



# Achieving the RES 2020 target



Ministry for Resources  
and Rural Affairs  
[www.mrra.gov.mt](http://www.mrra.gov.mt)

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# Scope

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- This presentation will provide information on the National Renewable Action Plan (NREAP)
  - Focuses on RES targets and **not** GHG and other emissions targets
  - Referred to obligations of Directive 2009/28/EC
  - Projected estimates of consumption figures, energy efficiency, consumption increase due to major projects and estimated uptake of renewables
  - NREAP report, trajectories and sectoral targets



# Stakeholders Consulted

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- Malta Resources Authority
- MEPA
- Transport Malta (TM)
- Institute for Sustainable Energy
- PPCD
- BRO
- Malta Enterprise
- Wasteserve Ltd.
- Enemalta Corporation
- NSO



# Malta Electricity System: Present Status

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- The Maltese electricity system is isolated-***no electrical interconnections with other countries.***
- EMC generates, distributes and supplies electricity in Malta.
  - Distribution is through a 132kV, 33kV and 11kV network.
- **Generation of electricity:**
  - Two Power Stations with nominal installed capacity of 571MW,
  - Fuel mix : HFO/Gas Oil (86%/14%).
- **Constraints:**
  - Lack of interconnection limits integration of RES
  - Lack of fuel diversification-no natural gas supply
  - Marsa steam plant accounting for 40% of generation plant operating under limited hours and to be completely shut down by 2015
  - Distribution system necessitate further reinforcement for reliability
  - Demand profile typically Mediterranean



# 2009 Estimated Gross Renewable Energy Share

- A. RES-Electricity: 2.29 GWh = 196.94 toe
- B. RES-Heat: 26.8 GWh = 2304.8 toe
- C. RES-Fuel: 748.0 toe

$$J = \frac{A+B+C}{A+B+C+D+E+H} \%$$

- D. Electricity Generation: 2167.6GWh = 186413.6toe
- E. Fuels heat + transport w/o Aviation: 216844 toe
- F. Fuels Aviation: 94658 toe

$$G = A+B+C+D+E+F$$

**G. Total Gross Consumption: 501165.3 toe**

$$H = G * 0.0412$$

**H. Capping for Aviation @ 4.12% : 20648.0 toe**

**I. Total Gross Consumption Adjusted by Aviation Capping: 427155.3 toe**

**J. Share of RES : 0.761%**



# 2009 Estimated Transport Renewable Energy Share

A. 2<sup>nd</sup> Gen Bio-fuels (x2): 587.45toe

B. 1<sup>st</sup> Gen Bio-fuels (x1): 0 toe

C. RES electricity (x2.5): 0 toe

D. Petrol ( unleaded + LRP): 78657.7 toe

E. Diesel : 96592.8 toe

F. Auto-gas: 0 toe

**G. Total transport Consumption: 175837.9 toe**

**H. Transport RES share: 0.668%**

$$H = \frac{2A+B+2.5C}{A+B+2.5C+D+E} \quad \%$$



# Energy Consumption data sources and trends

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- Electricity demand projections – EMC and others
  - *(also in line with CCC report)*
- Energy Efficiency – NEEAP till 2016
  - *(extrapolated till 2020)*
- LPG market – Gasco figures
- Transport consumption – TM
- Heating fuels
  - *(extrapolated trend from historical data)*
- Aviation fuel *(capped)*



# RES studies and activities

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- Mott MacDonald 'Feasibility Study for Increasing Renewable Energy Credentials 2009'
- Mott MacDonald 'Malta Wind Mapping Study 2009'
- Mott MacDonald 'Grid Stability Studies' 2010
- Wind Mast installation at Ahrax Tal-Mellieha



The 80-metre mast to analyse the *Sikka I-Bajda* off-shore potential





# RES technologies

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- Current Technology
  - On-shore wind & micro wind
  - Off-Shore wind
  - PV
  - SWH
  - Biomass
  - Bio-fuels
  - Heat Pump
- R & D
  - Deep sea wind
  - Wave energy
  - CSP –thermal
  - CSP - PV
  - Bio-fuels from algae
  - Ground source heat pump.



# Wind Potential in Malta

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- A study carried out by Mott MacDonald identified that the most cost-effective feasible technology for generating renewable electricity locally is large onshore wind farms.
- Unfortunately, the onshore wind potential in Malta and Gozo is restricted due to various environmental and planning constraints. These include:
  - spatial restrictions,
  - the cumulative visual and landscape impacts,
  - impacts on the natural environment,
  - lack of road access and
  - interference with airport operations



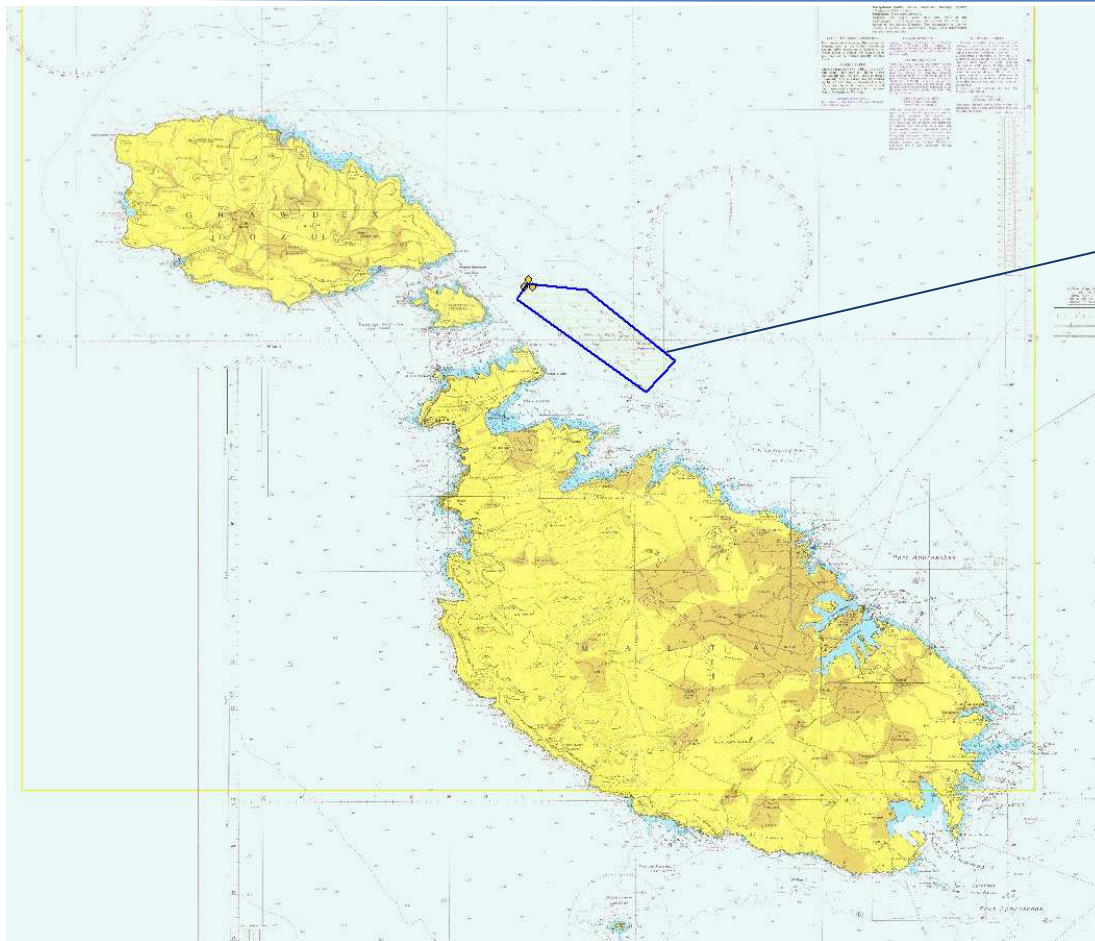
# Wind Potential in Malta

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- Offshore wind farms are currently the second best technology option in terms of costs.
- Proven offshore technology currently available on the market is only suitable for shallow waters (less than 30m depth).
- The Maltese waters are generally too deep for such technology;
- However 'Sikka I-Bajda' is an exception where the sea area consists of water depths varying between 10 to 35m which could lend itself feasible for the development of an offshore wind farm.
- The Sikka I-Bajda Offshore windfarm project is to contribute 3.5% of the overall 10% RES target.
- The EIA has been initiated



# Offshore Windfarm



## Sikka L-Bajda

- 19 x 5 MW turbines = 95 MW
- Estimated Annual Generation: 216.4GWh

## Constraints:

- Sites with water depth < 25m are very limited in Malta
- Wind farm capacity limited due to isolated electricity system & load profile
- Environmental issues being investigated



# Medium Scale Onshore Wind Farms

*Sites identified by Mott MacDonald which offer potential for medium-scale onshore wind farms . Total potential of identified sites is of 230MW.*



- Currently 2 sites are being proposed
- Sites to be subject to necessary assessments

## Wied Rini

- 12 x 850 kW
- Estimated Annual Generation: 27.7GWh

## Hal Far

- 5 x 850 kW
- Estimated Annual Generation: 10.4GWh



# Micro-Wind Penetration projected in Malta

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Uptake of Micro-Wind is quite dependent on the affectivity of the MEPA planning guidance which is more addressed to rural and industrial areas pilot projects.

- It is however being assumed that 10KWp annual uptake will be reasonable from 2010, following examples of the FTS initiatives.
- A further 5kWp is planned at the Cirkewwa Ferry terminal.
- Wasteserv Ltd, is planning to install micro-wind in its parks, e.g. Mghatab.
- MRRA (Agriculture) scheme has received further 13 micro-wind applications.



# Measures to promote RES

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- Grants
  - Domestic
    - 50% grant to a maximum of €3,000
  - Industry
    - Funds through the ERDF 2007-2013 scheme were launched in 2009. The funds available amount to €10m
    - 50% grant (maximum grant being €100,000)
- Net Metering strategy is used for the electrical power generated
  - Spill-off electricity is credited at a low feed-in tariff rate
  - A feed-in tariff mechanism is currently being evaluated



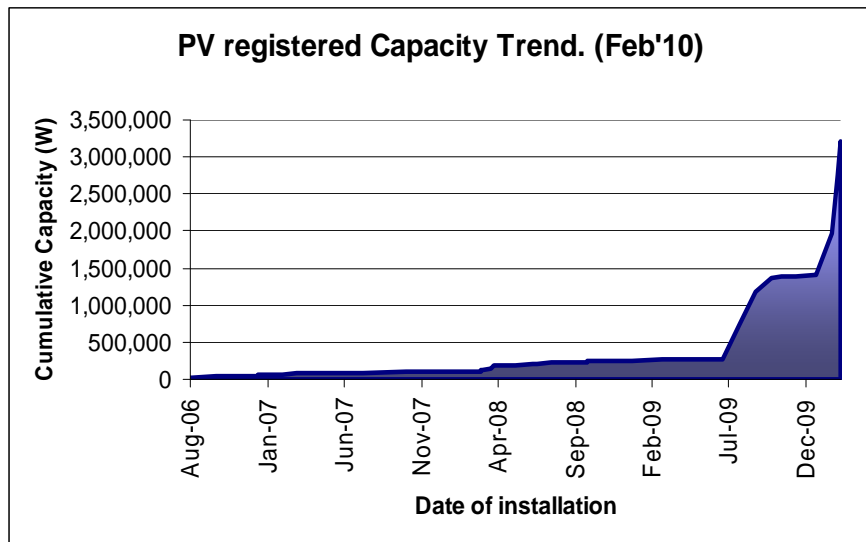
# PV Penetration projected in Malta

- End of 2009 status - Registered 1.5MW capacity.
- 213kWp annual penetration assumed (MML Feasibility study assumed 120 – 240kWp, though current trend and pricing shows a higher uptake 😊)
- Over 10 MWp of additional PV installations by 2015:
  - ME ERDF call for industry
  - Agriculture Schemes
  - Installations on MCAST and UoM
  - GoM roofs project
  - Wasteserve Ltd. Parks





# PV penetration trend



- **2009**
  - PV systems registered
    - 258 systems
  - PV Capacity
    - 1.5MWp
- **To-date**
  - PV systems registered
    - 365 systems
  - PV Capacity
    - 3.3MWp



# Solar Water Heaters (SWH)

- Solar water Heater Statistics:
  - Prior to 2008, an estimated 10,000 solar water heaters were installed
  - Between the 1st of Jan 2008 up to Feb 2009, a total of 2633 solar water heaters were approved and installed under the government subsidization scheme
  - In 2009 budget the government allocated funds for subsidization up to a maximum of €460 for 4500 units of solar water heaters. To date over 2688 grant applications were accepted.
  - In 2010 budget the subsidization was increased to 40% up to a maximum of €560. However the solar water heater scheme was restricted by social criteria. The scheme has so far not been very successful due to the following issues:
    - ✗ Since it is targeting persons whose income is low and who are not ready to make the necessary capital investment.
    - ✗ Most persons on low income live in apartments and often do not have a right to install a solar water heater on the communal roof.



# Registration of Technology

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- To improve the quality and reliability of the systems on the market, MRA requested that systems registered with the Authority were compliant with international standards:
- PVs were required to be certified to MSA EN61215 or MSA EN61646
- Solar hot water heaters were required to be certified to MSA EN12975 or MSA EN12976 or the solar key-mark certification
- Roof Insulation & Double glazing were required to be certified to the Technical guidance Conservation of fuel, energy & natural resources (minimum requirements on energy performance of building regulations, 2006)
- The introduction of compliance with standards will serve to ultimately weed out poor quality products from the market and avoid that RES products get bad publicity.



# Certification of Installers

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- The UoM and the MRA has initiated the formation of a training course for SWH and PV installers. Other institutions may eventually also participate.
- Besides the requirement of the Directive, this will also ensure that technologies project the appropriate benefits.
- Legislation would also be reviewed to ensure that installations are installed by certified installers.
- Same will follow in installations of bio-mass and heat pumps applications.



# Waste to Energy

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- Data has been provided by Wasteserv Ltd. for heat and electricity generated from:
  - Landfill gases from engineered landfills, waste to energy plant, St. Antnin MBT, MBT-North, MBT-Gozo
- Data has been provided by Water Services Corp for:
  - Tal-Barkat waste water treatment plant
- Others : Cattle Farm Complex
- Unfortunately, most of the heat generated will not be utilised and so have not been included to contribute in the RES target



# Bio-Fuels (1)

- Fuel consumption projections in transport have been supplied by TM
- Malta seems to stand at a disadvantage w.r.t. the use of Bio-ethanol with petrol due to increase in Reid Vapour Pressure.
  - Hence main potential lies in Bio-diesel
  - BioETBE in petrol is being investigated
- BioETBE as an oxygenate additive may contribute to around 3.6% by energy to overall transport target, assuming around 7% mix of RES energy component.
- Target may not be reached by further importation of bio-fuels as it is not a matter of quantities of importation but of how much can be mixed with conventional fuels:
  - An estimated 10% bio-diesel mix by volume in diesel and a 7% RES energy component in bioETBE mix with petrol would not be sufficient for Malta to reach the 10% overall target in transport unless most of the bio-diesel mix derives from waste vegetable oils (*this kind of biofuel counts twice towards the transport target*) and EV are introduced.



## Bio-Fuels (2)

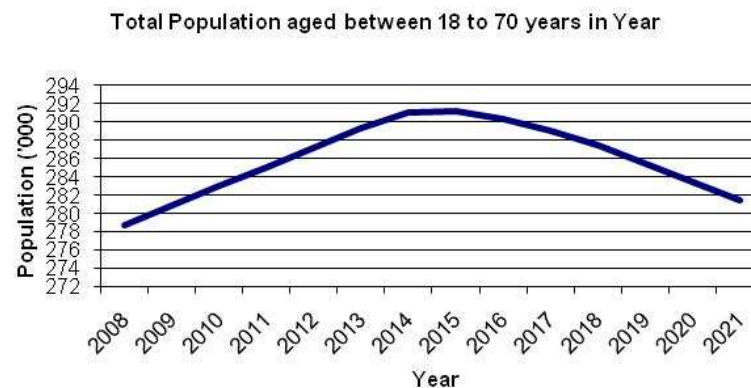
- The MRA is proposing an annual mandatory substitution obligation starting from 1.5% in 2011 and increasing gradually to reach the final 10% target by 2020.
- Public consultation is ongoing (<http://www.mra.org.mt/>)

Year	Total Biofuel as a percentage of the total energy content petroleum fuel placed on the market (%)
2011	1.5 %
2012	2.5 %
2013	3.5 %
2014	4.5 %
2015	5.5 %
2016	6.5 %
2017	7.5 %
2018	8.5 %
2019	9.5 %
2020	10.0 %



# Anticipated developments in the transport sector

- Auto-gas in petrol vehicles
- Public transport reform
- Electrical vehicles and solar charging stations
- Other technologies, such as methane from waste and hydrogen derived from RES, will be considered once they become commercially available
- Driver population from local residents is expected to decrease by 2020. *(source: 2008 census)*





# Estimates and trajectories

- Consumption figures have been reviewed in line with National projections and historical trends
- Compared to January 2008 present trends and estimates portray updated estimates for:
  - electricity consumption figures,
  - fuels used for industry and heating and
  - penetration of bio-fuels

	<b>2011- 2012</b>	<b>2013- 2104</b>	<b>2015- 2016</b>	<b>2017- 2018</b>	<b>2020</b>
<b>Trajectory Targets</b>	2.00%	3.00%	4.50%	6.50%	10.00%
<b>Projections</b>	2.45%	4.60%	6.19%	9.64%	<b>10.20%</b>



# Results by Energy category

in toe	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<i>Total final gross consumption with 4.12% capping in aviation.</i>	433,522	450,198	460,446	470,172	479,868	490,134	499,397	508,198	516,999	526,252	534,494
<i>RES contribution</i>											
Total RES-E (toe)	1,280	2,320	3,309	8,617	16,429	17,054	23,767	37,508	37,351	37,381	37,224
Total RES-H (toe)	3,532	4,584	4,935	4,939	4,944	4,948	4,952	4,956	4,713	4,717	4,474
Total bio-fuels (toe)	2,979	3,387	3,800	4,217	4,639	5,061	5,487	6,590	7,714	8,853	12,824
<b>Total RES (toe)</b>	<b>7,791</b>	<b>10,292</b>	<b>12,044</b>	<b>17,774</b>	<b>26,012</b>	<b>27,063</b>	<b>34,206</b>	<b>49,054</b>	<b>49,778</b>	<b>50,951</b>	<b>54,522</b>
<b>RES % of total final consumption</b>	<b>1.80%</b>	<b>2.29%</b>	<b>2.62%</b>	<b>3.78%</b>	<b>5.42%</b>	<b>5.52%</b>	<b>6.85%</b>	<b>9.65%</b>	<b>9.63%</b>	<b>9.68%</b>	<b>10.20%</b>
<b>Average on two year period</b>			<b>2.45%</b>		<b>4.60%</b>		<b>6.19%</b>		<b>9.64%</b>		
<b>RES interim targets</b>			<b>2.00%</b>		<b>3.00%</b>		<b>4.50%</b>		<b>6.50%</b>		



# Major Projects

Major RES Projects Start-up	2010	2011	2012	2013	2014	2015	2016
<b>Electrical</b>	WSL landfill gasses 5.4GWh	WSC Ta' Barkat 7.8GWh	Digestor from cattle farm 1.7MWh	Gozo & North MBT 33GWH	CHP in Hotels & industry 19GWH		
	Sant Antrnin - MBT 7.6GWh			Wind Farm Hal-Far 4.2MW 10GWh		Wind Farm Wied Rini 10MW 27GWh	Wind Farm Sikka I-Bajda 95MW 216GWh
	ME ERDF(2) - PV 2MW 3GWh	MCAST-PV 130KW 0.2GWh	GoM-roofs, UoM, WSL - PV 5.6MW 8.4GWh	GoM-roofs - PV 5MW 7.5GWh			
<b>Thermal</b>	WSL landfill gasses 7.5GWh			Gozo & North MBT #	CHP in Hotels & industry 35GWh		
	Sant Antrnin MBT 10GWh	WSC Ta' Barkat 8.2GWh					
	ERDF(2) - SWH 4GWh						

# Heat generation will not be utilised



# Percentage share of all sources of energy

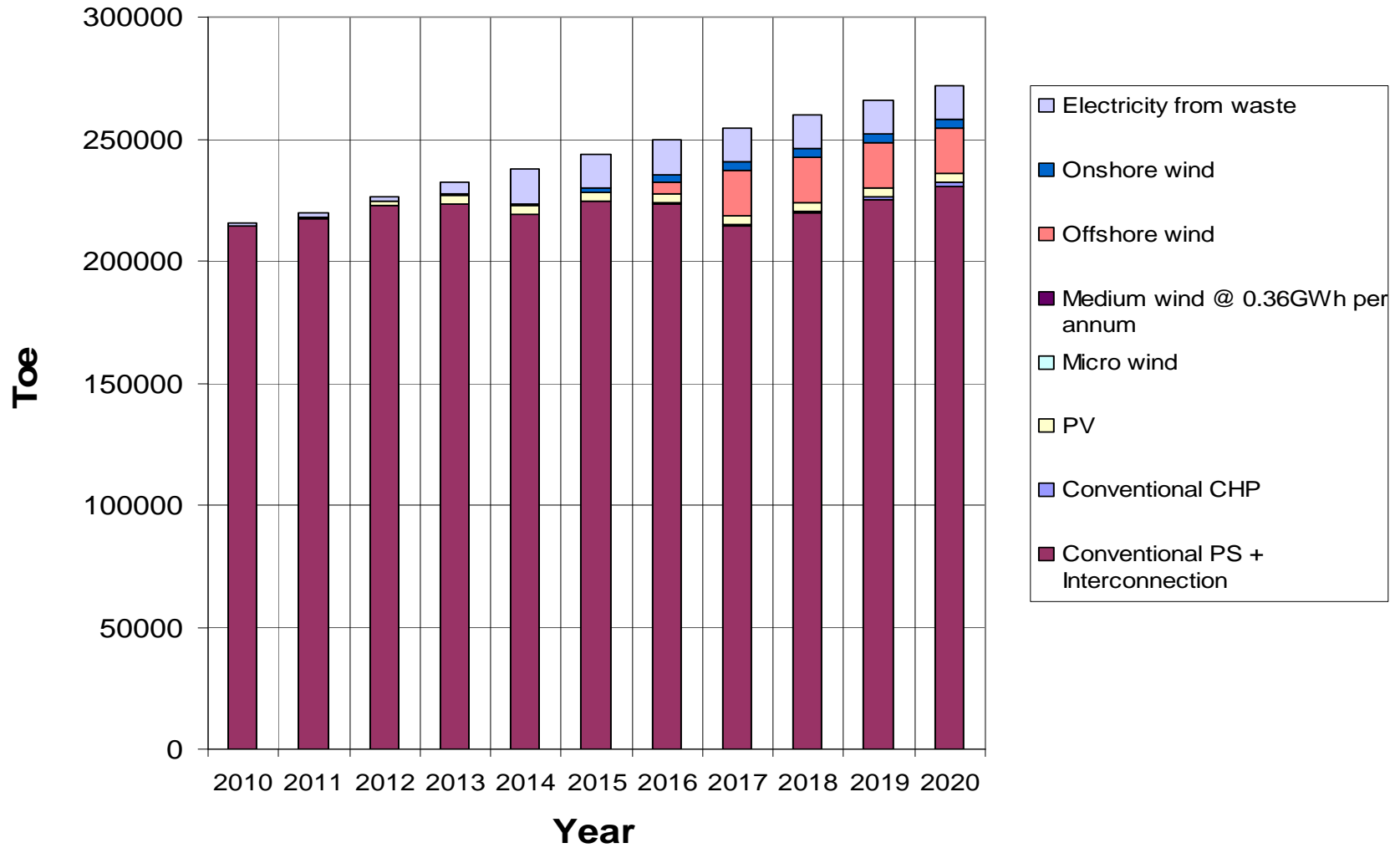
<u>% Share of category in Gross Energy Contribution</u>	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Power Stations	49.38%	48.35%	48.43%	47.52%	46.12%	46.21%	45.12%	42.56%	42.86%	43.19%	43.57%
Conventional CHP Electricity	0.00%	0.00%	0.00%	0.00%	0.00%	0.06%	0.11%	0.16%	0.21%	0.26%	0.31%
Conventional CHP Heat	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%	0.15%	0.23%	0.30%	0.36%	0.43%
Petrol	17.83%	17.17%	16.78%	16.42%	16.07%	15.70%	15.37%	15.05%	14.74%	14.41%	14.12%
Diesel	16.59%	16.18%	16.02%	15.88%	15.75%	15.60%	15.50%	15.26%	15.03%	14.79%	14.01%
Auto-gas	0.08%	0.15%	0.21%	0.28%	0.34%	0.40%	0.46%	0.52%	0.57%	0.63%	0.68%
Biofuel	0.69%	0.75%	0.83%	0.90%	0.97%	1.03%	1.10%	1.30%	1.49%	1.68%	2.40%
LPG	3.79%	5.45%	5.47%	5.50%	5.53%	5.55%	5.57%	5.61%	5.64%	5.66%	5.70%
Aviation Fuel (4.12% of Total gross consumption)	4.81%	4.78%	4.76%	4.75%	4.73%	4.71%	4.70%	4.69%	4.67%	4.66%	4.65%
Other fuels excluding aviation	5.72%	5.64%	5.70%	5.87%	6.04%	6.30%	6.43%	6.67%	6.86%	6.98%	7.07%
PV	0.12%	0.13%	0.31%	0.74%	0.73%	0.72%	0.71%	0.71%	0.70%	0.69%	0.69%
Offshore wind	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.98%	3.66%	3.60%	3.54%	3.48%
Onshore wind	0.00%	0.00%	0.00%	0.08%	0.19%	0.30%	0.66%	0.65%	0.63%	0.62%	0.61%
Microwind ~	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Medium wind @ 0.36 GWh per annum ~	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Energy from waste - Electricity	0.17%	0.38%	0.41%	1.02%	2.51%	2.45%	2.41%	2.37%	2.29%	2.25%	2.18%
Energy from waste - Heat	0.23%	0.44%	0.48%	0.47%	0.46%	0.45%	0.44%	0.44%	0.38%	0.37%	0.32%
Solar Water Heater	0.58%	0.58%	0.59%	0.58%	0.57%	0.56%	0.55%	0.54%	0.53%	0.52%	0.52%
Geothermal (small scale) #	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Heat-pumps #	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

10.20%

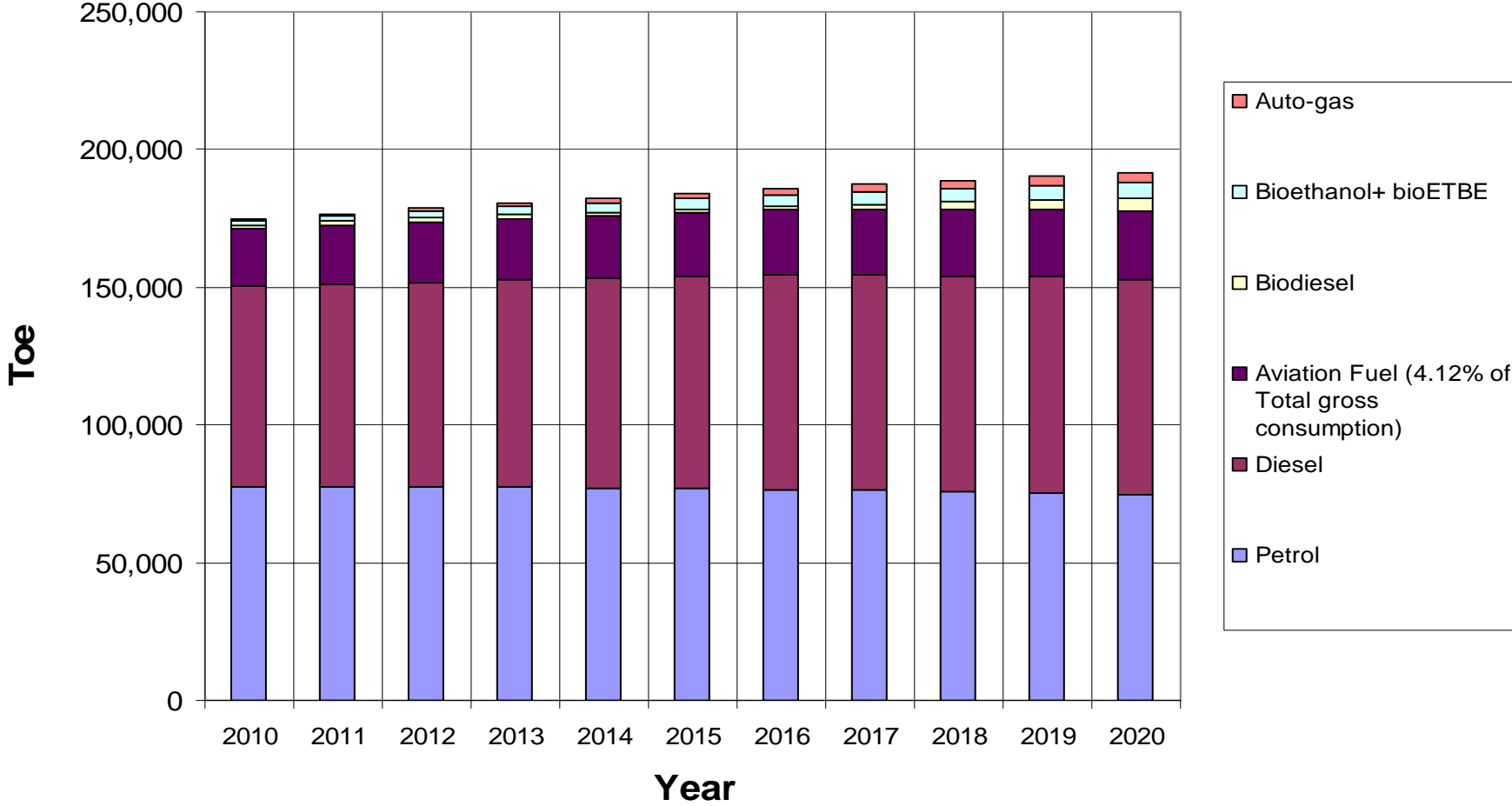
~ Negligible # To be investigated further



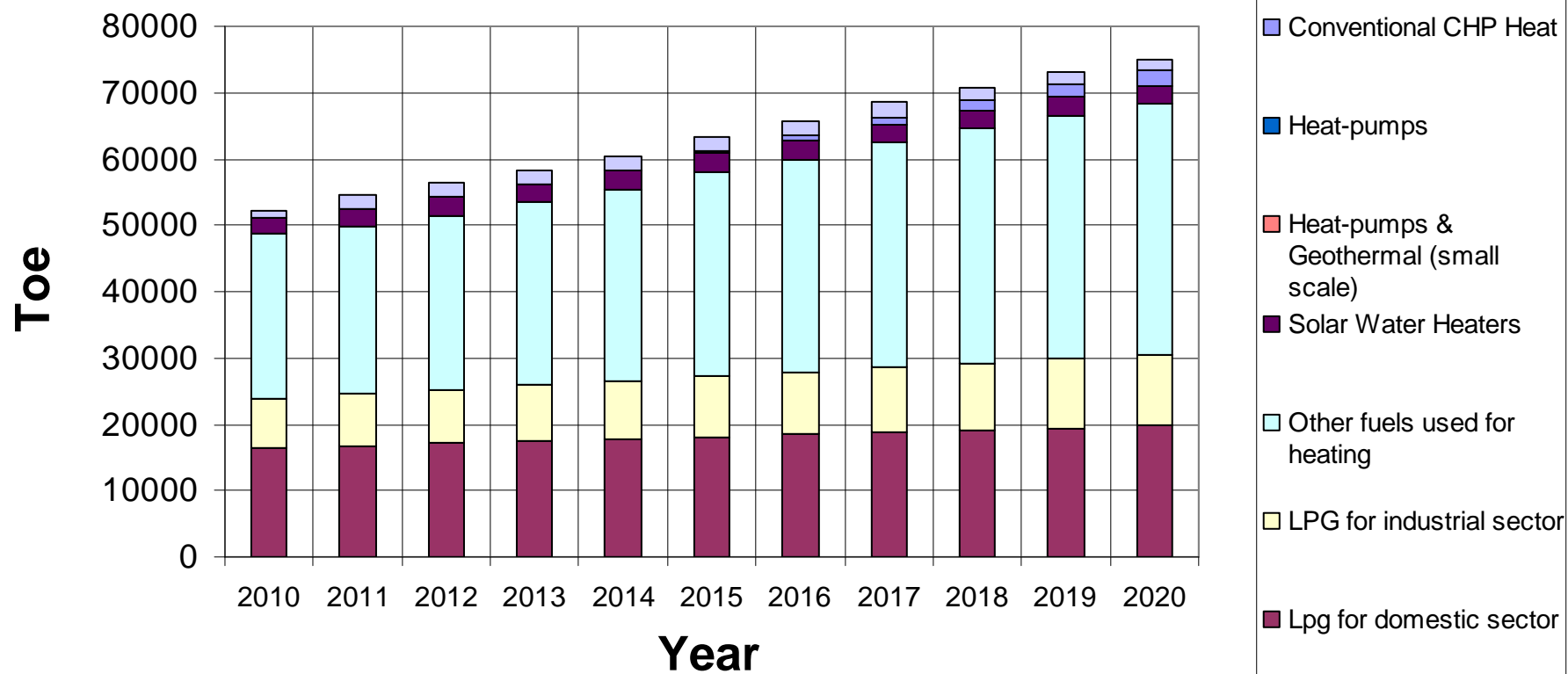
# Annual electricity generation by technology



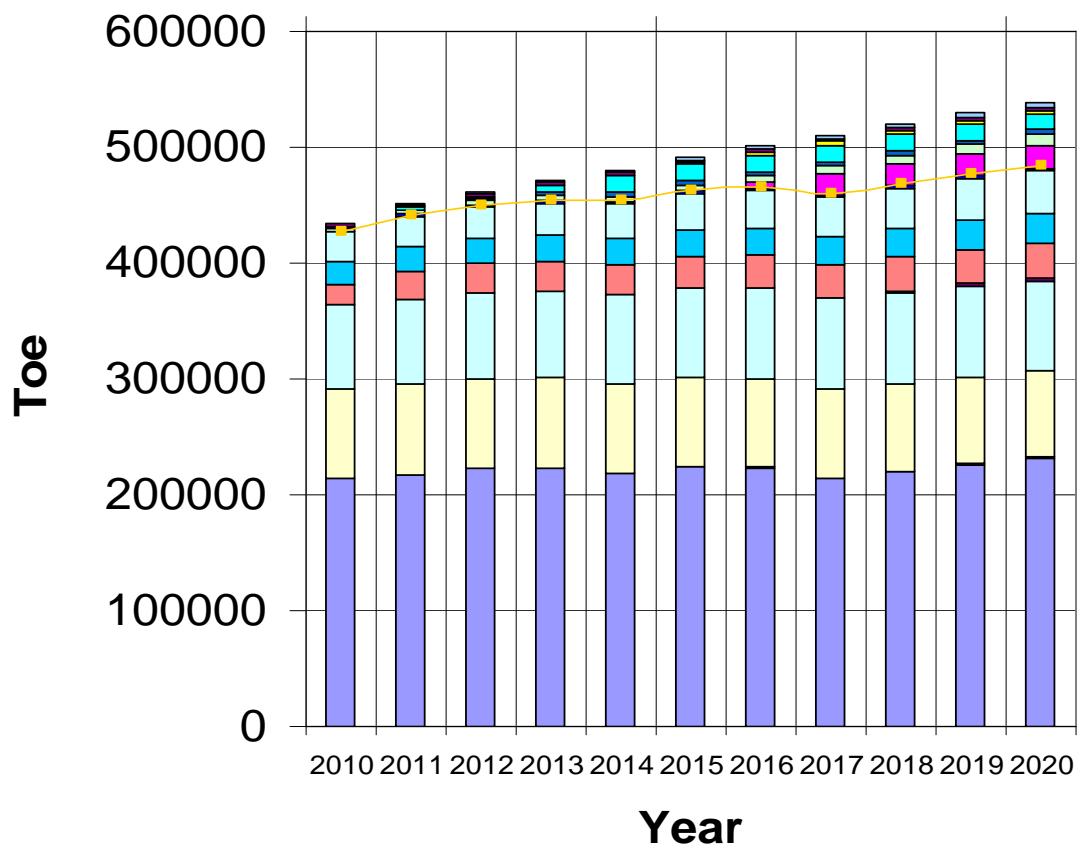
# Annual fuel use in Transport



## Annual heat generation by source



# Annual Gross Energy Content by category



- Auto-gas
- Heat-pumps
- Heat-pumps & Geothermal (small scale)
- Microwind
- Medium wind @ 0.36GWh per annum
- Solar Water Heaters
- Onshore wind
- Energy from waste - Electricity
- PV
- Biofuel
- Offshore wind
- Energy from waste - Heat
- Other fuels used for heating
- Aviation Fuel (4.12% of Total gross consumption)
- Total LPG
- Conventional CHP Heat
- Diesel
- Petrol
- Conventional CHP Electricity
- Conventional PS + Interconnection
- Total Conventional





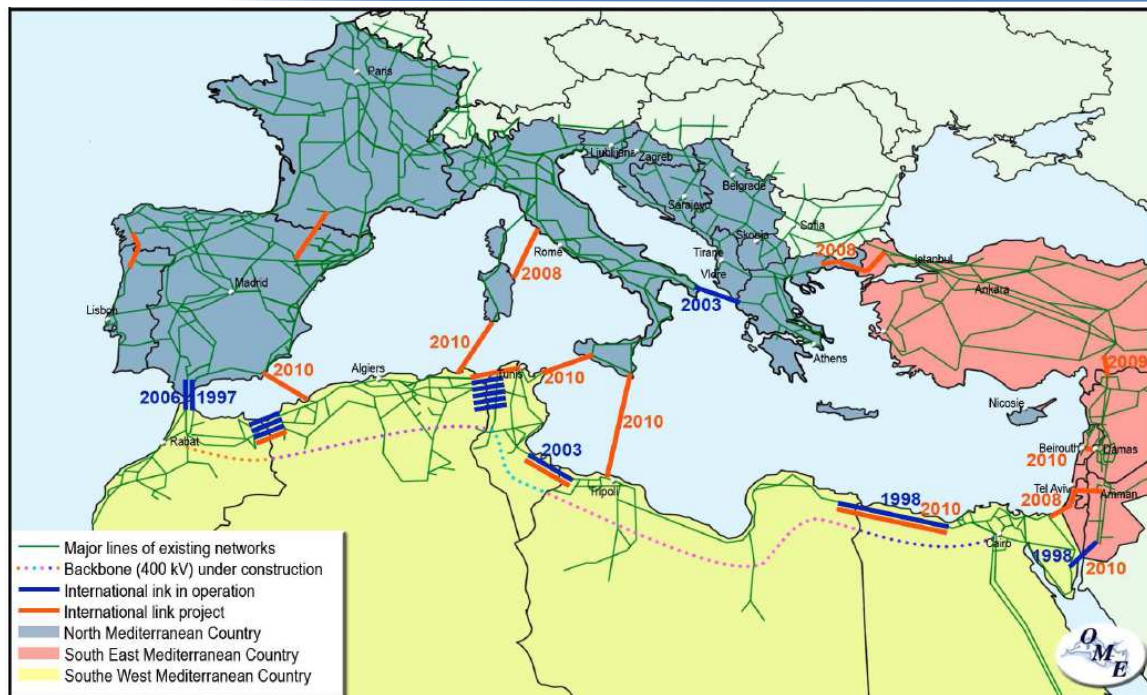
# Proposals

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- Though Malta's reviewed measures project a successful achievement in its targets, Malta should still initiate negotiations with other MS to consider possibilities of:
  - Statistical Transfers
  - Joint Projects
  - Joint Support Schemes
- Malta should also seek partnership in investing in RES plants in third countries. The energy generated from these plants can be consumed in the EU community and count towards the RE 2020 target.



# Energy Projects in the Mediterranean Region



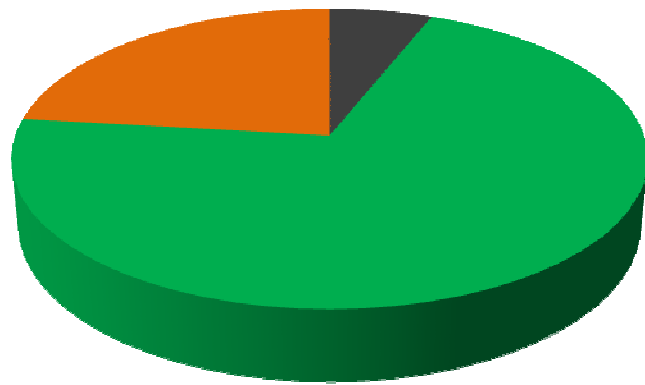
Malta supports energy projects in the Mediterranean basin because of their contribution to diversification of energy supplies in the EU internal electricity market.

The Mediterranean Solar Plan and Energy Ring is expected to:

- enable the exploitation of the large potential of renewable energy of the Southern Mediterranean countries;
- facilitate the flow of renewable energy from this region to the European market;
- contribute towards EU member states commitments related to 2020 RES target;
- contribute towards the security and stability in the region;

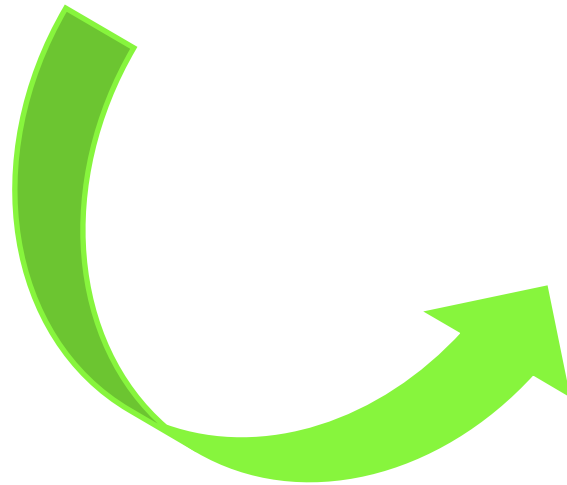
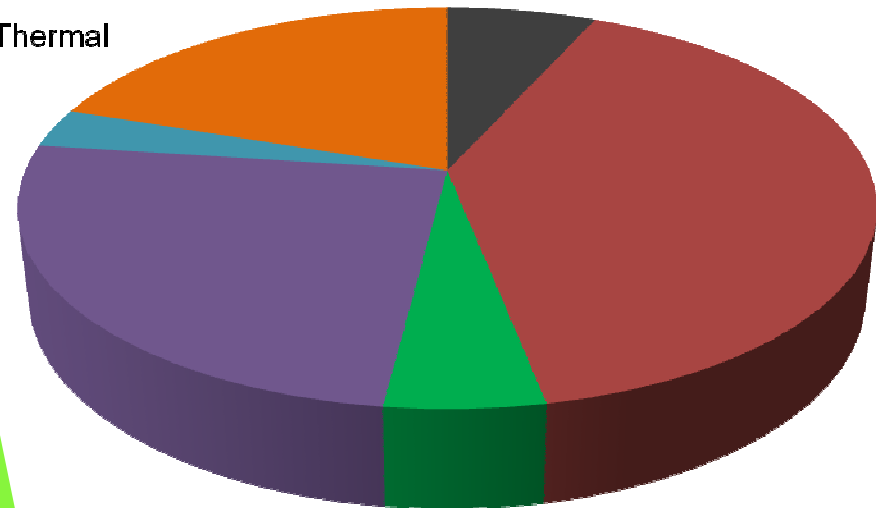
# 2009 → 2020

## RES Technology Share 2009



- PV
- Wind
- Solar Thermal
- Biomass Electric
- Biomass Thermal
- Bio-fuels

## RES Technology Share 2020



# What's Next

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- NREAP submission deadline : End of June 2010
- RE directive to be transposed in local legislation by end of year
- Biofuel Sustainability reporting
- 2012, 2014, 2016 trajectories and reporting
- 2020 final report



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# THANK YOU



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