

MALTA

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1. OVERVIEW OF THE REGION

Characteristics of the Region

Malta, or more specifically the Maltese Archipelago, comprises the inhabited islands of Malta, Gozo and Comino, together with a few uninhabited islands, collectively termed as Malta. As an entity, Malta, after its independence from the United Kingdom in 1964, and after becoming a democratic republic in 1974, joined the European Union in 2004. It is concurrently part of the Commonwealth of Nations and the United Nations. It is an independent Island State and has had its own self government since 1964.

As a hierarchical system of governance, Malta has a President, as head of state, the Prime Minister, Parliament, and finally Local Councils (equivalent to Municipalities – albeit on a town-scale).

On a regional level, there are no large-scale municipalities as such due to its size, however at town level there are Local Councils as a

political system of local government for each town. There are no intermediate levels between local government and national government and the levels of the six districts serve primarily for geographic, and statistical purposes (i).

The Maltese Islands cover an area of 316 km² accommodating a population which based on the latest census carried out in 2011 (ii) is of 452,515. This is equivalent to 1,432 people per sq.km, making Malta the seventh most densely populated sovereign state in the world (iii).



Figure 1 – Map of the Malta, Gozo & Comino

Malta boasts a free-market economy, with its Gross Domestic Product (GDP in € per capita) standing at €6.756 billion total (2012 estimates) or €5,500 per capita. At present Malta has an employment rate of 93.6% (2011 estimate) (iv).

Energy demand and supply of the Region
The total energy consumption (2011 basis) was equivalent to 813,014 tonnes of fuel.

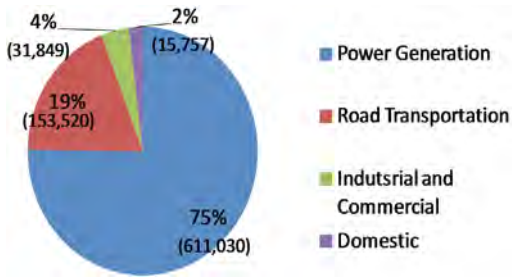


Figure 2 – Total Fuel Consumption by Sector

As can be seen from *Figure 2*, 75% of the total fuel consumption went into power (electricity) generation, with the balance (19%) making up road transport, (4%) industrial and commercial processes and (2%) fuel usage in the residential sector. A small fraction also goes for agricultural activities, but this is a very small amount.

Electricity consumption

The power generation sector, as discussed above, is the main fuel consuming sector. In fact close to 100% of the electricity produced is derived from fossil fuel (in 2011 this fuel mix was divided as follows HFO/Gasoil (84%/16%) (v). Malta presently has an independent isolated grid system, relying solely on imported fossil fuels, although work is underway to connect the Islands to the European electricity grid (end 2014), and a gas-pipeline interconnection planned to feed its power generation sector. Coal for electricity generation used to be imported until the mid-1990s but this was stopped for environmental reasons. The shift and plant investment was made towards conventional fuel oil.

The total electricity generation (vi) (based on 2011 values) was of around 2,168,553 MWh, supplied from one (Government-owned) utility, Enemalta Corporation. As shown in *Figure 3*, consumption is categorised as per following sectors: Domestic: 27%; Commercial: 29%; Industry: 22%; and other (including stations own use, etc.), 22%.

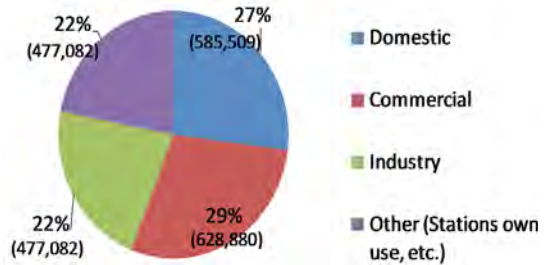


Figure 3 - Electricity Consumption by Sector

GHG emission factor for electricity from the grid ($\text{kgCO}_2\text{eq/kWh}$) based on averages between the two power stations, as calculated at generation stands at $0.86 \text{ kgCO}_2\text{eq/kWh}$. Total GHG from current emissions due to electricity (ktonCO_2eq), (from all sectors combined) currently stands at $1,865 \text{ ktonCO}_2\text{eq}$.

Other fuel consuming sectors

In terms of other fuel consuming sectors petrol and diesel oil are the two main fuels used in the transport sector, with biodiesel and Liquefied Petroleum Gas (LPG) making up only a marginal fraction of the total fuel consumption used in the road transport sector. Outside the road transport sector, LPG, used for space heating and cooking and heating oil (diesel oil) are the two main fuels used in the industrial, commercial and residential sector.

Renewable Energy Sources (RES)

According to the Ministry for Energy & Conservation of Water (MECW), through reporting by the Malta Resources Authority, the local energy regulator, as per records for 2012, the share of RES (Renewable Energy Sources) as a percentage of the total energy consumption stood at 1.8%, with the greatest contribution going for thermal energy, namely, RES-Heat having 50% of the share and the rest divided between RES-Electricity and RES-Transport.

The principal RES technologies present in Malta) are:

- photovoltaics (Grid-Connected PV) in the form of free-standing, grid connected systems, predominantly installed on top of residential, commercial and industrial roofs;

- Solar Water Heaters (SWH) for the provision of hot water in residential, hospitality and commercial premises;
- relatively large scale waste-to-energy technologies, including anaerobic digesters for municipal solid waste treatment, sewage treatment plants and engineered landfill gas treatment plants.

The possibility of installing large scale RES in Malta is probably limited for now by the fact that it is a small island grid and the potential instability an embedded large RES plant may cause. Therefore by and large small PV installations have been installed so far on household or factory rooftops, mostly assisted through Government and EU funding schemes. The currently ongoing project to connect Malta to mainland Europe via an interconnector should increase the possibilities for large scale RES plants due to a more stable grid.

Overview of the Energy Supply Chain

As discussed earlier Malta's energy supply chain is characterised by fuel imports, which predominantly are used in the power generation and road transport sectors. Pending any permanent means of gas link and being an island country, fuel imports into Malta are done exclusively through shipments.

Although electricity generation is liberalised, Malta enjoys a derogation from the Electricity Supply Directive in that it has one single distribution operator and electricity supplier, that is, Enemalta Corporation. The internal fuel market at wholesale and retail level is also liberalised although the specific circumstances of Malta which has a low market throughput, effectively has created a situation where whereas the retail sector is fragmented into many small parties, the wholesale sector is run by only 2 to 3 companies based on the fuel being imported.

With respect to renewables there are various importers of RES systems in Malta, particularly Photovoltaic systems and Solar Water Heaters. The Malta Resources Authority publishes lists of registered products relating to the provision of energy services including PV and solar water heaters (vii).

2. CURRENT SITUATION: TARGETS RELATED TO ENERGY POLICY

With respect to Energy Policy and energy targets for Malta as one region given its 2004 accession as an EU Member State, Malta is bound to respect targets set through the various EU Directives and international agreements. In this regard, particularly important among others are, the RES Directive (Directive 2009/28/EC), the Energy-Efficiency Directive (Directive 2012/27/EC) and the Building Performance Directive (EPBD Recast) (Directive 2010/31/EC). These are transposed directly into national law, in accordance with local conditions and parameters in the respective sector.

Malta's overall GHG reduction targets are based on the following set of actions listed in the National Energy Efficiency Action Plan (NEEAP) and National Renewable Energy Action Plan (NREAP):

- end-use energy efficiency improvement of 9% by 2016;
- primary energy efficiency improvement of 22% by 2020;
- renewable energy target set to 10% of final energy consumption by 2020;
- bio-fuel contribution in the fuel mix: 10% of final energy consumption of fuels by 2020;
- tightening of existing minimum standards as from 2013 and a further tightening by 2017. By 2018 Public Authority Buildings will qualify for nearly zero energy buildings; and
- reduction in GHG emissions under Effort Sharing Decision: +5% over 2005 levels by 2020.

The targets set are not easy to implement and all do come with a number of challenges, predominantly given Malta's size and isolation. Being a small and isolated country Malta does not benefit from the totality of the benefits usually associated with RES and energy-efficiency technologies;

- technology costs – Malta imports most of these technologies from abroad with currently no direct investment in the local industry (apart from the retailing aspect);
- country footprint – being a small state with a total footprint not exceeding 316 sq.km, Malta has a limited land resource where to

accommodate large RES. Moreover, being at a high premium, the available land space has to compete with other aspects such as environmental and economical.

Policies relevant to the built environment and its allied fields

Planning policies

In Malta one of the most important sustainable development initiatives related to planning has been the setting up of the National Commission for Sustainable Development. One of the principal tasks of the NCSD is to prepare a strategic plan for the period 2007 – 2016, entitled a 'National Strategy for Sustainable Development' *Energy and economy planning are incorporated in the aforementioned NCSD strategic document.*

Mobility and transport policies

As discussed in Malta's Indicative National Energy Efficiency Target for 2020 in accordance with Article 3 of Directive 2012/27/EC (viii) of 2013, apart from increasing the share of biofuels, an improved modal shift, improved traffic management, re-injuvinating Malta's private car fleet and electro-mobility remain key targets for a cleaner and more efficient transport sector. Amongst the proposed measures one may list:

- the continuous improvements to the Public Bus Transport System to further encourage modal shift from private to public transport;
- the establishment of core Intelligent Traffic Management System (ITMS) to improve traffic management;
- promotion of the use of the established cross harbour ferries and vertical connectivity;
- promotion of Green Travel Plans, including car sharing and electric car usage from the local authorities;
- deployment of a National Electric Car Charging Network by 2014 and demonstration projects to improve citizen perception and potentially encourage uptake; and
- promotion of energy efficient vehicles: Fiscal and other measures aimed to encourage the uptake of new environmentally friendly vehicles using efficient engine technologies.

Community awareness policies

Fiscal incentives (in the form of grants and Feed-in Tariff (FIT) payable per unit of electricity exported in the case of PV) established to promote the widespread use of PV and SWH at domestic and commercial levels.

Public dissemination through media and EU-funded projects aimed specifically at increasing awareness on RES technologies and energy-efficiency behaviour.

Community awareness was also publicised by the Housing Authority directly through social housing at building level. This came about through the implementation of new physical interventions at various housing estates. Such measures namely comprise PV systems, solar water heating, natural ventilation as well as other standard measures in line with today's building technology standards (e.g. insulation, double glazing, etc.). Apparently this had the most significant effect on the community as families and households became more aware of their own energy consumption.

Industry engagement policies

Malta's industry is based on various sectors as a result of a pro-active policy towards diversification, value-added and innovation. One of the methods used to engage industry with RES was the launch of various finite budget PV schemes with up to 85% subsidy, with 8-year contracts for a prescribed feed-in tariff, ranging from €0.22 reduced to €0.18 per kWh generated, scaled down in percentage subsidy and rate, in accordance with the payback period, given a lower cost of the PV technology.

Tourism, construction and manufacturing are amongst the main industries in Malta. A significantly large sector of the economy is formed by small businesses (mostly micro-businesses, meaning that they employ less than 10 people) which are typically family-owned. In 2004 there were 30,790 such enterprises (29,670 of which were micro) which employed 44,624 people (micro-enterprises) and 22,685 (small enterprises, meaning between 10 and 49 employees). This means a total of 67,309 workers. To put this in perspective, in the same year 216 medium and large enterprises employed 35,500 people in 2004.

Malta Enterprise is the Government's support agency for industry and implements industrial policy including the administration of incentives for the expansion of industry and the development of innovative enterprises. The agency's main focus is on enterprises demonstrating commitment towards growth and employment and specifically provides incentives for manufacturing, ICT, Healthcare, Pharmaceuticals, Biotechnology and others. The tourism sector falls under the responsibility of the Malta Tourism Authority although Malta Enterprise also used to administer an energy efficiency scheme for the hospitality sector.

Malta's incentive policy for industry centres mainly on investment tax credits whereby companies in certain sectors which invest in immovable assets or which employ people are eligible for discounts on their tax bills depending on their size, and subject to state aid rules. Investments in installations related to energy efficient and renewables are also eligible for such tax credits.

A particular emphasis is placed on micro-enterprises which are by far the most numerous in Malta. A micro-invest tax credit scheme (ix) was available until the end of 2012 to help these companies with certain types of investments, including investments in energy efficient and clean energy generation.

The recent budget (2014) announced by the Government will re-open this scheme placing a favourable discrimination on Gozitan micro-enterprises (Gozo companies are eligible for a 65% tax credit whilst others will get 45%).

Incentives also exist to help innovative start-ups, which can include enterprises involved in energy efficiency, clean energy or environmental technologies. Furthermore there is a paid for business advisory scheme whereby businesses can benefit from expert support in various areas including energy efficiency and the provision of energy audits. There are also schemes to help businesses achieve environmental certification, particularly in the hospitality industry and with a new emphasis on holiday farmhouses in Gozo.

Malta's current energy policy (x) proposes that the Government, through Malta Enterprise, will "*promote investment in renewable sources of energy and energy efficiency, pursuing job creation in the energy industry, serving both Malta and other countries.*"

Malta Enterprise, through its '*Business First*' agency, also makes available a Business Advisory Scheme (xi) to industry through which companies can source expert advice in various areas which include Environmental and Energy auditing.

It has to be noted that Malta is currently revising its energy policy in some detail with some schemes, that were available until recently, some of which were already taken up completely and now closed.

Policies towards education, training and skills development

Malta's *Building Industry Consultative Council* (BICC) in collaboration with the *Malta College of Art, Science & Technology* (MCAST), as Malta's main educational centre for vocational courses are promoting a project known as *Build-Up Skills*, whose aim is to create a National Education Platform that will develop a detailed National Qualifications Roadmap for the local construction industry.

The Malta Resources Authority expects retailers and installers of renewable systems and of insulation and double glazing to be competent and publishes a list of licensees and authorised service providers in the energy sector including a list of engineers who can certify PV systems (xii) The University of Malta's Institute for Sustainable Energy offers a course in the installation of solar heating and photovoltaic systems (xiii) .

The Malta Environment and Planning Authority has issued guidelines regarding the installation of PV systems (xiv). The Malta Resources Authority dedicates part of its website to disseminating information on climate change (xv). Various recommendations contained in Malta's National Climate Change Adaptation Strategy deal with Education, one example being Recommendation 82:

“The policy implementation recommendations relating to climate change adaptation are very often not scientific or technical solutions but behavioural solutions. Consequently, the Climate Change Committee for Adaptation proposes, if the recommendations of this Report are to be successfully implemented, the implementation of a sustained education and communications campaign that is both long term and targets simultaneously different sectors of the public”.

At a professional level (architects and civil engineers) the Faculty for the Built Environment at the University of Malta, formerly the Faculty for Architecture and Civil Engineering, has over the recent years seen a transition aimed at holistically addressing all those features related with the built environment including not only areas which strictly are pertinent with environmental aspects but also other areas related towards a sustainable building industry.

Policies towards energy generation from waste
The Waste Management Plan for the Maltese Islands refers to the recovery of energy from waste within existing and future facilities as an important step in sustainable waste management, with waste considered as a resource. Waste also contributes towards the Renewable Directive targets. The plan further identifies the opportunity to recover energy from waste (xvii) .

Policies towards technical innovation
A number of R&D incentives aimed specifically towards the creation of new composite building elements with a view to improve thermal performance of such elements, in line with latest building legislation.

Policies towards buildings' efficiency
Although building's energy efficiency has never been assessed and quantified on a national level, in general, the existing Maltese building stock is known to have high thermal inertia with a slow response to the microclimate.

Use of thermal insulation in-between walls was never the typical construction method, since Maltese winters are quite mild (average of +12degC). Today only a few new buildings are deploying cavity insulation. This is mainly

stemming from recent Government grant schemes as energy saving measures, namely double glazing and roof insulation. Developers and home owners were equally obliged to follow such measures in accordance with the latest current local legislation, now in force, as detailed below.

As part of its EU acceding obligations Malta in 2006 adopted LN 1002 of 2006 a direct transposition of Directive 2002/91/EC on the Energy Performance of Buildings (EPBD). Through this legislating new buildings and buildings undergoing major renovation were required to follow *“Technical Guidance Part F – Conservation of Fuel, Energy and Natural Resources”* - a generic list of minimum energy performance requirements for all buildings in Malta. As of 2012 with the coming into force of LN 376 of 2012 (transposing the recast EPBD - Directive 2010/31/EC) local authorities have started the process of establishing reference values for energy consumption of different typologies of existing buildings, with the scope of creating cost-optimal reference values for the energy performance of Maltese buildings.

Once these studies are completed it is expected that in line with what was presented in Malta's Indicative National Energy Efficiency Target for 2020 in accordance with Article 3 of Directive 2012/27/EC of 2013, (xviii) minimum requirements for energy performance of buildings will most probably be progressively revised towards a near-zero energy building target set for 2020 (xix).

Policies towards efficient generation and usage of heat

At primary energy level, recent investments in the local thermally run power stations have seen a drastic increase in the efficiency of grid sourced electricity. Heat recovery from such thermal stations for use in, for example, district heating is a non-starter since the infrastructure required does not justify the nominal heating required, limited to not more than a 1 month worth. Notwithstanding this a number of entities given their particular conditions and energy requirements (requiring year long space and domestic water heating) are looking and investing in CHP plants.

Due to its Mediterranean climate there is a

greater accent on cooling buildings. Depending on building size and other criteria (incl. cost, space available, etc.), this is typically achieved through de-centralised systems (split-unit AC being the most common devices) for residential buildings and centralised HVAC systems for large buildings. Good educational campaigns and a relatively energy conscious population has made sure that a good segment of the market share of these HVAC systems are of the energy efficient type.

3. CASE STUDY: Gozo

Gozo is identified as a distinct geographical region. It has a superficial area of 67km² and a population of 31,926 as in 2011. Most of the residents live around town hubs or in smaller villages (xx).

Promoted as a different region from Malta the main stakeholders include the Ministry for Gozo and Individual Local Councils representing each town and village together with other smaller local stakeholders include the Gozo Tourism Authority, Commercial Entities, Residents Associations and various NGOs. These include mainly those NGOs that are pro-environmental in one or many ways. The respective website shows an exhaustive list of all registered NGOs in Malta to date (Jan 2014); (as per national directory of 'environmental organisations') (xxi)

Initial conditions and local situation for the region: Gozo's Energy Consumption: (Electricity Statistics based on 2010)

- total Generated: 2,113,112 MWh;
- used in Stations: 121,623 MWh;
- industrial: (Malta) 460,413; (Gozo) 6,190 MWh;
- commercial: (Malta) 597,120 MWh; (Gozo) 28,434 MWh;
- domestic:(Malta) 434,875 MWh; (Gozo) 40,528 MWh;
- other: 423,939MWh.

Objectives and methods

The expected outcomes based on the three main pillars of sustainability are: Social, economic, and environmental fields. These are best described (collectively) in the masterplan for Gozo as a region, in a recently published Eco-plan for Gozo, concisely termed as Eco-Gozo. An extract from this document highlights its main thrust:

“Gozo, the second largest island in the Maltese archipelago, measuring about one third the size of Malta, and home to around 30,000 permanent inhabitants lies 25 minutes away by ferry from the most northern point of Malta. The island is in itself considered a Region known for its remarkable landscape consisting of pristine coastline and untouched country trails. Developed enough to guarantee a sustainable economic activity, Gozo is a natural masterpiece shaped through 7000 years of culture. Based on the values of sustainability and the need to protect the natural environment of Gozo, the Government of Malta has embarked on an ambitious vision to transform Gozo into an eco-island by 2020. The eco-island vision opens up to most sectors which determine life on the island and at the same time unites everything into one perspective and a common strategy. The four main pillars of this strategy bring together the environmental challenges on the island, the economic aspirations of its people, the development of society, and the preservation of its cultural identity” (xxii)

Interventions, measures and methods applied

The Eco-Gozo initiative includes quite a substantial number of actions and proposals. The following are only a short list of some of the actions which have been carried out. The short list covers aspects related to waste management, energy conservation and efficiency, water conservation and renewable energy technologies. Information is derived and adapted from the Eco-Gozo website. An exhaustive list of projects can be found on the same website.

Increased use of Sustainable Energy in the Ministry for Gozo: A PV system installed on top of the Ministry for Gozo roofs has over the period January-June 2012 generated around 40,000 units of electricity (kWh), covering around 30% of all the energy demand of the building.

Underground Recycle Waste Stream: One particular local council in Gozo, San Lawrenz, has proposed an underground recycled-waste system underneath a public street to encourage selective collection and recovery of packaging for subsequent recycling. The aim of such an action was to eliminate the negative visual impact on the urban landscape.

SAVE and REDUCE: Eco-Gozo Home Consultancy Visits: The project aimed to inform the Gozitan community on how to reduce the carbon and water footprints of their household and to encourage appropriate waste management practices. The scope of the project, was to provide consultancy visits to all households in Gozo using officers, trained to provide advice to families on energy and water conservation, renewable energy options and waste separation. An information booklet was also distributed to all the households.

Energy Efficiency and Energy Audits: Twelve energy audits in government premises were carried out, amongst which is the Administrative Centre in Victoria where most of the Government offices and the Ministry for Gozo are found, were conducted.

Water Reservoir at Gozo Stadium: Fresh water is scarce in Malta, and most of the drinking water comes either from the (depleting) ground water aquifer or energy intensive reverse osmosis plants. A project carried out by the Gozo Football Association comprised the building of two water reservoirs at the Gozo Stadium. This water conservation practice reduced the dependency on extracted water from the aquifer drastically.

Installation of Decorative Energy Efficient Luminaries: Through this project the Fontana Local Council has provided energy-efficient lighting, while embellishing the area by the installation of decorative luminaries, complemented with street furniture and paving of public open spaces and pedestrian areas.

Outcome and results

Improving the energy efficiency in Gozo is not easily quantified as it has no isolated system and being connected to the main grid and power stations in Malta creates a situation where the specific savings are only viewed as aggregated values. Also certain projects are still at concept stage with no detailed evaluation having been carried out

The main driver and scope of these projects has been throughout the regional aspect of Gozo, which attracted dedicated EU funding for particular situation. Its double insularity has always been considered as a drawback in many

aspects. Nonetheless its double insularity is also what most attracts Maltese and foreigners alike towards its beauty. In this context the specific projects, which are not only of a purely technical nature but are also aimed at resource conservation (e.g. water conservation) are seen as part of a holistic plan towards preserving the pristine conditions of Gozo as an isolated green island.

As discussed most of these projects attracted EU funding and one of the barriers encountered in developing this eco-Gozo plan is that since the capital costs of these projects/technologies are high, without dedicated local or EU funding few of these projects would have materialised.

Other aspects of the projects

There is a general desire by the business community in Gozo, to expand in terms of its current financial investment dimension. In a way, if not addressed properly this may be conflicting with the idea of a sustainable Gozo. A delicate balance between the Island's economic development and the island's sustainable ambition must therefore be struck.

4. CONCLUSIONS

The potential of Gozo as a stand alone case study as a region given its manageable scale, can easily act as a showcase to promote the reduction of energy consumption and CO₂ emissions. Its size renders it to be easily replicated or extended to the whole archipelago of Malta, comprising buildings of different types and varying size within all three sectors (industrial, commercial and the domestic sectors), towards a more coherent energy supply and demand of the region.

On a national level, the energy picture is bound to change, and quite imminently. With a new Government sworn in (March 2013), there is clearly an intended shift in "fuels' policy" from the use of HFO (Heavy Fuel Oil) and diesel to gas. However this is not the only change, as gas can be ferried in on special ships or through a dedicated gas pipeline.

At another level, the electrical interconnection with mainland Europe is now soon coming to its completion. A contractual agreement was signed between Malta and Italy, and the actual cable-laying which has already started is

expected to be completed by the end of 2014.

In the transport sector, a major energy guzzler, responsible for 20% of the national energy bill and emissions, new fiscal incentives are already in place to convert petrol vehicles to run on LPG, complemented with the new gas outlet points at existing established service stations.

Therefore the energy scenarios in Malta are multiple. Government's forecasts are tuned towards minimising energy costs, increasing energy efficiency and eliminating energy poverty – but aren't these the three underlying pillars of sustainability? Above all these point towards a better quality of life for all.

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communities of emerging countries. In particular, COST Actions are also open to participation by non-European scientists coming from neighbour countries (for example Albania, Algeria, Armenia, Azerbaijan, Belarus, Egypt, Georgia, Jordan, Lebanon, Libya, Moldova, Montenegro, Morocco, the Palestinian Authority, Russia, Syria, Tunisia and Ukraine) and from a number of international partner countries.

COST's budget for networking activities has traditionally been provided by successive EU RTD Framework Programmes. COST is currently executed by the European Science Foundation (ESF) through the COST Office on a mandate by the European Commission, and the framework is governed by a Committee of Senior Officials (CSO) representing all its 35 member countries.

More information about COST is available at www.cost.eu.



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