

**Quest title:**

*How Green is the Energy mix of the Maltese islands?*

**Age group: Year 9/10**

**Embedding: Physics lesson**

**Introduction**



*Source: Malta Today*

*Bound by the EU 2020 targets, Malta must produce 10% of its energy through renewable sources by the year 2020 which will simultaneously contribute to the reduction of the country's carbon footprint. These results are expected to be achieved through a number of renewable energy technologies, photovoltaic installations, solar water heaters, waste-to-energy, heat pumps, biomass imports and biofuels.*

*RES- Renewable Energy Source*

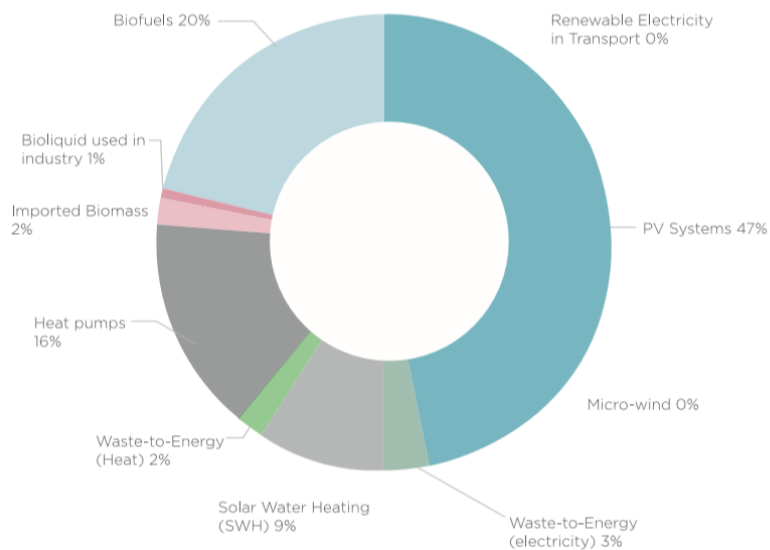


Figure 1 – Contribution by technology as a percentage share of the overall target

**The expected contribution of each type of technology to the final RES target – 10.04%**

**Source: National Renewable Energy Action Plan**

## **Process**

*Your tasks are not intended to investigate in depth each Renewable Energy Source in Malta but to shed some light on the various RESs being currently tapped.*

*The tasks also sheds some light on the Non-renewable energy sources namely; the Liquefied Natural Gas (LNG) and the Malta-Ragusa interconnector cable. Your job is investigate further how green or less green these are.*

*For each of the tasks you are to work in teams of up to 4 students.*

*The most likely sources of information are Enemalta and the Energy and Water Agency however in your research you may come across other valid sources. Nevertheless, always scrutinize the reliability of the source.*

*Before you start make sure you go through the resources highlighted, browse through the sites/links indicated to visualize and get a general idea of the issues that you are about to investigate.*

## Tasks:

### Task 1



*Source: Sustainable Built Environment Malta*

### **Task 1 - Data Logging**

*Visit the Xrobb I-Ghagin Nature Park and Sustainability Development Centre I/o M'Xlokk.*

Access the real-time logging system from the monitor of the central computer housed in the building. Notice and record any fluctuations in real-time data for wind turbines and photovoltaic cells during different times of the day. Watch closely for a distinct outputs by the two types of wind turbines (vertical axis/horizontal axis) present. The same can be applied for the different photovoltaic cells available on site. Try to discover which weather conditions yield the best energy mix output.

Find the maximum and minimum outputs recorded throughout that week or month. Obtain a meteorological report for the corresponding days of the month. Identify cloudy, sunny and particularly windy days from report. Compare information to check if there is any relation between the weather on certain days and the electricity generated at the park.

Use the data in the logbook or the data logged in the real time computer in main building to draw bar charts of energy generated by each type of wind turbine and /or PV panel in the past week/s or month/s.

Obtain also a 5-day weather forecast and drawing on past patterns try to predict what the energy output from the photovoltaic cells and the wind turbines will be in the next 5 days. Check whether your predictions were correct during the days that follow.

**Task 2**



**Source : Enemalta**

**Task 2 - How green is Liquefied Natural Gas (LNG)?** Contact the relevant authorities to investigate.

*From which countries is it fracked?*

*Who is being affected and in what ways?*

*Are there any measures safeguarding /compensating nearby communities?*

*How many times does the LNG tanker need to be re-fuelled yearly?*

*What is the yearly carbon footprint for the re-fuelling of the anchored ship?*

**Task 3**



Source: Enemalta

**Task 3- How green is the Malta-Ragusa cable operation?** Contact the relevant authorities to investigate.

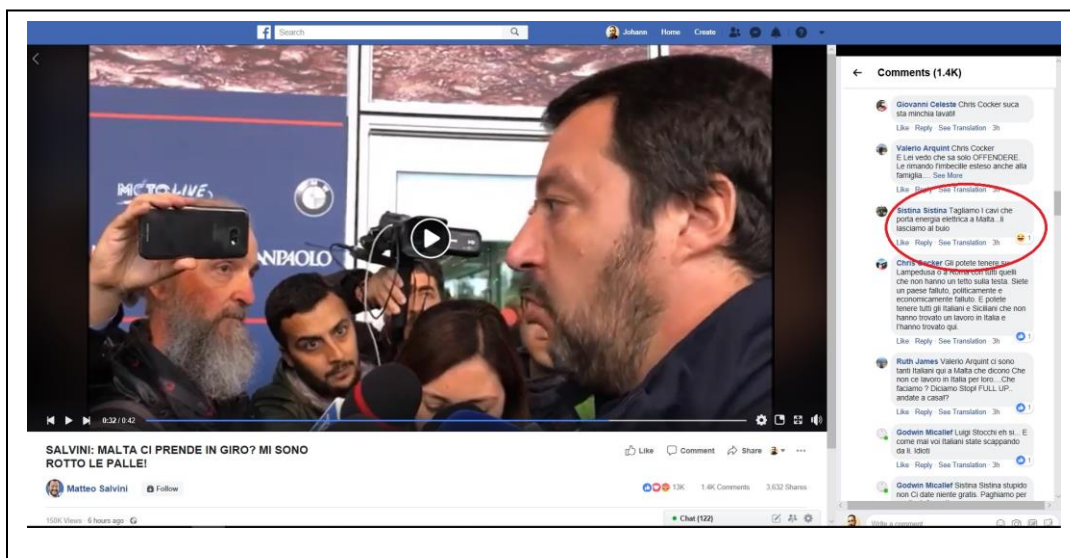
*From which countries is the energy tapped?*

*What is the energy mix composition used to supply the cable from mainland Europe?*

*Is it from Renewable Energy Sources or Non-Renewable Energy sources?*

*Are there any studies conducted to monitor how the electromagnetic field generated is affecting marine life?*

*How secure is the energy source in view of the rising demand and vis-à-vis the current restrained relationship with neighboring Italy?*



## Resources:

### Websites/links (5 URLs):

1. [History of Electricity in Malta](#)

<https://vassallohistory.wordpress.com/electricity-in-malta/>

2. [REACHING MALTA'S EU2020 ENERGY TARGETS WILL REQUIRE 'DISPROPORTIONATE' EFFORT – Energy and Water Agency article](#)

<https://www.maltachamber.org.mt/en/reaching-malta-s-eu2020-energy-targets-will-require-disproportionate-effort-ewa>

3. [Wind power ditched in favour of solar – Times of Malta article](#)

<https://www.timesofmalta.com/articles/view/20161103/local/wind-power-ditched-in-favour-of-solar-as-government-revisits-renewable.629952>

4. [National Renewable Energy Action Plan 2015-2020](#)

<https://govcms.gov.mt/en/Government/Press%20Releases/Documents/pr162438a.pdf>

5. [Share of Energy from Renewable Sources of the 28 EU countries - EUROSTAT](#)

[http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg\\_ind\\_335a&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_ind_335a&lang=en)

### Videos (Embedded from YouTube, Vimeo, etc)

1. [Dismantling of Delimara Power Station](#)

[https://www.youtube.com/watch?v=\\_uubZSIbP8](https://www.youtube.com/watch?v=_uubZSIbP8)

2. [Conversion from HFO to LNG](#)

<https://www.youtube.com/watch?v=l33T3dMlr0g>

3. [Liquefied Natural Gas](#)

<https://www.youtube.com/watch?v=WyZTuzUzR68>

4. [What is Fracking?](#)

<https://www.youtube.com/watch?v=lo8o2nTXhb0>

5. [Malta-Sicily Interconnector lands in Ragusa](#)

[https://www.youtube.com/watch?v=\\_EsWLwZ57A0](https://www.youtube.com/watch?v=_EsWLwZ57A0)

6. [Malta-Sicily electricity interconnector](#)

[https://www.youtube.com/watch?v=0ZuVsgl\\_59Y](https://www.youtube.com/watch?v=0ZuVsgl_59Y)

7. [Interconnector cable pulling in Malta](#)

[https://www.youtube.com/watch?v=Z\\_7tyvnhG6M](https://www.youtube.com/watch?v=Z_7tyvnhG6M)

8. [How a Gas Turbine works](#)

<https://www.youtube.com/watch?v=zcWkEKNvqCA>

## Documents

1. [National Renewable Energy Action Plan \(pdf attached\)](#)

## Learning Objectives

<b>Learning Outcomes: By the end of this Glocal Quest you should be able to:</b>	<b>Skills acquired</b>
<ul style="list-style-type: none"><li>• Explain the difference between Renewable and Non Renewable Energy sources.</li><li>• Name two RES that are being presently tapped in Malta</li><li>• Name two Non-RES that are being used for energy production in Malta</li><li>• Explain why the energy mix used in Malta is not only meeting the EU targets but also helping us meet international targets such as the SDGs.</li><li>• Name at least two SDGs that Malta is targeting through the energy mix approach</li><li>• Mention one other RES that is not yet part of the present energy mix in Malta but would contribute immensely had it been tapped</li></ul>	<ul style="list-style-type: none"><li>• Work and collaborate in a team</li><li>• Open for other ideas and respectful of them</li><li>• Communicate ideas</li><li>• Think globally and act locally</li><li>• Take informed decisions</li><li>• Question the reliability of source</li><li>• Take initiative</li><li>• Think critically</li><li>• Think outside of the box and realise that there are no one-size fits all solutions</li></ul>

## Review

Questions designed to review progress of the learner:

1. In your opinion which of the two non-renewable energy sources investigated (Malta- Ragusa Cable/ LNG operation) is the greenest?
2. Following your investigations @ the Xrobb l-Ghagin Nature Park and Sustainable Development Centre, what is your opinion on the fact that wind turbine technology was completely ditched from the proposed energy mix to reach the 2020 10% renewable energy target?
3. List the pros and cons of wind energy considerations as a valid Renewable Energy Source for the Maltese Islands in view of the looming 2020 targets.
4. What is your take on wind energy harnessing for Malta for the post 2020 targets that the EU will definitely set.
5. In the setting up of the National Renewable Energy Action Plan 2015-2020, optional renewable energy sources were being discussed. Do some research and name at least one other option that was being considered besides wind energy.
6. Each group leader is to take a copy of the SDG chart attached. In separate groups cross out any SDG targets that you think are most obviously not into the picture vis-a'-vis the Energy mix debate. Compare and contrast results, build your arguments and share your opinions.