ – A non-intrusive wireless mirroring network technology for the duplication of sensing and actuating signals in Industrial Procedures; Cost-efficient materials to increase durability performance in harsh environments; Free Moby Innovations; Microencapsulated PCM-Borehole Heat Exchangers (PCM-BHE); Light-powered electrodes ; Linear receiver for high and uneven fluxes; Cost-efficient static solar field based on spherical concentrators for increased performance due to high concentration ratios; Improved mechanical handling of coated ion exchange membranes; Low-cost proton exchange membranes for applications in mild conditions such as artificial photosynthesis</p> <p>Market ready innovations: Salt Hydrated Based Tanks for Thermal Energy Storage; Development of electronic designing by means of laser scribing technology; Solar receiver based on a thermionic energy converter; Bi-Axial Fresnel concentrator; etc.</p> <p>Tech ready innovations: Nano Enhanced Paraffins by the addition of carbon-based nanoparticles to increase the paraffins thermal performance; A near zero liquid discharge process for the treatment and reuse of cooling tower blow down water;</p>

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Project ID	Project title	Funding programme	Start – End date	Total budget, EUR	TCIP PA	Identified results, description
						Weather domain specific innovations: encapsulating algorithmic motives and prototype implementations; On-line monitoring device for the detection of high concentrated Cr(III) dissolved in water streams; Smart polymeric mirror made of polymeric materials for concentration solar thermal energy sector; High thermal capacity materials for thermal storage; etc.
792245	SUPER PV CoSt redUction and enhanced PERformance of PV systems	H2020/ IA	05/2018 – 10/2022	11,608,064	RE4	<p>System Level Innovations: developing a new digital and holistic process: PIM (PV information Modelling/Management). The main objective is to adopt digital software and hardware tools ensuring information flow through the PV value chain this way reducing costs related to the PV projects implementation and operation. These are: i) the development of a digital platform for design, simulation and operation , supporting the cost reduction of PV systems; and ii) the development of a tool for extending the PIM-based platform functionalities for operations and maintenance through a Digital Twin Model, continually updated to include the events sustained while in use, thanks to a sensor-enabled digital model that simulates the object in a live setting.</p> <p>System of five photovoltaic (PV) module innovations applied to crystalline silicon module (c-Si) based bifacial modules and copper indium gallium selenide (CIGS) modules. In combination with Power electronics (PE) and System integration, significant Levelized Cost of Energy (LCOE) reduction (26%-37%) could be achieved.</p>
101000570	VIRTIGATION EMERGING VIRAL DISEASES IN TOMATOES AND CUCURBITS: IMPLEMENTATION OF MITIGATION STRATEGIES FOR DURABLE DISEASE MANAGEMENT	H2020/ RIA	06/2021 – 05/2025	7,358,170	H; CC2	The Eggsplorer – a novel automated software tool for fast counting of whitefly eggs, to accelerate the determination of plant insect resistance and susceptibility.
654479	WASCOP Water Saving for concentrated solar power (CSP) plants. The technologies have been successfully tested	H2020/ RIA	01/2016 – 12/2019	5,941,608	RE2; CC1	A flexible and adaptive integrated solution (a toolbox for cooling and cleaning operations) to reduce water use in CSP plants. The toolbox was tested and validated in real conditions at three testing sites in France, Spain and Morocco.

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Project ID	Project title	Funding programme	Start – End date	Total budget, EUR	TCIP PA	Identified results, description
	and validated the toolbox in real conditions at three testing sites in France, Spain and Morocco. Team members assessed the technical, economic and environmental impacts on CSP plants for all the developed technological solutions.					
	BEEP - BIM for Energy Efficiency in the Public sector	ENI CBC/ MSB	09/2019 – 12/2022	1,900,000	RE1; RE2	Expected results: 1 energy efficiency heritage Building Information Model developed
	Fish-PhotoCAT Photocatalytic water remediation for sustainable fish farming	PRIMA	12/2020 – 11/2024	707,573	CC3	Developing an innovative photocatalytic reactor, by modifying the traditional filters used in aquaculture, to obtain a new low-cost generation filter for fresh and sea water purification.
	FRUALGAE Sustainable technologies and methodologies to improve quality and extend product shelf life in the Mediterranean agro-food supply chain	PRIMA	05/2020 – 10/2023	1,220,000	CC2	Design and testing of economic and eco-friendly active food packaging technologies for quality improvement and shelf life extension. Development and testing of economic and eco-friendly nonthermal food processing methods for quality improvement and shelf-life extension.
	INTEL-IRRIS Intelligent Irrigation System for Low-cost Autonomous Water Control in Small-scale Agriculture	PRIMA	06/2021 – 05/2024	1,045,120	CC1	INTEL-IRRIS Irrigation WaziApp Application INTEL-IRRIS starter-kit for smart irrigation systems - soil sensor devices LoRaWAN Field Tester The generic LoRa IoT sensor platform v0
	MED-WET Improving MEDiterranean irrigation and Water supply for smallholder farmers by providing Efficient, low-cost and nature-based Technologies and practices	PRIMA	06/2021 – 05/2024	1,101,053	CC1; CC2	"SLECI"-Technology - Self-regulating, Low Energy, Clay based Irrigation - a self-regulating subsurface irrigation technique that uses the actual suction force of the surrounding soil for regulation of the system's water release. Productive constructed wetlands for wastewater reuse - transforms vineyard wastewater into reclaimed irrigation water, which flows into the further production units with edible crops. Solar desalination system for utilization of saline and low-grade water

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6 Conclusions

A total of 448 results that have some technological or innovation potential were identified in a portfolio of 126 R&I projects funded through H2020, PRIMA and ENI CBC programmes. Very high potential was identified in 47 results, or 11% of all results. The share of results with high potential stood at 25%. The results with very high potential covered mainly advances in the areas of Renewable Energy and Climate Change, 24 and 21, respectively. They usually come from H2020 projects supported through IA or RIA schemes, but that distribution largely reflects the overall structure of the project portfolio in terms of funding programme.

The analysis per TCIP priority areas revealed that projects with very high potential most often have potential to contribute to the modernization of the electric power systems and the production, storage and infrastructure related to green hydrogen, or address approaches to alleviate water scarcity and draught in rural areas. Some of the identified results with very high potential were of high business/market maturity and further investigation of their potential to be scaled-up or introduced to the market would be beneficial to achieving the TCIP goals.

Annex 1 Project portfolio

See attached Excel file

Annex 2 TCIP priority areas and specific focus areas

Priority area	Technological development and efficiency	Methodological Approach
H1	<ul style="list-style-type: none"> - Establishing an epidemic preparedness and response EPR Intelligence hub for rapid action coordination among Euro-Mediterranean countries. - Technologies enabling system approach for sustainable and resilient health systems and societies. - More equitable access to health services and technologies (in particular for the most vulnerable). - Smarter and greener cities enabling healthier behaviour. 	<ul style="list-style-type: none"> - Pilot projects and demonstrations studies (Case studies to identify success elements and key obstacles to effectively implement transdisciplinary participative research; Build on Euro-Mediterranean success (based on previous and new projects); Develop capacities in health emergency preparedness; Pilot projects are the occasion to learn and put into practice open science approach) - Implementation research (Prevention programmes; Health systems resilience and disaster and crisis management; Include Social Sciences in particular Behavioural Science, Economic Sciences, Media and Communication).
RE1	<ul style="list-style-type: none"> - Identification and definition of the quantities relevant for a Renewable Energies scenario - Identification of database that could be shared within UfM countries - Stimulating the share of information/best practice in RE policy 	<ul style="list-style-type: none"> - Identification and definition of the quantities relevant for the Renewable Energies scenario - Identification of database and related digital platform that could be shared within UfM Countries - Stimulating the share of information/best practice in RE policy
RE2	<ul style="list-style-type: none"> - Matching energy production/storage/consumption - Technical capabilities to self-management - Digitalization & Renewable Energies & Isolated activities 	<ul style="list-style-type: none"> - Analysis of energy management, production and storage systems and specifications regarding less populated areas' needs - Development of energy production and storage technologies and its integration to suit these areas' activities - Digitalization of management system to become a smart city system self-sufficient
RE3	<ul style="list-style-type: none"> - Identification of technical / commercial loss zones - Identification of loss zones in systems impeded with customer-owned renewable-based Distributed Generation (DG) - Developing a relation between the electric loss percentage and electricity tariff 	<ul style="list-style-type: none"> - Identification of technical / commercial loss zones - Identification of loss zones in systems impeded with customer-owned renewable-based Distributed Generation (DG) - Developing a relation between the electric loss percentage and electricity tariff
RE4	<ul style="list-style-type: none"> - Identification of the best hydrogen production process using renewable energies to resolve and compensate the intermittency and excess of electricity production of these resources - Resolve the problems of storage and the transport of green H2 between South-East and North Mediterranean Countries - Development of research in the field of H2 distribution networks and infrastructures in Mediterranean countries 	<ul style="list-style-type: none"> - Identification of the solar energy processes which can be conducted to produce hydrogen: water electrolysis using solar generated electricity or direct solar water splitting - A combination of solar and wind power or others REs can provide a high load factor for the electrolysis process, and so lead to competitive cost of green hydrogen - The cost of electricity production from Renewable energies should fall more in the future for sites with good solar and wind resources (<10-20 € per MWh).
CC1	<ul style="list-style-type: none"> - Investigate methods to enhance and Recharge water aquifer - Develop techniques for water harvesting at macro and micro levels 	<ul style="list-style-type: none"> - Cooperative teamwork among researchers in the field of civil engineering (water) and hydrology and environmental and water resource management specialists. The joint effort is to locate sites suitable to build reservoir (small dams) for recharging purposes,

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Priority area	Technological development and efficiency	Methodological Approach
	<ul style="list-style-type: none"> - Investigate the potential of using brackish and effluent water in restoration of range land - Investigate energy efficient strategies for water desalination 	<ul style="list-style-type: none"> - to develop technologies to facilitate soil permeability in these locations, and to assess local environmental impacts - Cooperation among hydrologists, agriculturist (horticulture, agronomy, range land and water specialists: To develop techniques to harvest water and plants at the field and individual plant (shrubs) - Cooperation among agriculturists (range land specialists) soil chemists, ecologists - Cooperation among researchers in civil and mechanical engineering and water specialists
CC2	<ul style="list-style-type: none"> - Introduce new sustainable agricultural systems i.e., aquaponic, hydroponic, aeroponic coupled with using geothermal heating and cooling systems - Investigate management-based adaptation and measures 	<ul style="list-style-type: none"> - Cooperation among scientists in horticulture soil chemists and experts in fisheries - Cooperation among horticulturists, plant breeders, agronomists - Integrated AquaPonic systems for improving food production sustainability and brackish water use and recycling
CC3	<ul style="list-style-type: none"> - Building resilient rural communities - Investigate climate change adaptation and mitigation measures - Germplasm collection 	<ul style="list-style-type: none"> - Extensive, socio-economic studies and research on food technology and nutrition - Cooperative work among agronomist, range land specialist, ecologists and conservation scientists and forestry technologists - Research in botany, zoology, horticulture, agronomy and animal production specialists.

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