THE ENERGY & WATER AGENCY

MINISTRY FOR ENERGY AND WATER MANAGEMENT

NATIONAL STRATEGY FOR

RESEARCH AND INNOVATION IN ENERGY AND WATER

2021-2030

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LIST OF ABBREVIATIONS

ERDF	European Regional Development Funds
ESIF	European Structural Investment Funds
EWA	The Energy and Water Agency
GHG	Greenhouse Gas (emissions)
HES	Higher Education Sector
JRC	The Joint Research Centre
KPI	Key Performance Indicator
LNG	Liquefied Natural Gas
MCAST	Malta College of Arts, Science and Technology
MCST	Malta Council for Science and Technology
NECP	National Energy and Climate Plan
PSF	Peer Support Facility
PV	Photovoltaics (solar)
TRL	Technology Readiness Level

DR. MICHAEL FARRUGIA
Minister for Energy
and Water Management

FOREWORD

In Malta, the sectors of energy and water have seen radical change over the last decade. While the wheels of commerce began to turn rapidly at the beginning of this period, particularly in Malta where economic growth reached unprecedented levels, the Maltese Government initiated its implementation of packages of measures to improve energy and water management, particularly through significant investments in infrastructure.

The results of such investments can clearly be seen today, in the high efficiency of our power generation system, which now runs on cleaner fuel, and that of our water production and distribution system.

Our goal was and continues to be to ensure the safe, affordable and sustainable supply of these critical resources to the residents of Malta and local industry and businesses.

Sustainability will continue to be a key objective over the upcoming decade. The sectors of energy and water management are likely to face additional pressures, especially in the face of exacerbated climate change impacts, continued resident population growth and economic expansion.

Research and innovation is expected to play a critical role in this regard, particularly in Malta where national specificities present significant challenges to Malta's drive towards sustainability and decarbonisation as well as industrial competitiveness. The goal of R&I is positive change – positive change at multiple levels, from environmental protection to increased productivity and wealth. It thus forms a crucial component contributing to enhancing the prosperity of our country and the quality of life of its citizens.

EXECUTIVE SUMMARY

This Strategy is the first to be exclusively dedicated to R&I in the fields of energy and water. Through its implementation, the Government of Malta seeks to boost and guide the direction of domestic R&I in the fields of energy and water over the upcoming decade in a manner that is informed by and integrally tied with national direction for energy and water management and economic competitiveness.

The two sectors of energy and water bring together some of the most significant challenges being faced at national level, exacerbated by the rapid pace of economic and population growth and the intensifying impacts of climate change. As a semi-arid Mediterranean country with few indigenous sources of energy considered to be technically and economically viable, and limited availability of natural sources of fresh water, sustainable use of Malta's resources is a priority. The key role of R&I in contributing to and accelerating the attainment of national sectoral ambitions is acknowledged at both EU and national level, and it is expected that R&I supported through the implementation of this Strategy will contribute in a tangible manner to the long-term vision of sustainability for energy and water. Research for impact, not only excellence, is therefore priority.

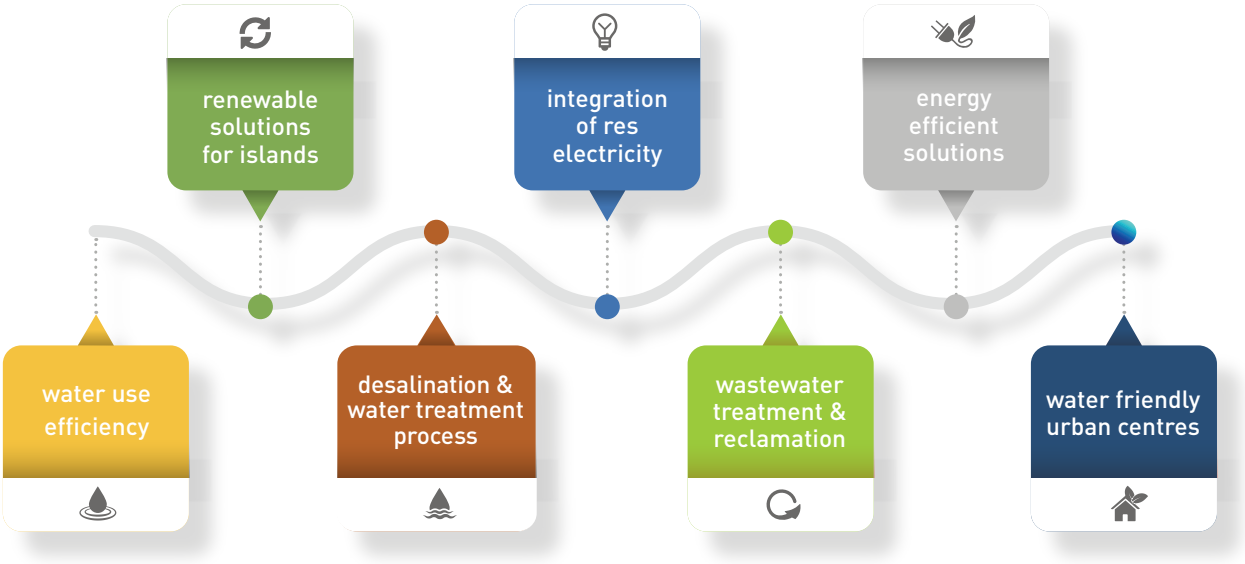
> "RESEARCH FOR IMPACT, NOT ONLY EXCELLENCE, IS THEREFORE PRIORITY."

The objectives of the National Strategy for R&I in Energy and Water (2021-2030) are to:

1. Strengthen and support R&I that:
    a. Addresses national policy priorities and challenges; and/or
    b. Bolsters national competitiveness and growth in a variety of sectors.
2. Increase coordination and cooperation between the wide array of stakeholders in fields of energy and water, thereby ensuring that outcomes from R&I activities translate into tangible positive impacts.

In order to boost domestic R&I activities and bolster local research capacities, additional financial support for R&I will be provided through the implementation of this Strategy. A recent review of the Maltese R&I system by the Policy Support Facility acknowledged a misalignment between the current support framework and the type of R&I activities undertaken by the major actors, as well as a general funding gap for R&I projects at the lower TRLs. In this regard, **this Strategy prioritises oriented-basic research and applied research to experimental design** (TRL 2 – 6). Such funds may also act as an essential springboard for research teams to apply for more significant levels of support as required at higher TRLs as projects evolve.

Seven thematic priority areas within the fields of energy and water (see figure below) were identified. These were designed to be complementary to the national outlook for the energy and water sectors and through engagement with experts and stakeholders. An understanding of the evolution of European research and the outlook of the European Commission also informed the selection, as this has the potential to positively supplement national resources and opportunities of domestic R&I activities and capabilities. In line with the guiding principles of this Strategy, a nexus approach is adopted to incentivise research that examines the synergies between the fields of energy and water, as well as to encourage the incorporation of such considerations in more sectoral work. Furthermore, **multidisciplinarity is emphasised within each priority area, expanding the scope for support to various areas of research, ranging from engineering and natural science to social and behavioural sciences, big data and artificial intelligence.**



In line with the second objective and in order to coordinate the implementation of **this Strategy foresees the establishment of Platform-RINEW (Research and INnovation in Energy and Water)**. This structure will bring together the myriad of stakeholders in the fields of energy and water from the public sector, academia and industry in a manner that reflects the inherent multidisciplinary nature of this Strategy. It will create a more horizontal relationship between those executing the Strategy, those participating within its support framework and those benefiting from its outcomes.

The highest impact of R&I is made when these three communities work together. Platform-RINEW, through enhancing interaction between these stakeholders and strengthening their cooperation and coordination, is expected to have the following impacts:

- Drive R&I that is tailored towards addressing local needs and challenges as well as facilitate the translation of R&I outcomes into tangible impacts;
- Streamline and effectively allocate available resources whilst also seeking to reduce fragmentation of the domestic R&I landscape;
- Ensure the effectiveness of support measures and maintain the momentum of R&I at each stage;
- Enable the development of appropriate supply- and demand-side policies which strengthen the interrelationship between the energy and water sectors and R&I;
- Encourage the exploration of particular issues from novel perspectives, through the development of formal communication channels with R&I actors from a wide variety of specialisation areas;
- Facilitate knowledge-sharing between the three groups of actors; and
- Create a sense of collective responsibility in moving the country along its path of sustainability, climate change resilience and environmental protection.

The implementation of this Strategy is envisaged to be executed through multiannual work programmes. Evaluation of the Strategy is expected to take place at the mid-point in its implementation period, coinciding with the possible revision of the National Energy and Climate Plan and the early stages of the development of the fourth River Basin Management Plan. Thus, continued alignment between these three interrelated policy documents will be maintained.

Malta looks positively towards the upcoming decade as a timely coming together of ambitious goals for energy and water management and a strong emphasis on the potential for R&I to contribute to these ambitious objectives, at both the national and international level, and thus serving the overall policy priorities of sustainability, decarbonisation, environmental protection and strengthened competitiveness and growth.

01 Introduction

Research and innovation (R&I) is increasingly viewed as an integral component of any field, particularly in terms of ensuring progress and maintaining a competitive edge. It is cross-cutting in nature, both in terms of the multitude of stakeholders involved in the process and the myriad of those who benefit from its outcomes. This Strategy is the first to be exclusively dedicated to R&I in the fields of energy and water. It benefits from collective national experience, particularly that of the Malta Council for Science and Technology (MCST) in supporting and defining a direction for R&I. It aims to bring the different players, instruments and policies at the national and European level closer together, thus clarifying and strengthening the national R&I landscape within the fields of energy and water. This Strategy is intended for researchers, policy-makers, industry and the general public, with the aim of providing clarity on the Government's vision and objectives for R&I in energy and water during the upcoming decade (2021-2030).

This Strategy aims to ensure complementarity and synergy between national and EU-level policies and programmes, as well as alignment with expected developments in the water and energy sectors and the long-term drive for sustainability, climate change resilience and environmental protection. Working in line with national targets and policy documents, this Strategy aims to encourage investment across multiple sectors throughout value chains and a wide array of scientific disciplines, as well as different actors and stakeholders. The key role of R&I in contributing to and accelerating the attainment of national ambitions is acknowledged at both EU and national level. Bolstering the support for and guiding the direction of R&I such that it is tailored to local specificities and national priorities is thus considered an integral component for development and progress within both the energy and water sectors. In addition, driving targeted R&I for both excellence and impact will feed into boosting industrial competitiveness and economic development through instruments of knowledge.

This Strategy thus explicitly serves three policy priorities:

1. contributing to Malta's transition to sustainability and decarbonisation in an effective, just and timely manner;

2. strengthening competitiveness, growth and commercial attractiveness whilst ensuring a high level of environmental protection and climate change resilience; and

3. increasing the level of domestic support for R&I in Malta.

1.1
SCOPE OF THE STRATEGY DOCUMENT

The National Strategy for Research and Innovation in Energy and Water 2021-2030 (hereinafter referred to as "the/this Strategy") is a sector-specific strategy developed to boost and support domestic R&I specifically in the areas of energy and water management within the wider R&I landscape. The document describes aspects of the current situation of R&I in Malta and the context for R&I in the upcoming decade, within which the Strategy will operate. The objectives and outcomes of the Strategy are outlined, along with the identified priority areas for R&I in energy and water during this period and the associated framework of support, including governance structures and research priorities.

1.2
DEVELOPMENT OF THE STRATEGY: OVERVIEW OF THE PROCESS

This Strategy aims at exploiting innovation potential within the fields of energy and water management, yielding cross-cutting benefits through targeted R&I investment. This would contribute towards the realisation of sustainable progress in the national energy and water sectors, and may extend to wider economic and societal goals of job creation, increased competitiveness and higher quality of life.

In light of these potential advances, and upon agreement between the Parliamentary Secretariat for Financial Services, Digital Economy and Innovation and the Ministry for Energy and Water Management, the Energy and Water Agency (EWA) was tasked with developing a sector-specific strategy for R&I in energy and water management to fully take advantage of the value-added of such targeted investment. This is also linked to the implementation of the Regulation of the Governance of the Energy Union (Regulation (EU) 2018/1999) which identifies R&I as one of the five dimensions of the Energy Union[1]. This Regulation requires that the National Energy and Climate Plan (NECP) includes *national objectives and funding targets for public and, where available, private research and innovation relating to the Energy Union, including, where appropriate, a timeframe for when the objectives should be met.*

Two fundamental inputs to the development of the Strategy were stakeholder consultations and national policy direction. The beginning of 2019 saw the start of engagement with experts, academia, and public and private institutions, with the Draft Strategy published for public consultation from mid-December 2019 until the beginning of February 2020; a public consultation event was held on 3rd February 2020, organised by the Energy and Water Agency and MEUSAC (the Malta-EU Steering and Action Committee). Continuous consultation and engagement of stakeholders and the public was considered to be crucial for the development of an effective Strategy that truly captures the interests of researchers and businesses and the concerns of citizens, identifies and builds upon domestic strengths, and addresses existing gaps. National policy priorities for the energy and water sectors also constituted a central component in determining the direction of this Strategy. Thus, this Strategy is aligned to and seeks to reflect the R&I priorities implicit in the outlook and objectives established in the 2nd River Basin Management Plan (2015-2021) and the National Energy and Climate Plan (2021-2030), as well as those being formulated for the 3rd River Basin Management Plan (2021-2027).

It must also be noted that the development of this Strategy was concurrent with that of the post-2020 National Strategy for Research and Innovation and the post-2020 Smart Specialisation Strategy[2,3], by the Malta Council for Science and Technology (MCST), the official government body responsible for R&I[4]. Although the timeframes diverged slightly, with the former expected to be finalised approximately one year earlier, ensuring consistency and synergy between these policy documents, whilst avoiding duplication of efforts, was considered crucial for the cohesiveness of the domestic R&I support landscape given that the implementation periods overlap significantly. Therefore, throughout the development of these Strategies, EWA and MCST were in close cooperation to ensure coordination and, to the extent possible, complementarity between the Strategies which will be effective over the same time period.

[1] The Energy Union builds five closely related and mutually reinforcing dimensions. These are decarbonisation (covering GHG emission reductions and renewable energy sources), energy efficiency, internal energy market, energy security and research, innovation and competitiveness.

[2] The adoption of this approach and its continuation post-2020 is a conditionality for Member States to access the R&I portion of European Structural and Investment Funds (ESIF).

[3] The Smart Specialisation Strategy identifies the thematic areas for future R&I investment; these are determined through consultations with stakeholders, through the entrepre neurial discovery process, who define R&I priority areas according to their judgement of the country's current and future economic specialisation.

[4] Refer to Annex II for an outline of the governance structure for R&I in Malta.

1.3 DEFINITIONS

With the aim of providing clarity on the interpretation and understanding of this Strategy and its objectives, Annex 1 establishes the definitions of key terms. These are based upon international guidance documents for R&I, particularly the Oslo Manual, jointly published by the OECD and Eurostat in 2018.

It should be noted that the term R&I, when used in the context of this document, is defined as:

- Research (R): research and experimental development as defined by the Frascati Manual (2015), that is, the creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

- Innovation (I): as defined by the Oslo Manual (2018), that is, a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process).

02 Setting the Context

2.1
MALTA'S CURRENT R&I LANDSCAPE

R&I in Malta is guided by the National Research and Innovation Strategy 2014-2020, developed by MCST. The Policy Support Facility (PSF) (2019)[5] notes in its peer-review of the Maltese research and innovation system that R&I tends to be given limited prominence in Malta in comparison with key economic sectors. This is perhaps reflected in the resources made available; in 2017, local funds for all R&I activity amounted to EUR 58.8 million (0.52% of GDP), with over 60% coming from (and remaining within) the business sector. A total of EUR 2.3 million was made available in 2017 by the Maltese Government to support R&I activities (this figure excludes co-financing). Figure 1 provides an overview of the sources of funding for R&I and their expenditure in 2017.

R&I FUNDING: SOURCE AND EXPENDITURE 2017

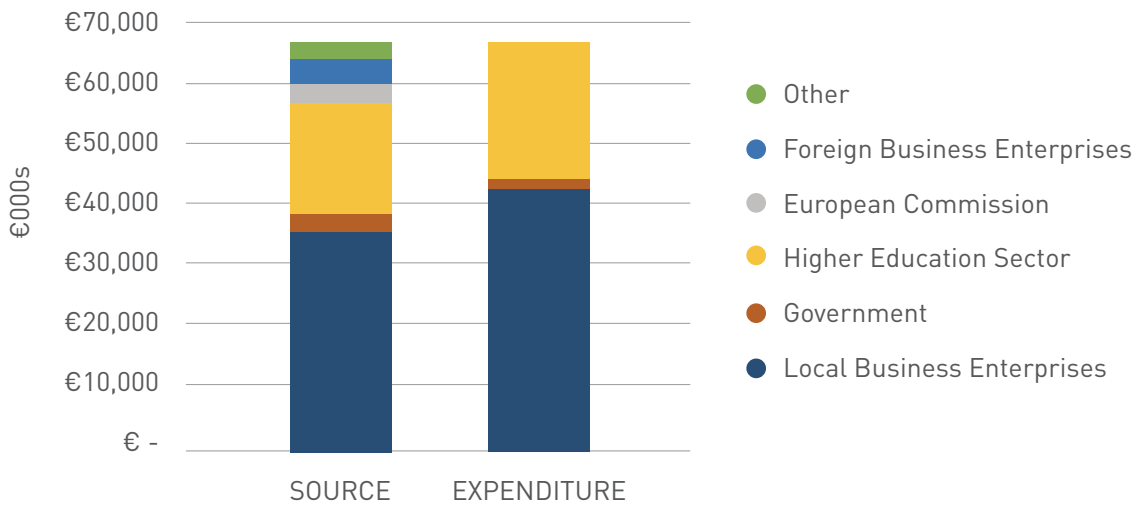
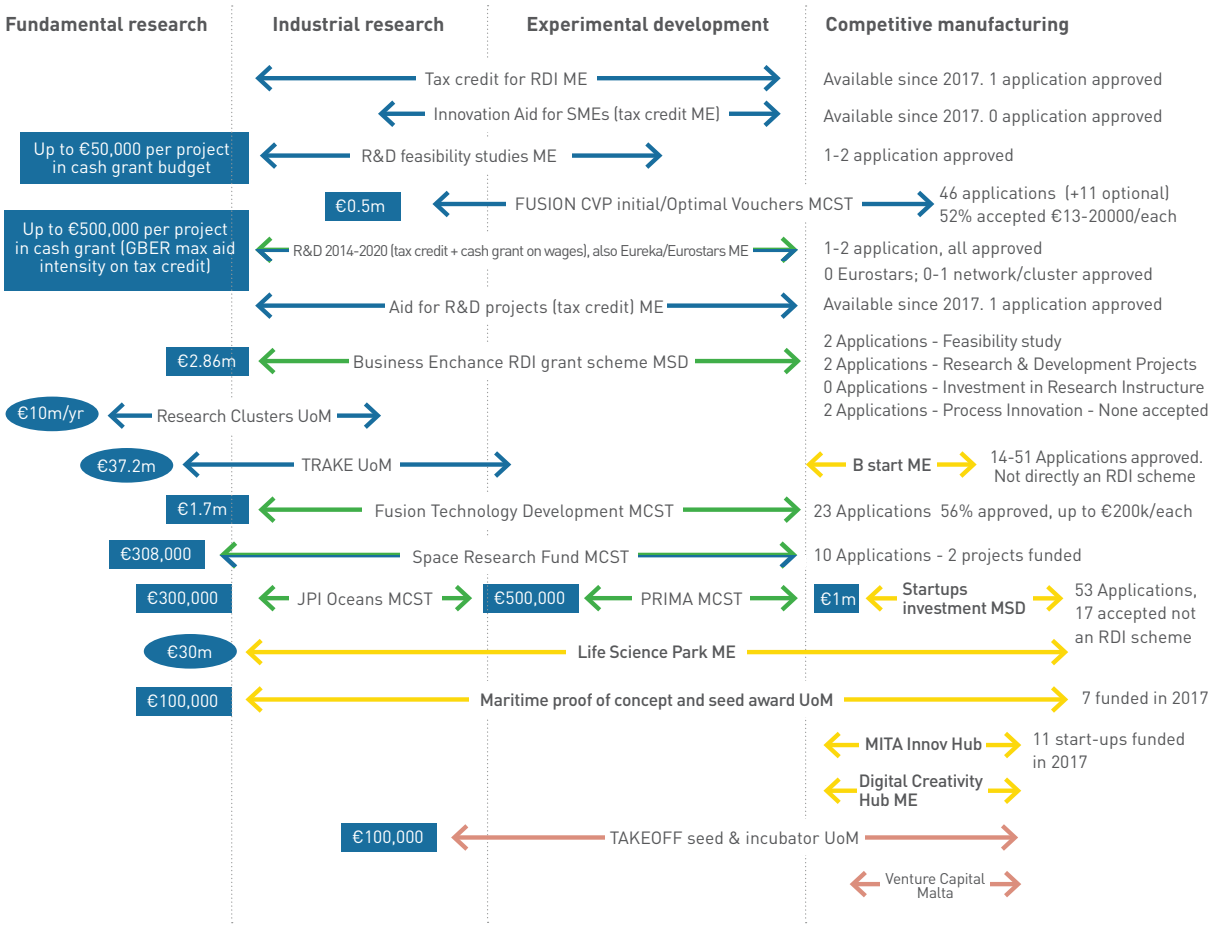


Figure 1: Source of R&I financial support (left) and expenditure of funds by end-user (right) in 2017.
Source: NSO News Release - Research and Development in Malta (2019)

[5] The Policy Support Facility (PSF) is a tool set up by the European Commission – DG Research & Innovation – to support Member States and countries associated with Horizon 2020 in improving the design, implementation and evaluation of national R&I policies. It is demand-driven (generated by a demand from the country's highest authorities) and is geared towards policy practice. In November 2017, Malta requested the support of the PSF for an independent peer-review of Malta's R&I system, with the key objective being to feed into the preparation of Malta's national strategy for R&I post-2020.



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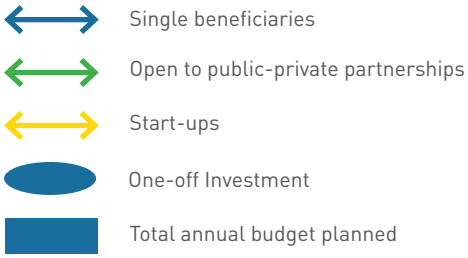


Figure 2 The policy mix for R&I in Malta (2018 data, yearly budgetary allocations).
Source: PSF Report (2019)

The support framework for the Maltese research community appears to be largely geared towards experimental development[6] and commercialisation, with little funding available for fundamental research (Figure 2). By contrast, University of Malta (UoM) and the Malta College for Science and Technology (MCAST), the main research performers in the Higher Education Sector (HES), tend to focus primarily on basic[7] and applied[8] research.

The PSF Report (2019) noted that this misalignment in Malta's current funding mix constitutes a significant competitive disadvantage, particularly for University of Malta, and reduces the attractiveness of academic positions. R&I undertaken by business enterprises is generally more geared towards R&I activities at the level of industrial research and experimental development. However, despite the emphasis of national support for such initiatives, R&I undertaken by businesses in Malta is limited, with the vast majority of companies seeing no compelling reason to invest in such initiatives. The administrative burden linked to the bureaucratic processes inherent in many schemes is often deemed too onerous in the context of the potential benefits to be reaped and the meagre financial support offered. A combination of these factors has resulted in a very low uptake of most of the existing schemes according to the PSF Report (2019).

In lieu of available funding for basic and applied research, a significant percentage of the R&I activity at HES is funded through participation in EU framework programmes. This constituted an essential driver of R&I over the past decade, most notably the European Regional Development Funds (ERDF). In particular, a large portion of these funds was dedicated to the development of research infrastructure, such as the Solar Research Laboratory and the Sustainable Living Complex, an important investment which provides an essential basis for R&I activities. This investment also implies the necessity of funding beyond European Structural Investment Funds (ESIF) for human resources, equipment and maintenance to ensure the sustained use of such infrastructure and that these investments bear fruit.

[6] Experimental development is defined, in line with the definition used by the NSO, as systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes.

[7] Basic research is defined, in line with the definition used by the NSO, as experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application of use in view.

[8] Applied research is defined, in line with the definition used by the NSO, as original investigation undertaken in order to acquire new knowledge.

However, while funds through EU Framework Programmes provide a number of advantages, reliance on such funds also implies that:

- The research undertaken tends to be stand-alone and reflects the specialisation of staff members who take advantage of EU opportunities through personal initiative. Furthermore, the scope of the research is dictated to some extent by the work programme and the nature of the calls issued, as opposed to national priorities and specificities.

- The dependence on short-term project funding creates continuity issues for both projects and engagement of research staff. The risk of short-lived institutional knowledge and loss of experience gained through participation in projects is reflected in Malta's struggle to reach the critical mass necessary for progress in domestic R&I.

As noted by the PSF Report (2019), one of the challenges faced by Maltese policymakers is to acquire a clear picture of the present R&I landscape. This extends to the R&I situation at a sectoral level as reporting on R&I, undertaken predominantly by the National Statistics Office (NSO), is drawn up in line with the Frascati Manual (2015) and thus does not have a clear energy/ low-carbon and water focus. Acquiring a clear overview of the sectoral and wider context of the current R&I landscape is essential for policymakers to establish the appropriate support framework for R&I in energy and water. An initial stock-take exercise was therefore carried out by the Energy and Water Agency with validation by MCST, to provide some insight into the current situation in terms of research focus (overview of projects in Annex 3 and Annex 4) and sources of funding (Table 1). Together with initial stakeholder consultations carried out by the Energy and Water Agency, this constitutes a guide to the existing levels of R&I in energy and water.

Table 1 Funds disbursed to Maltese participants and researchers, excluding co-financing, between 2010-2019 in the fields of energy and water research by support scheme.

	ENERGY	WATER
National funds	€ 3,039,297	€ 195,000
Horizon 2020	€ 9,060,688	€ 2,753,314
Interreg Programmes	€ 3,532,222	€ 2,007,886
LIFE Programme	€ 1,081,942	€ 10,780,614
ENPI/ENI CBCMED	€ -	€ 760,615
Operational Programme 1 (ERDF)	€ 56,136,330	€ -
Other	€ 2,433,643	€ 1,312,957
TOTAL	**€ 75,284,121**	**€ 17,810,385**

The data compiled thus far shows that MCST Fusion provided almost EUR 2 million in support to projects related to energy while research in the field of water received only EUR 0.2 million between 2014-2019 (out of a budget of approximately EUR 13.2 million). The biggest contribution from EU support programmes within these two sectors is from the ERDF. However, this was exclusively for research in energy projects with focus on buildings; indeed, support received mostly pertained to the development of research infrastructure such as the Sustainable Living Complex (awarded EUR 30 million under ERDF) as opposed to R&I projects. This is likely on account of Malta's Smart Specialisation Strategy (2014-2020) not specifically featuring energy or water research. The former was restricted to energy efficiency within buildings under the theme "resource efficient buildings"; water did not feature under this Strategy. Thus, researchers in the field of energy and water did not have access to ESIF (which include ERDF, among other financial instruments) for R&I.

This initial stock-take also revealed that the University of Malta and MCAST are among the largest receivers of funds for R&I. Indeed, a number of faculties at the University of Malta have invested in laboratories and facilities for R&I, such as the Solar Research Laboratory of the Institute for Sustainable Energy which was inaugurated in 2017. MCAST has an established Energy Research Group and Water Research Training Centre, demonstrating the focus it attributes to research and capacity building within these fields.

2.2
THE ENERGY AND WATER SECTORS

Great strides of improvement have been made over the last decade in the energy and water sectors. In the power sector, Malta closed the inefficient Marsa Power Station, commissioned an electricity interconnector with Sicily in 2015 and finalised the conversion of power generation from heavy fuel oil to cleaner LNG in 2017. This led to a significant increase in power generation efficiency and corresponding reduction in GHG emissions. This investment was complemented by financial support for the deployment of renewable energy and energy efficiency measures, sustained through national and EU funds, and which contributed towards a five-fold increase in renewable energy production, from circa 100GWh in 2010 to over 500GWh in 2018. Beyond 2020, Malta needs to ramp up its efforts to sustain its energy security through the development of sustainable, cost-effective solutions which may not necessarily be reflective of solutions adopted overseas where realities on the ground may be significantly different. This underlines the added value of research directed towards country specific challenges, with the aim of turning such challenges into opportunities.

Water provision in Malta has also made great strides over the last decades. Long-term experience with seawater reverse osmosis plants has provided an alternative source of potable water for a growing population, while research is being carried out using innovative technologies with the aim of continuously improving its quality for better social and environmental impacts. Expertise in leakage management and control, together with smart water metering, has significantly reduced the loss of potable water through the distribution network. The treatment of all wastewater generated on the islands led to improvements in bathing water quality and allowed the reclamation of a portion of this wastewater for agricultural applications through advanced wastewater treatment processes; this provides a viable alternative to the abstraction of groundwater in certain zones. Water production and treatment are also intrinsically linked to energy. Energy is a significant cost factor in seawater desalination, pumping, distribution and treatment. Over the years, significant developments have been made by the national water utility to reduce the specific energy requirements and therefore its operational costs. Furthermore, improved leakage management and increased water use efficiency lowers the demand on reverse osmosis plants, in turn further reducing the overall energy requirement for desalination.

However, these two sectors also bring together some of the most significant challenges being faced at national level, exacerbated by the rapid pace of economic and population growth. As a semi-arid Mediterranean country with few indigenous sources of energy considered to be technically and economically viable and limited availability of natural sources of fresh water, sustainable use of Malta's resources is a priority. As highlighted by the NECP 2021-2030, recent exceptional economic and demographic growth also brings about indirect effects which impinge on the country's long-term decarbonisation and resource efficient pathway. For instance, higher costs of land have a direct impact on the financial viability of land intensive renewables such as PV, which exacerbates the issue of limited land availability for deployment of such technologies.

Given local specificities, it is often the case that solutions applied by other Member States do not have the desired impact when implemented in Malta. Boosting R&I within these sectors may feed into national and industrial strategies, increasing their competitiveness and accelerating the transition to a lower impact economy in a socially just manner. Additionally, there are a number of areas where Malta's existing strengths may lend well to R&I in the fields of energy and water, creating additional opportunities and value-added outputs for the country. For instance, channelling Malta's rapid expansion of capabilities in ICT and artificial intelligence to the areas of energy and water may unlock opportunities for innovation.

03

R&I in Energy and Water
2030 Vision

Through the implementation of this Strategy, the Government of Malta seeks to boost and guide the direction of domestic R&I in the fields of energy and water management. This sector-specific Strategy aims not only to bolster research but also to provide a framework that will consolidate and centralise R&I support and reporting/monitoring for energy and water research. This will facilitate and be facilitated by a platform which brings together major stakeholders from the public and private sectors, industry and research institutions to create a coordination hub. In this manner, translating the outcomes from R&I initiatives into policy and practice will be enabled, and dialogue between stakeholders will highlight areas for cooperation and thus, opportunities for mutual gain. Research for impact, not only excellence, is priority.

3.1
OBJECTIVES AND OUTCOMES

Malta's vision of enhanced growth and competitiveness of business enterprises and progress towards sustainability in the energy and water sectors is closely knit with the primary objectives of this Strategy. These are to:

1. Strengthen and support R&I that:
    a. Addresses national policy priorities and challenges; and/or
    b. Bolsters national competitiveness and growth in a variety of sectors.

2. Increase coordination and cooperation between the wide array of stakeholders in fields of energy and water, thereby ensuring that outcomes from R&I activities translate into tangible positive impacts.

The objectives and envisaged outcomes of the Strategy are informed by and closely aligned to the outlook of the energy and water sectors. It is thus expected that R&I supported through the implementation of this Strategy will contribute in a tangible manner to the long-term vision of sustainability for these two sectors this through research that informs policy tools, research that provides solutions to national challenges being faced in the energy and water sectors, and/or research that contributes to economic competitiveness.

While under Horizon Europe (Figure 3), the two aspects of Objective 1 were merged within the same Pillar under the heading "Global Challenges and Industrial Competitiveness", this Strategy maintains somewhat of a distinction between the two objectives of solving societal challenges and enhancing industrial competitiveness, as was reflected in the structure of Horizon 2020.

> "R&I SUPPORTED THROUGH THE IMPLEMENTATION OF THIS STRATEGY WILL CONTRIBUTE IN A TANGIBLE MANNER TO THE LONG-TERM VISION OF SUSTAINABILITY FOR THESE TWO SECTORS"

This is because the *modus operandi* of R&I that targets one of these aspects tends to be distinct from, and not necessarily complementary to, R&I undertaken for the other. Industry operates on the logic of competitiveness and profit while societal challenges reflect the interests of citizens and civil society, implying a divergence in research focus and desired outputs. This also translates into differences in the primary actors who would be involved in such R&I activities and thus the type of support which would be required. The two are naturally aligned by their movement towards the overall objective of long-term decarbonisation and resource efficiency, but from different perspectives and with different priorities.

The second objective – increasing coordination and cooperation between stakeholders – stems from discussions with stakeholders during the development of this Strategy, during which the need and the desire for more frequent interaction between all parties was highlighted and emphasised. Firstly, creating a more dynamic relationship between government and academia, for instance, would enable research outcomes to better feed into national policies, and also place researchers in an informed position to tailor their work as well as pre-empt R&I needs that will arise from upcoming changes

Figure 3: The structure of Horizon Europe, the next EU funding programme for R&I which will run from 2021-2027. This has a proposed budget of EUR 100 billion. Energy and water management receive significant attention under Pillar II, notably within the clusters of "Climate, Energy and Mobility" and "Food, Bioeconomy, Natural Resources, Agriculture and Environment" under which actions are intended to contribute to climate neutrality and sustainable management of natural resources, respectively.

Source: https://ec.europa.eu/info/horizon-europe-next-research-and-innovation-framework-programme_en

in EU and national policy direction. Secondly, more frequent and better structured interaction between the private sector and academia will facilitate a deeper understanding of the needs of industry and R&I to be undertaken accordingly. This may also lead to the development of more active R&I partnerships between industry and academia, in which opportunities for mutual gain can be maximised and outcomes from such activities incorporated into products, processes and marketing applications for the wider benefit of the country. Furthermore, the establishment of formal communication links between a large pool of stakeholders from a variety of fields implies the potential for a particular issue to be tackled through the adoption of a novel perspective or approach. This contrasts with current praxis whereby partnerships form according to personal relationships and thus, the type of solution to the issue in question is already dictated by the associated researcher's area of specialisation. Thirdly, increased cooperation between these stakeholders would serve two important horizontal purposes, that of knowledge-sharing in all spheres as well as coordination to reduce fragmentation of the domestic R&I landscape.

The implementation of this Strategy, through its forward-looking approach and the provision of additional financial resources for R&I activities, is expected to contribute to progress in various sectors and have a positive impact on stakeholders and the wider society. An overview of the expected outcomes is provided in Figure 4.

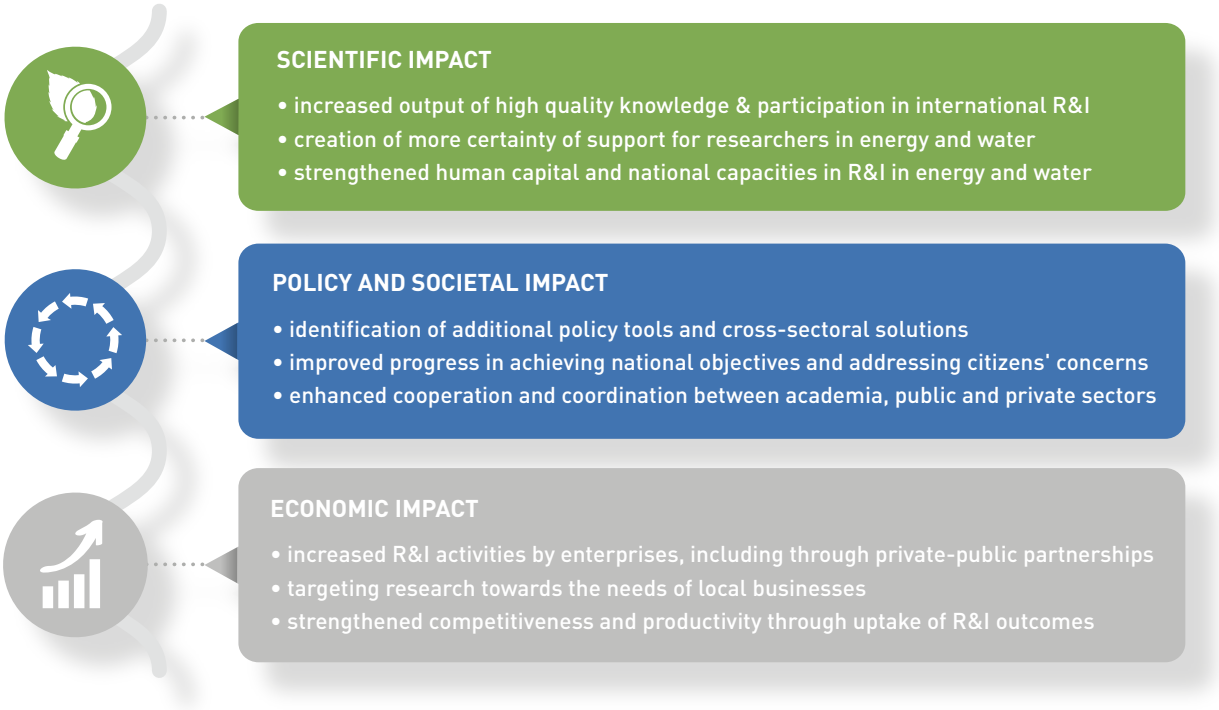


Figure 4: Overview of the outcomes expected through the implementation of the Strategy.

Benefits for Academia

For those primarily involved in research, whether in the HES or private research enterprises, this Strategy seeks to provide clarity and certainty on the direction of R&I in the fields of energy and water at the national level over the coming decade. Through the support framework established by this Strategy and the resources made available, the output of high-quality knowledge from this sector is expected to be amplified and the mass of research staff supported. This additional support received by Maltese researchers is also expected to provide them with improved standing within international research circles, increasing their chances of successful participation in international R&I projects such as those funded under Horizon 2020/Horizon Europe, as experienced staff is increasingly retained and the number of publications/projects by such teams increases.

Benefits for the Business Sector

Providing clarity to business enterprises about the future R&I landscape for the fields of energy and water, in addition to the provision of resources, will aid in increasing the activities of those already undertaking R&I initiatives and mobilising interested companies who are unfamiliar with the available support[9]. This is also expected to be enhanced through an increase in public-private partnerships, through the frequent interaction between these major stakeholders which is expected to be facilitated by the establishment of the proposed Platform. In this manner, it is expected that research will be targeted towards those areas where it is most required, and thus, where the impacts of R&I outcomes will be most felt. This is expected to contribute towards improvements in efficiency and productivity of the business sector and strengthen the development of knowledge-intensive exports.

Benefits for Policy Development

In line with the main objectives of this Strategy, R&I activity will be closely linked with national policy priorities in the areas of energy and water and undertaken in close collaboration with the main stakeholders in the public sector. This will augment the knowledge base of such entities, thus providing improved capabilities and essential input to guide the development of new (and potentially cross-sectoral) tools to address policy issues and societal concerns. In this manner, R&I will effectively contribute to and accelerate progress in achieving national sectoral objectives and the wider goal of sustainable development and inclusive growth.

[9] The Policy Support Facility (2019) noted that many companies are insufficiently aware of the support opportunities while other may have a hard time understanding which scheme is most appropriate to their work and sphere of interest.

3.2
KEY GUIDING PRINCIPLES

Ensuring complementarity with national and EU policies, avoiding duplication and enhancing synergies

This Strategy is being developed and implemented within the wider framework of national and international support programmes for R&I. Thus, it is essential to avoid overlap or duplication of efforts as this will only serve to increase fragmentation. Actions and resources should be channelled to effectively target niches or gaps that are not sufficiently addressed. This also implies the potential to exploit arising synergies; this Strategy seeks to identify and amplify such opportunities for the maximisation of resources and the impact of R&I outcomes.

Complementarity is also being established with national policies and the EU long-term vision for the energy and water sectors. Indeed, the development of this Strategy is concurrent with that of the National Energy and Climate Plan (2021-2030) and the upcoming River Basin Management Plan (2022-2027). The package of national policies, emanating from national policy direction and Malta's commitments as an EU Member State, shall act as a stimulus for research - from the supply-side (support through structures, financial instruments) and demand-side (regulations, objectives) - and as a receiver of the successful outcomes from the R&I.

Creating a balance between research and innovation

Meeting the objectives of this Strategy by addressing national policy priorities and societal concerns, as well as contributing to industrial competitiveness and growth, will require a combination of research-focused (oriented-basic research, applied research and experimental design) and innovation-focused activities (product, process and marketing innovation). Furthermore, it must be emphasised that innovation in the context of this Strategy is not merely viewed exclusively in terms of product development, but also as process and marketing innovation. The focus lies not on purely technological topics but a more holistic view of the complex system within which policy tools and regulatory issues, institutional and behavioural norms, technical constraints and opportunities, and economic priorities and evaluations co-exist. R&I that facilitates the realisation of national objectives and targets must necessarily span this wide spectrum of considerations; technological innovation alone is not sufficient.

Adopting a nexus approach

There exist significant synergies between the energy and water sectors, with the interdependencies between the two sectors commanding increasing attention in recent years. Indeed, the JRC recently established the Water-Energy-Food-Ecosystems Nexus project with the aim of feeding into the design and implementation of European and national policies. Interlinkages between energy and water are becoming increasingly evident by virtue of the challenges inherent in these two sectors being heightened by a mutual aggravator – climate change. Climate change is expected to intensify existing pressures on freshwater resources in Malta. In addition, it is becoming crucial that the management of energy and water resources is addressed within a shared framework to enable the consideration of potential synergies and trade-offs in decision-making. For instance, energy-related measures implemented in the transition to a low-carbon economy may have an adverse impact on freshwater resources; the production of biofuels may be more water-intense than the offset fuel. A nexus approach enables the maximisation of opportunities within both systems. For example, reduced losses in the local water distribution equates to lower electricity consumption for desalination purposes. For this reason, and in line with national attempts to enable cross-sectoral policy-making, this Strategy adopts a nexus approach.

Ensuring coordination and cooperation between public, private and research entities

Key to the success of any strategy is the capability of implementing entities to devise governance structures that enable cross-sectoral and cross-institutional coordination. This is essential given that this is a sectoral strategy which must be harmoniously situated within an already existing complex R&I landscape. Thus, coordination between public bodies providing support for R&I, academic and research institutions and business enterprises involved in R&I is essential during the planning of the Strategy and its successive multiannual work programmes. Furthermore, creating consistent links and facilitating frequent coordination between the public and private sector and the research communities, positions stakeholders in a better situation to maximise opportunities to their mutual benefit. This may be through joint undertakings or through the exploitation and incorporation of outputs from R&I activities within various sectors. The highest impact of R&I is made when these three communities work together.

04

Support Framework for R&I in Energy and Water

4.1
PLATFORM RINEW (RESEARCH AND INNOVATION IN ENERGY AND WATER)

This Strategy foresees the establishment of Platform-RINEW to act as the primary tool for the coordination of its implementation. A structure that facilitates multi-level coordination and cooperation between the myriad of stakeholders in the fields of energy and water will be an essential element to ensure effectiveness and efficacy of this Strategy. It will aid the streamlining and effective allocation of available resources, and thus also serve to reduce fragmentation of the domestic R&I landscape, as well as enable the development of appropriate supply- and demand-side policies which strengthen the interrelationship between the energy and water sectors and R&I.

Platform-RINEW will also create a more horizontal relationship between those executing the Strategy, those participating within its support framework and those benefitting from its outcomes.

In this manner, it will constitute a management model for awareness raising on available R&I support and providing guidance to potential beneficiaries. Finally, the frequent exchange of information between these different bodies of actors is imperative to ensure the effectiveness of support measures and maintain the momentum of R&I at each stage, from defining priority areas and support schemes to conducting R&I activities and the integration of successful outcomes within government and businesses alike.

In line with the second objective of this Strategy, Platform-RINEW will also serve as the mechanism to enhance cooperation and coordination between stakeholders in the field of energy and water R&I. It will bring together government, academia, industry and the commercial sector, reflecting the inherent multidisciplinary nature of this Strategy, as well as an attempt to move beyond sectoral logic and working in silos.

Closing the gap between these stakeholders is intended to drive R&I that is tailored towards addressing local needs and challenges as well as facilitate the translation of R&I outcomes into tangible impacts.

This gradual process may also result in R&I activities consequently being attributed increased importance and support. Furthermore, bringing together all sectors, from government to academia and the private sector, is intended to create a **sense of collective responsibility** in moving the country along its path of sustainability, climate change resilience and environmental protection.

It is envisaged that Platform-RINEW will be constituted of two committees, supported by a Secretariat (Figure 5):

1. **Steering Committee**: co-chaired by high-level executives from the Ministry for Energy and Water Management and the Parliamentary Secretariat for Financial Services and Digital Economy[10]. This committee will be responsible for the implementation of the Strategy and thus:
    - **a.** The approval and publication of the multiannual work programmes or 'Implementation Plans';
    - **b.** Budgetary control; and
    - **c.** The terms of reference of Platform-RINEW.

    Having the government body responsible for R&I involved in these key decisions is important to avoid fragmentation in the local R&I landscape and any potential overlaps. It shall also enable the Parliamentary Secretariat responsible for National R&I to share its wealth of experience on the implementation of R&I policy and schemes.

[10] The Policy Support Facility (2019) proposed that having a high-level member of the Maltese Government leading on R&I matters would ensure greater ownership, coordination and transparency, as well as a higher public investment for implementation purposes.

2. **Technical Committee**: co-chaired by a technical executive from EWA and a representative from key research institutions, the latter functioning possibly on a rotating basis. This committee will be composed of stakeholders from the public sector, academia, industry and other interested institutions. It will be tasked with:
    a. Creating and maintaining horizontal interaction between stakeholders;
    b. Organise roundtable discussions on key topics and informal networking sessions, as appropriate;
    c. Facilitate cooperation between the public, private and academic sectors; and
    d. The design of the Implementation Plans, including identified targets.

3. **Secretariat**: this will be responsible for:
    a. The day-to-day running of Platform-RINEW;
    b. Regular collection of data on R&I in energy and water, including for the purpose of monitoring and evaluation; and
    c. Act as a one-stop-shop for all matters related to R&I in the fields of energy and water, providing a coordinated support system with the knowledge of all relevant instruments.

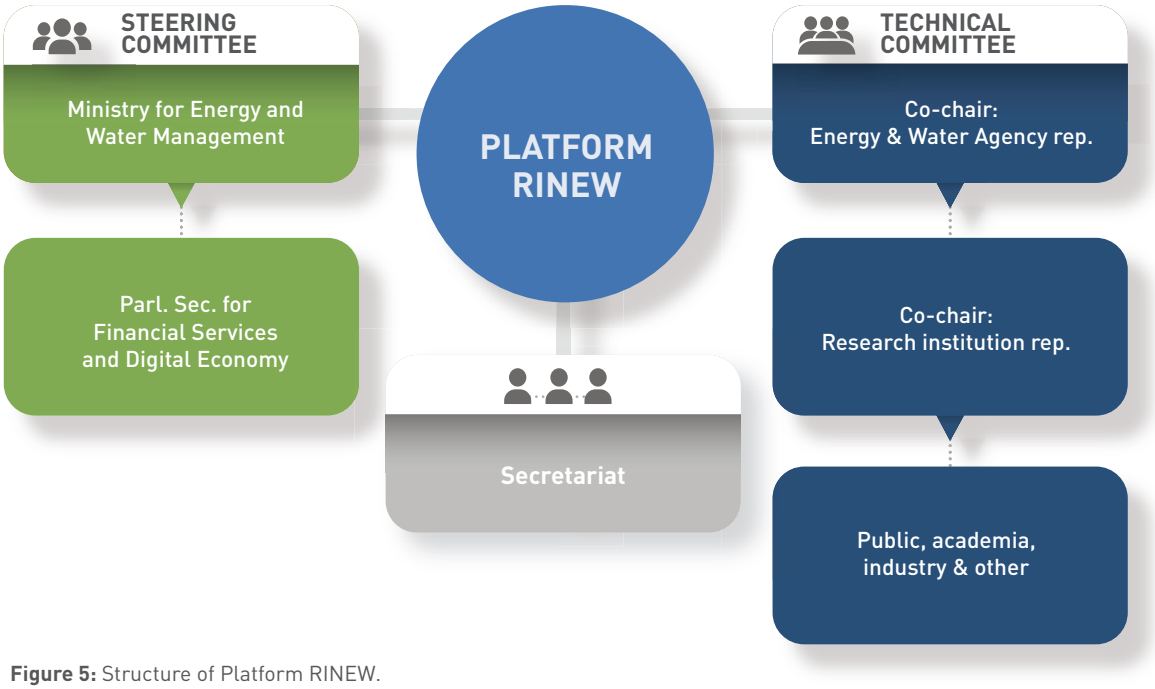


Figure 5: Structure of Platform RINEW.

4.2 FUNDING

Financial resources to support additional domestic R&I activities in line with the objectives of this Strategy will be provided through the establishment of a fund under Platform-RINEW. Oriented-basic research and applied research to experimental design (TRL[11] 2 – 6) are prioritised for financial support under this Strategy. This is based on engagement with experts and stakeholders to identify those sectors with potential for measurable growth and national policy support. It also takes into consideration existing and planned national and EU support programmes and tools for R&I, both of which tend to lean more heavily towards the higher TRL levels, particularly technological innovation and commercialisation, leading to a gap in the overall support framework for R&I at the lower TRL. This has been emphasised by local researchers and in the PSF Report (2019). In this manner, the support offered by Platform-RINEW will avoid fragmentation and overlap of funding mechanisms, at both EU and national level, and address the existing funding gap for R&I at TRL 2-6.

The financial support is expected to primarily take the form of research grants as these tend to be more appropriate for early stage R&I than other forms of support, such as debt instruments. The fund is envisaged to function through two distinct mechanisms, similar to the set-up of Horizon 2020[12]:

1. Calls for bottom-up proposals relating to the Priority Areas outlined in this Strategy; and

2. Calls for proposals to structured research questions which relate to Priority Areas.

[11] Technology Readiness Levels (TRLs) is a method for estimating the maturity of technologies based on a scale from 1 to 9, that is, from basic scientific research to actual application of the technology.

[12] This is one of the proposals received from academics during consultation sessions.

Support disbursed through this fund may also act as an essential springboard for research teams to apply for the larger volumes of support required at higher TRL levels as projects evolve. In this manner, the impact of complementary programmes and the deployment of financial support has the potential to be amplified. Synergies between this support framework and other funding instruments, particularly European financial instruments, will be examined and set out in the multiannual work programmes. Furthermore, this additional financial support may offer a certain level of stability for researchers which may facilitate the retention of experienced members of research teams, increasing the domestic capacity and resources to apply for international projects. International collaboration has the potential to unlock additional innovation capacity through leveraging greater pools of funding and talent and providing an avenue for international best-practice sharing.

4.3 PRIORITY AREAS FOR RESEARCH AND INNOVATION

The following Priority Areas (Figure 6) indicate the main themes which will be considered as priority for the receipt of support during the implementation of this Strategy. These were designed to be complementary to the national outlook for the energy and water sectors, taking into account objectives and required actions under relevant policy documents, including the NECP 2030 and the 2nd and upcoming River Basin Management Plans, and through engagement with experts and stakeholders. An understanding of the evolution of European research and the outlook of the European Commission also informed the selection, as this has the potential to positively supplement national resources and opportunities of domestic R&I activities and capabilities. During the consultation process, a number of specific applications were proposed. These were reviewed, and it was determined that most can comfortably fit within one or more of the identified priority areas. The implementation plans and eventual support schemes would then provide guidelines on how individual proposals would be ranked.

In line with the guiding principles of this Strategy, a nexus approach is adopted to incentivise research that examines the synergies between the fields of energy and water, as well as to encourage the incorporation of such considerations in more sectoral work.

Furthermore, this Strategy emphasises the importance of multidisciplinary and interdisciplinary research; social and technical research go hand in hand, and digitalisation is increasingly viewed as a key horizontal tool.

These types of research are given equal priority under this Strategy and cross-cutting research is encouraged.

OVERVIEW OF THE PRIORITY AREAS

- **Renewable Solutions for Islands**

The technical and economic potential of renewable energy sources (RES) on small islands is often limited with current technologies. The National Energy and Climate Plan identifies new technologies which are either at pilot stage or pre-commercialization stage as key for Malta's long-term decarbonisation. Innovative technologies, techniques or improvements are therefore required to provide effective solutions which take full account of intrinsic local limitations and barriers, but also future potential, as well as scalability. Research in RES integration and grid balancing, specifically noting national specificities, are also to be considered priorities under this area; it is only through successful integration that RES can fully contribute to improvements in security of supply and a robust internal energy market, and hence progress in national competitiveness and citizen well-being.

- **Energy Efficient Solutions**

Energy Efficiency Solutions may target both domestic as well as commercial/industrial/services sectors. Industry and services consume energy in a highly diverse manner and would, in general, require tailored solutions. Advances in technology, as

well as innovative IT and digital solutions may have significant impact on the efficient use of energy in these sectors. Furthermore, such solutions are often scalable and could be adopted by other enterprises, both locally and abroad. Given the specific consumption profiles of different industrial consumers, it is essential that individual consumers better identify opportunities, to tap either inhouse or external technical knowhow and develop *ad-hoc* researched solutions. This area also covers research in energy efficiency solutions for non-industry/services sectors, and may, for example include research in efficient building materials, or building envelope design.

- **Integration of Renewable Electricity**

As the capacity of RES increases at both national and international levels, issues relating to intermittency of electricity generation are receiving heightened attention, particularly due to the challenges of maintaining the stability of electricity grids. R&I activity, whether policy or technology driven, may focus on supply- and demand-side solutions which mitigate the impact of RES intermittency whilst possibly providing additional benefits to consumers. This area also covers research into energy storage solutions, this being also a key area of research at EU level[13], and indirectly ties in with electromobility, a sector which is bound to be tightly intertwined with renewable electricity distribution and storage.

- **Water Use Efficiency**

Reducing the demand of water resources in the domestic, industrial and agricultural sectors through increased water efficiency is a primary need in controlling water demand. Efficiency gains can be addressed either through more efficient supply or more efficient water use by the end users. This thematic area therefore focuses on the need to conserve water, increasing efficiency in the cycle of water production, conveyance and consumption and the integration of non-conventional water resources within the water use cycle.

[13] The EC have in place a Strategic Action Plan on Batteries and launched the European Technology & Innovation Platform focused on battery related R&I, supported through Horizon 2020.

- **Desalination and Water Treatment Processes**

In the absence of enough natural freshwater supplies to meet the needs of the population, Malta will always be highly dependent on seawater desalination as a reliable alternative source of potable freshwater. Improvement of current processes, together with the adoption of alternative technologies and processes for desalination, with the objective to decrease the specific energy consumption, reduce the environmental footprint and improve end-user acceptability of potable water is another key thematic area of research. In this regard, another key-area of research is the linkage of desalination processes to energy and mineral recovery. Furthermore, the need for improving the acceptability of drinking-water provided to the Maltese consumer has long been identified. This provides the opportunity to explore several technologies for the treatment of potable water in order to improve its taste and odour, thereby increasing the accessibility of safe and acceptable drinking-water to all consumers.

- **Wastewater Treatment and Reclamation**

The drive from Wastewater Treatment Plants (WWTP) to Water Resource Recovery Facility (WRRF) to recover water, energy and nutrients offers numerous opportunities to develop centralised and decentralised options for wastewater treatment and reclamation. Another focus is the decentralised treatment of industrial wastewaters for the reclamation of non-conventional waters and process ingredients for eventual reuse. The recovery of resources as promoted by this priority area is central to the principles of a circular economy.

- **Water Friendly Urban Centres**

The integration of green infrastructure into surface water management in urban areas reduces the risk arising from uncontrolled surface water runoff. The primary objective of this priority area is to reduce the risk of flooding within urban areas by adopting green infrastructures and nature-based solutions at the local scale. Such an approach will not only contribute to enhancing rainwater harvesting and increasing the recharge potential of aquifers but will also regenerate urban areas through the reintroduction of biodiversity. The development of water-friendly urban centres also increases the resilience of the resident population to scenarios of extreme events.

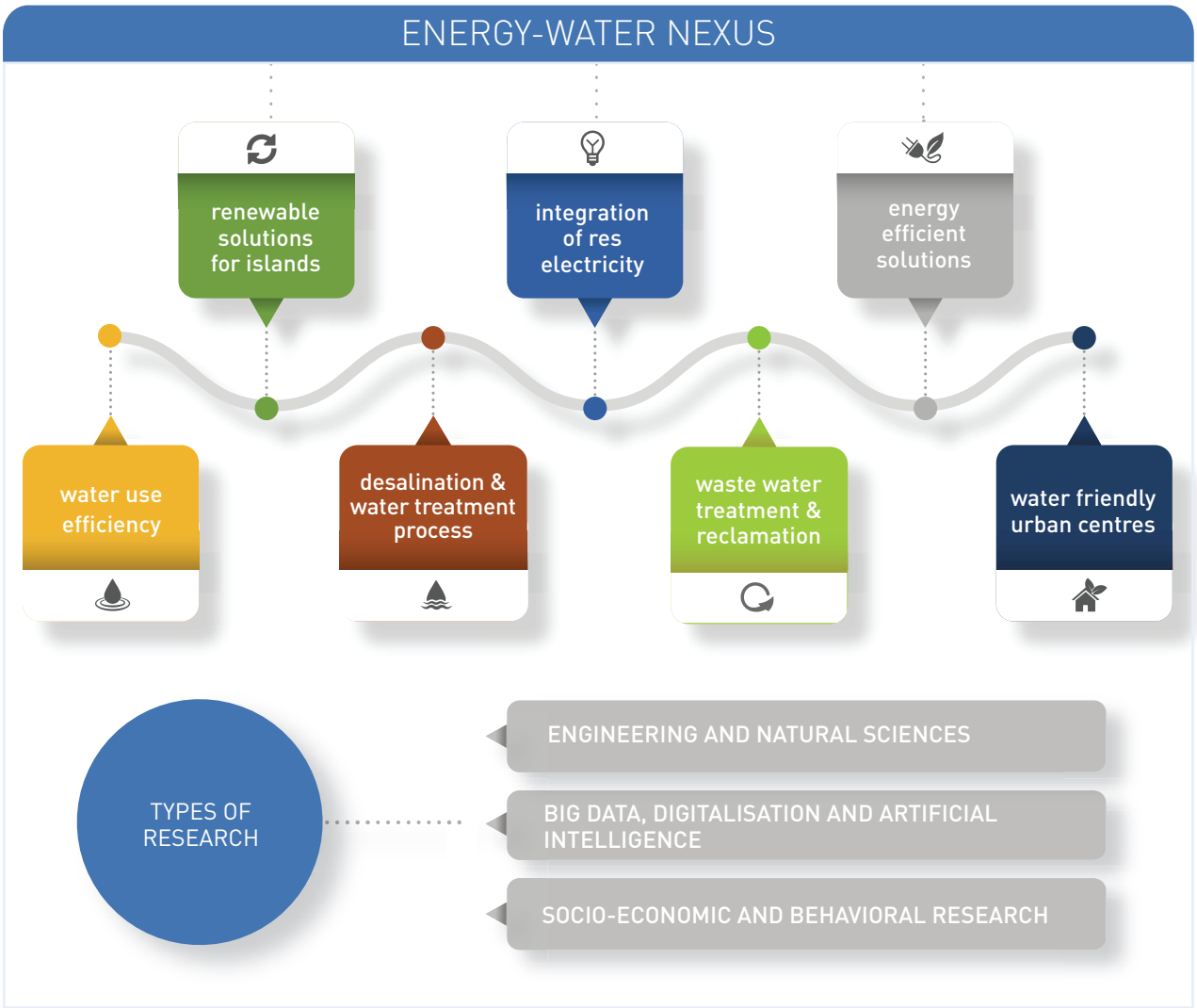


Figure 6: Priority areas for R&I activities during the ten-year period of the National Strategy for Research and Innovation in Energy and Water (2021-2030)

4.4
EVALUATION AND MONITORING

The systematic collection of data for evidence-based evaluation of the implementation of this Strategy is essential to track progress made in the sector and assess the potential for improvements. Given the lack of sectoral data on R&I in energy and water in Malta, the first step of this process necessitates an in-depth stock-take of the current situation in order to form a comprehensive baseline. Following this, data collection for the purpose of monitoring progress will be undertaken, upon which subsequent improvements can be proposed, bringing policy intelligence into the evaluation process[14]. In light of this, the Strategy prioritises the establishment of a baseline of R&I in energy and water during the period of the first Implementation Plan and the establishment of specific objectives for 2030, where relevant, pertaining to the Key Performance Indicators (KPIs) described below.

The monitoring framework outlined in this Strategy is informed by the general governing principles outlined by the European Commission[15]. It must:

1. be comprehensive to cover the objectives of the Strategy;
2. minimise overlap in data collection, taking into account the indicators already reported by MCST and NSO in particular, and;
3. make evidence available to all stakeholders and the public.

In line with these recommendations and based on engagement with experts and stakeholders, a number of KPIs are being proposed (Table 2). These may be revised based on further stakeholder consultations and subject to outcomes of the in-depth stock-taking exercise conducted during the first Implementation Plan of this Strategy.

[14] Policy Support Facility (2019)
[15] https://ec.europa.eu/info/sites/info/files/better-regulation-guidelines-monitoring.pdf

Table 2: Key performance indicators for monitoring and evaluation of the effectiveness of this Strategy. These are to be interpreted as specific to research undertaken within the fields of energy and water and in line with the objectives of this Strategy.

INDICATOR	JUSTIFICATION
Number of publications	Indicator of research
Results or findings used for policy-making design or implemented in the private sector	Indicator of the tangible impact of R&I
Level of national public sector R&I funding attributed to energy and water R&I (% of GDP)	Indicator of the magnitude of activity
Level of EU-level funding attributed to energy and water R&I (% of total EU funding obtained by Malta for energy and water R&I projects)	Indicator of the magnitude of activity and level of international participation
Number of projects	Indicator of the level of activity
Number of researchers	Indicator of critical mass for research

Public sector spending is important for R&I in any sector. In order to ensure efficient use of public funds, it is essential to obtain data, disaggregated by field and Priority Area, on the level of funding received throughout the period under this Strategy. This information is not currently reported and will have to be collected through mechanisms created during the period of the first Implementation Plan.

Patent statistics are widely used indicators to assess progress in R&I; however, these are exclusively an indicator of innovation. As this Strategy seeks to boost research at the stages of oriented-basic research, applied research and experimental design, patent statistics are not considered to be the most appropriate indicator. Therefore, the number of publications and projects in the fields of energy and water management are instead selected. These will provide insight on domestic activity levels and any progress in this regard towards 2030. The amount of funding for these projects provides information on the magnitude of R&I activities, particularly with regards to EU-level financing as an indicator of the level of international participation in energy and water projects.

Given its key role, understanding private investment in R&I is important. However, reporting on this indicator is often difficult as private R&I investment data tends to be either inaccessible or quite limited and the quality of data difficult to assess due to the confidentiality or sensitivity of the information. When figures on private R&I investment are published, these tend to not disclose the specific researched topic. Due to the difficulties associated with reporting and in order to avoid duplication of work, this Strategy does not propose the level of private sector funding as an indicator; the National Statistics Office provides high-level figures on an annual basis. Collecting information on the research area of R&I activities undertaken by the private sector on energy and water may provide more information on the areas of interest and type of research being undertaken, providing clarity for both policy-makers and researchers. This will provide the basis for higher cooperation between academia and the private sector and thus, the potential for further mobilisation of private funds.

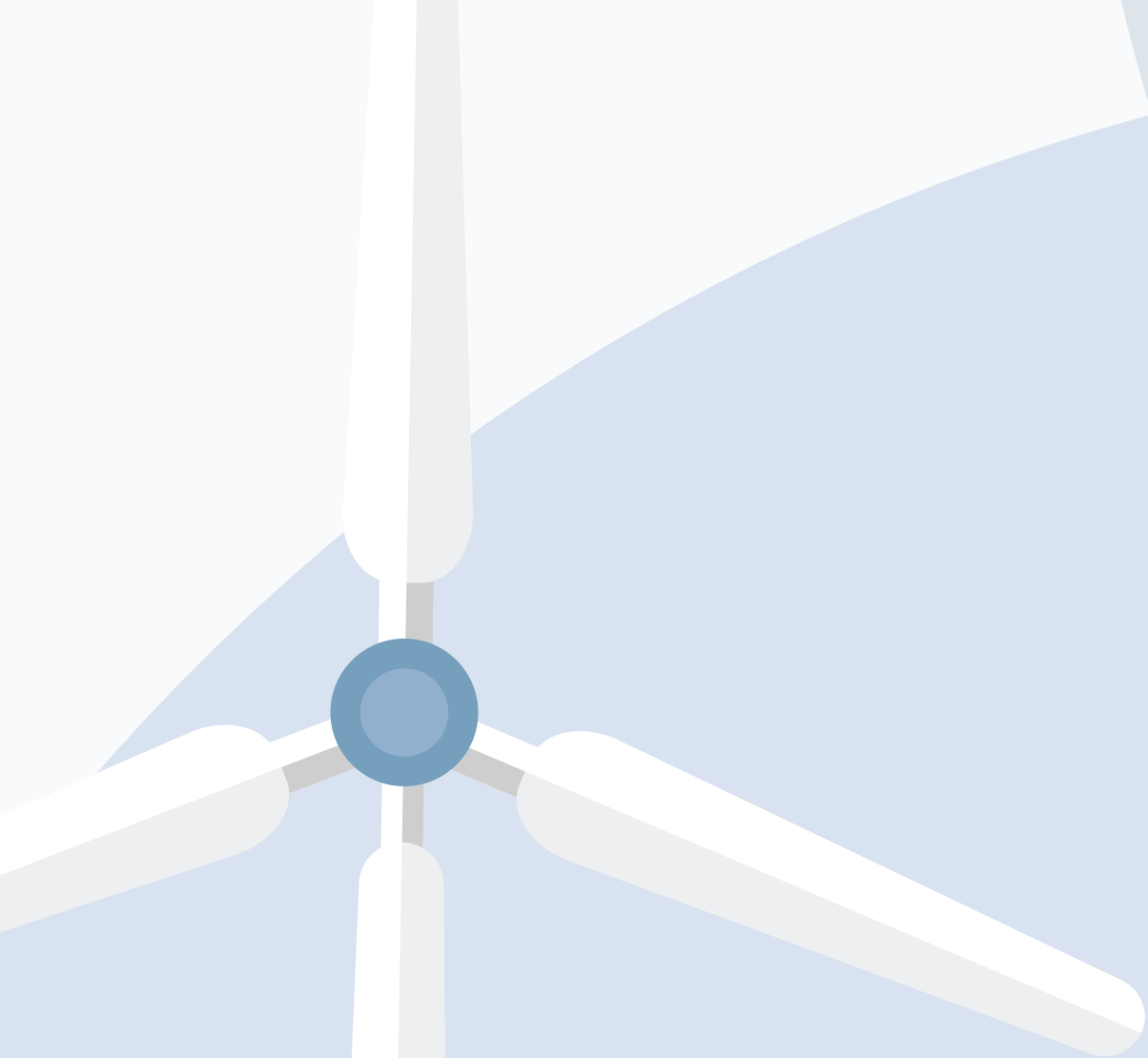
Evaluation of the National Strategy for Research and Innovation in Energy and Water (2021-2030) is envisaged, at the time of writing, to take place at the mid-point in its implementation period. This will coincide with the evaluation of the NECP, as mandated under the Regulation of the Governance of the Energy Union, and the early stages of the development of the fourth River Basin Management Plan. Thus, continued alignment between these three interrelated policy documents will be maintained. Should it be determined that a revision of the Strategy is required, this will be guided by the updated policy documents and the evidence-based evaluation assessing the progress made towards achieving the Strategy's objectives.

05

Concluding Note

Present and future challenges associated with the development and management of energy and water systems, climate action and industrial competitiveness will require timely investments in R&I in energy and water for the development and infiltration of innovative solutions. There exists significant research capacity, particularly within the local HES, and a number of local companies are known to conduct R&I activities in the areas of energy and water. However, their potential to expand both their activities and capacity, and thus their impact, may be constrained by the availability of resources. This also in view of the fact that neither water nor energy were explicitly included in the 2014-2020 Smart Specialisation Strategy (within MCST's National Strategy for Research and Innovation).

In this regard, Malta looks towards the upcoming decade as a timely coming together of ambitious goals for energy and water management and a strong emphasis on the potential for R&I to contribute to these ambitious objectives, at both the national and international level. The additional support channelled through the implementation of this Strategy, in the form of targeted investment across different areas of research from social and behavioural sciences to engineering, natural sciences and big data, is expected to boost domestic R&I activity and bolster local capacities whilst also resulting in R&I outputs of high-impact potential that will contribute to the realisation of national ambitions in the fields of energy, water and economic competitiveness.



annex 01

Definitions

Applied research

The work of original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific, practical aim or objective.

Experimental development

The systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes.

Marketing innovation

The implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.

Organisational innovation

The implementation of a new organisational method in the firm's business practices, workplace organisation or external relations.

Oriented basic research

The work carried out with the expectation that it will produce a broad base of knowledge likely to form the basis of the solution to recognised or expected current or future problems or possibilities.

Process innovation

The implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software.

Product innovation

The introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics.

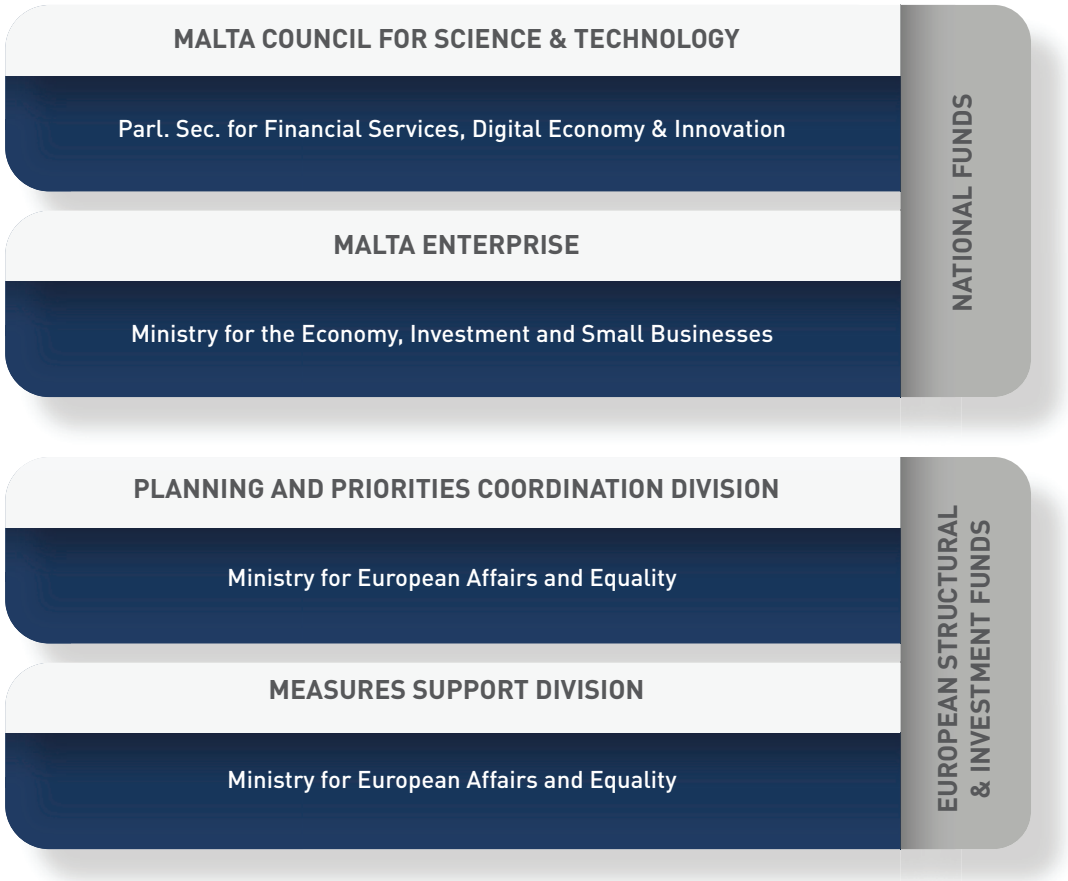
Research and experimental development

The creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

Annex 2
OVERVIEW OF CURRENT GOVERNANCE STRUCTURE FOR R&I

Due to Malta's size and the scale of the domestic R&I sector, the R&I governance system has a relatively well-established and simple structure with well-defined responsibilities. The key public bodies with a leading role in R&I governance are:

- The Malta Council for Science and Technology, within the Parliamentary Secretary for Financial Services, Digital Economy and Innovation (within the Office of the Prime Minister), which is responsible for research and innovation strategy and policy.
- Malta Enterprise, within the Ministry for Economy, Investment and Small Business, which operates a number of schemes promoting R&I in the private sector.
- Parliamentary Secretary for EU Funds, within the Ministry for European Affairs and Equality, is the managing authority for EU Structural and Investment Funds and responsible for development of operational programmes which govern the utilisation of such funds.



03 annex

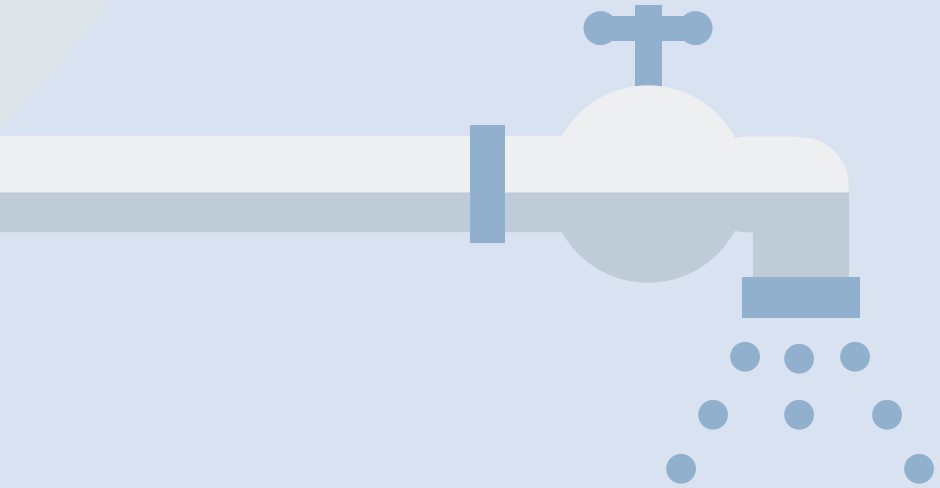
Research and Innovation Projects in the Field of Water (2010-2019)

Start Year	Funding Source	Code/ Acronym	Title of Project	Area	Coordinating & Participating Organisations	MT Grant Value	Project Value
2010	Interreg Mediterranean	MEDIWAT	A sustainable water management in MED Islands	Water Management	Malta Resources Authority		€1,480,000
2010	FP 7	SIRUS	Sustainable Irrigation water management and River-basin governance: Implementing User-driven Services	Irrigation	Integrated Resources Management (IRM) Company Ltd	€241,734	€3,039,867
2011	ENPI CBCMED	SWMED	Sustainable Domestic Water Use in Mediterranean Regions	Water Management	Ministry of Gozo, Malta Resources Authority	€261,240	€1,788,385
2011	Italia-Malta 2007-2013 OP (ERDF)	MORISO	Monitoraggio delle risorse idriche sotterranee ed interventi per il controllo dell'intrusione marina e per la riduzione dell'inquinamento da attività agricole	Water Efficiency	Malta Resources Authority, Water Services Corporation	€249,275	€969,970
2011	MCST National R&I Programme	GEO INF	Research on the Use of Infiltration Boreholes for Flood Mitigation and to Enhance Groundwater Recharge	Groundwater	Sustech Consulting, Dept of Civil and Structural Engineering, University of Malta Solid Base Lab. Ltd. Malta Resources Authority (MRA) St. Theresa College	€127,931	€127,931
2011	MCST National R&I Programme	NEPTUME	No-discharge Energy-efficient Prototype for Treatment of Urban Municipal Effluent (for water self-sufficiency in Public Gardens)	Wastewater	Architecture Project (AP) Ltd., Water Services Corportation, Department of Biology at the University of Malta	€185,143	€185,143
2011	CIP	@qua	@qua Innovation Network for Water Efficiency	ICT	Water Services Corporation	€20,000	€442,500
2011	LIFE programme	LIFE10 INF/ MT/000091	Investing in Water - Achieving Reduction in Water Consumption by Business in Malta	Water Efficiency	Malta Business Bureau, Malta Hotels & Restaurants Association (MHRA), Malta The Malta Chamber of Commerce, Enterprise and Industry (MCCEI), Malta	€166,542	€334,642

2012	FP7 - Environment	MARSOL	Demonstrating Managed Aquifer Recharge as a Solution to Water Scarcity and Drought	Groundwater	Malta Resource Authority, Water Services Corporation, Paragon Limited, Energy and Water Agency	€34,758	€8,022,151
2012	LIFE programme	LIFE12 ENV/ MT/000732	LifeMedGreenRoof - Constructing two demonstration green roofs to illustrate the potential of meeting environmental and energy targets	Water Efficiency	University of Malta, Fondazione Minoprio, Italy MAC Minoprio Analisi e Certificazioni S.r.l., Italy Malta Competition and Consumer Affairs Authority, Malta	€414,072	€837,647
2013	FP7 - SME	WATERGOLF	Wireless distributed intelligent system for irrigation optimisation and early turf disease prevention and treatment on Golf Courses	Irrigation	Malta Industrial Innovation for SMEs Limited, Multiple	€61,004	€1,497,565
2013	FP 7	WE@EU	Water Efficiency in European Urban Areas	Water Management	Paragon Limited, Malta	€183,535	€2,491,440
2013	FP 7	SUWANU	Sustainable Water treatment and Nutrient reuse options	Water Reuse	AquaBioTech Ltd, Office of the Prime Minister, Koperattivi Malta, University of Malta	€209,578	€1,612,178
2015	Horizon 2020	FREEWAT	FREE and open source software tools for Water resource management	ICT	Paragon Limited, Malta	€101,625	€1,583,913
2015	Horizon 2020	FOWARIM	Fostering Water Agriculture Research and Innovation in Malta	Water Efficiency	MCAST, Ministry of the Environment, Sustainable Development and Climate Change	€960,125	€960,125
2015	Horizon 2020	ESMERALDA	Enhancing ecoSysteM sERvices mApping for poLicy and Decision mAking	Policy	MCAST	€59,375	€3,133,306

2016	Interreg Mediterranean	CASTWATER	Coastal areas sustainable tourism water management in the Mediterranean	Water Management	Energy and Water Agency & Malta Regional Development and Dialogue Foundation	€342,822	€40,331,975
2016	Interreg Mediterranean	CONSUME-LESS	Consume Less in Mediterranean Touristic Communities	Water Efficiency	Energy and Water Agency & EcoGozo	€519,350	€2,635,000
2016	Horizon 2020	MARCAN	Topographically-driven meteoric groundwater – An important geomorphic agent	Groundwater	University of Malta	€833,252	€1,757,432
2016	MCST Fusion	CIXT	Crop Intelligent Tools	Irrigation	MCAST, 4 Sight Technologies Ltd., Marsovin Ltd.	€195,000	€211,252
2016	Horizon 2020	VicInAqua	Integrated aquaculture based on sustainable water recirculating system for the Victoria Lake Basin	Water Reuse	AquaBioTech Ltd.	€487,438	€2,997,710
2017	Horizon 2020	GeoERA	Establishing the European Geological Surveys Research Area to deliver a Geological Service for Europe	Groundwater	Ministry for Transport and Infrastructure – Continental Shelf Department		€31,303,030.39
2018	Interreg Europe	AQUARES	Water reuse policies advancement for resource efficient European regions	Water Reuse	Energy and Water Agency	€153,708	€1,835,546
2018	Horizon 2020	WasteWater Science	A novel affordable, portable and autonomous wastewater treatment unit for the agriculture industry	Wastewater recovery	Wastewater Science Limited, Malta,	€50,000	€71,429
2018	Interreg Europe	Micro WatTs	Micro Wastewater Treatment Systems using Photocatalytic Surfaces	Water treatment	University of Malta, MCAST, Econetique, Consiglio Nazionale delle Richerche, Universita' degli Studi di Catania, Plastica Alfa	€992,006	€2,415,048

2018	LIFE programme	LIFE-IP RBMP-Malta	RBMP Malta - Optimising the implementation of the 2nd RBMP in the Maltese River Basin District	Water Management	Energy and Water Agency, Ministry for Environment, Sustainable Development and Climate Change (MESDC), Malta Environment and Resources Authority, Malta Water Services Corporation, Malta Ministry for Energy and Water Management – Energy and Projects, Malta Ministry for Transport, Infrastructure and Capital Projects, Malta Ministry for Gozo, Malta	€10,200,000	€17,000,000
2019	Horizon 2020	MARSoluT	Managed Aquifer Recharge Solutions Training Network	Groundwater	Energy and Water Agency	€261,500	€2,992,494
2019	ENI CBCMED 2014-2020	NAWAMED	Naure Based Solutions for Domestic Water Reuse in Mediterranean Countries	Water Management	Energy and Water Agency	€157,956	€3,200,000
2019	ENI CBCMED 2014-2020	AQUACYCLE	Towards Sustainable Treatment and Reuse of Wastewater in the Mediterranean Region	Water Efficiency	Integrated Resources Management (IRM) Co. Ltd	€341,418	€2,800,000



04 annex

Research and Innovation Projects in the Field of Energy (2010-2019)

Start Year	Funding Source	Code/Acronym	Title of Project	Area	Coordinating & Participating Organisations	MT Grant Value	Project Value
2010	MCST Fusion	DOW	Design and Analysis of an Innovative Offshore Wind Turbine Support Structure for Deep Water Applications in the Maltese Islands	Renewable Energy	University of Malta, General Renewable Energy Ltd – Ecofys Honeycomb Services Ltd	€97,788	
2010	LIFE programme	DemoEV	Demonstration of the feasibility of electric vehicles towards climate change mitigation	Transport	Ministry for Transport and Infrastructure, Authority for Transport in Malta, Minstry for Gozo, EneMalta	€667,870	€1,888,010
2011	MCST Fusion	NEPTUME	No-discharge Energy-efficient Prototype for Treatment of Urban Municipal Effluent (for water self-sufficiency in Public Gardens)	Energy efficiency	Architecture Project (AP) Ltd., Water Services Corportation, Department of Biology at the University of Malta	€185,143	€185,143
2011	MCST Fusion	Wheels for All	The Development of an Integrated Personal Mobility Device	Transport	MCAST, Technoline Ltd KNPD	€115,763	
2011	MCST Fusion	R&I-2010-024	Converting Wave Energy into Electrical Energy - Focusing on Mediterranean Region and Climate	Renewable Energy	DexaWave Energy Malta, Institute for Sustainable Energy, University of Malta IOI-Malta Operational Centre, University of Malta	€195,463	
2011	MCST Fusion	DIACOM	Investigation of Advanced Metal – Diamond Composites for Thermal Management Applications	Value Added Manufacturing	IMA Engineering Services Ltd, Dept of Metallurgy & Materials Engineering, University of Malta Austrian Technology Institute (ATI)	€88,313	
2011	MCST Fusion	R&I-2011-011	Development of a family of Augmented Lift - Self Adjusting - Vertical Axis Wind Turbines (VAWT) for urban wind context	Renewable Energy	Econetique Ltd, Alurwind Ltd Dept of Mechanical Engineering, University of Malta Architecture Project (AP) Ltd	€128,641	

2011	MCST Fusion	Real Promise	Realtime Portable Reconfigurable Power Management Interoperable System	ICT	S-TEC (Superyacht Technology Expansion Centre) Ltd, part of MARSEC-XL Cluster, MCAST	€127,230	
2012	CIP	SUNSHINE	Smart UrbaN Servlces for Higher eNergy Efficiency	Energy efficiency	GeoSYS Limited, Malta	€2,313,643	€4,627,292
2012	MCST Fusion	Solaqua	Innovative photovoltaics on water	Renewable Energy	University of Malta, Pandia Energy Malta Ltd, General Membrane (Malta) Ltd.	€199,702	
2012	MCST Fusion	ThermHCB	Development of a Hollow Concrete Block with improved thermal properties, having same dimensions and load bearing characteristics as the traditional HCB	Buildings	Galea Curmi Engineering Services Ltd., JCR Ltd., University of Malta – Institute for Sustainable Energy in collaboration with the Faculty of the Built Environment	€179,921	
2012	LIFE programme	Life-MedGreen-Roof	Constructing two demonstration green roofs to illustrate the potential of meeting environmental and energy targets	Energy efficiency	University of Malta, Fondazione Minoprio, Italy MAC Minoprio Analisi e Certificazioni S.r.l., Italy Malta Competition and Consumer Affairs Authority, Malta	€414,072	€837,647
2013	MCST Fusion	CleanFlight	Cleaner Flight Operations in Departure and Approach in Maltese Airspace	ICT	University of Malta, QuAero Ltd	€138,948	
2014	MCST Fusion	OPPV	Offshore Passive Photovoltaics	Renewable Energy	MCAST, Econetique, Malta Mariculture Ltd., Mining Innovation Rehabilitation and Applied Research Corporation (MIRARCO)	€199,018	€233,288
2014	Operational Programme 1 (ERDF)	335	Solar Research Lab	R&I Infrastructure	University of Malta, Ministry for Education and Employment	€3,251,449	

2014	Operational Programme 1 (ERDF)	341	Study for Deep Energy and Resource Retro-fitting of St Vincent de Paul Hospital Residence	Buildings	Ministry for Energy and Conservation of Water, Ministry for Energy and Health	€227,143	
2014	Operational Programme 1 (ERDF)	348	Studies for the Development of a Waste-to-Energy Facility	Policy	WasteServ Malta Ltd., Ministry for Sustainable Development, the Environment and Climate Change	€151,418	
2014	Operational Programme 1 (ERDF)	349	An Energy Roadmap - Towards Achieving Decarbonistion for the Maltese Islands.	Policy	Ministry for Energy and Conservation of Water, Ministry for Energy and Health	€439,945	
2015	MCST Fusion	CleanFlight2	Cleaner Flight Operations in Departure and Approach in Maltese Airspace – Phase 2	ICT	University of Malta, QuAero Ltd., Malta Air Traffic Services	€198,485	€219,468
2015	Horizon 2020	BIG HIT	Building Innovative Green Hydrogen systems in an Isolated Territory: a pilot for Europe	Renewable Energy	Ministry For Transport, Infrastructure and Capital Projects	€32,999	€7,246,103
2015	Horizon 2020	GrowSmarter	GrowSmarter	Transport	Authority for Transport in Malta	€99,364	€24,820,974
2015	Horizon 2020	EMPOWER	Local Electricity retail Markets for Prosumer smart grid pOWER services	ICT	Malta Intelligent Energy Management Agency	€152,750	€4,429,808
2015	Horizon 2020	SMART-UP	Vulnerable consumer empowerment in a smart meter world	ICT	Projects in Motion Ltd	€74,125	€791,493
2015	Horizon 2020	EEPLIANT	Energy Efficiency Complaint Products 2014	Energy efficiency	Malta Competition and Consumer Affars Authority	€42,750	€2,499,873
2015	Horizon 2020	CAIV_EPBD	Concerted Action EPBD IV	Buildings	Ministry for Transport, Infrastructure and Capital	€27,376	€3,000,000
2015	Horizon 2020	ESMERALDA	Enhancing ecoSysteM sERvices mApping for poLicy and Decision mAking	Policy	Malta College of Arts, Science and Technology	€59,375	€3,002,166
2015	Horizon 2020	FREEWAT	FREE and open source software tools for WATer resource management	ICT	Paragon Europe Ltd	€101,625	€1,411,163

2016	MCST Fusion	Innovled	Innovative High Power LED Luminaires for Sports Applications	Efficient Buildings	Altern Ltd., Sports Malta	€199,578	
2016	MCST Fusion	FLASC	Development of a Hydro-Energy Storage System for Offshore Multi-purpose Floating Platforms (FLASC)	Energy Storage	University of Malta, Medserv p.l.c.	€198,206	€210,096
2016	Horizon 2020	ODYSSEE-MURE	ODYSSEE-MURE, a decision support tool for energy efficiency policy evaluation.	Policy	Energy and Water Agency	€23,574	€1,794,538
2016	Horizon 2020	BIG HIT	Building Innovative Green Hydrogen systems in an Isolated Territory: a pilot for Europe	Renewable Energy	Ministry for Transport, Infrastructure and Capital	€32,999	€5,000,000
2016	Horizon 2020	CA-RES3	Concerted Action supporting the transposition and implementation of Directive 2009/28/EC on the promotion of the use of energy from renewable sources (RES Directive)	Policy	Energy and Water Agency	€61,512	€4,981,469
2016	Horizon 2020	SIM4NEXUS	Sustainable Integrated Management FOR the NEXUS of water-land-food-energy-climate for a resource-efficient Europe	Policy	Epsilon Malta Ltd	€393,750	€7,895,658
2016	Horizon 2020	VicInAqua	Integrated aquaculture based on sustainable water recirculating system for the Victoria Lake Basin (VicInAqua)	Renewable Energy	AquaBioTech Ltd	€487,438	€2,997,710
2016	Horizon 2020	4PRIMA	Partnership for Research and Innovation in the Mediterranean Area	Policy	Ministry for Education and Employment	€138,688	€1,999,379
2016	Horizon 2020	R2PI	Transition From Linear 2 Circular: Policy And Innovation	Policy	University of Malta	€156,250	€3,013,475
2016	Interreg Europe	PROMETEUS	PROMotion of E-mobiliTy in EU regionS	Transport	Transport Malta	€237,278	€1,389,765
2016	Interreg Europe	ZEROCO2	Promotion of near zero CO2 emission buildings due to energy use	Buildings	University of Malta	€111,721	€1,344,233
2016	Interreg Europe	SUPPORT	Support Local Governments in Low Carbon Strategies	Policy	Gozo Regional Committee	€136,297	€1,848,134

2016	Interreg Europe	ENERSELVES	Policy instruments for energy self-consumption in buildings	Buildings	Malta Intelligent Energy Management Agency	€182,134	€1,598,431
2016	Interreg Mediterranean	SHERPA	Shared knowledge for Energy renovation in buildings by Public Administrations	Buildings	EcoGozo,	€143,924	€169,323
2016	Interreg Mediterranean	PRISMI	Promoting RES Integration for Smart Mediterranean Islands	Renewable Energy	Malta Intelligent Energy Management Agency	€61,391	€72,225
2016	Interreg Mediterranean	STEPPING	Supporting The EPC Public Procurement IN Going-beyond	Buildings	Malta Intelligent Energy Management Agency	€134,819	€158,610
2016	Interreg Mediterranean	LOCAL-4Green	LOCAL Policies for GREEN Energy	Policy	Malta Intelligent Energy Management Agency	€221,367	€260,432
2016	Interreg Mediterranean	NEW FINANCE	New finance for energy efficiency measures in public buildings	Policy	Malta Intelligent Energy Management Agency	€133,199	€156,705
2016	Interreg Mediterranean	MAESTRALE	Maestrale	Renewable Energy	Malta Intelligent Energy Management Agency	€195,716	€230,254
2016	Interreg Mediterranean	Pegasus	Promoting Effective Generation and Sustainable Uses of Electricity	ICT	Malta Intelligent Energy Management Agency	€138,402	€162,826
2016	Interreg Mediterranean	CONSUME-LESS	Consume Less in Mediterranean Touristic Communities	Energy efficiency	Energy and Water Agency & EcoGozo,	€519,350	€2,635,000
2016	Interreg Mediterranean	ENERJ	Joint Actions for Energy Efficiency	Energy efficiency	Gozo Regional Committee	€192,121	€226,025
2016	Interreg Mediterranean	MOBILITAS	MOBILity for nearLy-zero CO2	Transport	Paragon Europe Ltd	€188,589	€221,869
2016	Interreg Mediterranean	CAMP-sUMP	CAMPus sustainable University mobility plans in MED areas	Transport	University of Malta	€47,260	€55,600
2016	Interreg Mediterranean	CESBA MED	CESBA MED Sustainable MED Cities	Buildings	University of Malta	€271,788	€319,750
2017	MCST Fusion	MicroCHP	A Smart Micro Combined Heat and Power System (MICROCHP)	Renewable Energy	University of Malta, Abertax Kemtronics Ltd.	€199,957	€211,207
2017	MCST Fusion	NEVAC	Novel Evaporative Cooled Battery Technology (NEVAC)	Renewable Energy	University of Malta, Abertax Kemtronics Ltd	€199,137	€245,226

2017	Horizon 2020	ReSHEALi-ence	Rethinking coastal defence and Green-Energy Service infrastructures through enHancEd-durAbiLIty high-performance fiber reinforced cement-based materials.	Buildings	University of Malta	€5,557,596	€5,557,596
2017	Horizon 2020	EEPLIANT2	Energy Efficiency Compliant Products 2	Energy efficiency	Malta Competition and Consumer Affars Authority	€50,911	€2,856,213
2017	Horizon 2020	CA-EED 2	Concerted Action EED - Support to Member States and participating countries for the implementation of the Energy Efficiency Directive	Energy efficiency	Energy and Water Agency	€49,490	€4,696,182
2017	Horizon 2020	GeoERA	Establishing the European Geological Surveys Research Area to deliver a Geological Service for Europe	Renewable Energy	Ministry for Transport, Infrastructure and Capital	€-	€10,000,000
2017	Horizon 2020	SO-CLIMPACT	DownScaling CLImate imPACTs and decarbonisation pathways in EU islands, and enhancing socioeconomic and non-market evaluation of Climate Change for Europe, for 2050 and beyond.	Policy	AquaBioTech Ltd	€135,588	€4,481,340
2018	MCST Fusion	KERS	A Kinetic Energy Recovery System For A Landing Aircraft (KERS)	Aviation	University of Malta, Medavia Ltd.	€193,017	€209,108
2018	MCST Fusion	HDMS	Smart Single Phase Motor Soft Starter Without Starting Capacitor	Energy efficiency	Carlo Gavazzi Ltd., University of Malta	€194,987	€228,350
2018	Horizon 2020	VENTuRE	A Virtual and physical ExperimeNtal Towing centre for the design of eneRgy Efficient sea-faring vessels	Energy efficiency	University of Malta, NAVAL ARCHITECTURAL SERVICES LIMITED	€799,902	€799,904
2018	Horizon 2020	GEO4CIVHIC	Most Easy, Efficient and Low Cost Geothermal Systems for Retrofitting Civil and Historical Buildings	Buildings	Din l-Art Helwa	€298,375	€6,841,961

2018	Horizon 2020	CAV_EPBD	Concerted Action EPBD V	Buildings	Ministry for Transport, Infrastructure and Capital	€27,376	€5,000,000
2018	Horizon 2020	NEXT	New Exploration Technologies	ICT	Integrated Resources Management Co Limited	€256,875	€6,901,276
2018	Operational Programme 1 (ERDF)	ERDF.01.122	Sustainable Living Complex	R&I Infrastructure	University of Malta, Ministry for Education and Employment	€30,000,000	
2018	Operational Programme 1 (ERDF)	ERDF.01.124	Transdisciplinary Research & Knowledge Exchange (TRAKE) Complex at the University of Malta	R&I Infrastructure	University of Malta, Ministry for Education and Employment	€22,066,375	
2018	RIDT	Solaqua 2.1	Economically and Technologically Viable Floating Solar Development	Renewable Energy	University of Malta,	€100,000	€100,000
2018	TOSFA	Hybrid Boat	Creation of a Hybrid Boat using solar, electricity and a back-up internal combustion engine	Renewable Energy	University of Malta, Abertax Ltd.	€20,000	
2019	Interreg Europe	SMART-HY-AWARE	Smart solutions for HYdrogen potential AWAReness Enhancing	Transport	Transport Malta, Ministry for Gozo	€217,961	€1,674,229
2019	Interreg Europe	RESINDUSTRY	Policies for Renewable Energy Sources in industry	Renewable Energy	Ministry for Gozo	€175,653	€1,623,554
2019	Interreg Europe	E-BussED	Building capacities for European-wide e-bus deployment	Transport	Ministry for Gozo, Transport Malta	€223,253	€1,517,841

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2021-2030

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