ARE RENEWABLE CREDITS FROM OTHER COUNTRIES WORTHWHILE THAN PV'S IN MALTA TOWARDS THE ENERGY TRANSITION?

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ABSTRACT: The Kyoto Protocol, the Bali Roadmap, and the European Union (EU) demonstrate that economies must reduce carbon emissions and also to encourage participation of Electric Vehicles (EVs). Government grants, economies of scale and general awareness including global warming have all contributed in kickstarting this energy transition. In 2008 the EU has set a 2020 target for all UE member states according to their resources. Malta's share was set at 10 %. However, Malta has consistently lagged behind on its annual emission reduction plans and has long been on course to miss the final 2020 goal. The country is also lingering behind in its progress towards the next set of target due by 2030. Malta has recently signed an agreement to purchase 2 Million euros a year worth of 100GWh/year renewable energy credits from Estonia to make up for the energy gap needed to reach the 10 percent Target.. This paper presents a comparison study considering different levels of PV support schemes and systems, domestic vs utility-scale to renewable energy buyouts. At first glance the renewable energy buyout seem financially doable not considering many other external and complimenting factors of having PVs locally.

Keywords: Photovoltaic (PV), Renewable Energy Credits, Financial Evaluation.

1 INTRODUCTION

By this year 2020, Malta renewable energy share should have reached 10% of the total energy demand [1, 2], with further targets in 2030 being missed out since 2013. Current renewable energy share is about 8 % which accounts to 217.3 GWh [3].

Malta is the Maltese archipelago in the Mediterranean Sea that receives a large amount of solar irradiation, around 1700 KWh/m^2 annually. Solar energy is a renewable energy priority for the Maltese government and has been widely encouraged, reaching 151.5 MWp of the total cumulative photovoltaic (PV) installations [4], Fig. 1.

Local PV installations are dominated by 3kWp single-phase PV systems which have been widely encouraged since 2010. Self-consumption strategies as well as utility scale PVs are becoming ever important to mitigate utility issues with high penetration of PVs on the low voltage network and to narrow the gap in the renewable energy share albeit the year on year increase in the energy consumption which includes the electrification in the transport sector.

Recently a flexible agreement on renewable energy credits from Estonia was signed at a value of €2 million for a total of 100 GWh reductions per year [5].

The study is aligned with the JUMP2Excel and NEEMO projects research themes and thereby its aim is to compare the recent renewable energy credit yearly agreement bought from other countries like Estonia together with different scenarios of PV investment in Malta towards the Energy Transition.

This paper is structured as follows: Section 2 describes the assumptions and methodology used, Section 3 exhibit the comparative results. Finally Section 4 draws the general discussion and conclusions on this comparison.

2 METHODOLOGY

2.1 Assumptions

The assumptions within this financial methodology considering year zero as 2020 and current year of investment and applying life cycle costing technique as per (1) are:

- System cost at domestic level 1000 €/kWp excluding installation
- Installation Cost is 100% of system cost
- Utility-scale PV is 20% less than at domestic level
- Discount rate / Return on Investment is 7%
- System Performance ratio 0.92
- Solar Irradiance received on PV surface 1700kWh/m^2/yr
- Required Renewable Energy Margin 100 GWh

$$Net\ Present\ Value = \frac{Future\ Value}{(1+d)^{yr}} \quad (1)$$

where d is the discount rate and yr is the year of future value cost. The methodology for future payments on agreement for renewable credits with other countries uses the Net Present Value cumulative for 10 years.

2.2 The Renewable Energy Gap

In 2018, Malta registered its highest ever electrical

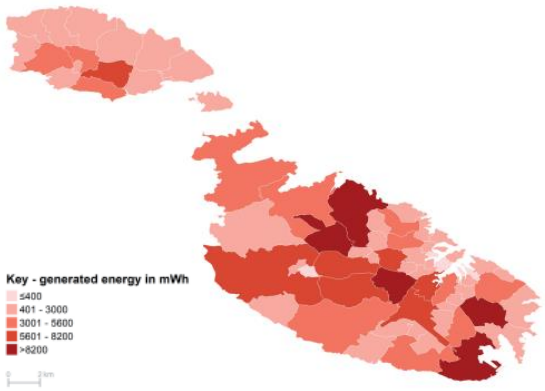

Figure 1: Total estimated MWh of PV installations by locality in Malta (2019) [4].

energy demand at 2532.606 GWh, 2.8% higher than previous year [3]. On the other hand 217.3GWh were harvested from 27,454 PV installations, which is around 8% of the electrical energy demand. This equates to around 36GWh renewable energy gap from 2020 targets. Hence the 100GWh renewable energy buyout, which has flexible terms, would certainly cover the current gap to reach the EU 2020 target. Furthermore in order to reach this gap around 22MWp of PV systems would be required.

2.3 System Costings and Benchmarks

The calculation of the current PVs system cost is estimated on the current trend of systems costs such as the ones exhibited by NREL in Fig. 2 [6] and the Maltese Government Regulator for Energy and Water Services (REWS) supporting scheme and guidelines for applications [7].

It is well known that the soft costs of installation, net profit, overheads and others make up 50% of the system costs. On the other hand, REWS estimate per unit cap at €1000/kWp excluding installation. Therefore the assumptions stated in sub-section 2.1 takes into account these factors. Furthermore for utility-scale and hence economies of scale scenario it is well known also to consider a 20% learning curve.

3 RESULTS

The financial comparative results of all nine potential support scheme scenarios in Table 1 on local PV investment compared to the recently renewable energy credits buyout at year zero are illustrated in Fig. 3. The period under consideration is 10 years of 100GWh renewable energy buyouts. The discounted value of which at 2M€ per year add up to 15M€ which is equivalent to just 1c5 / kWh.

Table 1: Scenarios considered in the study as National Investment on PVs versus Renewable Credits Buyouts

Scenarios	Domestic	Utility-Scale	Grant
1	100%	-	100%
2	100%	-	50%
3	-	100%	100%
4	50%	50%	100%
5	-	100%	50%
6	50%	50%	50%
7	75%	25%	50%
8	25%	75%	50%
9	40%	60%	30%
10	2 M€ for 100GWh / yr		

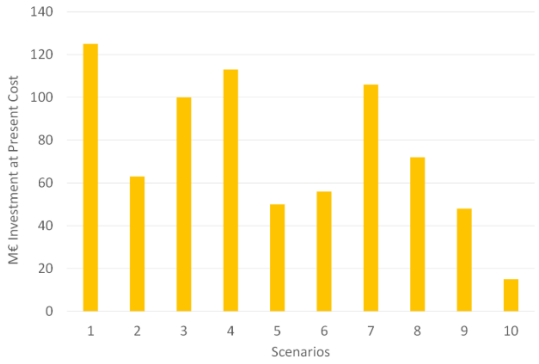

Figure 3: Comparison study on Present Cost Investment

4 CONCLUSION

This paper has considered the introduction of buyout renewable energy credits against local investment in PVs

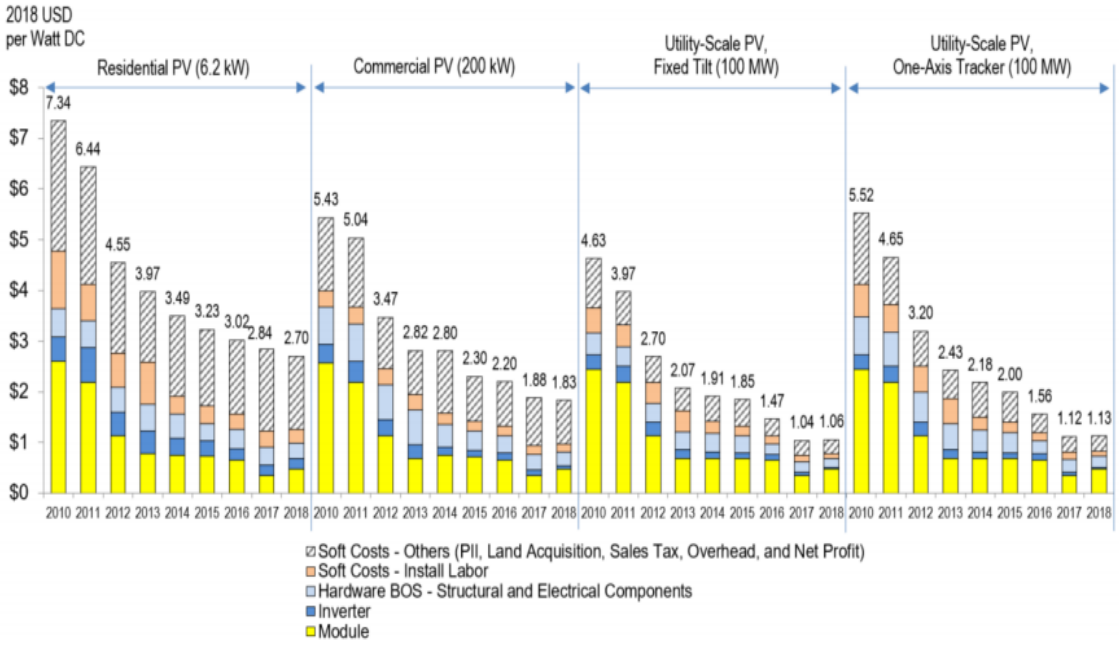

Figure 2: NREL PV System Cost Benchmarks [6]

on financial terms. A number of local scenarios that include percentage on governmental support and share between domestic and utility-scale PVs were considered.

All local scenarios require significantly more financial investment to reach same output as the recently agreed Maltese renewable energy credits from Estonia. Hence, on first instance and financial feasibility, the decision taken to cover any renewable energy gaps is sound.

However, a number of benefits may still be difficult at this stage to quantify on the local investment prospect which may eventually breakeven. These include the following considerations:

- electrification of the transport sector and its relation with PVs in electricity demand,
- local investment from local and foreign investors which would result in economy growth and revenue in taxes,
- reduction in localised emissions which will lead to better air and health quality,
- green jobs and further skills uptake, and
- targets reached with possibly renewable credits put on the market for other countries and industries.

Further 2030 energy gaps may be set into action. This is due to the ever growing electrical energy demand in Malta which is in a way acts as a moving boundary for targets to be reached. Nevertheless, PV installations have registering increase through a number of well encouraging incentives that proved that there is potential to expand the southmost European country where the solar insolation is the highest within a European state [8].

Renewable energy credits buyouts may thereby be futile to for the next 10 years. This methodological framework may serve in understanding the next energy gap especially considering local PVs and transport electrification. It would also prepare Malta among the ring leader countries in renewable energy share for the next decade.

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