Department of Environment
Ministry of Agriculture,
Rural Development and Environment

Cyprus' update on the national system for policies and measures and projections, the low-carbon development strategy, climate policies and measures and greenhouse gas projections

2020 report

in accordance to

Articles 13 and 14 on reporting by Member States of "Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC"

and

Articles 20, 21, 22 and 23 of "Commission Implementing Regulation (EU) No 749/2014 of 30 June 2014 on structure, format, submission processes and review of information reported by Member States pursuant to Regulation (EU) No 525/2013 of the European Parliament and of the Council"

May 2020

Title of report	2020 Cyprus' update on climate policies and measures and GHG projections
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Table of Contents

1. Background

Pursuant to Articles 13 and 14 in "Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC" (MMR)[1], EU Member States must report to the Commission updated information on the national system for policies and measures and projections, the low-carbon development strategy, climate policies and measures and greenhouse gas projections no later than 15 March 2015, and every second year thereafter. Moreover, Member States should communicate to the Commission any substantial changes to the information reported pursuant to this Article during the first year of the reporting period, by 15 March of the year following the previous report.

The previous update of policies and projections was submitted to the Commission in April 2019.

The content of this update meets the requirements in Articles 13 and 14 of regulation no 525/2013, and the requirements in the implementing acts referred to in Article 12(3) of the regulation. This includes information in accordance with Articles 20 – 23 in "Commission Implementing Regulation (EU) No 749/2014 of 30 June 2014 on structure, format, submission processes and review of information reported by Member States pursuant to Regulation (EU) No 525/2013 of the European Parliament and of the Council"(MMR IR)[2].

NOTES

- This report is accompanied by the electronic submission of tables included in Annex XII and Annex XII of IR, through the EIONET CDR.
- This report uses the NIR2019 submitted to the UNFCCC in May 2019 as the latest NIR.

[1] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:165:0013:0040: N PDF
[2] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0749&from EN

2. Reporting on policies and measures (MMR Art. 13)

2.1. Description of the national system for reporting on policies and measures and projections (MMR Art. 13(1)(a))

In accordance with Article 13(1)(a) of the MMR and Article 20 of the IR this chapter contains information on Cyprus' national system pursuant to Article 12(1) for reporting on policies and measures and projections of anthropogenic greenhouse gas emissions by sources and removals by sinks.

2.1.1. Information concerning the relevant institutional, legal and procedural arrangements, including the designation of the appropriate national entity or entities entrusted with overall responsibility for the policy evaluation of the Member State concerned and for the projections of anthropogenic greenhouse gas emissions

In Cyprus, the Department of Environment under the Ministry of Agriculture, Rural Development and Environment is the national entity entrusted with the overall responsibility for policy evaluation and for providing projections of anthropogenic greenhouse gas emissions.

The procedural arrangement for compiling information for policy evaluation and for making projections of anthropogenic greenhouse gas emissions in accordance with reporting requirements in EU legislation and under the UNFCCC and the Kyoto Protocol includes the involvement of and contributions from the following relevant ministries and institutions:

- Energy Service under the Ministry of the Energy, Commerce and Industry
- Ministry of Transport, Communications and Works
- Department of Forests under the Ministry of Agriculture, Rural Development and Environment
- Department of Agriculture under the Ministry of Agriculture, Rural Development and Environment
- Ministry of Finance
- Directorate General for European Programmes, Coordination and Development
- Private companies for cement, ceramics and lime production

<u>Institutional arrangements</u>

For the purposes of implementing the Regulation on the Governance of the Energy Union and Climate Action [(EU) 2018/1999][3] and in particular to set out the necessary foundation for a reliable, inclusive, cost-efficient, transparent and predictable Governance that ensures the achievement of the 2030 and long-term objectives and targets of the Energy Union in line with the 2015 Paris Agreement on climate change following the 21st Conference of the

[3] Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council

Parties to the United Nations Framework Convention on Climate Change (the "Paris Agreement"), through complementary, coherent, and ambitious efforts by the Union and its Member States, while limiting administrative complexity, a new structure for climate and energy governance has been approved by the Council of Ministers (15/11/2017 decision no. 83.709).

The core of this new structure (see Figure 1), the "National Governance System for Climate and Energy", is a Ministerial Committee, consisting of the Minister of Agriculture, Rural Development and Environment, the Minister of Energy, Commerce and Industry, the Minister of Finance and the Minister of Transport, Communications and Works. The Ministerial Committee is co-chaired by the Minister of Agriculture, Rural Development and Environment and the Minister of Energy, Commerce and Industry. This committee has to propose the National Energy and Climate Plan (NECP) to the Council of Ministers which takes the final decision. The proposal of the NECP is prepared by the Technical Committee, which consists of the Permanent Secretaries of the same Ministries. The Technical Committee also monitors the implementation of the NECP and makes proposals for its revisions when necessary. The Technical Committee is co-chaired by the Permanent Secretary of the Ministry of Agriculture, Rural Development and Environment and the Permanent Secretary of the Ministry of Energy, Commerce and Industry. The Technical Committee is consulted by the following seven Expert Working Groups: Decarbonisation, Energy Efficiency, Energy Security, Internal Energy Market, Research, Innovation and Competitiveness, Renewable Energy and Transport. Transport is an additional working group created due to the significant contribution of the sector to the national emissions. Each Working Group has a coordinator. All working groups with the exception of decarbonisation are the responsibility of the Ministry of Energy, Commerce and Industry; decarbonisation is the responsibility of the Department of Environment (Ministry of Agriculture, Rural Development and Environment). The secretariat of the National Governance System for Climate and Energy is held by the Department of Environment.

2.1.2. Description of relevant institutional, legal and procedural arrangements established within a Member State for evaluating policy and for making projections of anthropogenic greenhouse gas emissions by sources and removals by sinks

The institutional and legal arrangements for evaluating policy and for making projections of anthropogenic greenhouse gas emissions by sources and removals by sinks are described in Section 2.1.1.

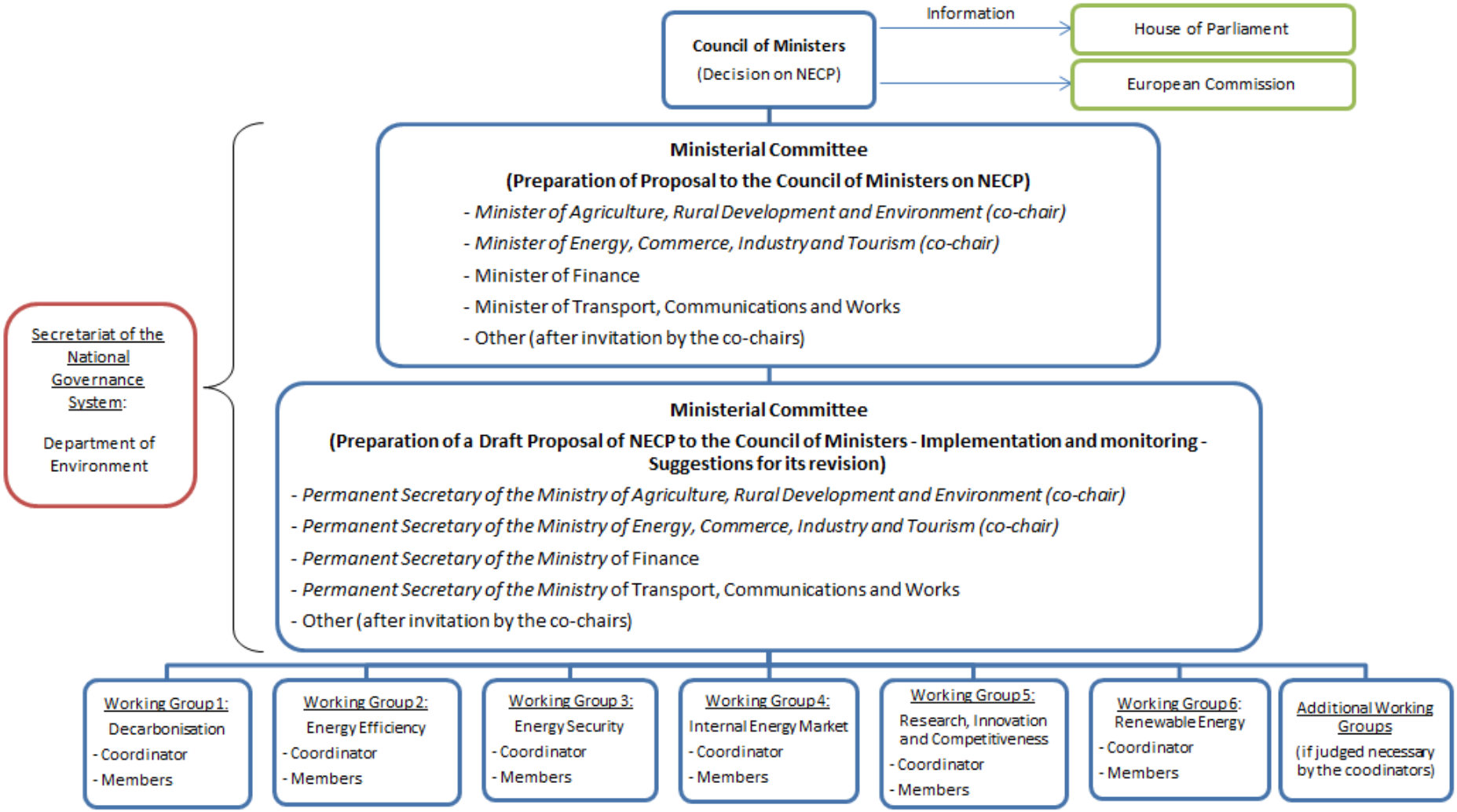

Figure 1. Structure of the National Governance System for Climate and Energy

2.1.3. Description of the relevant procedural arrangements and timescales to ensure the timeliness, transparency, accuracy, consistency, comparability and completeness of the information reported on policies and measures and the information reported on projections

A description of the relevant procedural arrangements is provided in section 2.1.1.

The relevant timescales to ensure the timeliness, transparency, accuracy, consistency, comparability and completeness of the information reported on policies and measures and the information reported on projections are defined by the Department of Environment for the purpose of complying with reporting requirements in EU legislation, under the UNFCCC and under the Kyoto Protocol in a timely manner.

Therefore the timescales take into account: the due date for the reporting of the information and the time needed for making the information sufficiently transparent (e.g. descriptions of methods and assumptions in the context of projections), accurate (e.g. sensitivity analyses in the context of projections), consistent (in the context of projections e.g. that the results of the GHG projections are presented in such a way that they are consistent with the historic GHG inventories), comparable (in the context of projections e.g. that the results of the GHG projections are presented in such a way that they can be compared with the historic GHG inventories and with projections of other countries, if they present the results of their projections in a similar way) and complete (in the context of projections e.g. that all sources, sinks and greenhouse gases included in the historic GHG inventories are also included in the greenhouse gas projections).

These requirements are taken into account when information on policies and measures and projections are to be reported to the European Commission or the secretariat for the UNFCCC and the Kyoto Protocol.

Furthermore, when information on policies and measures and projections are to be reported to the European Commission or the secretariat for the UNFCCC and the Kyoto Protocol, the most updated information is reported – including information on the most recently published comprehensive and well-documented GHG projection.

2.1.4. Description of the overall process for the collection and use of data, together with an assessment of whether consistent processes for collection and use of data are underpinning the evaluation of policies and measures and the making of projections as well as the different projected sectors in the making of projections

The overall process for the collection and use of data is coordinated by the Department of Environment under the Ministry of Agriculture, Rural Development and Environment and involves collection and use of information and data from:

- Energy Service under the Ministry of the Energy, Commerce, Industry and Tourism
- Ministry of Transport, Communications and Works
- Department of Forests under the Ministry of Agriculture, Rural Development and Environment
- Department of Agriculture under the Ministry of Agriculture, Rural Development and Environment
- Ministry of Finance
- Directorate General for European Programmes, Coordination and Development

- Private companies for cement, ceramics and lime production

The process for collection and use of information and data necessary for the evaluation of policies and measures and the making of projections is consistent as all relevant contributors are addressed in such a way that the information and data provided, e.g. activity data projections, are consistent with the statistical activity data used for the elaboration of historic greenhouse gas inventories.

To the extent that the projection methodologies across different projected sectors are based on the same parameters and assumptions, consistency across the sector projections is ensured. When the main drivers behind the projections of activity data differ across different projected sectors, consistency in the presentation of results is ensured. For all sectors it is ensured that the projection results in terms of greenhouse gas emissions are presented in a way that is consistent with the historic greenhouse gas inventories.

2.1.5. Description of the process for selecting assumptions, methodologies and models for policy evaluation, and for making projections of anthropogenic greenhouse gas emissions

Information on policy evaluation in relation to evaluation of effects and costs is included in Section 2.3.

Information on projections of anthropogenic greenhouse gas emissions, including information on assumptions, methodologies and models is included in Chapter 3.

2.1.6. Description of the quality assurance and quality control activities and of the sensitivity analysis for projections carried out

Information on projections of anthropogenic greenhouse gas emissions, including information on the quality assurance and quality control activities and of the sensitivity analysis for projections carried out is included in Chapter 3.

2.2. Update relevant to Cyprus' low-carbon development strategy (LCDS) and its implementation

Information on Cyprus' low-carbon development strategy and its implementation was submitted to the Commission on 16 March 2015. In accordance with Article 13(1)(a) of the MMR it should be noted that since then there have been no changes to the strategy, and no new information on its implementation. Information required under Article 21(a-e) of the IR can be obtained from the 16 March 2015 submission.

The 2020 update of the low-carbon development strategy will be submitted in the near future.

2.3. Information on applicable and relevant national policies and measures, or groups of measures, and on implementation of applicable and relevant Union policies and measures, or groups of measures, that limit or reduce greenhouse gas emissions by sources or enhance removals by sinks, presented on a sectoral basis and organised by gas or group of gases

The majority of scholars today agree on the growing influence of the economy and society on the earth's climate through activities such as fossil fuel burning, rainforest deforestation and livestock farming. Recognizing the impact of human activities on the climate, the international community agreed at the Rio Summit in Rio de Janeiro in 1992 with the United Nations Framework Convention on Climate Change. Cyprus ratified the Convention in 1997. The objective of the Convention is to stabilize concentrations of greenhouse gases in the atmosphere at levels that prevent dangerous impacts on the climate from human activities.

In 1997 the Kyoto Protocol was adopted, which set legally binding greenhouse gas emission limit values for the period 2008-2012. Cyprus has ratified the Kyoto Protocol as a state without obligations to reduce or limit emissions. In 2012, at the Climate Change Summit held in Doha, Qatar, the second binding period of the Protocol (2013-2020) was agreed. As part of the EU's commitments (20% reduction in greenhouse gas emissions by 2020 compared to 1990), the Republic of Cyprus also assumed the national targets for a 21% reduction in greenhouse gas emissions by 2020 relative to 2020 with 2005 from electricity, cement and ceramics, and 5% in other sectors such as agriculture, transport, waste, etc., compared to 2005 levels.

Wanting to prepare for the post-2020 international negotiations, EU leaders agreed in October 2014 to reduce greenhouse gas emissions by at least 40% by 2030 compared to 1990. This target for Cyprus corresponds to a reduction of greenhouse gas emissions by 42% by 2030 compared to 2005 by electricity, cement and ceramics industries (ETS sectors), and 24% in other sectors such as agriculture, transport, waste, etc. (non-ETS sectors), compared to 2005 levels.

The culmination of the collective efforts that took place in recent years to reduce greenhouse gas emissions and hence to tackle climate change effectively by the global community is the historic agreement reached in Paris in December 2015 at the 21st Session of the Parties to the United Nations Framework Convention on Climate Change. The Paris Agreement entered into force on 4 November 2016. Cyprus completed the ratification process of the Paris Agreement on 4 January 2017.

The effects of climate change are becoming increasingly felt both in Europe and globally. These are expected to be particularly serious for Cyprus, as climate change is already evident; over the last 100 years there has been an increase in average temperature and a decrease in average annual rainfall. The effects of climate change will not only continue but will also increase over the next decades.

In view of the above, Cyprus is faced with the challenge of developing its economy in a way that reduces greenhouse gas emissions, while taking appropriate measures and actions to adapt to climate change.

Climate change is a horizontal issue requiring the involvement and activation of almost all Ministries of Cyprus, including the Ministry of Agriculture, Rural Development and Environment, the Ministry of Energy, Commerce and Industry, the Ministry of Foreign Affairs, the Ministry of Transport, Communications and Works, the Ministry of Labour, Welfare and Social Insurance, the Cyprus Energy Regulatory Authority and the Local Authorities. As a result, the role of the Environment Department of the Ministry of Agriculture, Rural Development and Environment as a national coordinator is upgraded and strengthened. Additionally, an important factor in the effort is the continuous improvement of the institutional framework.

Climate change mitigation is one of the main targets identified in the Cypriot strategy for sustainable development launched by MARDE in 2007[4]. The objective of the strategy is the development of a set of principles for the formulation of an action plan in line with international challenges, and in accordance with EU policy directions and adjusted to the specific national circumstances.

Strategic planning

In February 2014, the House of Parliament voted the Law on Fiscal Responsibility and Budget Systems (FRBSL) no. 20(I)/2014, which covers a wide range of issues related to Management of Public Finance. The goal was to introduce new principles for budgeting that strengthen the flexibility of economic operators and the transparency of the use of state resources, achieving measurable results. In this context, ministries have been asked to implement new procedures for the preparation of a medium-term strategy plan and budgeting on the basis of those activities to achieve their objectives.

The importance of climate change mitigation (and adaptation) for Cyprus is highlighted through its inclusion as the first target of the strategic plan of the Department of Environment and as one of the strategic goals of the Ministry of Agriculture, Rural Development and Environment[5].

National Policies and measures

Given that Cyprus was a non-Annex I party to the UNFCCC until 2013, national policies and measures for the reduction of greenhouse gas emissions have been developed for the first time in 2007 for the implementation of EU Decision 280/2004[6]. Ever since, policies and measures are reviewed, revised and updated every 2 years. The involved ministries are presented in Table 1.

Table 1. Involved ministries to climate change mitigation policies and measures

Ministry	Issues
Ministry of Agriculture, Rural Development and Environment	Agriculture Forestry Land use Waste
Ministry of Energy, Trade, Industry and Tourism	Energy
Ministry of Transport, Communications and Works	Transport

[4] http://www.un.org/esa/agenda21/natlinfo/countr/cyprus/nsds_2007en.pdf
[5] http://www.moa.gov.cy/moa/agriculture.nsf/Stratigikos%20Sxediasmos%202016-2018%20EL%20-%20YpOik%20150901.pdf
[6] Decision No 280/2004/EC of the European Parliament and of the Council of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol

Ministry of Finance	National budgets
Ministry of Interior	Land use

The national policies are prepared, updated, and monitored by the Ministry of Agriculture, Rural Development and Environment (MARDE), in collaboration with the responsible Ministry for each measure or policy. Energy is the sector which has to contribute the most in the reduction of greenhouse gas emissions of Cyprus. The emissions of the energy sector including transport increased from 3,970 Gg CO_2 eq. in 1990 to 6,619 Gg CO_2 eq. in 2017, corresponding to 67% increase[7], while total national emissions excluding LULUCF increased by 58% during the same period. In 2017, energy emissions increased by 2% compared to 20156

Several policies and measures affecting the abovementioned objectives originate at the EU level, such as the fuel quality directive, emission performance standards for new vehicles, the regulation on fluorinated greenhouse gases, the landfill directive and the common agricultural policy. These are not described further here. Moreover, several policies and measures targeting renewable energy and energy efficiency affect the reduction of greenhouse gas emissions in Cyprus. An overview of key policies affecting the national climate target to 2030 is presented in Table 2.

Several additional measures are under examination, especially for the transport sector, which are anticipated to have considerable contribution to the reduction of greenhouse gas emissions. These measures have been included in the final submission of the NECP[8] to the European Commission in January 2020.

Table 2. Overview of key policies affecting the national climate target to 2030

Sector	**Information**
Energy	Renewable Energy penetration Energy Efficiency (including transport measures) Natural gas in electricity production
Industry	F-gases recovery
Agriculture	Promotion of anaerobic digestion for the treatment of animal waste
Waste	Reduction of waste to solid waste disposal sites from sorting at production level
	Reduction of organics to landfills
	Increase of amount of organic wastes treated by composting
	Promotion of anaerobic digestion for the treatment of the organic fraction of the municipal solid waste
	Biogas recovery from old sold waste disposal sites (deep unmanaged)

The contents of the sections that follow (2.3.1 - 2.3.6) contain information regarding:

- The objective of the policy or measure and a short description of the policy or measure (MMR Art. 13(1)(c)(i))
- Type of policy instrument (MMR Art. 13(1)(c)(ii))
- Status of implementation of the policy or measure or group of measures (MMR Art. 13(1)(c)(iii))

[7] Kythreotou N. and T. Mesimeris, 2019, Cyprus National Greenhouse Gas Inventory 2019. May 2019, available at https://unfccc.int/documents/65701
[8] https://ec.europa.eu/energy/sites/ener/files/documents/cy_final_necp_main_en.pdf

Indicators to monitor and evaluate progress over time (MMR Art. 13(1)(c)(iv)) are not used and therefore not included in this report. Quantitative estimates of the effects on emissions by sources and removals by sinks of greenhouse gases (MMR Art. 13(1)(c)(v)) are presented in Chapter 3.

Where available, estimates of the projected costs and benefits of policies and measures, as well as estimates, as appropriate, of the realised costs and benefits of policies and measures (MMR Art. 13(1)(c)(vi)) are reported.

Where available, all references to the assessments and the underpinning technical reports (MMR Art. 13(1)(c)(vii)) are reported.

2.3.1. Sectoral policies and measures: Energy

2.3.1.1. Renewable Energy Sources

Cyprus Government has development various support schemes, incentives and soft measures over the period 2008-2018 in order to further support the Renewable Energy Sources penetration. Especially in the Electricity Sector where the penetration was very low, a lot of support schemes have been developed over the period. A summary table of the existing and additional policies and measures on energy is attached in Appendix I.

Based on the various incentives the broken down generation, by technologies and the renewable based electricity production over the past 10 years in Cyprus is listed in the table below.

Table 3. Electricity Generation per Technology 2008-2017

Electricity production from renewable sources (GWh per year)	Solar	Wind	Biogas	Total
2008	2.55	0	11.54	14.09
2009	3.83	0	26.52	30.35
2010	6.39	31.37	35.12	72.88
2011	11.94	114.31	51.61	177.86
2012	21.54	185.48	50.02	257.04
2013	47.11	231.04	48.86	327.01
2014	83.59	182.85	50.55	316.99
2015	126.66	221.86	51.24	399.76
2016	147.65	226.7	52.02	426.37
2017	173.73	211.45	51.91	421.68

In the table below, broken down by technologies and how much was the electricity produced from renewable sources sold at a subsidized price over the past 10 years, is shown. The electricity generated for own consumption is not included.

Table 4. Renewable electricity sold at a subsidized price (GWh per year) 2008-2017.

Year	Solar	Wind	Biogas	Total
2008	1.64	0	7.81	9.45
2009	2.91	0	19.85	22.76
2010	4.59	31.37	24.8	60.76
2011	9.16	114.25	39.71	163.12
2012	18.65	185.05	37.63	241.33

2013	43.82	230.61	35.83	310.26
2014	60.11	182.42	37.46	279.99
2015	85.75	221.43	37.41	344.59
2016	94.41	226.27	36.61	357.29
2017	111.36	211.02	36.5	358.88

From 2016 onwards all the new installed RES projects (PV Parks) they are not receiving any subsidy. Table 5, shows the broken down cost, by technologies and the actual subsidy payed to renewable energy producers.

Table 5. Subsidy paid to RES Producers in million Euro per Year 2008-2017

	Solar	Wind	Biogas[9]
2008	0.03	0	
2009	0.135	0	
2010	0.055	0	0.122
2011	1.365	3.607	0.696
2012	2.369	2.223	0
2013	4.402	5.725	0
2014	9.624	10.433	0.266
2015	11.349	19.637	1.565
2016	14.005	24.815	1.783
2017	11.957	18.299	1.222

In addition, in Table 6 there is an analysis broken down by technologies and the specific subsidy of the electricity produced from renewable sources in Cyprus over the past 10 years.

It should be also noted that as of 2015, all the new support schemes for Electricity production will receive the so-called avoidance cost, which corresponds to an ideal marker price. The scheme will continue until the full liberalization of the market, where the new subsidized electricity and the subsidies paid to producers in provided through avoidance cost. The current selling price for electricity produced by renewable sources (avoidance cost) is available in the link https://www.eac.com.cy/EL/EAC/RenewableEnergySources/Pages/resenergypurcheac.aspx.

Electricity for own Consumption

Support schemes for the production of electricity from renewable energy sources for own use such Net-metering, net-billing and self-consumption have been implemented since 2013 as national policy to promote RES electricity. Currently the Net-metering category is applied for small scale photovoltaic systems with capacity up to 10KW, for all consumers (residential and non-residential). The scope of the net-metering is to provide the option to residential and small commercial consumers to cover all or part of their electricity consumption from a PV. The generated RES electricity is subtracted from building's electricity consumption. Consumers pay only for the difference between the energy consumed and energy produced (net electricity used) plus a cost that reflects the cost of the electricity grid to support continuous supply and taxes (VAT, RES levy).

The above scheme is expected to continue, with some modifications in the near future in order to enhance better the self-consumption for small systems.

[9] In 2013-2014 the market Price was higher than FiT Price for Biomass Projects. The excess amount was return to RES and Energy Efficiency fund.

Table 6. Subsidy per renewable energy source in Cyprus for the period 2008-2017

Specific subsidy of the renewable electricity (EUR/MWh)	2008	2009	2010	2011	2012	2013	2014-2017
Solar	Households Option 1: 0.205€/kWh + 55% Option 2: 0.383€/kWh 15 years contract Commercial Option 1: 0.205€/kWh + 40% Option 2: 0.335€/kWh 15 years contract	Households Option 1: 0.225€/kWh + 55% Option 2: 0.383€/kWh 15 years contract Commercial Option 1: 0.205€/kWh + 40% Option 2: 0.36€/kWh (≤ 20kW) Option 3: 0.34€/kWh (21-150kW) 20 years contract		0.31€/kWh (21-150kW) 20 years contract	Households 0.28€/kWh (≤7kW) 15 years contract Commercial 0.25€/kWh (≤150kW) 20 years contract	Commercial 0.138€/kWh (21-150kW) 20 years contract	No FiT Scheme for net-metering and self-generation
Wind		0.166€/kWh 20 years contract			0	0.145€/kWh 20 years contract	
Biomass	0.108€/kWh 20 years contract	0.135€/kWh 20 years contract					
Biogas	0	0.1145€/kWh 20 years contract					
Hydro	0	0	0	0	0	0	0

Self-generation / Net billing

With Self-generation and Net-billing schemes, PV generated energy has to be self-consumed within the same 20-min time period it was generated. If local energy demand exceeds PV production, energy is imported from the grid. With Self-generation scheme, excess PV generation is exported to the grid without any economic compensation nor additional fee. A compensation for excess energy is foreseen by the Net-Billing scheme. The size of these systems is basically unlimited (up to 10MW). Some existing burdens that exist (i.e. the long procedure needed for town planning or building permit), is expected to be overcome in the following years. This support scheme is the most effective for all industrial and commercial consumers, since the self-consumer is almost excluded for all the taxes for the energy that is self-consumed.

Development of a specific Software tool to perform technical and economical evaluations of simple energy systems taking into account Cyprus's regulatory and tariff context/framework.

In order to enhance the above schemes (net-metering, net-billing and self-consumption), a software tool will be developed and provided free of charge to both energy consultants and to the end users. With this tool (that will be monitored and maintain from the government), the end user can have an indication of what size system to install that can make economic sense. On the other hand the advance mode of the software tool, will give some more insights to the consultants in order to advice better the pronsumers in other sectors as well (Energy efficiency, storage, etc.) .

The operation of the energy system will be simulated by making energy balance calculations in each time step (interval) of the year. For each time step, the SW tool compares the electricity demand to the energy that the system can supply in that time step, and calculates the flow of energy to and from each component of the system and the corresponding cash flows. For systems that include batteries, SW tool will determine in each time step whether to charge or discharge the batteries.

Software tool estimates also the cost of installing and operating the system over the lifetime of the project, defined by the user as an input. Economic and Financial calculations account for costs such as initial investment, replacement, operation and maintenance, network fees and tariffs, RES incentive schemes etc.

New Forecasting Tool that will help further the penetration for RES

At a basic level Variable Renewable Energy (VRE) forecasting aims to predict the generation of renewable energy technologies with variable outputs that are strongly affected by weather (wind, sunshine, etc.). VRE forecasting was first developed for use by the wind power industry but has been adapted to provide forecasts for solar technologies including PV and CSP. Modern VRE forecasting has achieved a high level of accuracy through a combination of models and analysis tools that use historic and real-time weather observations along with characteristics and real-time generation of VRE assets to predict VRE power generation. VRE generation can be forecast across numerous different time scales, from minutes to hours to days and across various system scales, from single wind turbines to PV panels to CSP units up to regional systems with gigawatts of generation capacity.

Due to the isolation of the island and the various weather phenomena in Cyprus, deterministic numerical weather prediction (NWP) model forecast can provide useful information for decision-making.

Ministry of Energy has requested a Technical Assistance, through SRSS, in order to improve and correlate all the existing forecasting models in an effort to create a new weather to energy model tool for RES that will participate to the market and also for the Transmission System Operator for the smoother penetration of Renewables. One important aspect that will need to be indentified and examine, is the dust forecast prediction, which occurs vary often in the Area of Cyprus.

Forecasting aims to provide an accurate prediction of when and how much power VRE assets will generate at a given time in the following hours (i.e. up to 6 hours), along with an associated probability. This information will support TSO in reducing VRE integration costs and assists utilities and independent power producers (IPP) in more efficient operation of VRE assets, which increases revenue and makes VRE more attractive to investors as it was highlighted in IRENA study.

In general forecasting will help to increase the share of VRE generation that can be safely and economically integrated into an electricity grid.

Alternative fuels – Biofuels in transport

Biofuels are liquid or gaseous transport fuels such as biodiesel and bioethanol which are made from biomass. They serve as a renewable alternative to fossil fuels in the EU's transport sector, contributing to reduction of greenhouse gas emissions and improvement the EU's security of supply. Each member state is obliged to fulfil two obligatory targets by 2020, setting by the relevant EU Directives, 2009/28/EC and 2009/30/EC: 10% of the energy consumption of transport sector comes from renewable sources such as biofuels, and fuel suppliers are required to reduce the greenhouse gas intensity of the transport fuels that they enter in the market by 6% compared with the fuel baseline standard (greenhouse gas emission of EU transport fuels mix in 2010). Currently, the percentage of biofuels to transport fuels is at 2.5% and the greenhouse gas emission reduction is at 1%. These targets will gradually be increased until 2020 in order to meet the obligatory targets.

The European Directive 2014/94/EU on the Deployment of Alternative Fuels Infrastructure establishes a common framework for measures to develop the market for alternative fuels in the transport sector and the implementation of relevant infrastructure within the Union in order to minimize dependence on liquid minerals and reduce the environmental impact in the transport sector. Within the framework of the directive, which sets practical goals, the development of the market and related infrastructure for the use of electricity, liquefied natural gas (LNG), compressed natural gas (CNG) and hydrogen in transport is specifically promoted. Directive 2014/94/EU is a tool to meet the mandatory 2020 target for road transport, i.e. (a) 10% energy from RES in transport (Directive 2009/28/EC) and b) 6 % reduction in greenhouse gas emission intensity in the life cycle of road transport fuels (Directive 2009/30/EC). The competent authority for the achievement of those targets is the Ministry of Energy, Trade, Industry and Tourism. A National Policy Framework describing national targets and guidelines, support actions and policies for the development of alternative fuels and the necessary infrastructures was prepared by the Ministry of Transport, Communications and Works in cooperation with the Ministry of Energy, Commerce and Industry.

Charging points and infrastructures for electric vehicles have been installed in public buildings and in public roads. There are currently 18 double charging stations in Cyprus: 6 charging stations in Nicosia, 5 in Limassol, 2 in Larnaca, 2 in Ammochostos and 3 in Paphos.

Additionally, the Department of Electromechanical Services is proceeding to the installation of 10 high charging stations in high ways and public roads. Although the numbers are still very small, the expectation is that the registration of electric cars will increase considerably over the next five years. New electric car sales are expected to comprise 25%-50% of total vehicles on the road by 2040.

The installation of LPG systems in vehicles and LPG refuelling points in retail stations have also started in 2017 and will reduce the emission of pollutants and fuel consumption in old vehicles.

After analysing all the possible options for Cyprus and due to various uncertainties and political decisions, as well as various externalities, it was decided that the scenario with additional measures without electricity interconnection and with import of natural gas was adopted for the NECP.

2.3.1.2. Energy Efficiency

The existing and additional policies and measures for energy efficiency are described below. A summary table on the existing and additional polices and measures on energy efficiency is attached in Appendix I.

Existing policies and measures

The energy saving measures planned by 2020 and those that have been implemented in the previous years in each sector and those that will be implemented by 2020 (buildings sector, transport sector, residential sector, tertiary sector, public sector and industrial sector) for achieving the national target, as well as all legislative and non-legislative measures at national level for the promotion of energy efficiency.

The major implemented/ ongoing measures are:

Legislative measures (implemented /ongoing)

- Minimum energy performance requirements for new buildings, buildings that undergo major renovation and building elements that are retrofitted.
- Legislation that defines the technical requirements of Nearly Zero Energy Buildings.
- Compulsory issuing of Energy Performance Certificates (EPC) for new buildings and buildings that are sold or rented.
- Compulsory inspection of large air conditioning systems and heating systems with boiler.
- Requirements for technical building systems installed in existing buildings
- Legislation for the qualification of technical building systems installers
- Legislation for promotion of combined heat and power generation systems and high efficiency standards in heating and cooling systems.
- Legislation for energy efficiency (energy efficiency in public sector, energy efficiency in metering and billing, in transformation, transmission and distribution, energy audits etc)
- Legislation for regulating the market for energy auditing in buildings, industries and transport and the operation of Energy Service Companies (ESCOs)
- Legislation for energy labelling and market surveillance
- Legislations for setting up energy efficiency obligation scheme for energy companies

Information and training measures (implemented/ongoing)

- Training and Licensing of Energy Auditors.
- Licensing of ESCOs.
- Training of Energy Managers.
- Training and Licensing of Qualified Experts (Issuing Energy Performance Certificates of buildings).
- Certification s of small scale Renewable Energy Sources installers.
- Training and licensing of technical building system installers
- Licensing of Heating Systems Inspectors.
- Licensing of Air-conditioning Systems Inspectors.
- Promoting the role of energy managers within business. The energy manager monitors energy use in a business and promotes the implementation of actions to reduce energy consumption.
- Promotion of energy management system
- Training of Energy Saving Officer in the public sector. About 700 officers are assigned on government owned buildings. They are responsible for energy efficiency in each public building and they report back on the measures and savings achieved annually.
- Annual information campaigns for energy efficiency. The campaign uses the logo “Save energy-Save money”
- Annual competition for schools for promoting Energy Efficiency, 5 radio spots broadcasted by radio stations all over Cyprus, leaflets, workshops, annual fairs, lectures. Information actions promote energy efficiency investments, energy performance certificates, energy audits and energy performance contacting.
- More targeted awareness increase actions are implemented in 2018 and 2019 with technical assistance provided by EU (SRSS and Environment Agency Austria and Cyprus Energy Agency), in order to increased awareness of enterprises, industries, citizens, local authorities and journalists of the importance of energy efficiency and of opportunities to save energy and take steps towards saving energy. It will include: an electronic tool (in web-based user-friendly interface) for the calculation of energy savings that will enable households to have a clear view on cost effectiveness of potential energy saving measures, the establishment of the Energy Efficiency Network of enterprises and industries and Event-based awareness campaign for citizens, local authorities and journalists. Performance indicators will be used to evaluate their effectiveness.

Public financing schemes and other financial Measures (implemented/ongoing)

- 53 million euro has been secured by the European and Structural Funds 2014-2020 for grant schemes and projects for energy efficiency investments in private and public buildings. 33 million euro will be allocated for improving the energy efficiency for buildings used by SMEs and households while, the remaining amount will be allocated for improving the energy efficiency in central government public buildings. Moreover, 1,17 million Euro have been secured from the EU structural and cohesion funds for the period 2014-2020 for pilot projects of combined heat and power generation in public and semi-public buildings. The projects in public sector have started in 2018.
- The Ministry of Energy, Commerce and Industry (MECI) announced in 2017, the operation of a support scheme for the installation of cogeneration systems fueled by biomass/biogas for the production of electricity for self-consumption. MECI announced a support scheme based on net-billing principle for the installation of High Efficiency combined heat and power generation with capacity up to 5MW.

- A support scheme (Saving – Upgrading) was enacted in 2015 for the energy renovation of existing houses and existing buildings owned or used by small and medium enterprises utilizing European and Structural Funds 2014-2020 (33 million euro). The support scheme provides direct grants for the application of thermal insulation and other energy efficiency measures in buildings that will upgrade their energy class on the building's Energy Performance Certificate to at least B or achieve energy saving of at least 40% or upgrade the building to the nearly zero energy level. A 2nd phase of a scheme was announced in 2018 providing grants for energy efficiency upgrade for households and multifamily buildings (European and Structural Funds 2014-2020)
- Support scheme "Solar Energy for All" for on-the-site production and consumption of RES for own use which provides: (a) the installation of Net-metering photovoltaic systems with capacity up to 5KW connected to the grid for all consumers (residential and non-residential) and (b) the self-generation systems with capacity up to 10MW for commercial and industrial consumers.
- Support scheme for the replacement of old solar domestic hot water heating systems (f national funding).
- Energy poverty, vulnerable consumers' categories and measures to protect them were defined in a Ministerial Decree which entered into force in 14/9/2015. The Ministerial Decree includes measures such as (a) reduced prices on electricity tariffs, (b) financial incentives for participating in a scheme for installing a net-metering Photovoltaic system with a capacity of up to 3kW, (c) financial incentives for upgrading the energy efficiency of their houses, and (d) uninterrupted supply of electricity, during critical periods for those vulnerable consumers that continuous power supply is essential for reasons related to their health.
- Grant Scheme for the insulation of the roofs in the residential sector
- Grant Scheme for conducting energy audits in SMEs
- Establishment of a new energy efficiency revolving fund /soft loan Financing Instrument to promote investments in the fields of Energy Efficiency and Renewable Energy Sources, targeting small and medium-sized enterprises, public bodies and households (managed by the EIB, state's financial contribution € 40 million for 2019, funding is 85% from the European Commission and 15% of national participation)..
- Private financing institutions offer financing for energy efficiency investments, such as the energy loans for thermal insulation, for energy efficiency upgrade of buildings etc.
- In the framework of two new Interregional European programs between Cyprus and Greece (SYNERGEIN and STRATENERGY), 11 buildings in municipalities and wider public will be energy upgraded in the period 2018-2020.
- Targeted energy efficiency measures in public buildings
- Establishment of an energy efficiency network with voluntary agreements with businesses
- Financing measures for energy efficiency investments in existing hotels
- Financing measures in agriculture
- Targeted measures in transportation and Integrated Fleet Management Systems
- street lighting projects-replacing existing lamps / lighting fixtures in road lighting systems with new, more efficient ones
- Incentives for new buildings with higher energy efficiency than EPBD requirements- new buildings and buildings renovated can receive a 5% extra building factor if they achieve higher energy efficiency than the minimum mandatory levels provided by the legislation
- Reduced VAT for energy efficiency retrofits of households - applying a lower VAT rate (5 %), instead of 19 %, for renovation and repair works carried out in existing private

dwellings. The lower rate is used, inter alia, for works consisting in applying thermal insulation on the external envelope and replacing external door and window frames.

- Targeted energy efficiency measures at schools
- Increasing tax on electricity consumption for energy efficiency and renewables
- For the transport sector: measures to increase the use of a bicycle, to increase the use of public transportation, integrated fleet management system in governmental fleet, training and information on eco-driving etc.
- Excise duty on vehicles with a view to reducing CO2 emissions. This measure
- relates to the tax imposed on vehicles with a view to reducing CO2 emissions

Policies and measures for period 2021-2030

An In-Depth Assessment of the Energy Efficiency Potential in Cyprus has been conducted in the framework of a Technical Assistance project for the government of Cyprus and the aim was to assess the maximum theoretical and economically viable energy efficiency potential in Cyprus. A final energy demand forecast model was employed, which was specifically developed for the energy system of Cyprus. The model calculates future annual energy consumption in each major economic sector of Cyprus (agriculture, cement industry, other industry, households, services, road passenger transport, road freight transport and air transport) as a function of future macroeconomic variables and energy prices. It also calculates fuel shares in each sector, depending on technology costs (investment, operation, maintenance and fuel costs), the penetration potential of various technologies and technical constraints for the uptake of new technologies, and allows computing future final energy consumption by sector and fuel. A large part of the input data used in this top-down forecast model was derived from detailed simulations of building energy demand for a number of representative residential and commercial buildings, using the EnergyPlus model. In this way a reconciliation of engineering with economic calculations was achieved. Three distinct scenarios were designed: a reference scenario, which incorporates all policies adopted until early 2016; a 'realistic scenario', which assumes the implementation of cost-optimal measures in all economic sectors under a modest deployment of financial resources; and a much more ambitious 'maximum technical potential scenario', which assumes an unprecedented mobilisation of financial and human resources that could lead to a deep renovation of all existing buildings and a substantial penetration of alternative fuels in transport. After an interval between 2013-2018, where energy use patterns were affected by the significant economic downturn of years 2013-2015, it is projected that overall energy intensity in Cyprus will continue its downward trend in the coming decades, mainly as a result of improved energy performance of buildings in the residential and tertiary sector. Road transport, which currently accounts for 40% of final energy demand, is expected to demonstrate a decline in energy intensity too, but a slower pace since it exhibits great inertia and thus a shift towards more use of public transport modes will take a long time to materialize. In line with the real-world financial and technical capacity of Cyprus, the Realistic Scenario foresees a small or modest improvement in the intensity of energy use. Under this scenario, an assessment of the cost-effectiveness of the different Energy Efficiency interventions is performed in order to illustrate the optimum mix of these interventions. This is done on the basis of their cost efficiency and affected number of end-users as well as to their attractiveness for the end-users and also from a macroeconomic perspective. Overall, the expected expenditure (capital cost), only for energy efficiency interventions for the household and service sector until 2030, in order to meet the targets resulted out of the realistic scenario which is considered as the energy efficiency scenario (additional measures),

amount to at least 1 billion € and this is translated to a mean weighted ratio of annual investments at the level of around 0.33% of the estimated GDP over the 2018-2030 period.

To exploit the considerable potentials in the different sectors the main barriers preventing a broader uptake of energy efficiency measures limited financial support on the one hand and interest of final consumers on the other will be adequately addressed in the post 2020 period.

The regulatory framework will be further adjusted in order to establish a secure, consistent and market-oriented framework for energy efficiency interventions mainly targeting the building sector and to a less extent the transport sector. More emphasis will be put on issues related to standardization of energy services provided, the performance of such services and their procurement and operation in the public sector.

It is evident from the analysis provided in the context of this study, that the existing energy saving potential should be approached on a cost-efficient investment basis and to allow, even incentivize, the best performing interventions and instruments to scale-up.

The existing regulatory provisions with regard to the building code, Energy Performance Certificates, as well as energy audits for non-SMEs will be further enhanced in terms of monitoring processes and increased market value in order to create a sustainable regulatory framework for Energy Efficiency. In this context, the enhancement and extension (both also in time) of an obligation scheme for energy suppliers is proposed in order to increase relevance of the foreseen energy efficiency interventions on the market and to allow for the integration of these measures as new market mechanisms under a competitive framework. Though, the structure of the domestic energy market currently does not leave big room for competition among energy suppliers, considering the anticipated changes especially in the electricity market the introduction of such energy efficiency obligations can be expected to foster and accelerate the establishment of a functioning national energy service market.

The low-hanging fruits in terms of energy efficiency interventions still are not fully exploited and further emphasis will be given to awareness, training and information activities that would allow the fairly easily achievement of some significant energy savings.

A balanced mix of mandatory obligations as well as voluntary targets for the various energy consumers and suppliers will be considered. This needs to be done in a way that while going beyond the minimum mandatory instruments currently foreseen under the EED not to create market failures or uneven burden for some end-users or market participants. The instrument of energy audits especially for non-SMEs should be exploited far more in the future in both the service and industry sector and to be directly linked with any kind of state financial support.

Any regulatory market barrier should be addressed as efficient and as fast as possible in order not to witness market bottlenecks or lock-in effects. For this reason, mainly capacity building measures for various stakeholders groups (e.g. building installers, energy managers, lawyers, bankers) will be timely planned and implemented. The introduction of standardized tools and procedures as well as the development of electronic databases, registries and communication platforms are also considered key instruments for the successful tackling of the existing mainly market-related barriers.

However, the most sever barrier for the achievement of the planned savings is the limited available budget for such kind of interventions. The private sector has been accustomed to

be responsive only when a significant public subsidy is available, while the public sector tends to request full upfront capital coverage. For this reason, the transition to a more market-oriented financial support scheme, will be definitely a challenge and a careful planning along with the mobilization of the appropriate financial and market instruments will be required. Public support will continue to play a vital and indispensable role in the achievement of the targeted energy savings and as such the appropriate new energy efficiency financing instruments will be deployed and be in operation in due course. The aim from the side of the State is not to reduce its overall share in the support of the energy efficiency interventions, but mainly to drive the public financial resources to more cost-efficient support instruments and types of energy efficiency interventions with a higher leverage.

The establishment of a dedicated energy efficiency revolving fund is proposed (soft loans) allowing the sustainable medium-term design of national support schemes for energy efficiency interventions. The success or not of this proposed fund is closely associated with the involvement and cooperation with the domestic banking sector and for this reason the active and direct participation of the latter sector should be thoroughly discussed and ultimately guaranteed before the launch of support programs under this Fund.

In this context the possibility of additional inflows to this fund will be assessed and considered, mainly in the framework of carbon/green taxes, however without jeopardizing the existence of an initial capital for the medium-term fund operation. The capital for the fund operation is overall proposed to be allocated from the national Cohesion and Structural funds.

Benchmarking assessment and analysis in order to support the efficient planning and distribution of public funds is essential and to this end the current data set of specific energy consumption data for various end-use sectors needs to be systematically broadened and detailed. Market surveys and wider participation of market associations in the various national energy efficiency schemes (e.g. voluntary agreements) and exploitation of data collected by the energy managers of the public buildings and the stock of issued energy building certificates in the framework of dedicated Information System databases and platforms are proposed to be one of the first administrative driven actions.

The Government is examining a fiscally neutral green tax reform, which can significantly contribute towards transition to an economically and environmentally sustainable development. A gradual implementation of environmental taxes to sectors (that are not subject to the EU Emissions Trading System) and at the same the reduction of other expenses related e.g. to labour cost, is expected to lead to energy savings and will notable reduce the energy dependency of Cyprus. It is noted that this measure, due to the expected large impact on reducing the national energy consumption, will simultaneously contribute to the achievement of obligations of the country for 2030 regarding energy efficiency, the reduction of the carbon dioxide emissions and the increase of share for renewable energy sources. In general, a fiscally neutral gradual green tax reform can have substantially positive effects both on environmental and economic performance of a country and enable the transition to a more productive, more resource-efficient and less polluting economy.

In the household/residential sector, while not undermining the acceleration of new building requirements (i.e. deep renovations leading to nZEB consumption), any new instrument will be designed to be cost-attractive as well as implementable in market terms. Programmes with a fast market uptake (i.e. roof insulation, heat pumps, solar thermal) allowing both

comprehensive and stand-alone interventions shall be priorities. Linking these types of interventions in the household sector to the proposed Energy Efficiency Obligation Schemes will be considered in order to bridge the regulatory and financial gaps and to allow an upscale of the deemed beneficiaries.

In the service sector targeted sub-sectors for tailored initiatives are proposed to be the tourism and the industry food, diary, tobacco sector, while as far as the public sector is concerned emphasis should be given to hospitals and energy efficiency upgrade of street lighting. Since the latter is primarily under the responsibility of municipalities and communes, targeted schemes would need to be designed to empower and/or support local government to programme, procure and implement such measures, while a priority should again be given to the mobilisation of private capital through light energy performance contracting.

Moreover, MECI, with technical assistance from SRSS completed two studies, one by JRC and one by GIZ, which looked into the barriers that hinder the development of the ESCO market in Cyprus. These, given the results of these studies, such as the preparation of template tender studies provide a list of solutions, measures and actions that can be taken in order to overcome these barriers. Targeted and well-designed actions will be taken documents as standard procedures for procuring ESCO projects in public sector. More actions will include capacity building, targeted trainings, information workshops and events for removing barriers that impede the uptake of energy performance contracting and the implementation of energy efficiency investments in general

Ministry of Energy, Commerce and Industry is working together with the Department of Spatial Planning and Housing to revise the existing requirements that qualify a building to receive an extra 5% building factor. These requirements are examined to go beyond requirements for NZEB at least for new buildings.

The Directive 2018/844/EU amending Directive 2010/31/EU on energy efficiency of buildings has to be transposed to national legislation by March 2020. As a result, new measures will be implemented in the building sector and onwards. The most notable ones are:

a) Setting measurable progress indicators in building renovation
b) Integration of electro-mobility infrastructure in build environment
c) Smart readiness indicator for buildings
d) Promotion of building automation and control systems in heating and cooling systems

As far as concerns the agricultural sector the focus will be mainly given to higher penetration of RES systems for heating and cooling, achieving relative significant savings in terms of primary energy use and avoided cost of imported fuel, while also the adoption and support of an energy audit scheme could allow the identification of some significant cost efficient energy saving potential that could be addressed under tailored design national programmes either for specific sub-sectors (e.g. wineries) or agricultural process activities (e.g. greenhouses, drying). Given the poor knowledge on RES and energy efficiency potentials and technologies along the agricultural value chain all measures will need to be accompanied by awareness raising and training activities.

The transport sector, while exhibits a reference high potential for savings, due to existing and persistent modal shift patterns and overall infrastructure constraints is expected to perform quite modestly in terms of energy savings in the decade up to 2030. Action will focus on modifying the vehicle taxes to accelerate the penetration of higher efficient cars and light commercial vehicles, soft measures to promote a modal shift towards public, e-mobility and

other alternative transport modes. To accelerate the uptake of e-mobility public funding the charging infrastructure and/or other regulatory measures for the set-up of charging infrastructure to enable the development of a free and competitive market will be considered, however only after a certain satisfactory level of cost-efficiency for these infrastructure investments is reached.

Finally, using the European Structural and Investment Funds in the new Programming Period 2020 – 2026, under the "Greener low carbon Europe" thematic priority, actions to promote energy efficiency and the use of renewable energy sources will be promoted. It expected that 30% of the resources available from the European Regional Development Fund, which are expected to be 30% of € 225 to € 250 million, should be allocated to the above thematic priority.

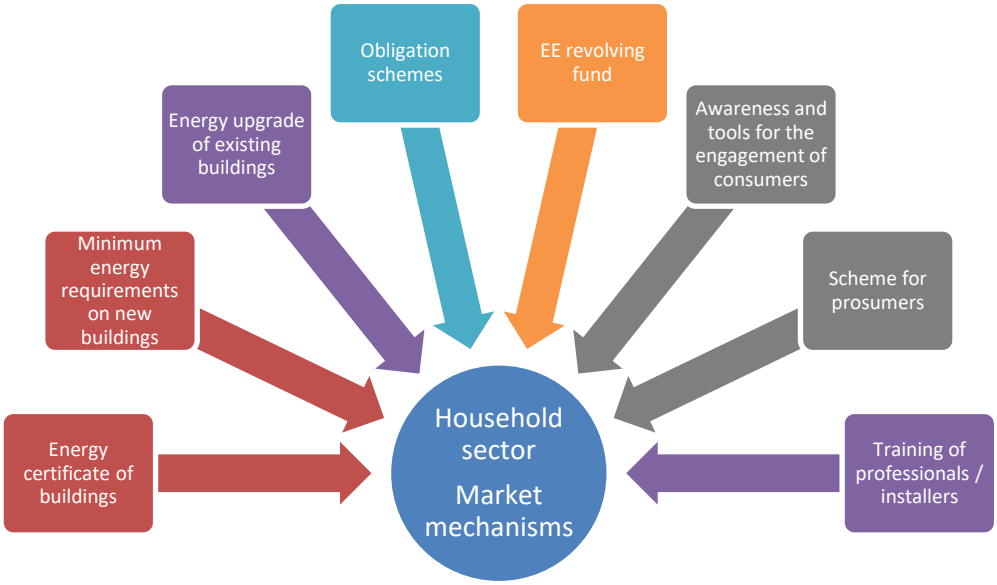

Figure 2. Overview of policies for the household sector

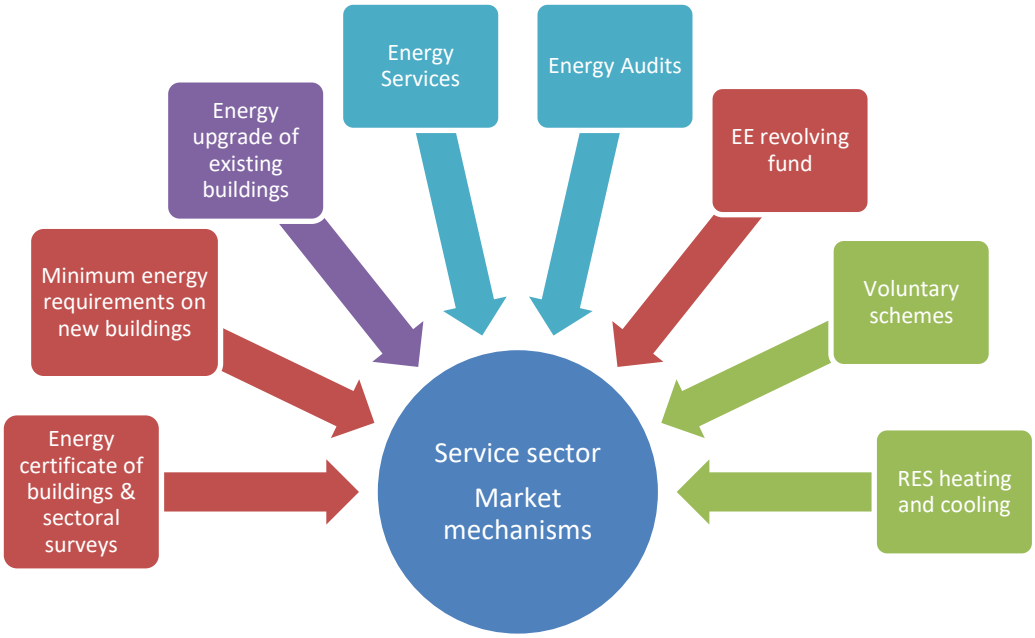

Figure 3. Overview of policies for the service sector

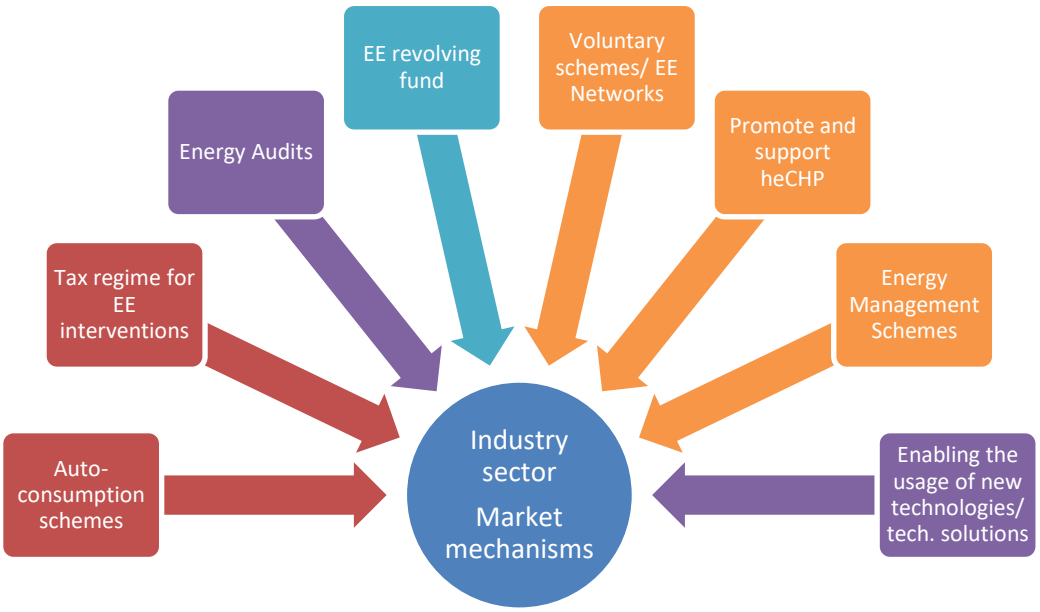

Figure 4. Overview of policies for the industry sector

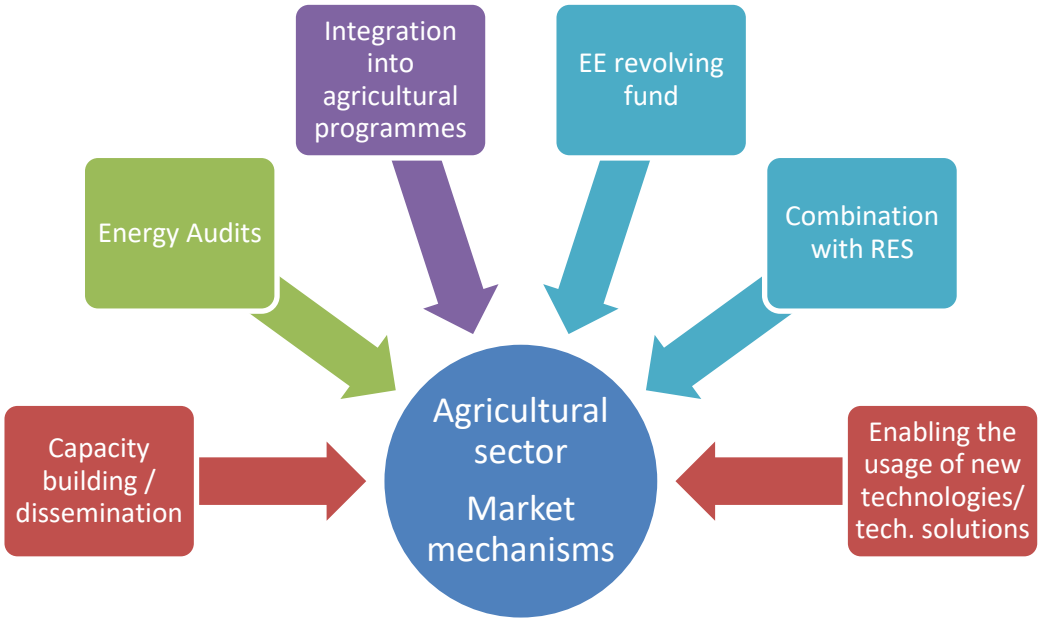

Figure 5. Overview of policies for the agricultural sector

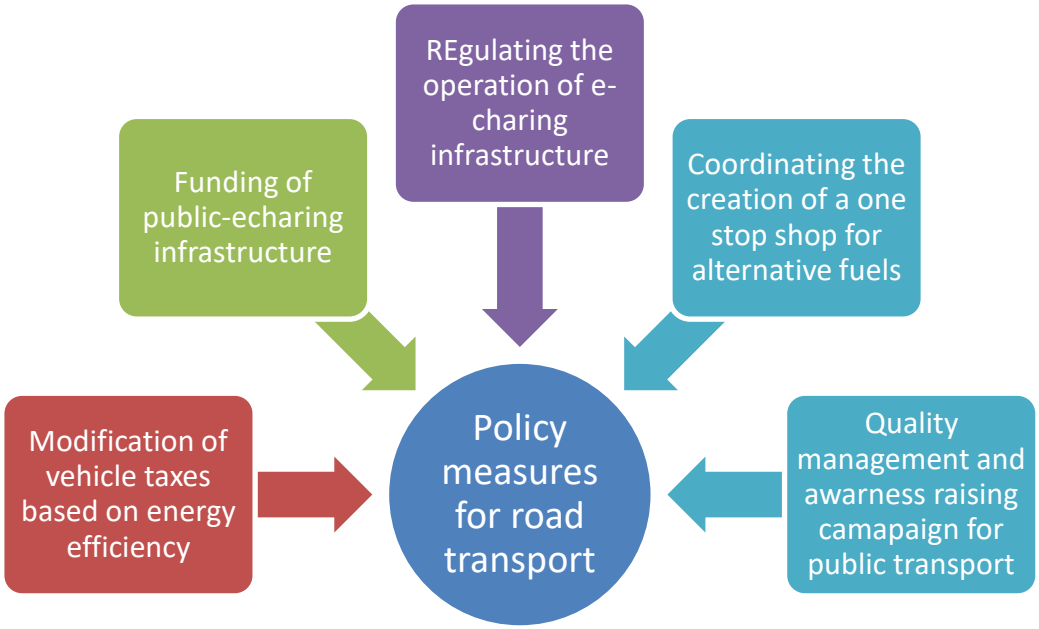

Figure 6. Overview of policies for the transport sector

TRANSPORT

In 2016, road transport emissions contributed 23% of the total national emissions excluding LULUCF (Kythreotou and Mesimeris, 2018). The emissions from road transport increased by 68% compared to 1990. According to information from the International Road Federation, Cyprus has the highest car ownership rate in the world with 742 cars per 1,000 people. Other means of transport are very low compared to other countries: 3% public transport and less than 2% bicycle (Ministry of Communications and Public Works, 2010).

In addition to the importance for emissions, transport is an issue of particularly great interest to the society of Cyprus, due to the very large growth of the number of privately owned cars and the associated problems in traffic that are experienced, especially in the capital, Nicosia. Even though many studies have been completed since the 1990s on how to deal with traffic in the urban areas of Cyprus and especially Nicosia, only recently action has been taken and measures are being implemented.

Policies and measures that have already been adopted and are planned aim to reduce the energy consumption of road transport sector contributing to the achievement of the indicative national energy efficiency target and the long-term union greenhouse gas emissions commitments consistent with Paris Agreement. One of the main efforts is to decrease the modal share of vehicles by 30%, increase the modal share for the public transport trips by 20% and of pedestrians and cyclists by 20%, expecting to lead to more than 10% reduction of the consumption of energy from road transport sector by 2030. The adoption of appropriate measures has led to the increase of the use of energy efficient vehicles and vehicles with low or zero GHG emissions, although there is still significant potential for energy efficiency improvement of the sector. The deployment on alternative fuels infrastructure will contribute to the penetration of alternative fuels in transport sector, especially alternative fuels with low or zero GHG emissions. Another target is the share of renewables to the energy consumption of road transport sector to be at least 10% by 2020, contributing to the GHG reduction and the diversification of energy mix of the transport sector. This target is continuing after 2020 and becoming stricter for 2030.

Policies and Measures

The energy intensity in the transport sector of Cyprus is among the highest in the EU, mainly due to the large percentage of road transport operations. However, there has been a remarkable improvement in this sector in recent years. The increase of the energy efficiency of private vehicles and the import of smaller and more efficient cars have led to better results although public transport in Cyprus is not adequately developed. The transport sector, along with the electricity generation and building sectors, is one of those sectors that offer a significant potential for energy efficiency improvement.

Actions such as improvement of infrastructure for further encouragement of use of public transport, cycling and walking and financial incentives to encourage new vehicles with low or zero emissions and discourage the use of vehicles with high emissions, can reduce the emissions of one of the most important sectors in Cyprus.

In particular, the increase of the modal share for the bus trips to 20% and the modal share of pedestrians and cyclists to 20% by 2030, will be achieved by the development and implementation of measures, such as high quality public transport services, zero or near zero emission zones, improvement of cycling and pedestrian facilities, effective parking policy, measures to promote the use of sustainable modes of transport and discouragement of the use of the passenger car and introduction of a tram system in Nicosia. Furthermore, the possibility of setting up a railway system linking the main urban areas should be further exploited.

According to the 2013 (Amending) Law on Motor Vehicles and Road Traffic, which entered into force on 1 January 2014, the annual circulation tax for each category M1 motor vehicle and the annual circulation tax for each category N1 motor vehicle, resulting from a category M1 motor vehicle and classified under the category of light lorry (VAN type), is calculated on

the basis of the carbon dioxide emissions of the vehicle. In addition, as from 1 January 2014, category N2 and N3 vehicles (lorries) and M2 and M3 vehicles (buses) are registered in so far as they have been proven to comply with the 'EURO VI' requirements on the emission of pollutants.

A revision of the vehicle taxes and annual circulation taxes in order to promote the further use of low emission vehicles, including zero emissions vehicles (ZLEVs) has been prepared by amending the Motor Vehicles and Road Traffic Law. The proposed legislation is expected to enter into force in the first quarter of 2019.

The launch of the 4th Old Vehicle Scrapping and Replacement Scheme was announced on 11th of October 2010, whereas the scheme was implemented in 2011. Applications were admitted for a period of 2 months with final date on 13th of December 2010. The 4th Scheme related to the payment of a grant equal to EUR 1 800 and covered the scrapping of M1 category motor vehicles, older than 15 years old, under the condition that a new car with CO2 mass emissions lower or equal to 165gr/km would be purchased.

The new public transportation system was put into force in the second half of 2010. The new bus operators replaced part of their vehicles with new ones that have low fuel consumption and pollutant emissions, as compared to the old vehicles that were replaced. The Ministry of Transport, Communications and Works has recently installed a telematics system that manages the bus services and records data for further optimization of the Public transport system. The related website and mobile application contain a detailed map of the routes and the timetable of buses in order to facilitate passengers in real time.

New bus concessions are planned to be put in force in 2020 and will further improve the public transportation system. The increase of the use of buses that have low or zero GHG emissions will be implemented by applying the following:

- Additional Cost for the Tenderer to convert their bus fleet to Compressed Natural Gas (CNG), when such fuel source is available in Cyprus and the prerequisites for doing so exist.
- Additional Cost for the Tenderer to provide Electric Buses (maximum capacity 22 persons) in Historic City Centres of Nicosia, Limassol, Larnaca, Paphos and Famagusta (Paralimni & Agia Napa).
- The tenderer may submit a variant to their standard offer (of 10-year contract period), showing amortisation over a longer period – not exceeding 15years – for supplying a fleet with vehicles (buses) operating with electric energy, which are more expensive than the usual diesel buses, and will require further significant investments on charging stations in depots and key locations, but contribute towards a cleaner environment. To consider such a variant, all vehicles shall be electric and the tenderer will carry out a detailed feasibility study taking into account all costs (including vehicle and infrastructure cost).

The introduction of environmental fees for the use of the road network by 2030 is a revenue generating measure that will discourage the use of cars and also provide a source of funding for implementing the other proposed measures. This measure will be implemented by actions, such as applying congestion charges in the city centres, toll charges applied initially to HGV on Motorways to be extended later to other roads and vehicle types, increasing the taxes for fossil fuels and increasing the parking charges and penalties for illegal parking.

The enhanced planting of trees along streets and strategic road corridors is another measure that reduces the CO2 amount of the atmosphere. Benefits include shading, ambient temperature reduction, CO2 absorption (up to 22 000 tonnes/year), and better conditions for walking and cycling.

In the context of the implementation of EU Regulation (EC) No 1222/2009 on the labelling of tyres with respect to fuel efficiency and other essential parameters, delegated inspectors of the Energy Department perform market surveillance checks in order to identify cases of non-compliance with these provisions. In addition, presentations on energy savings in the transport sector and on eco-driving are made in the context of the seminars addressed to unemployed engineers of all specialisations organised by the Energy Department and the Productivity Centre, with the support of the Human Resources Development Authority of Cyprus.

2.3.2. Sectoral policies and measures: Industry

The New EU F-gas Regulation adopted in 2014 and applies from 1 January 2015, aims among others in preventing emissions of F-gases from existing equipment by requiring leakage checks, proper serving and recovery of the gases at the end of the equipment's life. For the full implementation of this regulation in Cyprus a proper recovery system needs to be setup and used in Cyprus. Given the high GWP of the F-gases, and their increasing contribution to the national emissions, it is considered crucial for proper recovery to be implemented within the following years.

Under the provisions of Art. 9 of Regulation 517/2014/EC, on fluorinated greenhouse gases, without prejudice to existing Union legislation, Member States shall encourage the development of producer responsibility schemes for the recovery of fluorinated greenhouse gases and their recycling, reclamation or destruction. Cyprus has recently adopted and harmonized the above Regulation into Cypriot Law 62(I)/2016 and 46(I)/2017. The next step is to forward a national Law regarding a producer's responsibility scheme. The main provision of this Law will follow the "polluter pays" principle and each producer will have to participate in an appropriate scheme for management of f-gases that have been recovered for any reason.

At the same time, under the provisions of the same scheme, certified technicians will be encouraged to return to the scheme any fluorinated gases the have recovered, for a pre-decided profit.

Competent authority
Department of Environment, Ministry of Agriculture, Rural Development and Environment
Other involved authorities
-
Type
Legislative, compulsory
National legislation
Fluorinated greenhouse gases Law (No. 62(I)/2016 and 46(I)/2017)
Relevant EU legislation
Regulation on fluorinated greenhouse gases 517/2014
Measures towards attainment
- Implementation of "polluter pays" principle; each producer will have to participate in an appropriate scheme for management of f-gases that have been recovered

2.3.3. Sectoral policies and measures: Agriculture

Anaerobic digestion technology may help to address two congressional concerns that have some measure of interdependence: development of clean energy sources and reduction of greenhouse gas emissions. Anaerobic digestion, as a way of converting biomass to energy, has been practiced for hundreds of years. It is a technology that helps to reduce waste, generate energy and cut down on carbon emissions. The general performance of anaerobic digesters and the diversity of wastes which they can treat have been increasing steadily as a result of new reactor design, operating conditions, or the use of specialised microbial consortia, during the last decades. In Cyprus there are currently operating more than 10 anaerobic digesters, of which the majority is at large animal farms. All available studies show that there is a great potential in Cyprus to further promote anaerobic digestion for the treatment of waste with high organic content.

Even though anaerobic digestion is not clearly stated in the European or national legislation, the technology is preferred by large animal farms to comply with the terms stated on the wastewater and air emissions permits. The technology is strongly promoted by the Department of Environment, especially for the large installations that fall under the Industrial Emissions directive. Relevant national legislation that encourages the promotion of anaerobic digestion is (a) the Control of Water Pollution (Waste Water Disposal) Regulations 2003, Κ.Δ.Π. 772/2003; (b) the Control of Water Pollution (Sensitive Areas for urban waste water discharges) Κ.Δ.Π. 111/2004. It is a voluntary measure which is expected to increase. Therefore it is considered important to further promote the use of anaerobic digestion for the treatment of animal waste.

2.3.4. Sectoral policies and measures: Waste

With the EU Landfill Directive being the main guiding force, in combination to the improvement of the infrastructure of the country, Cyprus has developed and implementing during the recent years the National Municipal Waste Management Plan of 2015-2021 which is currently undergoing a major revision[10]. The implementation of the strategy is the responsibility of the Department of Environment.

The National Municipal Waste Management Plan of 2015-2021 (MWMP) contains quantitative and qualitative targets and enumerates specific measures and actions to be taken in order for the EU targets to be reached. One of the quantitative target is that no more than 95,000 tonnes of biodegradable waste to be disposed in landfills (represents the 35% target of the 1999/31/EC directive). Also the Legal Measures will be focused on the:

- Development of local waste prevention and management schemes
- Mandatory obligation for establishing separate collection systems by local authorities,
- Establishment of extended producer responsibility (EPR) in streams other than packaging waste,
- Establishment of a landfill tax/levy,
- Banning the disposal of certain waste streams from entering into landfills (e.g. green waste, high calorific value waste, etc.)

The adaptations of the strategy that are envisaged:

a) One Sanitary Landfill and one Residual Sanitary Landfill (supplementing MBT unit at Koshi) were constructed and operated (both meet the requirements of directive

[10] The final plan is expected to be available at the end of 2019

99/31/EC). The MBT unit was constructed and operated from 01/04/2010 serving Larnaca - Ammochostos districts. The Plant was designed in a way that a high separation of recycled and biodegradable material is achieved. Another I.W.M.P (Integrated Waste Management Plant) serving Limassol district is expected to be operated by the year 2018.

b) The construction of the Green Point Network (22 collection points for the depositing of various waste streams out of households – bulky waste, green, textile, furniture, WEEE, etc.) is competed. The 4 Green Points, serving Paphos district are operated and the rest expected to be operated by 2018.
c) Separate collection at source was promoted at households, from the existing collective system for the packing waste serving also and all types of paper, created under the packaging directive while the competent authority promotes the separate collection from other household streams such as other organic waste e.g. food and green waste.
d) The construction works for the rehabilitation/restoration of the old non approved landfills, which are closed at Paphos and Larnaca - Ammochostos districts, were completed. The preparation of studies/documents regarding the rehabilitation/ restoration of the 20 non sanitary landfills of Nicosia district and the 44 sanitary landfills of Limassol district will be completed within 2018 and after that the construction works will begin.

A comprehensive study was undertaken in 2005 for the elaboration of a Strategic Plan, an Environmental study and a Feasibility study for the restoration and management of landfills. The purpose of the study was to record all landfills, assess their status and level of risk, create a restoration priority list based on pollution risk assessments, and undertake the appropriate environmental studies as well as feasibility studies for the restoration of the prioritised landfills. These studies were a necessary step for the restoration of all landfills recorded.

Two (2) landfills are still active in Cyprus but arrangements are made in order to be closed and restored. According to recent data, these two landfills are fed with approximately 155,000 ton and 200,000 ton of municipality waste each year respectively (reference year 2012).

Sixty two (62) non sanitary landfills are planned to be restored appropriately within the following years. According to the preliminary study contacted in 2005, these landfills contain approximately 597,269 m3 of solid waste excluding 2 major landfills that have not been closed yet.

Fifty three (53) landfills have been restored the last five years and are being monitored. During their restoration a total of 4,902,000 m3 of solid waste were reallocated and properly buried using composite liners and leakage collection systems.

The key features of the strategy that have been included in the GHG reduction Policies and Measures are the following:

- Reduction of waste to solid waste disposal sites from sorting at production level
- Reduction of organics to landfills
- Increase of amount of organic wastes treated by composting
- Promotion of anaerobic digestion for the treatment of the organic fraction of the municipal solid waste

An additional measure considered and not included in the solid waste management strategy is biogas recovery from old landfills, during their restoration.

2.3.5. Sectoral policies and measures: Forests

The island has already been affected by climate change and consequently the forests suffer by the prolonged droughts which put the forest ecosystem under serious water stress and high fire risk.

The Department of Forests adopts and applies actions aiming to the adaptation of forest stands (natural and artificial) to climate change. The strategic intention "Protection of the environment and promotion of resource efficiency" is achieved through the protection of forests from fires, overgrazing, human interventions and other biotic and abiotic factors that affect them. Additionally, these actions contribute to the reduction of greenhouse gas emissions and increase carbon sequestration. These actions can be grouped into three main areas as listed in the Statement of Forest Policy:

b) Protecting forests against forest fires,
c) Adaptation of forests to climate change and enhancing the contribution of forests in addressing climate change and improvement of main forests and forested areas,
d) Improvement and expansion of forests.

The above actions include the following measures:

a) Maintenance and improvement of biodiversity in forests. In particular, the conservation of biodiversity is enhanced by the protection of flora and fauna and the protection and restoration of their habitats,
b) Protection of forests from illegal logging: The implementation of Law 139 (I) / 2013 acts as a tool to control most of the available firewood locally and apply criminal penalties for any illegal or uncontrolled logging and / or disposal of the local timber market without authorization,
c) Reforestation of Amiantos (asbestos) Mine as well as restoration of abandoned mines in cooperation with the Competent Authorities (the Department of Geological Survey and the Mines Service),
d) Protection of forests and enhancement of their structure and resistance to climate change through the Rural Development Program 2014 – 2020.

In particular, through the Rural Development Program 2014 - 2020, a number of activities and actions have been promoted under Measure 8 (Investments in forest area development and improvement of the viability of forests). The Action 8.5.3 includes thinning operations in dense forest stands, with the purpose of improving the structure of forests, the adaptation of forest stands to climate change, the reduction of emissions and increase the absorption of greenhouse gases. The implementation of targeted thinning is expected to improve stability and resilience to other disturbances, such as drought, increase of temperature and prolonged heat waves (as a result of climate change).

Additionally the Department of Forests participates in European and International co-funded projects (LIFE+, Interreg etc.) which aim to protect threatened species and ecosystems from the impacts of climate change and succeed their adaptation and sustainable management.

2.3.6. Sectoral policies and measures: Businesses

A new financial support scheme is currently in development that is planned for implementation for 2020 to 2022, to encourage business to take measures towards their reduction of greenhouse gas emissions. The scheme started as an initiative, "Business4Climate" through which the Cyprus Employers and Industrialists Federation, the

Cyprus University of Technology and the Department of Environment of the Ministry of Agriculture, Rural Development and Environment, aimed to commit businesses to more actively involved in climate action by reducing their greenhouse gas (GHG) emissions by 8% until 2030 through a voluntary commitment. Currently there are 64 signatories.

2.4. Information on planned additional national policies and measures envisaged with a view to limiting greenhouse gas emissions beyond Cyprus' commitments under Decision 406/2009/EC and in view of the implementation of an international agreement on climate change (MMR Art. 13(1)(d))

There are no planned additional national policies and measures envisaged with a view to limiting greenhouse gas emissions beyond Cyprus' commitments under Decision 406/2009/EC.

2.5. Information on the extent to which the Cyprus' action constitutes a significant element of the efforts undertaken at national level as well as the extent to which the projected use of joint implementation, of the CDM and of international emissions trading is supplemental to domestic action in accordance with the relevant provisions of the Kyoto Protocol and the decisions adopted thereunder (MMR Art. 13(1)(e))

Cyprus does not intend to use joint implementation (JI), the clean development mechanism (CDM) and international emissions trading (IET) under the Kyoto Protocol (the Kyoto mechanisms) to meet its quantified limitation or reduction commitment pursuant to the Kyoto Protocol - in meeting the 2013-2020 targets.

3. Projections (MMR Art. 14)

3.1. Introduction

This Chapter describes a “with measures” or “with existing measures” (WEM) scenario and a “with additional measures” (WAM) scenario concerning the national projections of greenhouse gas emissions by sources and their removals by sinks for the years 2020, 2030 and 2040. The “with measures” scenario assumes that no additional emission reduction policies and measures are adopted than the existing ones (implemented and adopted). The “with additional measures” scenarios assume the implementation of additional policies (planned). The two scenarios are presented in the following sections.

3.2. Projections

This section describes a “with measures” scenario (WEM), and a “with additional measures” (WAM) scenario concerning the national projections of greenhouse gas emissions by sources and their removals by sinks for the year 2040.

The “with measures” scenario assumes that no additional emission reduction policies and measures are adopted than the existing ones. The “with additional measures” scenario assumes the implementation of additional policies (planned). The three scenarios are presented in the following sections.

The resulting impact from the implementation of the policies and measures included are presented in Table 7 and Figure 7.

Some important issues that should be noted for these projections are the following:

a) The change noticed during the recent years in the types of HFCs used is not taken into consideration due to the high uncertainty associated to any prediction of such changes.
b) The emissions from the possible exploitation of natural gas in the Exclusive Economic Zone are not taken into account due to the high uncertainty associated to any prediction of such changes.
c) The organic fraction of solid waste not going to the landfill is treated by composting, anaerobic digestion and incinerated for energy. The additional organics for incineration at the cement installation have not been accounted for.
d) The municipal solid waste management strategy is currently undergoing a major revision, which is expected to be completed by the end of 2020. This revision in addition to the municipal solid waste management policies and measures to be implemented will also provide a revision of waste production projections.
e) LULUCF projections are not available and are therefore not taken into account in the present report.

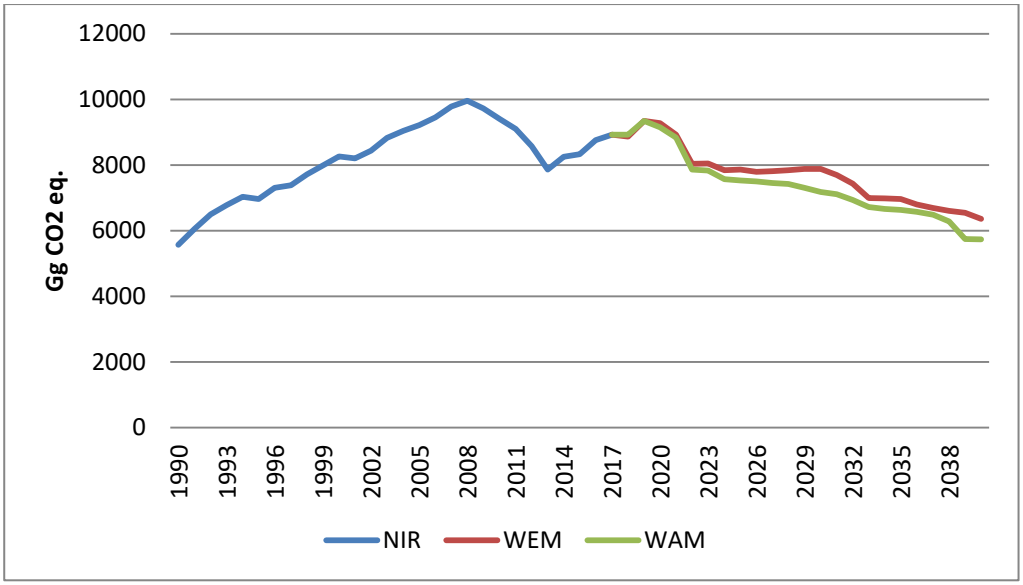

Figure 7. BaU, WEM and WAM Projections of total national GHG emissions (excluding LULUCF)

Table 7. Projections of national GHG emissions disaggregated by sector (excluding LULUCF)

	Sector	2020	2025	2030	2035	2040
WEM	Energy	6787	5450	5549	4698	4157
	IPPU	1420	1432	1442	1448	1454
	Agriculture	492	518	515	511	508
	Waste	493	446	363	289	226
	TOTAL	**9192**	**7845**	**7869**	**6947**	**6345**
WAM	Energy	6784	5192	4931	4470	3652
	IPPU	1419	1425	1428	1428	1427
	Agriculture	492	516	512	507	503
	Waste	450	395	305	223	151
	TOTAL	**9144**	**7528**	**7176**	**6628**	**5733**

3.3. Assessment of aggregate effect of policies and measures

The effect of currently implemented and adopted policies and measures (that are incorporated in the WEM projections scenario) is estimated at 2,433 in terms of GHG emissions avoided on a CO_2 equivalent basis in 2040, while the effect of planned policies and measures is 3,056 Gg CO2 eq. in 2040.

3.4. Progress in achievement of the ESD targets

Cyprus is committed to reducing its emissions in sectors covered under the Effort Sharing Decision (ESD, non-ETS) by 5% compared to 2005 emissions. The quantified annual reduction targets set by EU Decisions[11] for Cyprus are 5.92 million AEA in 2013, reducing to 3.97 million in 2020 (according to AR4 GWPs). The cumulative amount of AEAs for the period 2013-2020 is set at 40.0 Mt CO_2 eq. The annual allocation is presented in Table 8 and Figure 8.

[11] Commission Decision of 26 March 2013 on determining Member States' annual emission allocations for the period from 2013 to 2020 pursuant to Decision No 406/2009/EC of the European Parliament and of the Council (2013/162/EU) available at http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32013D0162; Commission Decision (EU) 2017/1471 of 10 August 2017 amending Decision 2013/162/EU to revise Member States' annual emission allocations for the period from 2017 to 2020 available at http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2017.209.01.0053.01.ENG

Table 8. Cyprus' ESD annual emission allocations (t CO_2 eq.) for the period 2013–2020, using GWPs calculated applying GWP from the AR4, according to Commission Decision 2017/1471

Year	Annual Emission Allocations (t CO_2 eq.)
2013	5 919 071
2014	5 922 555
2015	5 926 039
2016	5 929 524
2017	4 196 633
2018	4 122 837
2019	4 049 042
2020	3 975 247
TOTAL	**40 040 948**

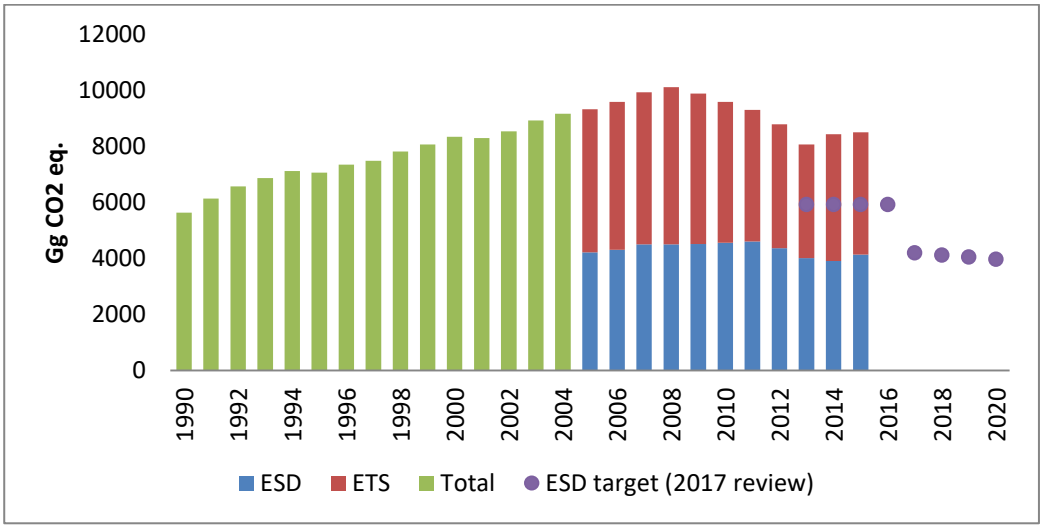

Figure 8. Cyprus' total greenhouse gas emissions for the period 1990-2016[12], including a breakdown of the emissions 2008-2015 in emissions under ETS and emissions under ESD (non-ETS) and the ESD target for 2013-2020 (Gg CO_2 eq).

3.5. With existing measures (WEM)

The measures included in the WEM scenario are presented in Appendix I. The activity data used for the calculations is presented in Appendix II. The methodologies applied are the same as those used for the preparation of the 2019 submission of National Greenhouse Gas emissions inventory of Cyprus to the UNFCCC[13]. The impact of the implementation of the PaMs on the emissions is presented in Table 9. The WEM projections by gas are presented in Table 10. Emissions based on the WEM scenario are projected to increase by 12% in 2040 compared to 1990 and reduce by 32% compared to 2005.

Table 9. Total WEM GHG emissions aggregated by source category (Gg CO2 eq.) 2017-2040

	2017	2020	2030	2040
ENERGY	**6602**	**6787**	**5549**	**4157**
1A1 Energy Industries	3300	3273	2083	1067
1A2 Manufacturing Industries and Construction	647	931	927	917
1A3a ii Domestic Aviation	1	1	1	1
1A3b Road Transport	2093	2048	2007	1728
1A3d ii Domestic water-borne navigation	2	2	2	3

[12] Based on the final inventory submission to the UNFCCC, May 2019: Kythreotou N. and T. Mesimeris, 2019, Cyprus National Greenhouse Gas Inventory 2019. May 2019, available at https://unfccc.int/documents/65701
[13] https://unfccc.int/documents/65701

1A4a Commercial / Institutional	93	92	80	67
1A4b Residential	365	335	341	263
1A4c Agriculture / Forestry / Fishing / Fish farms	85	85	84	80
1A5 Non-Specified	17	19	24	31
IPPU	**1269**	**1420**	**1442**	**1454**
2A1 Cement production	919	1065	1065	1065
2A2 Lime Production	3	4	6	6
2A4a Ceramics	13	13	13	13
2A4b Other Uses of Soda Ash	0.2	0.3	1	1
2D1: Lubricant Use	5	5	5	5
2D2: Paraffin Wax Use	0.1	0.1	0.1	0.1
2D3 Other	19	20	20	21
2F. Product uses as ODS substitutes	250	253	267	277
2G1b: Use of Electrical Equipment	0.2	0.2	0.2	0.2
2G3a: Medical Applications	6	6	6	6
2G3b: Propellant for Pressure & Aerosol Products	55	56	59	61
2G4: Other	0.01	0.01	0.01	0.01
AGRICULTURE	**495**	**492**	**515**	**508**
3A Enteric Fermentation	255	253	274	274
3B Manure Management	91	90	86	78
3B2.5 Indirect N2O emissions	28	28	30	31
3D1.1 Inorganic N fertilisers	37	37	37	37
3D1.2 Organic N fertilisers	65	65	69	70
3D1.4 Crop residues	2	1	1	1
3D2 Indirect N2O Emissions from managed soils	17	17	17	18
3F. Field burning of agricultural residues	0.3	0.1	0.1	0.1
3H Urea application	0.4	0.4	0.4	0.4
WASTE	**564**	**493**	**362**	**224**
4A Solid Waste Disposal	476	398	254	102
4B Biological Treatment of Solid Waste	6	9	10	12
4D1 Domestic Wastewater Treatment & Discharge	50	51	54	56
5D2 Industrial Wastewater Treatment & Discharge	31	35	44	55
WEM TOTAL (excl. LULUCF)	**8931**	**9192**	**7867**	**6343**

Table 10. Total WEM GHG emissions aggregated by gas (Gg CO2 eq.) 2017-2040

SECTOR	GAS	2017	2020	2030	2040
ENERGY	CO2	6515	6692	5459	4078
	CH4	22	25	25	22
	N2O	66	70	65	56
	HFCs	0	0	0	0
	SF6	0	0	0	0
IPPU	CO2	959	1106	1109	1110
	CH4	0	0	0	0
	N2O	61	62	65	68
	HFCs	250	252	254	249
	SF6	0.2	0.2	0.2	0.2
AGRICULTURE	CO2	0.4	0.4	0.4	0.4
	CH4	307	304	320	314
	N2O	188	188	194	193
	HFCs	0	0	0	0
	SF6	0	0	0	0
WASTE	CO2	0	0	0	0
	CH4	545	472	341	201
	N2O	19	21	23	24

	HFCs	0	0	0	0
	SF6	0	0	0	0
TOTAL	**CO2**	**7474**	**7798**	**6568**	**5189**
	CH4	**873**	**800**	**686**	**538**
	N2O	**334**	**341**	**347**	**341**
	HFCs	**250**	**252**	**254**	**249**
	SF6	**0.2**	**0.2**	**0.2**	**0.2**
	TOTAL	**8931**	**9191**	**7855**	**6317**

3.5.1. Directive 2003/87/EC and Decision No 406/2009/EC

The total ETS / ESD emissions for the WEM projections are presented in Table 11.

Table 11. ETS and ESD emissions according to the WEM scenario

		2017	2020	2030	2040
ENERGY	**ETS**	3795	4018	2821	1806
	ESD	2807	2769	2729	2352
IPPU	**ETS**	932	1077	1077	1077
	ESD	338	342	351	349
AGRICULTURE	**ETS**	0	0	0	0
	ESD	495	492	515	508
WASTE	**ETS**	0	0	0	0
	ESD	564	493	362	224
TOTAL	**ETS**	**4726**	**5095**	**3898**	**2883**
	ESD	**4204**	**4096**	**3956**	**3433**

3.5.2. WEM sensitivity analysis

Sensitivity analysis was not carried out for the GHG projections due to unavailability of reduction of emissions for all measures.

3.6. With additional measures (WAM)

The additional measures included in the WAM scenario are presented in Appendix I. The activity data used for the calculations is presented in Appendix III. The methodologies applied are the same as those used for the preparation of the 2019 submission of National Greenhouse Gas emissions inventory of Cyprus to the UNFCCC[14]. The impact of the implementation of the PaMs on the emissions is presented in Table 12. The WAM projections by gas are presented in Table 13. Emissions based on the WAM scenario are projected to increase by 3% in 2040 compared to 1990 and reduce by 37% compared to 2005.

Table 12. Total WAM GHG emissions aggregated by source category (Gg CO2 eq.) 2017-2040

	2017	2020	2030	2040
ENERGY	**6602**	**6784**	**4931**	**3652**
1A1 Energy Industries	3300	3273	1827	938
1A2 Manufacturing Industries and Construction	647	931	927	919
1A3a ii Domestic Aviation	1	1	1	1
1A3b Road Transport	2093	2048	1665	1401
1A3d ii Domestic water-borne navigation	2	2	2	3
1A4a Commercial / Institutional	93	91	75	48
1A4b Residential	365	333	325	231

[14] https://unfccc.int/documents/65701

1A4c Agriculture / Forestry / Fishing / Fish farms	85	85	85	81
1A5 Non-Specified	17	19	24	31
IPPU	**1269**	**1420**	**1442**	**1454**
2A1 Cement production	919	1065	1065	1065
2A2 Lime Production	3	4	6	6
2A4a Ceramics	13	13	13	13
2A4b Other Uses of Soda Ash	0.2	0.3	1	1
2D1: Lubricant Use	5	5	5	5
2D2: Paraffin Wax Use	0.1	0.1	0.1	0.1
2D3 Other	19	20	21	21
2F. Product uses as ODS substitutes	250	253	267	277
2G1b: Use of Electrical Equipment	0.2	0.2	0.2	0.2
2G3a: Medical Applications	6	6	6	6
2G3b: Propellant for Pressure & Aerosol Products	55	56	59	61
2G4: Other	0.01	0.01	0.01	0.01
AGRICULTURE	**495**	**492**	**512**	**503**
3A Enteric Fermentation	255	253	274	274
3B Manure Management	91	90	83	71
3B2.5 Indirect N2O emissions	28	28	31	33
3D1.1 Inorganic N fertilisers	37	37	37	37
3D1.2 Organic N fertilisers	65	65	69	69
3D1.4 Crop residues	2	1	1	1
3D2 Indirect N2O Emissions from managed soils	17	17	17	18
3F Field burning of agricultural residues	0.3	0.1	0.1	0.1
3H Urea application	0.4	0.4	0.4	0.4
WASTE	**564**	**450**	**303**	**150**
4A Solid Waste Disposal	476	355	196	30
4B Biological Treatment of Solid Waste	6	9	10	12
4D1 Domestic Wastewater Treatment & Discharge	50	51	54	56
5D2 Industrial Wastewater Treatment & Discharge	31	35	43	52
WAM TOTAL (excl. LULUCF)	**8931**	**9146**	**7188**	**5759**

Table 13. Total WAM GHG emissions aggregated by gas (Gg CO2 eq.) 2017-2040

SECTOR	GAS	2017	2020	2030	2040
ENERGY	CO2	6515	6689	4855	3588
	CH4	22	24	22	19
	N2O	66	70	55	45
	HFCs	0	0	0	0
	SF6	0	0	0	0
IPPU	CO2	959	1106	1109	1110
	CH4	0	0	0	0
	N2O	61	62	65	68
	HFCs	250	253	267	277
	SF6	0.2	0.2	0.2	0.2
AGRICULTURE	CO2	0.4	0.4	0.4	0.4
	CH4	307	303	318	311
	N2O	188	188	193	192
	HFCs	0	0	0	0
	SF6	0	0	0	0
WASTE	CO2	0	0	0	0
	CH4	511	429	282	127
	N2O	3	21	23	24
	HFCs	0	0	0	0
	SF6	0	0	0	0
TOTAL	**CO2**	**7474**	**7795**	**5964**	**4698**

	CH4	**839**	**757**	**622**	**457**
	N2O	**318**	**341**	**336**	**329**
	HFCs	**250**	**253**	**267**	**277**
	SF6	**0.2**	**0.2**	**0.2**	**0.2**
	TOTAL	**8880**	**9146**	**7190**	**5761**

3.6.1. Directive 2003/87/EC and Decision No 406/2009/EC

The total ETS / ESD emissions for the WEM projections are presented in Table 14.

Table 14. ETS and ESD emissions according to the WAM scenario

		2017	**2020**	**2030**	**2040**
ENERGY	**ETS**	3795	4017	2565	1677
	ESD	2807	2766	2366	1976
IPPU	**ETS**	932	1077	1077	1077
	ESD	338	343	364	377
AGRICULTURE	**ETS**	0	0	0	0
	ESD	495	492	512	503
WASTE	**ETS**	0	0	0	0
	ESD	564	450	303	150
TOTAL	**ETS**	**4726**	**5095**	**3643**	**2754**
	ESD	**4204**	**4051**	**3545**	**3005**

3.6.2. WAM sensitivity analysis

Sensitivity analysis was not carried out for the GHG projections due to unavailability of reduction of emissions by measures.

3.7. Information available to the public (MMR Art. 13(3) and Art. 14(4))

Assessment of the costs and effects of national policies and measures is available and presented in detail in the NECP[15].

National projections of greenhouse gas emissions by sources and removals by sinks along with relevant technical reports that underpin those projections, including descriptions of the models and methodological approaches used, definitions and underlying assumptions are available in the NECP accessible in English at the website of the Department of Environment[15].

[15] http://www.moa.gov.cy/moa/environment/environmentnew.nsf/All/C1AE50C8353E2D35C2257FF00034D1E0?OpenDocument

Appendix I. Existing and additional policies and measures (Summary Tables)

Renewable Energy Sources

Name of policy or measure	Main objective	Quantified objective	Short description (precise scope and modalities of operation)	Relevant Energy Union dimension(s) affected	Sector(s) affected	Union policy which resulted in the implementation of the PaM	Status of implementation	Implementation period
Support scheme for the production of electricity from renewable energy sources for own use Category A:Net-metering	Increase in renewable energy (Energy supply)		The implementation of the measure started in 2013 as national policy to promote RES electricity. Currently the Net-metering category is applied for small scale photovoltaic systems with capacity up to 10KW, for all consumers (residential and non-residential).The scope of the net-metering is to provide the option to residential and small commercial consumers to cover all or part of their electricity consumption from a PV.The generated RES electricity is subtracted from building's electricity consumption. Consumers pay only for the difference between the energy consumed and energy produced (net electricity used) plus a cost that reflects the cost of the electricity grid to support continuous supply and taxes (VAT, RES levy).	Decarbonization Energy security	Energy supply: electricity production Energy consumption : electricity in all end users (households, services, industry, agriculture)	RES directive 2009/28/EC	Adopted	2013-2024
Support scheme for the production of electricity from renewable energy sources for own use Category A:Net-billing	Increase in renewable energy (Energy supply)		The implementation of the measure started in 2018 as national policy to promote RES electricity and reduce the cost of electricity in the commercial and industrial consumers. Currently the Net-billing is applied for RES installation with power 10kW to 10MW of commercial - industrial entities. .The scope of the measure is to provide an option to medium and large scale electricity consumers to cover all or part of their electricity consumption from RES.The generated RES electricity that is not self-consumed is credit to the consumer in the respective purchase price of electricity from RES and that amount is subtracted from the cost of the electricity bough from the grid. Fees that reflects the cost of the grid to support continuous supply and taxes (VAT, RES levy) are applied.	Decarbonization Energy security	Energy supply: electricity production Energy consumption : electricity in commercial users	RES directive 2009/28/EC	Adopted	2018-2030
Self-consumption of electricity from renewable energy sources	Increase in renewable energy (Energy supply)		Self-consumption of RES electricity was introduced in 2013 in the Support scheme for the production of electricity from renewable energy sources for own use. In 2018 the net-billing category was introduced as an alternative option to self-consumption. Self consumption is applied to all commercial and industrial consumers. It cover the installation of RES systems with power 10kW to 10MW. The scope of the measure is to provide an option to medium and large scale electricity consumers to cover all or part of their electricity consumption from RES. In this cause the consumer get no credit for the generated RES electricity that is not self-consumed. Fees that reflects the cost of the grid to support continuous supply and taxes (VAT, RES levy) are applied. Based on the Governmental Regulation and the amendments of RED II Directive after 2020 no fees may applied to the self-consumed electricity. After 2025 the existing net-metering scheme maybe converted to self-consumption or net-billing scheme	Decarbonization Energy security	Energy supply: electricity production Energy consumption : electricity in commercial users	RES directive 2009/28/EC	Adopted	2013-2030

Stand alone RES systems	Increase in renewable energy (Energy supply)		A support scheme for the installation of Stand-alone PV and small wind generators was in operation from 2004. Until 2013 a grand was provided for such installations. Currently stand alone PV and biomass/biogas installations can by used from all consumers. The capacity of the system is based on the annual electricity consumption of the user.	Decarbonization Energy security	Energy supply: electricity production Energy consumption : electricity in commercial users	RES directive 2009/28/EC	Adopted	2004-2030
Installation of net-metering PV systems in houses of vulnerable consumers	Increase in renewable energy (Energy supply) Energy Poverty		Financial support of €900 per installed kW, with maximum grand amount €2700, is given for the installation of net-metering PV systems in houses of vulnerable consumers (families with low income, disability persons etc.).	Decarbonization Energy security	Energy supply: electricity production Energy consumption : electricity in houses of vulnerable consumers	RES directive 2009/28/EC	Adopted	2013-2020
Support scheme for the installation or replacement of solar water heaters in households	Increase the use of renewable energy in heating. Support the local industry		The measure provides a grand of €350 for the installation of a solar water heater and a grand of €175 for the installation/replacement of solar panels. The measure is in operation since 2004.	Decarbonization Energy security	Energy consumption : heating in households	RES directive 2009/28/EC	Adopted	2004-2020
Rural development programme 2014-2020 of the Ministry of Agriculture, Rural Development and Environment.	Support rural development		Subsidy is granted under the scheme for actions that involve purchasing and installing PV systems used to generate energy for own use in agricultural holdings/enterprises. Subsidy is also granted for purchasing energy storage systems.	Decarbonisation Energy security	Energy consumption Agriculture		Adopted	2016-2021
Support scheme for the installation of RES systems that will operate in the competitive electricity market	Increase in renewable energy (Energy supply)		The Scheme covers the installation of commercial plants producing electricity from Renewable Energy Sources (RES) that will participate in the competitive electricity market (expected to be operational in 2021). Up to one year after the operation of the competitive electricity market , the produced electricity from RES will be sold to the Electricity Authority of Cyprus at the respective purchase price of electricity from RES (avoidance cost). .The scheme allows the installation of commercial PV systems, wind parks, solar concentrated station, and biomass/biogas stations and wave energy systems. The Scheme opens for calls in 2016 and 2017 (until the end of April 2018). In the last call applications were submitted for a total capacity of 392MW, mainly for G11photovoltaic parks. (12.5MW wind park, 379 MW photovoltaic systems, 2.2MW biomass system)The first 120 MW have already been licensed. In the end of 2018 with a re-announcement of the Scheme, approvals will be given for more projects.	Decarbonisation Energy security	Energy supply: electricity production	RES directive 2009/28/EC	Adopted	2016-2022
Incentives for encouraging the use of RES in different types of developments.	Increase the use of renewable energy sources (Energy supply)		On 17 November 2014, the Minister for Interior issued an order under Article 6 of the Town and Country Planning Act setting out incentives and/or requirements for encouraging the use of RES in different types of developments. The order aims to create the conditions for encouraging natural and legal persons to produce energy from RES and concerns different types of developments. The incentive granted consists in increasing the building permit ratio, or in some cases the use of RES is a requirement for applicability of other incentives under the development plans.	Decarbonisation Energy security	Energy consumption	RES directive 2009/28/EC	Adopted	2014-2021

Certification of small-scale RES system installers	Training of RES system installers		From 2015 a certification scheme is available for installers of small scale (up to 30kw) biomass boilers and stoves, photovoltaic systems, solar thermal system, shallow geothermal systems and heat pumps. The candidates after the completion of their training and a success in a theoretical and practical examination can be registered in a registry of certified installers of RES systems of the Ministry of Energy, Commerce, Industry and Tourism	Decarbonisation	Other sectors: Training, Information	RES directive 2009/28/EC	Adopted	2015-2030
Research and innovation programs in the sector of RES	Research and Innovation		Participation in various Research programs regarding the implementation of CSP units, solar desalination, production of hydrogen from RES	Research, innovation and competitiveness	Energy supply, energy consumption transport		Adopted	2018-2030
Incentives for encouraging the use of RES in different types of developments & RES communities	Increase the use of renewable energy sources (Energy supply)		Installation of PV Systems in Public Schools up to 20kW with Net-metering,	Decarbonisation & RES	Electricity production & RES	RES directive 2009/28/EC	Adopted	2019-2021
Support scheme for the production of electricity from RES-Feed-in Tariffs for RES installations	Increase in renewable energy (Energy supply)		The operation of the FIT scheme started in 2004 as a national policy to get both environmental benefits and introduce the use of RES in electricity. the scheme provide a fixed selling price for each RES technology for a period of 15 or 20 years.RES feed-in tariffs was in dependence of RES type and unit capacity and was calculated for an internal return rate of 12%. In 2013 the selling price of the electricity from large scale photovoltaic parks (with total capacity 50MW) was set after a tender. The measure stop in 2013. Currently only existing plants may receive the feed-in tariff.	Decarbonization Energy security	Energy supply: electricity production	RES directive 2009/28/EC	Implemented	2004-2013
Support scheme for the promotion of renewable energy sources and energy saving	Increase the use of renewable energy		The measure was in operation from 2004 until 2013. Through the support scheme financial support was provided for the installation of solar water heater, solar space heating systems, geothermal systems and biomass heaters in residential and non-residential buildings. In 2015 operated the scheme 'Save & Upgrade' scheme for residential buildings and for enterprises, which provide financial support for the same installations	RES , Decarbonization , Energy Security	Energy consumption	RES directive 2009/28/EC	Implemented	2004-2020
Support scheme for the installation of net-metering photovoltaic systems with capacity up to 20KW, in public schools buildings.	Increase in renewable energy (Energy supply)		The measure provides the regulatory framework for the installation of 4.2 MW of photovoltaic systems in 428 public schools. The PV system will operate under the net-metering schema. Each PV system will have a power up to 20kW. The roof tops were PV will be installed will be thermally insulated.	RES, Decarbonization Energy security	Energy supply: electricity production Energy consumption : electricity in public buildings	RES directive 2009/28/EC	Adopted	2020-2021
Support scheme for storage units	Increase the use of renewable energy sources (Energy supply)		Support scheme for the installation of electricity storage units in national grid that will allow the further penetration of RES	Decarbonisation Energy security	Energy supply: electricity production	Electricity directive & 2018/2001/EC	Planned	2020-2030
Renewable Energy Communities	Increase the use of renewable energy sources (Energy consumption)		Implementation of an enabling framework to promote and facilitate the development of Renewable Energy Communities	Decarbonisation Energy security	Energy supply: electricity production Energy consumption : electricity in households and commercial users	Electricity directive & 2018/2001/EC	Planned	2020
Renewable Energy Communities	Increase the use of renewable energy sources (Energy supply)		Intallation of PV Systems in Governmentail budildings with the net-billing scheme.	Decarbonisation	Electricity production	RES directive 2009/28/EC & Building Directive 2010/32/EC	Planned	2019-2030

Improve forecasting modelling tool for Weather to Energy production	Reduce the Operating Reserves and increase the penetration of RES by reducing the curtailment level		The model will combine existing studies along with existing tools and forecasting models, in order to further improve the day to day operation for the System Operator	Reasearch and innovation	Energy Efficiency , Renewables, Security of supply, Internal Energy Market, Competitiveness	RES Directive, Electricity Law	Planned	2019-2021
Framework for Repowering of existing RES systems	Increase the use of renewable energy sources (Energy supply)		(Based on the new RES Directive 2001/2018/EC). All the plants that will have their licence expire they will let to participate in the Electricity Market (special rules may apply)	Decarbonization	RES targets & Electricity Production	RES directive 2009/28/EC & 2018/2001/EC	Provisional	2023-2030
Support Scheme for RES in order to promoto innovation and reduce CO2	Increase the use of renewable energy sources (Energy supply)		NER300 Scheme, 2 CSP projects were financed and 1 Project with Smart Grid and Storage	Research, innovation and competitiveness	RES targets & Electricity Production	RES directive 2009/28/EC & 2018/2001/EC	Provisional	2021-2022
Create localised tools for selecting the appropriate PV size and scheme	Educational		Software tool Developed for assisting both consultans and end users (http://www.mcit.gov.cy/mcit/EnergySe.nsf/All/312EB6608C682704C22582CF0025445D?OpenDocument)	Reasearch and innovation	Energy Efficiency , Renewables, Competitiveness	RES directive 2009/28/EC & 2018/2001/EC	Implemented	2019-2030
Statistical Transfer (RES)	Reach the Target in more economic way		Technical Assistance Requested from SRSS for 2020, use of platform for 2030	Decarbonization	Renewable Targets	RES directive 2009/28/EC & 2018/2001/EC	Planned	2020 & 2030
Energy Storage, Further analysis for both behind the meter and cental storage for further Penetration of RES	Inrease the Penetration of RES		http://www.stores-livinglab.eu/ & http://www.foss.ucy.ac.cy/pdf/highlights/StoRES%20Layman's%20Report%20-%20V4%20-%20Online%20version.pdf	Decarbonization	Renewable Targets & Energy Efficiency	RES Directive, Electricity Law	Implemented	2019-2020
Virtual net-meting	Increase the use of renewable energy sources (Energy supply)		Extend net-metering scheme, in order to give the opportunity to both hotels and multi-appartment building to install a PV system with net-billing scheme (since no space is available)	Decarbonization	Renewable Targets	RES directive 2018/2001/EC	Planned	2022-2030
Replacement of the conventional transport fuels with biofuels	Increase the consumption of renewable energy in transport sector in order to achieve the renewable energy targets.		According to the relevant decree, the suppliers of transport fuels (petrol and diesel) are obliged to blend biofuels to conventional transport fuels in order to achieve a certain target, which is percentage of biofuels to whole annual sales of petrol and diesel, in energy content.	Decarbonisation	Renewable Targets	RES directive 2009/28/EC & 2018/2001/EC	Implemented	2008-2030

Energy Efficiency

Name of policy or measure	Main objective	Quantified objective	Short description (precise scope and modalities of operation) - Scope, Actions taken, target group, how and when implemented, responsible for implementation	Relevant Energy Union dimension(s) affected	Sector(s) affected	Planned budget (euro)	Expected impact	Type of policy instrument	Union policy which resulted in the implementation of the PaM	Status of implementation	Implementation period	Projections scenario in which the PAM is included
Fiscally neutral green tax reform by increasing environmental taxes while reducing labor taxation	Indicative national energy efficiency target; Cumulative end-use energy savings	To promote energy efficiency	The Government is examining a fiscally neutral green tax reform, which can significantly contribute towards transition to an economically and environmentally sustainable development. A gradual implementation of environmental taxes to sectors (that are not subject to the EU Emissions Trading System) and at the same the reduction of other expenses related e.g to labor cost, is expected to lead to energy savings and will notable reduce the energy dependency of Cyprus.	Energy Efficiency, Decarbonization	Agriculture, Industry, Service, Transport, Households, Energy supply	Not applicable	Reduction of energy consumption	Fiscal	Energy Efficiency Directive 2012/27/EE	Provisional	2021-2030	with planned measures
Supporting scheme for energy efficiency investment using European Structural and Investment Funds 2021-2027	Indicative national energy efficiency target	49 ktoe of cumulative end use energy savings	The European Structural and Investment Funds in the new Programming Period 2021 – 2027, under the "Greener low carbon Europe" thematic priority, will include actions to promote energy efficiency and the use of renewable energy sources .	Energy Efficiency, Decarbonization	Agriculture, Industry, Service | SME Public sector Households	€ 95 million	Reduction of energy consumption	Economic	Energy Efficiency Directive 2012/27/EE	Adopted	2023-2027	with existing measures
Energy Fund of Funds providing soft loans for energy efficiency.s	Indicative national energy efficiency target	56.62 Ktoe of cumulative end use energy savings	The scope is to provide soft loan to cover the capital cost for implementing energy efficiency investments. Launching year expected the year 2020. Target group is households, SMEs and public sector. It will provide low interest loans. The PAM will be implemented by the National Government and local banks.	Energy Efficiency, Decarbonization	Agriculture, Industry, Service | SME Public sector Households	60 million up to 2023 , with projection for continuation after 2023	Reduction of energy consumption	Economic	Energy Efficiency Directive 2012/27/EE	Adopted	2021-2023	with existing measures
Energy efficiency Obligation scheme	Indicative national energy efficiency target; Cumulative end-use energy savings	100 ktoe of cumulative end use energy savings	Under the obligation schemes, energy suppliers must save a certain annual rate of their energy sales with additional energy efficiency projects. The obligation schemes will play a major role in helping to fulfil part of the mandatory target and is directly and indirectly linked with the achievement of primary energy saving target, RES and CO2 targets up to 2030.	Energy Efficiency, Decarbonization	Agriculture, Industry, Service, Transport, Households	Not applicable	Reduction of energy consumption	Regulatory	Energy Efficiency Directive 2012/27/EE	Adopted	2021-2030	with existing measures
Supporting Schemes through national Fund of Renewable Energy (RE) & Energy Conservation (EC) for promoting energy efficiency investments in Residential and Public sector and energy audits in SMEs	Indicative national energy efficiency target; Cumulative end-use energy savings	37.3 ktoe of cumulative end use energy savings	The policy measure concerns the various subsidy/financing schemes regarding energy efficiency measures that will be designed and operated the next years by the Management Committee of Renewable Energy and Energy Conservation Fund.	Energy Efficiency, Decarbonization	Households Service	37 million euro up to 2023, with projection for continuation after 2023	Reduction of energy consumption	Economic	Energy Efficiency Directive 2012/27/EE	Adopted	2020-2023	with existing measures
Promotion of energy Efficiency in enterprises, through voluntary agreements under the "Business for climate" initiative.	Indicative national energy efficiency target; Cumulative end-use energy savings	at least 250 businesses	Voluntary commitment from businesses to reduce their emissions by more than 8% by 2030. It includes specific commitment for improving their energy efficiency. The PAM will be implemented by Cyprus Employers & Industrialists Federation, Cyprus Energy Agency and the National Government.	Energy Efficiency, Decarbonization	Agriculture, Industry, Service	13.5 million up to 2023, with projection for continuation after 2023	Reduction of energy consumption	Voluntary	Energy Efficiency Directive 2012/27/EE	Planned	2021-2030	with planned measures
Additional floor space "allowance" for new buildings and buildings that are renovated	Indicative national energy efficiency target; Cumulative end-use energy savings	16.5 ktoe of cumulative end use energy savings	In the case of new buildings and buildings undergoing renovation, it is possible to increase the building rate by 5 % for energy class A building, and primary energy consumption will not exceed 50 (kwh / m2 year). The aim is to incentivize the construction or renovation of buildings that go beyond NZEB requirements.	Energy Efficiency, Decarbonization	Agriculture, Industry, Service, Households | Buildings	Not applicable	Reduction of energy consumption	Regulatory	Energy Performance of Buildings Directive 2018/844/EU	Implemented	2014 - onwards	with existing measures
uptake of energy efficiency services in public sector by removing procurement hurdles	Indicative national energy efficiency target	Currently not available	Templates and standard procedures for energy performance procurement in public sector will be prepared and disseminated to all public authorities. The PAM will be implemented by the National Government.	Energy Efficiency, Decarbonization	Service (Public Sector)	Currently not available	Reduction of energy consumption	Regulatory	Energy Efficiency Directive 2012/27/EE	Planned	2021-2030	with planned measures
Removing barriers that impede the uptake of energy performance contracting and the implementation of energy efficiency investments in general	Indicative national energy efficiency target; Cumulative end-use energy savings	Currently not available	Targeted training and other events to be provided to selected target groups, involved in energy efficiency (implementation and financing). The PAM will be implemented by the National Government in cooperation with other parties/agencies/organizations.	Energy Efficiency, Decarbonization	Agriculture, Industry, Service, Transport, Households, Energy supply	Not applicable	Reduction of energy consumption	Education	Energy Efficiency Directive 2012/27/EE	Planned	2021-2030	with planned measures

individual energy efficiency interventions and energy efficiency retrofits in selected governmental and municipal buildings through project funding and Interreg projects CYPRUS-GREECE	Indicative national energy efficiency target; Cumulative end-use energy savings	1.34 Ktoe of cumulative end use energy savings	Article 5 of Directive 2012/27/EU foresees that Member States are obliged to renovate annually 3% of the total area of buildings owned and used by central government authorities or to choose an alternative approach including other cost-effective energy-saving measures in selected privately-owned public buildings (including, but not limited to, deep renovations and measures to change the behavior of users) in order to achieve by 2020 an equivalent amount of energy savings. Cyprus for the period 2014-2020 adopted the alternative approach and same approach will be followed for the period 2021 – 2030.	Energy Efficiency, Decarbonization	Service (Public Sector)	1.68 million euro up to 2023	Reduction of energy consumption	Economic	Energy Efficiency Directive 2012/27/EE	Adopted	2020-2023	with existing measures
Implementation of measures aimed at attaining energy savings in existing public buildings (annual obligation)	Indicative national energy efficiency target; Cumulative end-use energy savings	22.19 Ktoe	Implementation of individual measures in the building shell, in heating and cooling equipment and energy efficiency retrofits, based on energy performance certificate. The PAM will be implemented by the National Government	Energy Efficiency, Decarbonization	Service (Public Sector)	15 million euro	Reduction of energy consumption	Economic	Energy Efficiency Directive 2012/27/EE	Implemented	2020-2023	with existing measures
Net billing Scheme for high efficiency cogeneration (HECHP)	Key electricity and gas transmission infrastructure projects	Available installed capacity 20MW	The net-billing scheme applies to commercial/industrial and public administration consumer categories for the installation of HECHP systems with the prime goal of covering their own consumption. The installed capacity of each net-billing system can be up to 5 MW. Launching year 2018	Energy Efficiency, Decarbonization	Industry, Service	Not applicable	Reduction of energy consumption	Regulatory	Energy Efficiency Directive 2012/27/EE	Implemented	2018 onwards	with existing measures
Pilot projects for installing high efficiency cogeneration in public buildings	Key electricity and gas transmission infrastructure projects	two pilot projects	The general hospital of Nicosia and the University of Cyprus were selected to install and operate HECHP in order to cover part of their energy needs.	Energy Efficiency, Decarbonization	Service (Public Sector)	1,2 million euro	Reduction of energy consumption	Education	Energy Efficiency Directive 2012/27/EE	Adopted	2019-2023	with existing measures
Minimum energy performance requirements for new and existing buildings, requirements for technical building systems installed in	Indicative national energy efficiency target	All new and existing buildings	All new and existing buildings, except those described in the Annex to the Regulation on the Energy Performance of Buildings Law (Law 142(I)/2006) must satisfy the minimum energy performance requirements established by a relevant decree adopted by the Minister for Commerce, Industry and Tourism.This measure arises from Cyprus' obligation to implement the Buildings Directive concerning the energy performance of buildings. The purpose of the measure is described in the wider purpose of applying the Directive concerned.	Energy Efficiency, Decarbonization	Households Service	Not applicable	Reduction of energy consumption	Regulatory	Buildings Directive	Implemented	2009-onwards	with existing measures
Minimum energy performance requirements for new buildings - revised	Indicative national energy efficiency target	All new dwellings	All new dwellings, except those described in the Annex to the Regulation on the Energy Performance of Buildings Law (Law 142(I)/2006) must satisfy the minimum energy performance requirements established by a relevant decree adopted by the Minister for Commerce, Industry and Tourism. This measure arises from Cyprus' obligation to implement the Buildings Directive concerning the energy performance of new buildings. The purpose of the measure is described in the wider purpose of applying the Directive concerned.	Energy Efficiency, Decarbonization	Households	Not applicable	Reduction of energy consumption	Regulatory	Buildings Directive	Adopted	2020-onwards	with existing measures
Energy efficiency obligation in public purchases and national green public procurement action plan	Indicative national energy efficiency target	not available	'Green public procurement' (GPP) means that environmental factors are taken into account in entering into (public) contracts for buying products, services or works falling within the scope of the two Coordination of Public Procurement Procedures Laws , with a view to ensuring continued progress in environmental performance, by reducing environmental impacts and maintaining economic sustainability.	Energy Efficiency, Decarbonization	Service (Public Sector)	Not applicable	Reduction of energy consumption	Regulatory	Energy Efficiency Directive 2012/27/EE	Implemented	2007 - onwards	with existing measures
Implementation of soft measures (information campaigns, trainings, workshops, etc).	Indicative national energy efficiency target; Cumulative end-use energy savings	5 ktoe of cumulative end use energy savings	The Ministry of Energy, Commerce and Industry (MECI), places particular emphasis on providing people with information on energy issues, with a view to increasing awareness among citizens and among different professionals. For this purpose, MECI in cooperation with other bodies organise every year, workshops associated with Energy Saving training seminars , energy efficiency awareness campaigns, development of and energy savings tool for citizens, lectures at schools, distribution of leaflets on energy efficiency issues, awareness for taking behavioural changing measures in public sector etc.In addition, MECI participates in the annual 'Save Energy' exhibition organised by Cyprus Employers and Industrialist Federation and distributes material concerning ES and RES technologies and through Facebook, Twitter and YouTube accounts promote, among other things, ES and RES.	Energy Efficiency, Decarbonization	Agriculture, Industry, Service, Households | Buildings	1.67 million euro	Reduction of energy consumption	Education	Energy Efficiency Directive 2012/27/EE	Adopted	2021-2030	with existing measures
RES and Energy Conservation fee (tax)applied on electricity.	Indicative national energy efficiency target; Cumulative end-use energy savings	93.3 ktoe of cumulative end use energy savings	From 2021 onwards it is expected that energy consumption fee (i.e. the contribution to the RES and Energy Efficiency National Fund) that is paid by all consumers of electricity, will be maintained at least to an average value of 0,8 Eurocents/kWh. Compared to the minimum electricity tax level of 0,1 Eurocent per kilowatt-hour foreseen in Directive 2003/96/EC, the RESEE fee leads to higher retail prices of electricity. Energy savings due to this taxation exceeding the minimum EU levels is taken into account, as energy tax imposed for energy	Energy Efficiency, Decarbonization	Agriculture, Industry, Service, Transport, Households	Not applicable	Reduction of energy consumption	Fiscal	Energy Efficiency Directive 2012/27/EE	Implemented	2021 onwards	with existing measures
Energy efficient street lighting	Indicative national energy efficiency target; Cumulative end-use energy savings	10.32 ktoe of cumulative end use energy savings	The measure consists in replacing existing lamps / lighting fixtures lighting systemsin public roads with new, more efficient ones. The measure concerns the replacement of existing lamps with more efficient ones in the national highway that is under the responsibility of Department of Electromechanical Services, as well as, in local roads that are under the responsibility of the municipalities	Energy Efficiency, Decarbonization	Service (Public Sector)	15,3 million euro based on current data	Reduction of energy consumption	Economic	Energy Efficiency Directive 2012/27/EE	Adopted	2018 - 2023	with existing measures
Technical guidance promotion of NZEB and electronic tool kit for consumers	Indicative national energy efficiency target; Cumulative end-use energy savings	To increase public awareness	By having this information consumers can decide for the most beneficial option for their energy related products	Energy Efficiency, Decarbonization	Service	Not applicable	Reduction of energy consumption	information	Energy Efficiency Directive 2012/27/EE	Implemented	2018 - onwadrs	with existing measures

Energy efficiency in electricity infrastracture	Indicative national energy efficiency target	To reduce grid losses	This measure aims to decrease system losses and lead to substantial energy savings in the distribution system by upgrading the medium nominal voltage of 11kV to 22kV. This will require designing new transmission/distribution substations at 22 kV of nominal voltage, upgrading switchgear and other equipment e.g. transformers operating at 11kV, planning to switch from 11kV to 22kV where the equipment is already upgraded to 22kV but operation is still at 11kV. This measure was indicated by the assessment that was undertaken to evaluate the energy efficiency potentials of the electricity infrastructure in Cyprus (Art. 15(2) of the EED).	Energy Efficiency, Decarbonization	Electricity Sector	Currently not available	Reduction of power losses in transmission and distribution systems	Regulatory	Energy Efficiency Directive 2012/27/EE	Implemented	2016- 2030	with existing measures
Measures promoting the installation of small-scale renewable energy technologies on or in buildings	Indicative national energy efficiency target; Cumulative end-use energy savings	To promote the self consumption of RES energy produced on or in the building	The implementation of this measure reduces energy purchased by the final customers where small-scale renewable energy technologies are installed.	Energy Efficiency, Decarbonization	Agriculture, Industry, Service, Transport, Households	Not applicable	Reduction of energy consumption	Regulatory	RES Directive and Energy Efficiency Directive 2012/27/EE	Implemented	2015-2030	with existing measures
Energy efficiency in electricity infrastracture	Indicative national energy efficiency target	To increase power generation efficiency	Increase of energy efficiency in electricity generation due to the increase of efficiency and the switching of the fuel to natural gas	Energy Efficiency, Decarbonization	Electricity Sector	Not applicable	Reduction of energy consumption	Planning	Energy Efficiency Directive 2012/27/EE	Implemented	last quarter of 2021	with existing measures
Efficient district heating and cooling	Indicative national energy efficiency target; Cumulative end-use energy savings	10 ktoe of primary energy savings	Development of efficient district heating and cooling infrastructure based upon RDF fired cogeneration technologies in tourist areas.	Energy Efficiency, Decarbonization	Service sector	90 million euro	Reduction of energy consumption	Economic	Energy Efficiency Directive 2012/27/EE	Provisional	2029	with planned measures
Energy efficiency in water sector	Indicative national energy efficiency target; Cumulative end-use energy savings	4.3 Ktoe of cumulative end use energy savings	Promotion of measures i in water sector (including production, cleanign, pumping, desalination etc) that will acheive end use savings	Energy Efficiency, Decarbonization	Service sector, defence sector and industry	Currently not available	Reduction of energy consumption	Planning	Energy Efficiency Directive 2012/27/EE	Planned	2021-2030	with planned measures
Advanced Metering Infrastructure Plan	Indicative national energy efficiency target; Cumulative end-use energy savings	10.32 ktoe of cumulative end use energy savings	The measure concerns the gradually installation of 400,000 electricity smart meters on building stock of the country between the period 2021-2027	Energy Efficiency, Decarbonization	Agriculture, Industry, Service, Households	Currently not available	Reduction of energy consumption	Regulatory	Energy Efficiency Directive 2012/27/EE	Adopted	2021-2027	with existing measures
Excise tax on road transport fuels exceeding the minimum levels as required in Directive 2003/96/EC.	Indicative national energy efficiency target; Cumulative end-use energy savings	199.6 ktoe of cumulative end use energy savings	Energy savings from taxation measures exceeding the minimum levels of taxation applicable to fuels as required in Directive 2003/96/EC are taken into account, as energy taxes imposed for energy efficiency. Excise tax on road transport fuels to be exceeding the minimum levels of taxation applicable to fuels as required in Directive 2003/96/EC and its possible amendment, at least at levels of 2019 (the national taxation for unleaded petrol and automotive diesel to exceed the EU minimum taxation to at least 0,07 Euros/litre)	Energy Efficiency, Decarbonization	Agriculture, Industry, Service, Households, Transport	Not aplicable	Reduction of energy consumption	Fiscal	Energy Efficiency Directive 2012/27/EE	Adopted	2014-onwards	with existing measures
Vehicle excise duty based on CO2 emissions.	Indicative national energy efficiency target; Cumulative end-use energy savings	4.07 ktoe of cumulative end use energy savings	This measure relates to the tax imposed on vehicles with a view to reducing CO2 emissions, which has been in force since 2014. The latest amendment to the Motor Vehicles and Road Traffic Law (Law N.47(I)/2019) has revised the method of calculating the motor vehicle registration fees beyond the CO2 parameter. More specifically, higher fees are now charged for vehicles emitting more than 120 g/km. Furthermore, an additional fee is included based on the 'Euro' technical specifications of vehicles.	Energy Efficiency, Decarbonization	Transport sector	Not applicable	Reduction of energy consumption	Economic, Fiscal, Planning, Regulatory	Energy Efficiency Directive 2012/27/EE	Adopted	2012-onwards	with existing measures
Old vehicle scraping scheme and financial incentives for the purchase of electric vehicles	Indicative national energy efficiency target; Cumulative end-use energy savings	To promote further the use of low emission vehicles, including zero emissions vehicles (ZLEVs).	Incentives for the purchase and use of low/zero emission vehicles including the old vehicle scraping scheme and financial incentives for the purchase of electric vehicles that was announced in late 2019. This scheme will come into force in 2020.	Energy Efficiency, Decarbonization	Transport sector	€3,000,000.	Reduction of energy consumption	Economic, Fiscal, Planning, Regulatory	Energy Efficiency Directive 2012/27/EE	Adopted	2020	with existing measures
Installation of charging points and infrastructures for electric vehicles	Indicative national energy efficiency target; Cumulative end-use energy savings	In order to promote the electric vehicle and the deployment of the relevant infrastructure.	The Electricity Authority of Cyprus has deployed a total of 19 recharging stations accessible to the public in Cyprus: 7 charging stations in Nicosia, 5 in Limassol, 2 in Larnaca, 2 in Ammochostos and 3 in Paphos. Furthermore, the Department of Electromechanical Services is proceeding to the installation of 10 high charging stations in highways and public roads.	Energy Efficiency Decarbonisation	Transport sector	€ 1,000,000	Reduction of energy consumption	Economic, Fiscal, Planning, Regulatory	Energy Efficiency Directive 2012/27/EE	Adopted	2018	with existing measures
New Bus Contracts 2020-2030	Indicative national energy efficiency target; Cumulative end-use energy savings	• Lower CO2 emissions by newer and more environmentally friendly engines • More comfortable buses that could increase ridership • More modern, practical, physically attractive and technologically improved buses that can increase ridership	This measure will be implemented via specific requirements within the new bus operators' contracts that will come to force in 2020. More specifically, based on the new contracts, it is required that the average age of any PT operator's bus fleet drops to 10 years for the contract period 2020-2030. At the moment, on a national level, the average age of the public bus fleet is approximately 17 years and it is therefore expected that extensive renewal of the fleet will be undertaken to meet these requirements. This measure will be implemented by including specific requirements within the new bus operators' contract such as: • Additional Cost for the Tenderer to Convert their bus fleet to Compressed Natural Gas (CNG), when such fuel source is available in Cyprus and the prerequisites for doing so exist. The proposal should be identifying, but not costing, the number of CNG Fuel Stations; • Additional Cost for the Tenderer to provide Electric Buses (maximum capacity 22 persons) in Historic City Centres • May submit a variant to their standard offer (of 10 year contract period), showing amortisation over a longer period – not exceeding 15years – for supplying a fleet with vehicles (buses) operating with electric energy, which are more expensive than the usual diesel buses, and will require further significant investments on charging stations in depots and key locations, but contribute towards a cleaner environment.	Energy Efficiency Decarbonisation	Transport sector	€ 550,000,000, Cost of bus fleet renewal will be covered by the private companies that will take over the new bus contracts between 2020-2030 In detail the estmated value of the bus contacts by region: Nicosia: € 180,000,000 Limassol : € 140,000,000 Larnaca: € 80,000,000 Paphos: € 60,000,000 Famagusta: € 60,000,000 Intercity: € 30,000,000	Reduction of energy consumption	Economic, Fiscal, Planning, Regulatory	Energy Efficiency Directive 2012/27/EE	Adopted	2020-2030	with existing measures

Installation of telematic system in public bus fleet	Indicative national energy efficiency target; Cumulative end-use energy savings	Further optimisation and improvement of the public transport system. The related website and mobile application contain a detailed map of the routes and the timetable of buses in order to facilitate passengers in real time.	The Ministry of Transport, Communications and Works has installed, a telematic system that manages the bus services and records data for further optimisation of the public transport system. The related website and mobile application contain a detailed map of the routes and the timetable of buses in order to facilitate passengers in real time. This action was completed in 2018 and its cost was approximately €7,000,000, including maintenance for 5 years.	Energy Efficiency Decarbonisation	Transport sector	€7,000,000, including maintenance for 5 years.	Reduction of energy consumption	Economic, Fiscal, Planning, Regulatory	Energy Efficiency Directive 2012/27/EE	Adopted	2018	with existing measures
Shift of modal share from car trips to sustainable modes of transport – Implementation of Sustainable Urban Mobility Plans	Indicative national energy efficiency target; Cumulative end-use energy savings	Shift of modal share from car trips to Sustainable modes of transport - Sustainable Urban Mobility Plan actions/measures. The modal share for cars in Cyprus is currently over 90% and the modal share target for 2030 (75% car, 13% public transport, 12% walking/ cycling) is set as a national target in the Sustainable Mobility Plans and the National Strategic Plan	Target of Modal share of all modes of transport are set/will in the Sustainable Urban Mobility Plans and the National Strategic Plan Actions/ measures and include: • Significantly improved bus service (routes, frequency, hours of operation) • Upgrading of infrastructure for pedestrians, cyclists and public transport • Development and implementation of a holistic parking policy • Configuration of zero or low emission zones • Promotion of a tram system in Nicosia • Development and implementation of high-quality public transport corridors for other cities .	Energy Efficiency Decarbonisation	Transport sector	**€ 1,338,000,000** **Total Infrastructure and Operation / Maintenance Costs from 2020-2030 (Excludes existing public transport operating costs which add up to € 550,000,000 for 10 years)** The total cost includes: - Capital infrastructure cost for SUMP measures = € 55,000,000 per year (10 years) - Capital infrastructure cost for Nicosia Tram € 216,000,000 - Operating cost (Excl. revenues for Nicosia Tram € 11,000,000 per year (2 years from 2028) - Cost of improved Public Transport € 55,000,000 per year (10 years)	Reduction of energy consumption	Economic, Fiscal, Planning, Regulatory	Energy Efficiency Directive 2012/27/EE	Planned	2020-2030	with additional measures (phase B)
Use of buses with low or zero emissions	Indicative national energy efficiency target; Cumulative end-use energy savings	Use of low or zero emission buses – According to the impact assessment of the energy department a 7.3% share of electric buses can be achieved by 2030	• Complementary measure of limited scope • Incorporation into the terms of the new public transport contracts • Harmonization and implementation of European Directives and the 'Clean Vehicles Directive' etc. • Provide more incentives for tourist buses to convert to renewable energy sources engines .	Energy Efficiency Decarbonisation	Transport sector	• Cost per vehicle and cost of infrastructure from new bus contracts and private sources • Natural penetration of technology due to technological improvements and European /National Directives	Reduction of energy consumption	Economic, Fiscal, Planning, Regulatory	Energy Efficiency Directive 2012/27/EE	Planned	2020-2030	with additional measures (phase B)
Use of vehicles with low or zero emissions	Indicative national energy efficiency target; Cumulative end-use energy savings	Use of low or zero emission vehicles – According to the impact assessment a 11% share of passenger vehicles and 10% of electric trucks can be achieved by 2030	• Harmonization and implementation of European Directives and the 'Clean Vehicles Directive' etc • Addintional Incentives to use low/zero emission vehicles .	Energy Efficiency Decarbonisation	Transport sector	€3,000,000 per year for additional incentives to use low/zero emission vehicles • Natural penetration of technology due to technological improvements and European /National Directives	Reduction of energy consumption	Economic, Fiscal, Planning, Regulatory	Energy Efficiency Directive 2012/27/EE	Planned	2020-2030	with additional measures (phase B)

Internal Energy Market

Name of policy or measure	Main objective	Quantified objective	Short description (precise scope and modalities of operation)	Relevant Energy Union dimension(s) affected	Sector(s) affected	Planned budget (Euro Million)	Type of policy instrument	Union policy which resulted in the implementation of the PaM	Status of implementation	Implementation period
Electricity Interconnectivity of Cyprus	Transfer of Electricity with benefits for: - Security of Supply - Market Integration - Decarbonisation and Increased RES penetration		EuroAsia Interconnector is a future cross border interconnector between Crete, Cypriot, and Israel Transmission Systems via the world's longest submarine HVDC power cable.HVDC onshore converter stations with rated capacity of either 2000 or 1000 MW will be located at the connection points.It is a leading Project of Common Interest of the European Union and also priority Electricity Highway Interconnector Project. The Interconnector is an energy highway bridging Asia and Europe.	Energy security, Internal energy market, Decarbonisation	Transmission of Electriticy	€1,5 billion	Economic,regulatory and planning	Regulation (347/2013/EC), Regulation on the Governance of the Energy Union and Climate Action 2018/1999	Adopted	Expected completion dates for the 1st stage (1000 MW), as submitted to ACER (Progress report for Projects of Common Interest (PCIs) Cyprus - Crete 31/12/2023 Cyprus - Israel 31/12/2023
Development of natural gas network pipeline infrastructure in Cyprus	The transportation of natural gas to power stations	Security of supply and market integration.	The project involves the development of natural gas network pipeline infrastructure network from the regasification facility in Vasilikos area to the three Power Plants (Vasilikos, Dhekelia and Moni) and the three IPPs	Energy security, Internal energy market, Decarbonisation	Energy sources for Power generation					The target date for the completion of the entire network is 2023/2024
Cyprus TSO Ten Year Network Development Plan 2019-2028 according to Article 63 of the Laws for the Regulation of the Electricity Market from 2003 to 2017.	The development and the secure operation of the Transmission Network in the years 2019-2028	Criterion n-2 for the backbone network, Criterion n-1 for the rest of the network circuits and the transmission power transformers.	The Transmission TYNDP (T-TYNDP) analyses the investments to be carried out during the ten year period between 2018 and 2027 for the development and the secure operation of the transmission electricity system. The TYNDP takes into consideration the total yearly demand forecast for the period 2016-2025 as well as the maximum forecasted demand for each transmission substation. The TYNDP is implemented by the Transmission System Owner.	Energy Security, Internal Energy Market	Transmission System	243.9	Planning	Directive 2009/72/EC concerning common rules for the internal market in electricity	Adopted	2019-2028
Regulatory Decision 05/2017 on the Implementation of a Binding Schedule for the Full Implementation and Operation by the DSO of the Meter Data Management System (MDMS).	Access of new Suppliers to the electricity market.	n/a	MDMS enables the registration and entry of the meters in a particular registry. The meter readings of all consumers are registered and communicated to respective suppliers. Manages the supplier switching process.	Distribution, Supply	Electricity Supply	18.7	Regulatory	Directive 2009/72/EC concerning common rules for the internal market in electricity	Adopted	2019-2020
Regulatory Decision 02/2018 on the Implementation of a Binding Schedule for the Mass Installation and Operation by the DSO of Advanced Metering Infrastructure (AMI).	Observability, monitoring, data recovery and electrical energy and power measurements.	Roll out of 400 000 smart meters by 2027.	AMI offers the necessary observability, monitoring and recoverability of data and measurements of electric energy and power at the customer's connection point. AMI increases the accuracy of load and demand forecasting, improves the system analysis, enables the load and demand management and in effect the optimisation of the operation of the Distribution System. AMI aids at managing EV Charging, PV System management and generation monitoring, optimisation of RES generation forecasting, maximises RES penetration, enables remote DSO operations (connections/ disconnections, meter reading), aids at the reduction of non-technical losses.	Internal Energy Market	Rights of Electricity Customers	75-80	Regulatory	Directive 2009/72/EC concerning common rules for the internal market in electricity , Energy Efficiency Directive 2012/27/EU	Adopted	2021-2027
Ministerial decision that dedicates MECI as National Competent Authority (NCA). NCA is responsible to implement all the nesessary actions in order to achieve real priority status for PCIs in public sector.	Efficient and fast administrative processing of PCIs' application files through streamlining of Public Permitting Procedures and bureaucracy		Priority status in Ministries and other authorities involved in the permitting process of PCIs is a necessity. For that reason, a variety of legislative and non-legislative measures are in place in order to sipmlify and accelerate the permitting granting process for PCIs.	Energy Security, Internal energy market, Decarbonisation	Electricity supply/generat ion		Regulatory, Education-Information	Regulation (347/2013/EC), chapter III, article 7	adopted	
Ministerial decision that dedicates MECI as NCA. NCA is responsible to ensure the transparency and public participation before and during permit granting process and publish a manual of procedures applicable to projects of common interest.	Public Consultation and Participation Plan for PCIs		At the start of the permit granting process, the Project Promoter has to submit a concept for public participation. For each PCI the Project Promoter or the NCA have to carry out at least one public consultation before the submision of the final and complete application file.	Energy Security, Internal energy market, Decarbonisation	Electricity supply/Gas supply/Power generation		Regulatory, Education, Information	Regulation (347/2013/EC), chapter III, article 9	adopted	
Ministerial decision that dedicates MECI as NCA. NCA is responsible to develop the NCAs' website "OneStopShopPCIs".	Increase efficiency and transparency and help enhance cooperation among Member States.	The MECI budget 2019 includes budget provisions 50000€ for the design of the website.	The website will provide licensing and internal administration procedures for supporting Energy Investors.	Energy security, Internal energy market, Decarbonisation	Electricity supply/Gas supply/Power generation		Regulatory, Education, Information	Regulation (347/2013/EC)	adopted	
MoU between the countries of Cyprus, Greece, Israel and Italy (05/12/2017, Nicosia).	Acceleration of the implementation of EastMed Pipeline	Regional cooperation	Memorandum of Understanding between Cyprus, Greece, Israel and Italy for the EastMed pipeline project. It is a legal measure that will accelerate the implementation of EastMed Pipeline.	Energy Security, Internal energy market, Decarbonisation	Gas supply/Power generation		Regulatory	Regulation (347/2013/EC)	Implemented	
Ministerial Decision for the establishment of the trilateral cooperation sectretarirat, on 21/11/2018 (Cross Border collaboration between Cyprus, other Member States and third countries involved in the PCIs)	Accelerate PCIs' implementation		The trilateral cooperation of Cyprus, Greece and Israel is necessary for the assesment of PCIs' Cross Border Environmental Impact Assesment but also for permitting purposes. Close collaboration between Govermental Authorities, NRAs, NCAs, Transmission System Operators for Gas and Electricity of Cyprus, Greece and Israel can accelerate the implementation of PCIs.	Energy Security, Internal energy market, Decarbonisation	Electricity supply/Gas supply/Power generation		Regulatory		Implemented	

Financial assistance for the Preparation of the Natural Gas Market in Cyprus-Cynergy programme	Import of NG in Cyprus market		New legislation for natural gas, studies for the use of natural gas in sectors like industry, transportation.	Energy Security, Internal energy market, Decarbonisation	Gas supply/Power generation		Regulatory, Education, Information	Regulation 347/2013/EC, Chapter V, article 14	adopted	
Financial assistance of PCIs	Grant of financial assistance for PCIs to accelerate Investment in the field of Trans-European Networks - (PCIs)		In relation to the EU support, PCIs have received grants from CEF for studies and works. Project Promoters will submit new requests for grants in the future CEF calls.	Energy Security, Internal energy market, Decarbonisation	Gas supply/Electricity supply/Power generation		Economic and fiscal measures.	Regulation (347/2013/EC) Regulation 1316/2013	adopted	
Regulatory Decision 01/2017 on the Implementation of a Binding Schedule for the Full Commercial Operation of the New Electricity Market Model.	Introduce Forward, Day Ahead, Intraday and Balancing Market with a Contingency Reserve to operate a competitive electricity market in Cyprus and to aid in the increase of the share of renewable energy sources to the electricity balance.	The participation in the electricity market of (1) 212.5MW of RES Generation, (2) IPPs with a total licensed capacity of 500MW, (3) 4 licensed independent Suppliers.	The introduction of Forward and Day-Ahead Markets and at a later stage an Intraday market in order to allow for new RES, IPPs and Suppliers to compete in generating and supplying electricity to final customers. Forward market is based on bilateral over the counter trading between suppliers and generators. The incumbent's bilateral prices will be fixed at its Wholesale Regulated Tariff. Day-Ahead Market will be centrally operated by the TSOC (who is also the Market Operator), obligatory for conventional generators for their available capacity not contracted in the Forward Market or allocated to cover Replacement Reserve. The energy offer cap will be Administratively Defined by the Regulator. The minimum energy offer by the incumbent is equal to its generator's minimum variable cost. Integrated Scheduling Process will be used for preallocating balancing activation instructions to Balancing Responsible Parties (before real time Balancing) and procuring frequency ancillary services (FCR, aFRR, mFRR). ISP may modify the Unit Commitment (GUC). Schedule.Real time Balancing inherits ISP GUC. Dispatch instructions will be issued by the TSOC during real time balancing.	Internal Energy Market	Competition in the electricity market	5 to 8	Regulatory	Recast Electricity Directive and Regulation (Draft)	Adopted	2019-2021
Regulatory Decision on Storage Systems that are installed before the metering point.	Amend the TSRs and TDRs to allow the participation of storage systems that are installed before the metering point in the electricity markets.	n/a	The (draft) Regulatory Decision permits the participation in the electricity market of licensed storage systems installed before the meter that are not combined with consumption of energy locally and calls the TSOC to amend the Market and Network Rules to enable their non-discriminatory participation in the market. The TSOC should also define the minimum capacity and technical characteristics of a storage system to be able to participate in the electricity market as a dispatched unit. The (draft) Regulatory Decision also calls the TSOC, in cooperation with the DSO, to take into consideration when drafting the Transmission - TYNDP any developments regarding the provision of services by storage systems in combination with the rate of RES development, the benefits due to loss reduction, investment avoidance and/or upgrading of the network and/or the Transmission and Distribution Substations. The Transmission TYNDP should also include storage systems before the metering point. The Regulatory Decision calls the TSOC to amend Market and Network Rules in order to allow for the provision of services by storage systems related to the operation of the transmission and distribution systems, to suggest network charges applicable during their charging cycle in the case that such systems offer services to the TSOC and/ or DSO related to the operation of the transmission and/or distribution system.	Internal Energy Market	Participation of RES in the Electricity Market	n/a	Regulatory	Recast Electricity Directive and Regulation (Draft)	Planned	2020
Amend the national law to enable operation of the electricity market and make the Market Operator/TSO independent from the vertically integrated electricity company	Enable the operation of the electricity market and make MO/TSO independent financially and organizationally (management, human resources) independent from the incumbent EAC.	n/a	The amending Bill makes all necessary legislative changes to allow for the operation of the Net-Pool market electricity model. The Net-Pool market model is in compliance to the EU Target Model.The Bill introduces the category of "Aggregators" to allow for the combination of load and energy, including energy from storage systems. It also creates the category of "Storage Systems" and allows for the licensing of aggregators, storage systems and BRPs. The Regulator is authorized to decide on simplified licensing procedures for self-consumption, RES, suppliers and non-connected generation systems. Strengthens clauses related to the Distribution System Owner, Distribution System Operator. Foresees for the independence of the Cyprus TSO from the incumbent by providing to the former the necessary resources and autonomy in decision making related to its budget and personnel. Provides for a certification process for the TSO independence. Broadens the duties and responsibilities of the TSO to include Market Operation and provides to the MO/TSO the authority to enforce Market Rules. Strengthens clauses related to the Transmission TYNDP. The Bill also concentrates previously scattered clauses on Universal Service under a dedicated Article.	Internal Energy Market	Competition in the electricity market	n/a	Regulatory	Recast Electricity Directive and Regulation (Draft)	Planned	2019

Amend Trade and Settlement Rules and Transmission and Distribution Rules to allow for Demand Response in the market according to Art. 15(8) Directive 2012/27/EU	Participation of Demand Response in the Day Ahead Market and the Balancing and Ancillary Services Markets.	n/a	Technical modalities will be defined in order for the national law, as harmonized with Article 15(8) of the Directive, to be applied in practice.	Internal Energy Market	Competition in the electricity market	n/a	Regulatory	Recast Electricity Directive and Regulation (Draft)	Planned	2020
Minesterial Order (no. K.D.P. 289/2015) regarding the energy poverty, the categories of vulnerable customers of electricity and the measures to be taken to protect such customers.	Protection of vulnerable customers of electricity		Based on the provisions of Directive 2009/72/EC that «each Member State shall define the concept of vulnerable customers which may refer to energy poverty and, inter alia, to the prohibition of disconnection of electricity to such customers in critical times..», the Minister of Energy, Commerce, Industry & Tourism, after consultation with the Cyprus Energy Regulatory Authority (CERA) and the Minister of Labour, Welfare and Social Insurance, has issued an Order (no. K.D.P. 289/2015) regarding the energy poverty, the categories of vulnerable customers of electricity and the measures to be taken to protect such customers. The Order determines the categories of vulnerable consumers of electricity. Additionally, the above Order defines the measures to protect vulnerable categories of electricity customers as follows: (a) reduced prices on electricity tariffs (special electricity tariff 08) which is based on a Ministerial Decision (no. K.D.P. 286/2016) (b) financial incentives (depending on the available budjet) for installing a net-metering Photovoltaic system (c) financial incentives (depending on the available budjet) for upgrading the energy efficiency of their houses (d) safeguarding the continuous supply of electricity, during critical periods, to those vulnerable consumers that uninterrupted power supply is essential for reasons related to their health	Internal Energy Market	Vulnerable customers of electricity	(a) special electricity tariff: approximetely 3 m per year. In accordance with the Law, the reduced revenues of the Electricity Authority of Cyprus (EAC) from the application reduced tariff of with Code 08, should be recovered by the EAC in a proportionate way from all electricity customers. (b) financial incentives (depending on the available	(a)economic,regulatory (b)economic (c) economic (d) regulatory	Based on the provisions of Directive 2009/72/EC that «each Member State shall define the concept of vulnerable customers which may refer to energy poverty and, inter alia, to the prohibition of disconnection of electricity to such customers in critical times..»,	implemented	(a) since 2006 (b) since 2013 (c) since 2014 (d) since 2015
NCA has accepted the EuroAsia Interconnector application file for the starting of the statutory permit grantng procedure	Implementation of EuroAsia Interconnector-end the electricity isolation of Cyprus	Achievement of the interconnection target of 15% in 2030	The statutory permit granting procedure is the second phase of the permit granting process that leads to the comprehensive decision for the construction of the project. During that phase every involved authority has to examine the permiting application fast so as the comprehensive decision is taken before the end of 2020.	Internal Energy Market	Electricity supply/generation		Regulatory	Regulation (347/2013/EC), chapter III, article 10	Implemented	November 2019 - December 2020

Energy Security

Name of policy or measure	Main objective	Quantified objective	Short description (precise scope and modalities of operation)	Relevant Energy Union dimension(s) affected	Sector(s) affected	Planned budget (Euro Million)	Type of policy instrument	Union policy which resulted in the implementation of the PaM	Status of implementation	Implementation period
Project "LNG Import Terminal."	Import NG in Cyprus fuel market		Design and Constuction of the LNG import teminal and 20 years operations and maintenance.	Energy Security, Internal energy market.	Power generation, diversification of energy mix	500	Economic,regulatory and planning		Implemented	
1. Single Action Plan for the restoration of the electrical system after power blackout , 2. Setting certain Quality of Electricity Supply Indicators	Coping with constrained or interrupted supply of electricity.		1. TSOC submits to CERA whenever it is considered necessary an updated action plan for the restoration of the electrical system after power blackout. The Action Plan includes among other issues the steps/actions to be taken by the TSOC and the Power Plants themselves, the critical support staff, alert mechanisms, means of communication and any other possible actions for the implementation of the Plan. The Action Plan is in force since 2014 and since then several revisions have been made. it is expected that in 2019 the TSOC will submit to CERA revised version of the Action Plan. 2. In order to improve the quality of supply and taking into account CEER's recommendations to harmonise Electricity Continuity of Supply (CoS) indicators, data collection procedures and the methodology to calculate the value of CoS as well as other major aspects such as voltage quality and commercial quality, CERA is in the process of taking the decision on preparing such indicators with external assistance.	Energy Security, Internal energy market.	Power generation		Regulatory and planning		Implemented (bullet No.1)	Annualy since 2014 (for bullet No.1)
Ministerial Decision ΚΔΠ 212/2014 for holding of emergency oil stocks equivalent to 90 days of net imports of petroleum products.	Coping with constrained or interrupted supply of petroleum products.	638.000 Toes of oil stocks	The Cyprus Organization for the Storage and Management of Oil Stocks (KODAP) is the Central Stockholding Entity of Cyprus established by "The Maintenance of Oil Stocks Law of 2003" (N.149(I)/2003)". According to this law, KODAP is responsible for the maintenance of the national oil stocks equivalent to 90 days of net imports. It acquires, maintains and sells national oil stocks, in conformity with the provisions of Directive 2009/119/EC. In the event of a major supply disruption, the Minister of Energy, Commerce, Industry and Tourism may implement the emergency procedures and measures provided by the law, including the release of emergency oil stocks.	Energy Security, Internal Energy Market	Energy inland consumption	10-12 per year	Regulatory	Directive 2009/119/EC	Implemented	Annualy since 2004
Ministerial Decision 77.286 on 16/11/2014 for the establishment of the New Energy and Industrial Area of Vasilikos	The development and the secure operation of energy infrastractures under the new Energy and Industrial Area	500.000 Toes of oil stocks	This area is designed to be used for the installations of the oil storage, LNG infrustructures and gas based industries.	Energy Security, Internal Energy Market	Oil Industry, electricity production of Natural Gas	100	Planning		adopted	2018-2022
Ministerial Decision 77.286 on 16/11/2014 for concession to the KODAP suitable land in the Vasilikos area for the construction of privately owned oil terminal storage	Holding of emergency oil stocks in national territory	200.000 Toes of KODAP own oil stocks	KODAP is planning to built its own petroleum storage terminal in national territory in order to relocate its own oil stocks in Cyprus, as well as, to reduce the annual storage cost.	Energy Security, Internal Energy Market	Oil Industry, energy inland consumption	53, 35 from EIB	Planning	Directive 2009/119/EC	Adopted	2018-2022
Ministerial Decision 84.952 on 14/5/2018 for the Signing of a Memorandum of Understanding and Agreement between the Government of the Republic of Cyprus and the Companies Marketing Petroleum Products, namely BP Eastern Mediterranean Ltd, ExxonMobil Cyprus Ltd, Hellenic Petroleum Cyprus Ltd, Intergaz Ltd, Petrolina (Holdings) Public Ltd and Synergaz Ltd for the relocation of petroleum and liquefied petroleum gas installations from the Larnaca coastline to the Vasilikos area	The development and the secure operation of energy infrastractures under the new Energy and Industrial Area	120.000 Toes of oil stocks	Oil companies are builting new petroleum storage terminals at Vasilikos area and are in the process of relocating their own oil stocks from Larnaca.	Energy Security, Internal Energy Market	Oil Industry	50	Planning		Implemented	2018-2020

Decarbonisation

Name of policy or measure	Main objective	Quantified objective	Short description (precise scope and modalities of operation)	Relevant Energy Union dimension(s) affected	Sector(s) affected	GHG affected (if relevant)	Planned budget	Type of policy instrument	Union policy which resulted in the implementation of the PaM	Status of implementation	Implementation period	Projections scenario in which the PAM is included
Preparation of the proper recovery system for F-gases in equipment	Reduction of emissions of fluorinated gases (Industrial processes)	To achieve 10% collection and recovery of fluorinated gases by 2030.	Preparation of the proper recovery system for F-gases in equipment; This is an obligation according to EU and national legislation. It is however still not properly implemented. WEM considers that the necessary implementing measures will be taken so that in 2020 proper recovery of F-gases in old equipment is performed. A financial support scheme is under preparation by the Department of Environment to provide an award for the recovery of the gases. It is anticipated that the first supporting scheme will be in place in 2021.	Decarbonisation	F-gases	HFC; SF6	€ 2 million	Regulatory	F-gases regulation	Planned	2020-	WEM; WAM
Promotion of anaerobic digestion for the treatment of animal waste	Further promotion of anaerobic digestion for the treatment and management of animal waste	To increase the contribution of anaerobic digestion by 2030 to 14.7% for cattle waste, 10% for sheep and goat waste, 25.7% for poultry waste and 69% for pig waste.	Further promotion of anaerobic digestion for the treatment and management of animal waste; Promotion of anaerobic digestion in existing biogas plants; Encouragement of new biogas plants to exploit organic waste from livestock breeding. A financial support scheme is under preparation by the Department of Environment to provide an award for the recovery of the gases. It is anticipated that the first supporting scheme will be in place in 2021.	Decarbonisation	Agriculture	CH4; N2O	€ 4 million	Economic	Industrial emissions Directive 2010/75/EU (Recast of IPPC Directive 2008/1/EC and Large Combustion Plant Directive 2001/80/EC)	Implemented	ongoing	WEM; WAM
Reduction of waste to solid waste disposal sites from sorting at production level	Implementation of measures to increase sorting of munucipal solid waste at the source	Reduction of waste to solid waste disposal sites from sorting at production level (40% from 2021, 55% in 2025, 60% in 2030).	Implementation of measures to increase sorting of munucipal solid waste at the source; This will be achieved by reorganization of the currently implemented Municipal Waste Collection Scheme; waste will be separately collected with the goal to reduce the amounts of waste going to landfills.	Decarbonisation	Waste	CH4; N2O	€ 45 million	Regulatory	Waste Directive 2006/12/EC; Landfill Directive 1999/31/EC	Planned	2021-	WEM; WAM
Reduction of organics to landfills	Implementation of measures to avoid disposal of organic municipal solid waste in disposal sites/landfills	Reduction of organics to landfills to 15% from 2021.	Implementation of measures to avoid disposal of organic municipal solid waste in disposal sites/landfills; According to the waste management hierarchy, landfilling is the least preferable option and should be limited to the necessary minimum and this is encouraged by the relevant national and EU legislation. This is an obligation and measures should be taken for its implementation.	Decarbonisation	Waste	CH4; N2O		Regulatory	Waste Directive 2006/12/EC; Landfill Directive 1999/31/EC	Planned	2021-	WEM; WAM
Promotion of anaerobic digestion for the treatment of the organic fraction of the municipal solid waste	Implementation of measures to promote the use of anaerobic digestion for the management of organic municipal solid waste	Introduction of anaerobic digestion for the treatment of organic wastes treated by (5% from 2021)	Implementation of measures to promote the use of anaerobic digestion for the management of organic municipal solid waste; Anaerobic digestion will be further exploited to treat the organic waste that will be diverted from the landfill.	Decarbonisation	Waste	CH4; N2O		Regulatory	Waste Directive 2006/12/EC; Landfill Directive 1999/31/EC	Planned	2021-	WEM; WAM
Biogas recovery from old sold waste disposal sites (deep unmanaged)	Biogas recovery from deep unmanaged and managed anaerobic disposal sites	Biogas recovery from old landfills, during their restoration (30% from 2020).	Biogas recovery from deep unmanaged and managed anaerobic disposal sites; Part of the contracts for the recovery of old and currently operating landfills is biogas recovery. However, it is not possible to collect biogas from all landfills; the conservative collection rate of 20% has been chosen from deep unmanaged.	Decarbonisation	Waste	CH4; N2O		Regulatory	Waste Directive 2006/12/EC; Landfill Directive 1999/31/EC	Planned	2020-	WEM; WAM
Reduction of emissions from the businesses	Promotion of volunatry actions for the reduction of emissions from the businesses through financing support scheme	8% reduction of emissions from businesses	Business4Climate is an innovative idea developed in 2017-2018 by Cyprus Employers and Industrialist Federation, in collaboration with the Cyprus University of Technology (scientific advisor) and the Department of the Environment. Climate4Climate initiative was developed as a pilot project to demonstrate how Cypriot enterprises can voluntarily commit and take action against climate change. Enterprises (other than those involved in the ETS) participating in the project have to sign of a voluntary declaration, to reduce greenhouse gas emissions by more than 8% by 2030. For mobilizing the enterprises, a support schemes is under preparation from the Department of Environment, utilising national funds. It is anticipated that the first supporting scheme will be in place in 2020.	Decarbonisation Energy Efficiency	Energy Waste	CO2; CH4; N2O	€13.5 million for the period 2020-2022	Voluntary	NA	Adopted	2020-2022	WEM; WAM
Integrated Fleet Management System (Central Government vehicles)	Indicative national energy efficiency target; Cumulative end-use energy savings	• Rationalize the management of the public service vehicle fleet • Better use of the vehicle fleet • Utilizing vehicle refuelling data to compare and high fuel consumption vehicles and replace them where necessary.	The Department of Electrical and Mechanical Services, as the Public Authority for the management of the public vehicles in 2017 started to install an integrated Fleet Management System. Installations were completed on approximately 1800 vehicles.	Energy Efficiency Decarbonisation	Transport sector	All GHG	€ 1,659,000	Economic, Fiscal, Planning, Regulatory	Energy Efficiency Directive 2012/27/EE	Adopted	2017	with existing measures
Tree planting along urban and intercity roads	Indicative national energy efficiency target; Cumulative end-use energy savings	1. Shading, lowering temperatures and better walking and cycling conditions, it has been estimated that due to the above there will be an additional shift from car to sustainable modes of transport 2. CO2 absorption 3. Aesthetic upgrading and urban landscaping of all cities and rural routes.	Extensive tree planting of up to 650,000 trees along the urban road network and up to 350,000 trees along the interurban road network.	Energy Efficiency Decarbonisation	Transport sector	All GHG	€85 million (planting and infrastructure; maintenance and watering excluded)	Economic, Fiscal, Planning, Regulatory	Energy Efficiency Directive 2012/27/EE	Planned	2020-2030	with additional measures (phase B)

Appendix II: WEM projected activity data

	GDP real	3.87598	3.64963	3.21137	3.01976	2.97373	2.7	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
1A1 Energy Industries																									
1A1a Main Activity Electricity and Heat Production																									
1A1a i Electricity Generation																									
FUEL CONSUMPTION (TJ)		ETS	CT_WEM_211119_1300.xlsx																						
Natural Gas	0	0	0	0	6437	32754	33210	33233	33440	32234	33086	34491	35967	36909	34408	30660	23943	24672	25072	22721	22193	21468	20859	18381	
HFO	35876.95	32621	24028	19203	24345	2569	2626	105	245	279.93	43.1246	67.5684	111.877	125.456	218.483	208.9	26.9145	51.3026	69.2999	301.8	0	0	0	0	
Diesel	10889.74	10498	20294	23730	8894	0	0	0	0	0	0	0	0	0	0	0	0	0	56.7967	97.1	124	142	483	468	
	46767	43119	44322	42933	39676	35323	35836	33338	33685	32514	33129	34559	36079	37035	34627	30869	23970	24723	25199	23120	22317	21611	21341	18849	
1A2 Manufacturing Industries and Construction																									
1A2f Non-Metallic Minerals (glass, ceramic, cement, etc.; ISIC Division 26)																									
FUEL CONSUMPTION (TJ)		ETS																							
LPG	26	10	13	13	11	9	8	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
Diesel	34	5	6	6	5	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
RFO	403	32	40	40	35	29	24	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	
Pet-coke consumption	3533	2333	2966	2949	2547	2145	1743	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	
other bituminus coal	125	570	725	721	622	524	426	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328	
Waste (non-renewable)	902	2240	2250	2847	3152	3457	3762	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067	
solid biomass	838	1446	1500	1898	2102	2305	2508	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712	
TOTAL	5861	6636	7499	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	
total without alt. fuel		2949	3749	3728	3220	2712	2203	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	
All other ndustry																									
FUEL CONSUMPTION (TJ)			Demand_results_for_Taliotis_30Jul2019																						
LPG	298.2	279.0	301.5	322.2	330.3	324.6	317.6	318.6	325.3	333.0	341.8	352.2	362.8	374.2	378.4	384.0	391.2	399.5	408.7	418.6	428.9	439.2	449.2	459.0	
Diesel	719.6	495.9	659.1	767.7	822.1	825.1	819.8	833.8	855.8	874.2	890.9	907.8	922.4	936.3	930.8	927.4	926.2	926.5	927.9	930.3	932.7	934.7	935.7	935.7	
RFO	816.5	862.8	1025.7	1131.4	1169.3	1147.0	1112.2	1092.6	1082.6	1072.4	1062.5	1054.2	1044.4	1034.7	1005.6	980.1	957.9	937.8	919.6	902.7	886.4	870.0	853.1	835.8	
Pet-coke consumption	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
other bituminus coal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Waste (non-renewable)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
solid biomass	71.8	52.0	48.7	48.4	47.8	46.2	44.8	44.9	46.2	48.1	50.6	53.6	57.0	60.8	63.6	66.7	70.2	74.1	78.4	83.0	88.0	93.2	98.6	104.3	
TOTAL	1906	1690	2035	2270	2369	2343	2294	2290	2310	2328	2346	2368	2387	2406	2378	2358	2346	2338	2334	2335	2336	2337	2337	2335	
1A3 Transport																									
1A3a Civil Aviation																									
1A3a i International Aviation																									
FUEL CONSUMPTION (TJ)			Demand_results_for_Taliotis_30Jul2019																						
Jet kerosene	13962.61	13391.9	14307.7	15070.1	15801	16246.5	16593.1	17014.1	17449.8	17875.7	18285.8	18678.6	19020	19316	19521.8	19735.3	19965.1	20204.5	20452.7	20689.9	20906.4	21097.3	21257.4	21387	
1A3a ii Domestic Aviation																									
FUEL CONSUMPTION (TJ)			CUT_draft_demand_projections_Oct2018																						
Jet kerosene	11.4763	8.8191	9.4104	9.92904	10.4371	10.7614	11.0022	11.2471	11.4991	11.7597	12.0211	12.2843	12.5277	12.694	12.8019	12.9251	13.0684	13.2278	13.4038	13.5842	13.7631	13.9376	14.1042	14.2629	
1A3b Road Transport																									
FUEL CONSUMPTION (TJ)			CT_WEM_211119_1300.xlsx																						
Gasoline	15544.78	15869	16282	15889	16464	16790	17099	17398	17689	17970	18001	17487	17013	16583	16372	16229	15854	15485	15123	14769	14424	14087	13757	13433	
Diesel	12842.95	12288	12135	11890	11665	11456	11251	11087	10906	10729	10705	10729	10711	10660	10444	10233	10204	10174	10145	10115	10087	10058	10029	10001	
Biodiesel	358.789	660	652	1424	1196	1196	1195	1197	1197	1197	1197	1181	1163	1146	1127	1110	1096	1082	1068	1054	1040	1027	1014	1001	
LPG		0	3	7	10	13	16	19	23	26	29	32	38	38	35	25	25	25	25	25	25	25	25	22	
TOTAL	28747	28817	29073	29209	29334	29454	29561	29701	29815	29922	29932	29429	28925	28425	27978	27598	27179	26765	26360	25964	25576	25196	24825	24457	
% biodiesel to diesel	2.8%	5.4%	5.4%	12.0%	10.2%	10.4%	10.6%	10.8%	11.0%	11.2%	11.2%	11.0%	10.9%	10.7%	10.8%	10.9%	10.7%	10.6%	10.5%	10.4%	10.3%	10.2%	10.1%	10.0%	

1A3d Water-borne navigation																										
1A3d i International water-borne navigation																										
FUEL CONSUMPTION (TJ)		gdp																								
Diesel	4355.685	4525	4690	4840	4986	5135	5273	5405	5529	5657	5787	5920	6056	6195	6338	6484	6633	6785	6941	7101	7264	7431	7602	7777		
RFO	6226	6468	6704	6919	7128	7340	7538	7726	7904	8086	8272	8462	8657	8856	9060	9268	9481	9699	9922	10150	10384	10623	10867	11117		
TOTAL	10582	10992	11393	11759	12114	12474	12811	13132	13434	13743	14059	14382	14713	15051	15397	15751	16114	16484	16864	17251	17648	18054	18469	18894		
1A3d ii Domestic water-borne navigation																										
FUEL CONSUMPTION (TJ)		gdp																								
Diesel	22.16783	23	24	25	25	26	27	28	28	29	29	30	31	32	32	33	34	35	35	36	37	38	39	40		
TOTAL	22.16783	23.0271	23.8675	24.6339	25.3778	26.1325	26.8381	27.509	28.1417	28.789	29.4511	30.1285	30.8215	31.5303	32.2555	32.9974	33.7564	34.5328	35.327	36.1395	36.9707	37.8211	38.691	39.5808		
1A4 Other Sectors																										
1A4a Commercial / Institutional																										
FUEL CONSUMPTION (TJ)		Demand results for Taliotis 30Jul2019																								
diesel	616	503	526	547	539	528	514	514	516	516	515	515	512	509	507	504	500	495	490	483	476	468	459	449		
RFO	127	259	242	241	240	235	229	220	209	199	191	183	175	168	161	156	150	144	139	134	129	124	119	114		
LPG	573	471	479	491	484	475	461	457	452	446	441	436	430	425	420	414	409	403	396	390	382	374	366	356		
solid biomass	17	18	20	22	21	21	20	21	22	23	24	25	25	26	26	27	27	28	28	28	28	28	28	28		
gas biomass	12	13	14	15	15	15	14	15	16	16	17	17	18	18	19	19	19	19	20	20	20	20	20	20		
charcoal	209	221	248	265	262	257	250	259	272	283	292	302	309	316	323	329	334	339	342	345	346	347	346	344		
TOTAL	1554	1484	1529	1581	1562	1531	1488	1486	1486	1484	1480	1477	1470	1462	1456	1449	1439	1428	1414	1399	1381	1361	1337	1311		
biomass		252	282	302	299	293	284	295	310	322	333	343	352	360	368	375	381	386	390	393	394	395	394	391		
		biomass distribution based on 2017 statistics																								
1A4b Residential																										
FUEL CONSUMPTION (TJ)		Demand results for Taliotis 30Jul2019																								
Other kerosene	630	514	547	539	535	536	530	528	529	529	528	525	521	515	502	488	474	459	443	423	405	386	367	349		
Diesel/gas oil	2886	2356	2506	2470	2452	2454	2427	2417	2423	2424	2418	2406	2387	2361	2298	2236	2171	2101	2028	1940	1853	1768	1683	1599		
LPG	1605	1635	1749	1726	1714	1716	1699	1716	1761	1802	1843	1883	1920	1955	1951	1950	1949	1946	1944	1917	1893	1869	1845	1819		
Solid Biomass	163	168	182	179	176	174	171	175	184	192	201	209	217	224	226	228	230	232	234	233	231	230	228	227		
Charcoal	255	262	285	279	275	273	267	274	288	301	314	326	339	350	353	357	360	363	366	364	362	359	357	354		
TOTAL	5539	4935	5269	5193	5151	5153	5094	5111	5185	5249	5304	5349	5384	5406	5331	5259	5184	5101	5016	4877	4744	4612	4481	4348		
Diesel/gas oil		2871	3053	3009	2987	2990	2957	2945	2952	2953	2946	2931	2908	2876	2800	2724	2645	2559	2471	2363	2258	2153	2051	1948		
Solid Biomass		429	467	458	450	447	439	449	472	493	514	535	555	574	580	585	590	595	601	596	593	589	585	581		
		biomass distribution based on 2017 statistics																								
		Diesel/gas oil distribution to diesel and kerosene based on 2017 stats																								

1A4c Agriculture / Forestry / Fishing / Fish farms																										
1A4c i Stationary																										
FUEL CONSUMPTION (TJ)		Demand_results_for_Taliotis_30Jul2019																								
Diesel/gas oil	951	945	980	983	998	982	957	946	943	943	943	946	947	949	945	940	936	930	925	918	909	897	884	868		
LPG	115	74	75	74	75	74	72	70	69	67	66	66	65	64	63	62	61	60	59	58	57	56	55	54		
solid biomass																										
gas biomass	487	592.23	592.23	831.033	2373.7	2373.7	2373.7	2373.7	2373.7	2373.7	2373.7	2373.7	2373.7	2373.7	2373.7	2373.7	2373.7	2373.7	2373.7	2380.23	2397.45	2470.71	2521.7	2521.7		
TOTAL	1553	1611.86	1646.93	1888.76	3446.49	3429.54	3402.83	3389.93	3385.61	3383.74	3383.37	3385.03	3385.81	3386.93	3381.35	3375.76	3370.62	3364.3	3357.66	3356.22	3363.45	3424.41	3460.51	3443.83		
		gas biomass from "Primary Energy - Electricity" sheet																								
1A4c ii Off-road Vehicles and Other Machinery																										
IE in 1A3b road transport																										
1A4c iii Fishing (mobile combustion)																										
FUEL CONSUMPTION (TJ)		gdp																								
Diesel	86	89	93	96	98	101	104	107	109	112	114	117	120	122	125	128	131	134	137	140	143	147	150	154		
1A5 Non-Specified																										
1A5a Stationary																										
FUEL CONSUMPTION (TJ)		gdp																								
Diesel/gas oil	238	247	256	264	272	280	288	295	302	309	316	323	331	338	346	354	362	371	379	388	397	406	415	425		
Lignite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Solid Biomass	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
TOTAL	237.919	247.141	256.16	264.387	272.371	280.47	288.043	295.244	302.034	308.981	316.088	323.358	330.795	338.403	346.187	354.149	362.294	370.627	379.152	387.872	396.793	405.919	415.255	424.806		
1A5b Mobile																										
FUEL CONSUMPTION (TJ)		gdp																								
Jet kerosene	74.6	78	80	83	85	88	90	93	95	97	99	101	104	106	109	111	114	116	119	122	124	127	130	133		
1AD Feedstocks, reductants and other non-energy use of fuels																										
Lubricants	transport	0.00246	0.00887	0.0047	0.00428	0.0041	0.00363	0.00473	0.00383	0.0036	0.00034	-0.0168	-0.0171	-0.0173	-0.0157	-0.0136	-0.0152	-0.0152	-0.0151	-0.0151	-0.0149	-0.0148	-0.0147	-0.0148		
LC-Fuel Consumption (TJ)	314.6	315.4	318.2	319.7	321.0	322.4	323.5	325.0	326.3	327.5	327.6	322.1	316.6	311.1	306.2	302.0	297.4	292.9	288.5	284.1	279.9	275.8	271.7	267.7		
Bitumen	gdp																									
LC-Fuel Consumption (TJ)	1565.79	1626	1686	1740	1793	1846	1896	1943	1988	2033	2080	2128	2177	2227	2278	2331	2384	2439	2495	2553	2611	2671	2733	2796		

2. INDUSTRIAL PROCESSES	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
2A Mineral Industry																								
2A1 Cement production																								
Moni	0	ETS																						
Vasiliko	1716889		full capacity																					
Total Clinker (tn)	**1716889**	1593425	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000
Total Clinker (kt)	1716.89	1593.425	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
2A2 Lime Production																								
slaked lime production (t)	4369	4648	4928	5207	5486	5766	6045	6324	6603	6883	7162	7441	7721	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
2A4 Other Process Uses of Carbonates																								
2A4a Ceramics									full capacity 2025															
total production (t)	152570	159636	166703	173769	180835	187901	194968	202034	209100	209100	209100	209100	209100	209100	209100	209100	209100	209100	209100	209100	209100	209100	209100	209100
total production (kt)	152.570	159.636	166.703	173.769	180.835	187.901	194.968	202.034	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100
non-ETS production (t)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2A4b Other Uses of Soda Ash																								
adopted for soda ash		continuing 2015-2017 trend																						
imports - Mc (t)	449	533	597	660	724	787	851	915	978	1042	1105	1169	1233	1296	1360	1423	1487	1551	1614	1678	1741	1805	1868	1932
imports - Mc (kt)	0.449	0.533	0.597	0.660	0.724	0.787	0.851	0.915	0.978	1.042	1.105	1.169	1.233	1.296	1.360	1.423	1.487	1.551	1.614	1.678	1.741	1.805	1.868	1.932
2D Non-Energy Products from Fuels and Solvent Use																								
2D1: Lubricant Use																								
		assume constant 2017																						
LC-Fuel Consumption (kt)	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826
LC-Fuel Consumption (TJ)	314.605	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052	314.6052
2D2: Paraffin Wax Use																								
		assume constant 2017																						
imports (kt)	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
2D3 Other																								
2019 TOTAL	17.875	17.985	18.097	18.214	18.330	18.444	18.557	18.667	18.774	18.876	18.975	19.069	19.158	19.244	19.325	19.402	19.476	19.547	19.616	19.682	19.747	19.811	19.873	19.935
population	864.2	869.5	874.9	880.6	886.2	891.7	897.2	902.5	907.6	912.6	917.4	921.9	926.2	930.4	934.3	938.0	941.6	945.0	948.3	951.5	954.7	957.8	960.8	963.8
per capita (t/cap)	0.02068																							
Urea-based catalysts																								
diesel consumption road tran	298.67	285.76	282.22	276.51	271.27	266.42	261.65	257.83	253.62	258.27	261.58	263.55	264.55	263.19	261.99	260.55	263.25	265.87	268.43	270.92	269.89	268.86	267.83	266.81
activity																								
	5.97	5.72	5.64	5.53	5.43	5.33	5.23	5.16	5.07	5.17	5.23	5.27	5.29	5.26	5.24	5.21	5.26	5.32	5.37	5.42	5.40	5.38	5.36	5.34
2F Gg CO2 eq.																								
population (1000s)	864.2	865.2554	870.6544	876.2578	881.8411	887.3533	892.7814	898.0682	903.1987	908.1378	912.8796	917.398	921.705	925.8166	929.7218	933.4467	936.9943	940.4086	943.7077	946.9007	950.0174	953.0881	956.0917	959.0632
2F. Product uses as ODS subs	249.565	249.8693	251.4284	253.0466	254.6589	256.2508	257.8183	259.345	260.8266	262.2529	263.6223	264.9271	266.1709	267.3582	268.486	269.5617	270.5861	271.5721	272.5248	273.4469	274.347	275.2337	276.1011	276.9592
2F per capita (t/cap)	0.28878	using 2017 per cap emissions																						
2G1b: Use of Electrical Equipment																								
per capita emissions (kg/cap)																								
AVERAGE	0.00019	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193
population	864200	865255.4	870654.4	876257.8	881841.1	887353.3	892781.4	898068.2	903198.7	908137.8	912879.6	917398	921705	925816.6	929721.8	933446.7	936994.3	940408.6	943707.7	946900.7	950017.4	953088.1	956091.7	959063.2
SF6 emissions (Gg CO2 eq.)	0.16713	0.16733	0.168374	0.169458	0.170538	0.171604	0.172653	0.173676	0.174668	0.175623	0.17654	0.177414	0.178247	0.179042	0.179797	0.180517	0.181203	0.181864	0.182502	0.183119	0.183722	0.184316	0.184897	0.185471
2G3: N2O from Product Uses																								
2G3a: Medical Applications																								
Total Population (1000 persons	864.2	865.2554	870.6544	876.2578	881.8411	887.3533	892.7814	898.0682	903.1987	908.1378	912.8796	917.398	921.705	925.8166	929.7218	933.4467	936.9943	940.4086	943.7077	946.9007	950.0174	953.0881	956.0917	959.0632
2G3b: Propellant for Pressure and Aerosol Products																								
Total Population (1000 persons	864.2	865.2554	870.6544	876.2578	881.8411	887.3533	892.7814	898.0682	903.1987	908.1378	912.8796	917.398	921.705	925.8166	929.7218	933.4467	936.9943	940.4086	943.7077	946.9007	950.0174	953.0881	956.0917	959.0632
2G3c: Other																								
2G4: Other																								
	assume constant as 2016																							

3. AGRICULTURE	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
3A Livestock																								
3A Enteric Fermentation																								
3A1 Cattle																								
3A1a Dairy cattle																								
Pregnancy (NEp)		assume constant 2017																						
% pregnant	72.24	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400
Cpregnancy																								
NEp=C*NEm *%pregnant	3.17	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692
GE (gross energy intake)																								
Digestibility of feed, DE (%)																								
GE MJ/head/day	290.829	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286
3A1b Other cattle																								
population	36600	35748.9	35748.9	35748.9	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994
3A2 Sheep																								
population	321488	316354	319396	319396	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606
3A3 Swine																								
population	350163	359222.6	359222.6	362744.4	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7
3A4 Horses																								
population	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342
3A4 Mules and Asses																								
population	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316
3A4 Goats																								
population	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637
3B Manure Management																								
3B1 CH4 emissions																								
3B1.1 Cattle																								
T2 - equation 10.23, pg. 10.41, vol.4, IPCC2006																								
3B1.1a Dairy cattle																								
population	30137	29785	29785	29785	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202
waste management																								
solid storage	95%	94.5%	94.0%	93.5%	93.0%	92.5%	92.0%	91.5%	91.0%	90.5%	90.0%	89.5%	89.0%	88.5%	88.0%	87.5%	87.0%	86.5%	86.0%	85.5%	85.0%	84.5%	84.0%	83.5%
anaerobic digester	5%	5.5%	6.0%	6.5%	7.0%	7.5%	8.0%	8.5%	9.0%	9.5%	10.0%	10.5%	11.0%	11.5%	12.0%	12.5%	13.0%	13.5%	14.0%	14.5%	15.0%	15.5%	16.0%	16.5%
3B1.1b Other cattle																								
population	36600	35749	35749	35749	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994
waste management																								
solid storage	95%	94.5%	94.0%	93.5%	93.0%	92.5%	92.0%	91.5%	91.0%	90.5%	90.0%	89.5%	89.0%	88.5%	88.0%	87.5%	87.0%	86.5%	86.0%	85.5%	85.0%	84.5%	84.0%	83.5%
anaerobic digester	5%	5.5%	6.0%	6.5%	7.0%	7.5%	8.0%	8.5%	9.0%	9.5%	10.0%	10.5%	11.0%	11.5%	12.0%	12.5%	13.0%	13.5%	14.0%	14.5%	15.0%	15.5%	16.0%	16.5%
3B1.2 Sheep																								
population	321488	316354.5	319396.4	319396.4	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7
3B1.3 Swine																								
T2 - equation 10.23, pg. 10.41, vol.4, IPCC2006																								
breeding swine (sows)	33157	33260	33260	33586	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564
waste management																								
anaerobic digester	55%	55.9%	56.7%	57.6%	58.5%	59.3%	60.2%	61.1%	62.0%	62.8%	63.7%	64.6%	65.4%	66.3%	67.2%	68.0%	68.9%	69.8%	70.7%	71.5%	72.4%	73.3%	74.1%	75%
aerobic treatment (liquid systems)	45%	44.1%	43.3%	42.4%	41.5%	40.7%	39.8%	38.9%	38.0%	37.2%	36.3%	35.4%	34.6%	33.7%	32.8%	32.0%	31.1%	30.2%	29.3%	28.5%	27.6%	26.7%	25.9%	25%
market swine (all except sows)	317006	325962	325962	329158	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745
Volatile substanse excretion (VS)																								
waste management																								
anaerobic digester	55%	55.9%	56.7%	57.6%	58.5%	59.3%	60.2%	61.1%	62.0%	62.8%	63.7%	64.6%	65.4%	66.3%	67.2%	68.0%	68.9%	69.8%	70.7%	71.5%	72.4%	73.3%	74.1%	75%
aerobic treatment (liquid systems)	45%	44.1%	43.3%	42.4%	41.5%	40.7%	39.8%	38.9%	38.0%	37.2%	36.3%	35.4%	34.6%	33.7%	32.8%	32.0%	31.1%	30.2%	29.3%	28.5%	27.6%	26.7%	25.9%	25%

3B1.4 Other - Horses																									
population	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342
3B1.4 Other - Mules and Asses																									
population	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316
3B1.4 Other - Goats																									
population	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637
3B1.4 Other - Poultry																									
Laying chicken	570330	593125.5	598884	604642.5	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918
Broiler chicken	2777700	2756064	2782822	2809580	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853
Turkeys	11860	9960.1	10056.8	10153.5	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6
Other poultry	0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Total population (1000s)	3359.890	3359.151	3391.765	3424.380	3522.220	3522.221	3522.222	3522.223	3522.224	3522.225	3522.226	3522.227	3522.228	3522.229	3522.230	3522.231	3522.232	3522.233	3522.234	3522.235	3522.236	3522.237	3522.238	3522.239	
3B2 N2O & NMVOCs emissions																									
3B2.1 Cattle																									
3B2.1a Dairy cattle																									
population	30137	29784.59	29784.59	29784.59	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	
Typical Animal Mass (kg)	550	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	
3B2.1b Other cattle																									
population	36600	35748.9	35748.9	35748.9	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	
Typical Animal Mass (kg)	350	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	
3B2.2 Sheep																									
population	321488	316354	319396	319396	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	
Typical Animal Mass (kg)	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
3B2.3 Swine																									
3B2.3a Breeding Swine																									
population	33157	33260.16	33260.16	33586.24	34564.48	34564.48	34564.48	34564.48	34564.48	34564.48	34564.48	34564.48	34564.48	34564.48	34564.48	34564.48	34564.48	34564.48	34564.48	34564.48	34564.48	34564.48	34564.48	34564.48	
Typical Animal Mass (kg)	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	
3B2.3b Market Swine																									
population	317006	325962.4	325962.4	329158.1	338745.3	338745.3	338745.3	338745.3	338745.3	338745.3	338745.3	338745.3	338745.3	338745.3	338745.3	338745.3	338745.3	338745.3	338745.3	338745.3	338745.3	338745.3	338745.3	338745.3	
Typical Animal Mass (kg)	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	
3B2.4 Other - Horses																									
population	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	
Typical Animal Mass (kg)	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	
3B2.4 Other - Mules and Asses																									
population	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	
Typical Animal Mass (kg)	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	
3B2.4 Other - Goats																									
population	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	
Typical Animal Mass (kg)	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
3B2.4 Other - Poultry																									
population	3359890	3359151	3391765	3424380	3522220	3522221	3522222	3522223	3522224	3522225	3522226	3522227	3522228	3522229	3522230	3522231	3522232	3522233	3522234	3522235	3522236	3522237	3522238	3522239	
Typical Animal Mass (kg)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
3D Agricultural Soils																									
3D1 Direct NsO emissions from managed soils																									
3D1.1 Inorganic N fertilisers																									
FSN (kg N in fertilizer)	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	

3D1.2 Organic N fertilisers																								
3D1.2b Sewage Sludge applied to soils		assuming constant as 2017																						
dry sludge applied on land (t DM)	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1
3D1.2c Other organic fertilisers applied to soils																								
Constantinos Ioannides 16/11/2017: personal commu		extrapolating using 2013-2017 trend																						
TOTAL composting (1000t wet mass)	36.52	48.927	53.698	58.469	63.24	68.011	72.782	77.553	82.324	87.095	91.866	96.637	101.408	106.179	110.95	115.721	120.492	125.263	130.034	134.805	139.576	144.347	149.118	153.889
3D1.4 Crop residues																								
Crop production (t/yr)																								
Wheat	16592	7316.12	7454.16	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2
Barley	18754	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907
Oats	248	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352
Beans & pulses (legumes)	4145	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Potatoes (tubers)	111410	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803
cultivated area (ha)																								
Wheat	8678	8889	9057	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225
Barley	10953	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536
Oats	490	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367
Beans & pulses (legumes)	493	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498
Potatoes (tubers)	4440	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041
Crop yield (YieldFresh), kg/ha																								
Wheat	1912	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823
Barley	1712	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Oats	506	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959
Beans & pulses (legumes)	8408	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032
Potatoes (tubers)	25092	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361
3F. Field burning of agricultural residues																								
Area Burnt (ha/yr)																								
FracBURN (kg N/kg crop-N)	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
Wheat	868	889	906	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922
Barley	1095	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454
Oats	49	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Beans & pulses (legumes)	49	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Potatoes (tubers)	444	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504
3H Urea application																								
CO2-C=M*EF		constant as 2017																						
M - t Urea applied to soils (assumed = to sa	570	570	570	570	570	570	570	570	570	570	570	570	570	570	570	570	570	570	570	570	570	570	570	570

5. WASTE	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
4A Solid Waste Disposal																								
	864200	865255.4	870654.4	876257.8	881841.1	887353.3	892781.4	898068.2	903198.7	908137.8	912879.6	917398	921705	925816.6	929721.8	933446.7	936994.3	940408.6	943707.7	946900.7	950017.4	953088.1	956091.7	959063.2
POPULATION	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Regional Population (1000 persons)																								
Lefkosia	335.9	336.3	338.4	340.5	342.7	344.9	347.0	349.0	351.0	352.9	354.8	356.5	358.2	359.8	361.3	362.8	364.1	365.5	366.8	368.0	369.2	370.4	371.6	372.7
Ammochostos	47.5	47.6	47.9	48.2	48.5	48.8	49.1	49.4	49.7	49.9	50.2	50.4	50.7	50.9	51.1	51.3	51.5	51.7	51.9	52.1	52.2	52.4	52.6	52.7
Larnaca	146.5	146.7	147.6	148.5	149.5	150.4	151.3	152.2	153.1	153.9	154.7	155.5	156.2	156.9	157.6	158.2	158.8	159.4	160.0	160.5	161.0	161.6	162.1	162.6
Lemesos	242.0	242.3	243.8	245.4	247.0	248.5	250.0	251.5	253.0	254.3	255.7	256.9	258.1	259.3	260.4	261.4	262.4	263.4	264.3	265.2	266.1	266.9	267.8	268.6
Pafos	92.3	92.4	93.0	93.6	94.2	94.8	95.4	95.9	96.5	97.0	97.5	98.0	98.4	98.9	99.3	99.7	100.1	100.4	100.8	101.1	101.5	101.8	102.1	102.4
TOTAL	864.2	865.3	870.7	876.3	881.8	887.4	892.8	898.1	903.2	908.1	912.9	917.4	921.7	925.8	929.7	933.4	937.0	940.4	943.7	946.9	950.0	953.1	956.1	959.1
Urban Population (1000 persons)																								
Lefkosia	246.9	247.2	248.7	250.3	251.9	253.5	255.1	256.6	258.0	259.4	260.8	262.1	263.3	264.5	265.6	266.7	267.7	268.7	269.6	270.5	271.4	272.3	273.1	274.0
Ammochostos		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Larnaca	86.6	86.7	87.3	87.9	88.4	89.0	89.5	90.0	90.6	91.0	91.5	92.0	92.4	92.8	93.2	93.6	93.9	94.3	94.6	94.9	95.2	95.6	95.9	96.2
Lemesos	184.6	184.8	186.0	187.2	188.4	189.6	190.7	191.8	192.9	194.0	195.0	196.0	196.9	197.8	198.6	199.4	200.2	200.9	201.6	202.3	202.9	203.6	204.2	204.9
Pafos	65.1	65.2	65.6	66.0	66.4	66.9	67.3	67.7	68.0	68.4	68.8	69.1	69.4	69.8	70.0	70.3	70.6	70.8	71.1	71.3	71.6	71.8	72.0	72.3
TOTAL	583.2	584.0	587.6	591.4	595.1	598.9	602.5	606.1	609.6	612.9	616.1	619.1	622.1	624.8	627.5	630.0	632.4	634.7	636.9	639.1	641.2	643.2	645.3	647.3
Rural Population (1000 persons)																								
Lefkosia	89.0	89.1	89.6	90.2	90.8	91.4	91.9	92.5	93.0	93.5	94.0	94.4	94.9	95.3	95.7	96.1	96.5	96.8	97.2	97.5	97.8	98.1	98.4	98.7
Ammochostos	47.5	47.6	47.9	48.2	48.5	48.8	49.1	49.4	49.7	49.9	50.2	50.4	50.7	50.9	51.1	51.3	51.5	51.7	51.9	52.1	52.2	52.4	52.6	52.7
Larnaca	59.9	59.9	60.3	60.7	61.1	61.5	61.8	62.2	62.6	62.9	63.2	63.5	63.8	64.1	64.4	64.6	64.9	65.1	65.4	65.6	65.8	66.0	66.2	66.4
Lemesos	57.4	57.5	57.9	58.2	58.6	59.0	59.3	59.7	60.0	60.3	60.7	61.0	61.2	61.5	61.8	62.0	62.3	62.5	62.7	62.9	63.1	63.3	63.5	63.7
Pafos	27.2	27.2	27.4	27.6	27.8	27.9	28.1	28.3	28.4	28.6	28.7	28.9	29.0	29.1	29.3	29.4	29.5	29.6	29.7	29.8	29.9	30.0	30.1	30.2
TOTAL	281.0	281.3	283.1	284.9	286.7	288.5	290.2	292.0	293.6	295.2	296.8	298.3	299.7	301.0	302.3	303.5	304.6	305.7	306.8	307.8	308.9	309.9	310.8	311.8
per capita production to disposal sites (kg/cap)	**481**	**498**	**502**	**506**	**510**	**514**	**519**	**524**	**528**	**534**	**539**	**545**	**552**	**559**	**561**	**566**	**572**	**577**	**583**	**588**	**594**	**599**	**605**	**610**
Annual per capita production (kg/cap) to model	655.58	662.31	667.81	672.77	678.55	684.28	690.33	696.52	702.96	709.90	717.26	725.38	734.16	743.71	746.17	753.31	760.54	767.83	775.15	782.52	789.89	797.26	804.64	811.99
Population to model (mln)	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Un-managed, deep	0.578	0.579	0.338	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Un-managed, shallow	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Managed, anaerobic	0.286	0.287	0.532	0.876	0.882	0.887	0.893	0.898	0.903	0.908	0.913	0.917	0.922	0.926	0.930	0.933	0.937	0.940	0.944	0.947	0.950	0.953	0.956	0.959
	40% sorting at source from 2021; 55% 2025; 60% 2030; 65% 2035																							
MSW to disposal sites (% of total)	75%	75%	75%	75%	60%	56%	53%	49%	45%	44%	43%	42%	41%	40%	39%	38%	37%	36%	35%	35%	35%	35%	35%	35%
composition of waste to disposal sites																								
Food	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%
Garden	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
Paper	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%
Wood	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Textile	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%
Nappies	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Plastics, other inert	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
	15% of organics to landfill from 2021; 10% in 2035																							
MSW to disposal sites (% of total)	75%	75%	75%	75%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%
composition of waste to disposal sites																								
Food	48%	48%	48%	48%	14%	14%	14%	13%	13%	13%	12%	12%	12%	12%	11%	11%	11%	10%	10%	10%	10%	10%	10%	10%
Garden	8%	8%	8%	8%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Paper	27%	27%	27%	27%	52%	52%	53%	53%	53%	53%	53%	54%	54%	54%	54%	55%	55%	55%	55%	55%	55%	55%	55%	55%
Wood	3%	3%	3%	3%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
Textile	11%	11%	11%	11%	21%	21%	21%	21%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%
Nappies	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Plastics, other inert	3%	3%	3%	3%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
4B Biological Treatment of Solid Waste																								
increase composting to 10% in 2021 and keep constant																								
BaU M composted, 1000 t wet waste	33.120	45.696	46.362	47.007	47.713	48.417	49.143	49.878	50.627	51.406	52.210	53.063	53.957	54.903	55.317	56.070	56.823	57.577	58.330	59.083	59.836	60.590	61.343	62.096
NIR2019 composting (%)	6.7%	7.5%	8.3%	9.2%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
increase AD to 5% in 2021 and keep constant																								
W4 AD (1000t) from Feb2018 PROJ					67.9	68.4	69.0	69.7	70.3	71.0	71.7	72.5	73.4	74.4	74.6	75.3	76.1	76.8	77.5	78.3	79.0	79.7	80.5	81.2

Appendix III: WAM projected activity data

	GDP real	3.8759849	3.64963	3.2113714	3.0197589	2.973729	2.7	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
1A1 Energy Industries																								
1A1a Main Activity Electricity and Heat Production																								
1A1a i Electricity Generation																								
FUEL CONSUMPTION (TJ)		ETS	PPM_201119_1300_LoMS_NoEA_NOconnector.xlsx																					
Natural Gas	0	0	0	0	6437	31935	32266	31844	31615	31941	32337	33235	32561	32119	31712	29315	27178	27072	27377	26895	27191	24504	16039	16696
HFO	35876.954	32621	24029	19201	24269	2544	2588	62	201	219.57	303.51967	355.50104	268.87532	298.08006	358.11036	436.7	0	115.28046	188.22291	580.5	0	0	0	0
Diesel	10889.737	10498	20294	23729	8769	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0
	46767	43119	44323	42930	39475	34479	34855	31906	31817	32160	32641	33591	32830	32417	32070	29752	27178	27188	27566	27476	27191	24504	16039	16696
1A2 Manufacturing Industries and Construction																								
1A2f Non-Metallic Minerals (glass, ceramic, cement, etc.; ISIC Division 26)																								
FUEL CONSUMPTION (TJ)		ETS																						
LPG	26	10	13	13	11	9	8	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Diesel	34	5	6	6	5	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
RFO	403	32	40	40	35	29	24	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Pet-coke consumption	3533	2333	2966	2949	2547	2145	1743	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340
other bituminus coal	125	570	725	721	622	524	426	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328	328
Waste (non-renewable)	902	2240	2250	2847	3152	3457	3762	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067	4067
solid biomass	838	1446	1500	1898	2102	2305	2508	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712	2712
TOTAL	5861	6636	7499	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474	8474
total without alt. fuel		2949	3749	3728	3220	2712	2203	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695
All other ndustry																								
FUEL CONSUMPTION (TJ)		Demand_results_for_Taliotis_30Jul2019.xlsx																						
LPG	298.2	279.0	301.5	322.0	330.0	324.2	317.1	318.1	324.6	332.2	340.8	351.1	361.5	372.7	377.3	383.4	391.0	399.8	409.4	419.9	430.8	441.6	452.3	462.7
Diesel	719.6	495.9	658.8	767.2	821.2	824.0	818.4	832.1	853.9	872.0	888.4	904.9	919.1	932.6	928.2	925.7	925.7	927.0	929.5	933.0	936.6	939.7	941.8	943.0
RFO	816.5	862.8	1025.4	1130.7	1168.2	1145.6	1110.5	1090.6	1080.3	1069.8	1059.6	1051.0	1040.8	1030.7	1002.7	978.3	957.1	938.2	920.9	905.2	889.8	874.4	858.5	842.0
Pet-coke consumption	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
other bituminus coal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waste (non-renewable)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
solid biomass	71.8	52.0	48.6	48.3	47.8	46.1	44.7	44.8	46.1	48.0	50.5	53.5	56.8	60.6	63.4	66.6	70.2	74.2	78.5	83.3	88.4	93.7	99.3	105.2
TOTAL	1906	1690	2034	2268	2367	2340	2291	2286	2305	2322	2339	2360	2378	2397	2372	2354	2344	2339	2338	2341	2346	2349	2352	2353
1A3 Transport																								
1A3a Civil Aviation																								
1A3a i International Aviation																								
FUEL CONSUMPTION (TJ)		Demand_results_for_Taliotis_30Jul2019.xlsx																						
Jet kerosene	13962.615	9529.314	9220.4812	9219.5408	9226.5981	9241.2042	9248.9782	9286.3501	9303.8523	9318.8787	9335.1756	9341.266	9343.0998	9345.5615	9299.5345	9253.5075	9207.4805	9161.4535	9115.4265	9069.3995	9023.3725	8977.3455	8931.3185	8885.2915
TOTAL	13962.615	9529.314	9220.4812	9219.5408	9226.5981	9241.2042	9248.9782	9286.3501	9303.8523	9318.8787	9335.1756	9341.266	9343.0998	9345.5615	9299.5345	9253.5075	9207.4805	9161.4535	9115.4265	9069.3995	9023.3725	8977.3455	8931.3185	8885.2915
1A3a ii Domestic Aviation																								
FUEL CONSUMPTION (TJ)		CUT_draft_demand_projections_Oct2018																						
Jet kerosene	11.476298	8.8190992	9.4104025	9.9290428	10.437067	10.761449	11.002165	11.247143	11.499076	11.759688	12.02113	12.284314	12.527662	12.694033	12.80194	12.925116	13.068373	13.227801	13.403782	13.584179	13.763149	13.937558	14.104174	14.262877
TOTAL	11.476298	8.8190992	9.4104025	9.9290428	10.437067	10.761449	11.002165	11.247143	11.499076	11.759688	12.02113	12.284314	12.527662	12.694033	12.80194	12.925116	13.068373	13.227801	13.403782	13.584179	13.763149	13.937558	14.104174	14.262877
1A3b Road Transport																								
FUEL CONSUMPTION (TJ)		PPM_201119_1300_LoMS_NoEA_NOconnector.xlsx																						
Gasoline	15544.781	15869	16282	15889	16017	15902	15778	15652	15526	14982	14262	13556	12864	12022	11965	11804	11415	11029	10653	10284	9924	9573	9230	8895
Diesel	12842.954	12288	12135	11890	11723	11566	11408	11295	11099	11237	11112	10972	10829	10499	10374	10239	10200	10174	10121	10083	10054	10024	9995	10022
Biodiesel	358.789	660	652	1424	1183	1171	1158	1148	1133	1121	1090	1058	1026	1350	1056	958	942	928	912	897	883	869	856	846
LPG	0.1806542	0	3	7	10	13	16	19	23	26	29	32	35	35	35	22	22	21	21	20	20	20	20	19
TOTAL	28747	28818	29072	29209	28933	28652	28361	28115	27781	27366	26492	25617	24755	23906	23430	23023	22579	22153	21707	21285	20882	20486	20101	19781
% biodiesel to diesel	2.8%	5.4%	5.4%	12.0%	10.1%	10.1%	10.2%	10.2%	10.2%	10.0%	9.8%	9.6%	9.5%	12.9%	10.2%	9.4%	9.2%	9.1%	9.0%	8.9%	8.8%	8.7%	8.6%	8.4%
1A3d Water-borne navigation																								
1A3d i International water-borne navigation																								
FUEL CONSUMPTION (TJ)		gdp																						
Diesel	4355.685	4525	4690	4840	4986	5135	5273	5405	5529	5657	5787	5920	6056	6195	6338	6484	6633	6785	6941	7101	7264	7431	7602	7777
RFO	6226	6468	6704	6919	7128	7340	7538	7726	7904	8086	8272	8462	8657	8856	9060	9268	9481	9699	9922	10150	10384	10623	10867	11117
TOTAL	10582	10992	11393	11759	12114	12474	12811	13132	13434	13743	14059	14382	14713	15051	15397	15751	16114	16484	16864	17251	17648	18054	18469	18894

1A3d ii Domestic water-borne navigation																									
FUEL CONSUMPTION (TJ)		gdp																							
Diesel	22.167831	23	24	25	25	26	27	28	28	29	29	30	31	32	32	33	34	35	35	36	37	38	39	40	
TOTAL	22.167831	23.027053	23.867455	24.633928	25.377813	26.132481	26.838058	27.509009	28.141716	28.788976	29.451122	30.128498	30.821454	31.530347	32.255545	32.997422	33.756363	34.53276	35.327013	36.139534	36.970744	37.821071	38.690955	39.580847	
1A4 Other Sectors																									
1A4a Commercial / Institutional																									
FUEL CONSUMPTION (TJ)		Demand_results_for_Taliotis_30Jul2019.xlsx																							
diesel	616	502.51752	524.34529	540.71297	528.79684	518.02436	501.41134	498.62243	497.40728	494.82554	491.34229	488.11621	483.64268	478.66011	463.67191	448.51282	433.41517	418.21203	402.92179	387.55278	369.36481	351.18471	333.03065	315.00865	
RFO	127	258.70991	242.07969	240.14296	234.85074	230.06643	222.68821	214.18826	202.32941	192.32811	183.52278	175.28036	167.57221	160.23124	151.80943	143.87144	136.24633	128.87279	121.8414	115.08666	108.17349	101.55717	95.206579	89.11374	
LPG	573	471.29246	477.3801	486.59822	475.87467	466.1803	451.22992	444.17302	436.77245	429.42033	422.11181	415.35965	408.07684	400.71301	386.04977	371.58238	357.38758	343.31298	329.39537	315.60467	299.8381	284.24942	268.83287	253.65425	
solid biomass	17	18	20	21	21	20	20	20	21	22	22	23	24	24	24	23	23	23	22	22	21	20	19	19	
gas biomass	12	13	14	15	15	14	14	14	15	15	16	16	17	17	17	17	16	16	16	15	15	14	14	13	
charcoal	209	221	247	262	256	251	243	249	260	269	276	283	289	294	291	287	283	278	272	267	258	249	239	229	
TOTAL	1554	1484.0987	1524.7661	1565.4657	1530.9663	1499.778	1451.6801	1440.8486	1432.8857	1422.8403	1411.4323	1401.3729	1388.6099	1374.8954	1333.0195	1290.7875	1248.8382	1206.6793	1164.3385	1121.8265	1071.0742	1020.2981	969.51946	919.02111	
	biomass	251.5788	280.96106	298.01159	291.44407	285.50686	276.35067	283.86485	296.37654	306.26635	314.45541	322.61672	329.3182	335.29109	331.48839	326.82082	321.7891	316.28146	310.17996	303.58234	293.6978	283.30685	272.44936	261.24447	
		biomass distribution based on 2017 statistics																							
1A4b Residential																									
FUEL CONSUMPTION (TJ)		Demand_results_for_Taliotis_30Jul2019.xlsx																							
Other kerosene	630	514	545	536	531	531	524	522	519	516	511	505	499	493	479	464	448	430	411	390	370	350	331	313	
Diesel/gas oil	2886	2356	2499	2457	2435	2430	2400	2389	2377	2362	2341	2315	2285	2258	2193	2125	2051	1968	1881	1786	1693	1604	1517	1432	
LPG	1605	1635	1743	1716	1701	1699	1679	1695	1723	1749	1774	1799	1822	1856	1847	1835	1818	1794	1764	1720	1678	1638	1599	1560	
Solid Biomass	163	168	182	177	174	172	169	173	179	186	192	198	204	211	212	213	213	212	210	205	201	198	194	190	
Charcoal	255	262	284	277	272	269	264	270	281	290	300	309	318	330	332	333	332	331	327	321	315	309	303	298	
TOTAL	5539	4935	5253	5164	5113	5101	5035	5048	5079	5102	5118	5127	5127	5148	5064	4970	4862	4734	4593	4421	4257	4099	3945	3793	
	Diesel/gas oil	2871	3044	2993	2966	2961	2924	2911	2896	2877	2852	2821	2783	2751	2672	2589	2498	2398	2292	2175	2063	1954	1848	1745	
	Solid Biomass	429	465	455	446	441	432	442	460	476	491	507	522	541	544	546	545	542	537	526	516	507	497	488	
		biomass distribution based on 2017 statistics																							
		Diesel/gas oil distribution to diesel and kerosene based on 2017 stats																							
1A4c Agriculture / Forestry / Fishing / Fish farms																									
1A4c i Stationary																									
FUEL CONSUMPTION (TJ)		Demand_results_for_Taliotis_30Jul2019.xlsx																							
Diesel/gas oil	951	945	980	983	998	982	957	946	943	943	943	946	948	949	945	940	936	931	925	918	910	898	885	870	
LPG	115	74	75	74	75	74	72	70	69	67	66	66	65	64	63	62	61	60	59	59	58	56	55	54	
solid biomass		0	0	0	1	1	1	1	2	4	6	8	11	15	19	24	30	37	45	55	67	80	94	111	
gas biomass	487	592	592	831	2374	2374	2374	2374	2374	2374	2374	2374	2830	2830	2830	2830	2830	2830	2830	2830	2830	2830	2830	2830	
TOTAL	1553	1611.8616	1647.2321	1889.1225	3447.0283	3430.0872	3403.3858	3391.0843	3387.9674	3387.5884	3389.139	3393.3587	3853.5766	3858.5343	3857.1818	3856.5413	3857.4274	3858.3033	3860.2026	3862.2914	3863.865	3864.6832	3864.5018	3864.576	
		gas biomass from "Primary Energy - Electricity" sheet																							
1A4c ii Off-road Vehicles and Other Machinery																									
IE in 1A3b road transport																									
1A4c iii Fishing (mobile combustion)																									
FUEL CONSUMPTION (TJ)		gdp																							
Diesel	86	89	93	96	98	101	104	107	109	112	114	117	120	122	125	128	131	134	137	140	143	147	150	154	
TOTAL	86	89.333347	92.593684	95.567211	98.45311	101.38084	104.11812	106.72107	109.17566	111.6867	114.25549	116.88337	119.57169	122.32184	125.13524	128.01335	130.95766	133.96968	137.05098	140.20316	143.42783	146.72667	150.10138	153.55372	
1A5 Non-Specified																									
1A5a Stationary																									
FUEL CONSUMPTION (TJ)		gdp																							
Diesel/gas oil	238	247	256	264	272	280	288	295	302	309	316	323	331	338	346	354	362	371	379	388	397	406	415	425	
Lignite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Solid Biomass	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL	237.919	247.1407	256.16043	264.38669	272.37053	280.47009	288.04278	295.24385	302.03446	308.98125	316.08782	323.35784	330.79507	338.40336	346.18664	354.14893	362.29435	370.62712	379.15155	387.87203	396.79309	405.91933	415.25548	424.80635	
1A5b Mobile																									
FUEL CONSUMPTION (TJ)		gdp																							
Jet kerosene	74.6	78	80	83	85	88	90	93	95	97	99	101	104	106	109	111	114	116	119	122	124	127	130	133	
TOTAL	74.6	77.5	80.3	82.9	85.4	88.0	90.3	92.6	94.7	96.9	99.1	101.4	103.7	106.1	108.6	111.1	113.6	116.2	118.9	121.6	124.4	127.3	130.2	133.2	
1AD Feedstocks, reductants and other non-energy use of fuels																									
Lubricants	d transport	0.0024663	0.0088432	0.0046905	-0.009432	-0.009739	-0.010137	-0.00869	-0.011871	-0.014934	-0.031937	-0.03302	-0.033665	-0.034291	-0.019901	-0.017381	-0.019283	-0.018888	-0.020124	-0.019446	-0.01894	-0.018942	-0.018815	-0.015886	
LC-Fuel Consumption (TJ)	314.6	315.4	318.2	319.7	316.6	313.6	310.4	307.7	304.0	299.5	289.9	280.4	270.9	261.6	256.4	252.0	247.1	242.4	237.6	232.9	228.5	224.2	220.0	216.5	
Bitumen	gdp																								
LC-Fuel Consumption (TJ)	1565.79	1626	1686	1740	1793	1846	1896	1943	1988	2033	2080	2128	2177	2227	2278	2331	2384	2439	2495	2553	2611	2671	2733	2796	

2. INDUSTRIAL PROCESSES	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
2A Mineral Industry																								
2A1 Cement production																								
Moni	0	ETS																						
Vasiliko	1716889		full capacity																					
Total Clinker (tn)	**1716889**	1593425	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000
Total Clinker (kt)	1716.89	1593.425	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
2A2 Lime Production																								
slaked lime production (t)	4369	4648	4928	5207	5486	5766	6045	6324	6603	6883	7162	7441	7721	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
2A4 Other Process Uses of Carbonates																								
2A4a Ceramics									full capacity 2025															
total production (t)	152570	159636	166703	173769	180835	187901	194968	202034	209100	209100	209100	209100	209100	209100	209100	209100	209100	209100	209100	209100	209100	209100	209100	209100
total production (kt)	152.570	159.636	166.703	173.769	180.835	187.901	194.968	202.034	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100	209.100
non-ETS production (t)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2A4b Other Uses of Soda Ash																								
adopted for soda ash		continuing 2015-2017 trend																						
imports - Mc (t)	449	533	597	660	724	787	851	915	978	1042	1105	1169	1233	1296	1360	1423	1487	1551	1614	1678	1741	1805	1868	1932
imports - Mc (kt)	0.449	0.533	0.597	0.660	0.724	0.787	0.851	0.915	0.978	1.042	1.105	1.169	1.233	1.296	1.360	1.423	1.487	1.551	1.614	1.678	1.741	1.805	1.868	1.932
2D Non-Energy Products from Fuels and Solvent Use																								
2D1: Lubricant Use																								
		assume constant 2017																						
LC-Fuel Consumption (kt)	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826	7.826
2D2: Paraffin Wax Use																								
		assume constant 2017																						
imports (kt)	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
PW (TJ)	4.01887	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874	4.018874
2D3 Other																								
Solvent Use																								
population	864.2	869.5	874.9	880.6	886.2	891.7	897.2	902.5	907.6	912.6	917.4	921.9	926.2	930.4	934.3	938.0	941.6	945.0	948.3	951.5	954.7	957.8	960.8	963.8
per capita (t/cap)	0.02068																							
Urea-based catalysts																								
		A_PaMs_080819_1300_LoMS_EC template.xlsx																						
		12288.15	12135.23	11889.69	11723.27	11565.73	11408.45	11295.17	11612.96	11785.26	11900.72	11955.22	11801.72	11445.38	11519.12	11508.25	11612.21	11726.56	11810.22	11906.29	11858.89	11810.46	11763.19	11331.95
diesel consumption road tran	298.67	285.77	282.21	276.50	272.63	268.97	265.31	262.68	270.07	274.08	276.76	278.03	274.46	266.17	267.89	267.63	270.05	272.71	274.66	276.89	275.79	274.66	273.56	263.53
activity																								
	5.97	5.72	5.64	5.53	5.45	5.38	5.31	5.25	5.40	5.48	5.54	5.56	5.49	5.32	5.36	5.35	5.40	5.45	5.49	5.54	5.52	5.49	5.47	5.27
2F Gg CO2 eq.																								
population (1000s)	864.2	865.2554	870.6544	876.2578	881.8411	887.3533	892.7814	898.0682	903.1987	908.1378	912.8796	917.398	921.705	925.8166	929.7218	933.4467	936.9943	940.4086	943.7077	946.9007	950.0174	953.0881	956.0917	959.0632
2F. Product uses as ODS subs	249.565	249.8693	251.4284	253.0466	254.6589	256.2508	257.8183	259.345	260.8266	262.2529	263.6223	264.9271	266.1709	267.3582	268.486	269.5617	270.5861	271.5721	272.5248	273.4469	274.347	275.2337	276.1011	276.9592
2F per capita (t/cap)	0.28878	using 2017 per cap emissions																						
2G1b: Use of Electrical Equipment																								
per capita emissions (kg/cap)																								
AVERAGE	0.00019	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193	0.000193
population	864200	865255.4	870654.4	876257.8	881841.1	887353.3	892781.4	898068.2	903198.7	908137.8	912879.6	917398	921705	925816.6	929721.8	933446.7	936994.3	940408.6	943707.7	946900.7	950017.4	953088.1	956091.7	959063.2
2G3: N2O from Product Uses																								
	864200	865255	870654	876258	881841	887353	892781	898068	903199	908138	912880	917398	921705	925817	929722	933447	936994	940409	943708	946901	950017	953088	956092	959063
2G3a: Medical Applications																								
Total Population (1000 persons	864.2	865.2554	870.6544	876.2578	881.8411	887.3533	892.7814	898.0682	903.1987	908.1378	912.8796	917.398	921.705	925.8166	929.7218	933.4467	936.9943	940.4086	943.7077	946.9007	950.0174	953.0881	956.0917	959.0632
2G3b: Propellant for Pressure and Aerosol Products																								
Total Population (1000 persons	864.2	865.2554	870.6544	876.2578	881.8411	887.3533	892.7814	898.0682	903.1987	908.1378	912.8796	917.398	921.705	925.8166	929.7218	933.4467	936.9943	940.4086	943.7077	946.9007	950.0174	953.0881	956.0917	959.0632
2G4: Other																								
	assume constant as 2016																							
CO2 (kt)	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215	0.01215

3. AGRICULTURE	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
3A Livestock																								
3A Enteric Fermentation																								
3A1 Cattle																								
3A1a Dairy cattle																								
Lactation		assume constant 2017																						
kg milk/ day	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795	19.6795
fat in milk, %																								
NEl=milk*(1.47+0.40*fat)	56.48	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003	56.48003
Pregnancy (NEp)		assume constant 2017																						
% pregnant	72.24	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400	72.2400
Cpregnancy																								
NEp=C*NEm *%pregnant	3.17	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692	3.16692
GE (gross energy intake)																								
Digestibility of feed, DE (%)																								
GE MJ/head/day	290.829	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286	290.8286
Ym (CH4 conversion rate)																								
EF=(GE*Ym*365days/yr)/55.65	124.0	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876	123.9876
animal population	30137	29784.59	29784.59	29784.59	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4	34202.4
3A1b Other cattle																								
population	36600	35748.9	35748.9	35748.9	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994
3A2 Sheep																								
population	321488	316354	319396	319396	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606	334606
3A3 Swine																								
population	350163	359222.6	359222.6	362744.4	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7	373309.7
3A4 Horses																								
population	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342
3A4 Mules and Asses																								
population	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316
3A4 Goats																								
population	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637
3B Manure Management																								
3B1 CH4 emissions																								
3B1.1a Dairy cattle																								
population	30137	29785	29785	29785	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202	34202
waste management																								
solid storage	95%	94.3%	93.5%	92.8%	92.0%	91.3%	90.5%	89.8%	89.0%	88.3%	87.5%	86.8%	86.0%	85.3%	84.5%	83.8%	83.0%	82.3%	81.5%	80.8%	80.0%	79.3%	78.5%	77.8%
anaerobic digester	5%	5.8%	6.5%	7.2%	8.0%	8.7%	9.5%	10.3%	11.0%	11.8%	12.5%	13.3%	14.0%	14.7%	15.5%	16.2%	17.0%	17.7%	18.5%	19.2%	20.0%	20.7%	21.5%	22.2%
3B1.1b Other cattle																								
population	36600	35749	35749	35749	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994	37994
waste management																								
solid storage	95%	94.3%	93.5%	92.8%	92.0%	91.3%	90.5%	89.8%	89.0%	88.3%	87.5%	86.8%	86.0%	85.3%	84.5%	83.8%	83.0%	82.3%	81.5%	80.8%	80.0%	79.3%	78.5%	77.8%
anaerobic digester	5%	5.8%	6.5%	7.2%	8.0%	8.7%	9.5%	10.3%	11.0%	11.8%	12.5%	13.3%	14.0%	14.7%	15.5%	16.2%	17.0%	17.7%	18.5%	19.2%	20.0%	20.7%	21.5%	22.2%
3B1.2 Sheep																								
population	321488	316354.5	319396.4	319396.4	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7	334605.7
3B1.3 Swine																								
breeding swine (sows)	33157	33260	33260	33586	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564	34564
waste management																						0.778261	0.78913	0.8
anaerobic digester	55%	56.1%	57.2%	58.3%	59.3%	60.4%	61.5%	62.6%	63.7%	64.8%	65.9%	67.0%	68.0%	69.1%	70.2%	71.3%	72.4%	73.5%	74.6%	75.7%	76.7%	77.8%	78.9%	80%
aerobic treatment (liquid systems)	45%	43.9%	42.8%	41.7%	40.7%	39.6%	38.5%	37.4%	36.3%	35.2%	34.1%	33.0%	32.0%	30.9%	29.8%	28.7%	27.6%	26.5%	25.4%	24.3%	23.3%	22.2%	21.1%	20%
market swine (all except sows)	317006	325962	325962	329158	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745	338745
waste management																								
anaerobic digester	55%	56.1%	57.2%	58.3%	59.3%	60.4%	61.5%	62.6%	63.7%	64.8%	65.9%	67.0%	68.0%	69.1%	70.2%	71.3%	72.4%	73.5%	74.6%	75.7%	76.7%	77.8%	78.9%	80.0%
aerobic treatment (liquid systems)	45%	43.9%	42.8%	41.7%	40.7%	39.6%	38.5%	37.4%	36.3%	35.2%	34.1%	33.0%	32.0%	30.9%	29.8%	28.7%	27.6%	26.5%	25.4%	24.3%	23.3%	22.2%	21.1%	20.0%

3B1.4 Other - Horses																									
population	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342	342
3B1.4 Other - Mules and Asses																									
population	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316
3B1.4 Other - Goats																									
population	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637	257637
3B1.4 Other - Poultry																									
Laying chicken	570330	593125.5	598884	604642.5	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918	621918
Broiler chicken	2777700	2756064	2782822	2809580	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853	2889853
Turkeys	11860	9960.1	10056.8	10153.5	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6	10443.6
Other poultry	0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Total population (1000s)	3359.890	3359.151	3391.765	3424.380	3522.220	3522.221	3522.222	3522.223	3522.224	3522.225	3522.226	3522.227	3522.228	3522.229	3522.230	3522.231	3522.232	3522.233	3522.234	3522.235	3522.236	3522.237	3522.238	3522.239	
3D Agricultural Soils																									
3D1 Direct NsO emissions from managed soils																									
3D1.1 Inorganic N fertilisers																									
FSN (kg N in fertilizer)	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	7841000	
EF1 (kgN2O-N/kg N)		assuming constant as 2017																							
3D1.2b Sewage Sludge applied to soils		assuming constant as 2017																							
dry sludge applied on land (t DM)	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	1613.1	
3D1.2c Other organic fertilisers applied to soils																									
TOTAL composting (1000t wet mass)	36.52	48.927	53.698	58.469	63.24	68.011	72.782	77.553	82.324	87.095	91.866	96.637	101.408	106.179	110.95	115.721	120.492	125.263	130.034	134.805	139.576	144.347	149.118	153.889	
3D1.4 Crop residues																									
Crop production (t/yr)																									
Wheat	16592	7316.12	7454.16	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	7592.2	
Barley	18754	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	2907	
Oats	248	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	352	
Beans & pulses (legumes)	4145	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	
Potatoes (tubers)	111410	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	122803	
cultivated area (ha)																									
Wheat	8678	8889	9057	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	9225	
Barley	10953	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	14536	
Oats	490	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	367	
Beans & pulses (legumes)	493	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	
Potatoes (tubers)	4440	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	5041	
Crop yield (YieldFresh), kg/ha																									
Wheat	1912	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	823	
Barley	1712	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	
Oats	506	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	959	
Beans & pulses (legumes)	8408	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	8032	
Potatoes (tubers)	25092	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	24361	
3F. Field burning of agricultural residues																									
Area Burnt (ha/yr)																									
FracBURN (kg N/kg crop-N)	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	
Wheat	868	889	906	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	922	
Barley	1095	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	
Oats	49	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	
Beans & pulses (legumes)	49	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	
Potatoes (tubers)	444	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	504	

5. WASTE	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
4A Solid Waste Disposal																								
		869498.6	874924.1	880555	886165.7	891704.9	897159.6	902472.3	907628	912591.4	917356.4	921897	926225.1	930356.8	934281.2	938024.4	941589.4	945020.4	948335.7	951544.3	954676.4	957762.1	960780.4	963766.5
POPULATION	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Regional Population (1000 persons)																								
Lefkosia	335.9	336.3	338.4	340.5	342.7	344.9	347.0	349.0	351.0	352.9	354.8	356.5	358.2	359.8	361.3	362.8	364.1	365.5	366.8	368.0	369.2	370.4	371.6	372.7
Ammochostos	47.5	47.6	47.9	48.2	48.5	48.8	49.1	49.4	49.7	49.9	50.2	50.4	50.7	50.9	51.1	51.3	51.5	51.7	51.9	52.1	52.2	52.4	52.6	52.7
Larnaca	146.5	146.7	147.6	148.5	149.5	150.4	151.3	152.2	153.1	153.9	154.7	155.5	156.2	156.9	157.6	158.2	158.8	159.4	160.0	160.5	161.0	161.6	162.1	162.6
Lemesos	242.0	242.3	243.8	245.4	247.0	248.5	250.0	251.5	253.0	254.3	255.7	256.9	258.1	259.3	260.4	261.4	262.4	263.4	264.3	265.2	266.1	266.9	267.8	268.6
Pafos	92.3	92.4	93.0	93.6	94.2	94.8	95.4	95.9	96.5	97.0	97.5	98.0	98.4	98.9	99.3	99.7	100.1	100.4	100.8	101.1	101.5	101.8	102.1	102.4
TOTAL	864.2	869.5	874.9	880.6	886.2	891.7	897.2	902.5	907.6	912.6	917.4	921.9	926.2	930.4	934.3	938.0	941.6	945.0	948.3	951.5	954.7	957.8	960.8	963.8
Urban Population (1000 persons)																								
Lefkosia	246.9	247.2	248.7	250.3	251.9	253.5	255.1	256.6	258.0	259.4	260.8	262.1	263.3	264.5	265.6	266.7	267.7	268.7	269.6	270.5	271.4	272.3	273.1	274.0
Ammochostos		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Larnaca	86.6	86.7	87.3	87.9	88.4	89.0	89.5	90.0	90.6	91.0	91.5	92.0	92.4	92.8	93.2	93.6	93.9	94.3	94.6	94.9	95.2	95.6	95.9	96.2
Lemesos	184.6	184.8	186.0	187.2	188.4	189.6	190.7	191.8	192.9	194.0	195.0	196.0	196.9	197.8	198.6	199.4	200.2	200.9	201.6	202.3	202.9	203.6	204.2	204.9
Pafos	65.1	65.2	65.6	66.0	66.4	66.9	67.3	67.7	68.0	68.4	68.8	69.1	69.4	69.8	70.0	70.3	70.6	70.8	71.1	71.3	71.6	71.8	72.0	72.3
TOTAL	583.2	584.0	587.6	591.4	595.1	598.9	602.5	606.1	609.6	612.9	616.1	619.1	622.1	624.8	627.5	630.0	632.4	634.7	636.9	639.1	641.2	643.2	645.3	647.3
Rural Population (1000 persons)																								
Lefkosia	89.0	89.1	89.6	90.2	90.8	91.4	91.9	92.5	93.0	93.5	94.0	94.4	94.9	95.3	95.7	96.1	96.5	96.8	97.2	97.5	97.8	98.1	98.4	98.7
Ammochostos	47.5	47.6	47.9	48.2	48.5	48.8	49.1	49.4	49.7	49.9	50.2	50.4	50.7	50.9	51.1	51.3	51.5	51.7	51.9	52.1	52.2	52.4	52.6	52.7
Larnaca	59.9	59.9	60.3	60.7	61.1	61.5	61.8	62.2	62.6	62.9	63.2	63.5	63.8	64.1	64.4	64.6	64.9	65.1	65.4	65.6	65.8	66.0	66.2	66.4
Lemesos	57.4	57.5	57.9	58.2	58.6	59.0	59.3	59.7	60.0	60.3	60.7	61.0	61.2	61.5	61.8	62.0	62.3	62.5	62.7	62.9	63.1	63.3	63.5	63.7
Pafos	27.2	27.2	27.4	27.6	27.8	27.9	28.1	28.3	28.4	28.6	28.7	28.9	29.0	29.1	29.3	29.4	29.5	29.6	29.7	29.8	29.9	30.0	30.1	30.2
TOTAL	281.0	281.3	283.1	284.9	286.7	288.5	290.2	292.0	293.6	295.2	296.8	298.3	299.7	301.0	302.3	303.5	304.6	305.7	306.8	307.8	308.9	309.9	310.8	311.8
per capita production to disposal sites (kg/cap)	**481**	**498**	**502**	**506**	**510**	**514**	**519**	**524**	**528**	**534**	**539**	**545**	**552**	**559**	**561**	**566**	**572**	**577**	**583**	**588**	**594**	**599**	**605**	**610**
Annual per capita production (kg/cap) to model	655.58	662.31	667.81	672.77	678.55	684.28	690.33	696.52	702.96	709.90	717.26	725.38	734.16	743.71	746.17	753.31	760.54	767.83	775.15	782.52	789.89	797.26	804.64	811.99
	40% sorting at source from 2021; 55% 2025; 60% 2030; 65% 2035																							
MSW to disposal sites (% of total)	75%	75%	75%	75%	60%	56%	53%	49%	45%	44%	43%	42%	41%	40%	39%	38%	37%	36%	35%	35%	35%	35%	35%	35%
composition of waste to disposal sites																								
Food	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%
Garden	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
Paper	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%
Wood	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Textile	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%
Nappies	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Plastics, other inert	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
	15% of organics to landfill from 2021; 10% in 2035																							
MSW to disposal sites (% of total)	75%	75%	75%	75%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%
composition of waste to disposal sites																								
Food	48%	48%	48%	48%	14%	14%	14%	13%	13%	13%	12%	12%	12%	12%	11%	11%	11%	10%	10%	10%	10%	10%	10%	10%
Garden	8%	8%	8%	8%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Paper	27%	27%	27%	27%	52%	52%	53%	53%	53%	53%	53%	54%	54%	54%	54%	55%	55%	55%	55%	55%	55%	55%	55%	55%
Wood	3%	3%	3%	3%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
Textile	11%	11%	11%	11%	21%	21%	21%	21%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%
Nappies	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Plastics, other inert	3%	3%	3%	3%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%

WEM RESULTS (Gg CH4) from model																								
Un-managed, deep	13.648811	13.82343	13.66599	13.04847	12.46021	11.89977	11.36577	10.85692	10.37197	9.909768	9.469191	9.049186	8.648749	8.26693	7.902825	7.556352	7.226652	6.912909	6.614346	6.330228	6.059856	5.802566	5.557728	5.324742
Un-managed, shallow	2.3566903	2.251598	2.15142	2.055919	1.964865	1.878043	1.795248	1.716285	1.640969	1.569124	1.500582	1.435186	1.372785	1.313236	1.256401	1.202153	1.150367	1.100928	1.053725	1.00865	0.965605	0.924493	0.885224	0.847712
Un-managed, total	16.005501	16.07503	15.81741	15.10439	14.42508	13.77781	13.16102	12.5732	12.01294	11.47889	10.96977	10.48437	10.02153	9.580165	9.159226	8.758505	8.37702	8.013837	7.66807	7.338878	7.025461	6.72706	6.442953	6.172454
Managed, anaerobic	3.0367011	3.336461	3.629603	4.300448	5.492924	6.650475	7.774804	8.868233	9.932542	10.96961	11.98172	12.97082	13.9395	14.89003	15.82483	16.72981	17.61647	18.48571	19.33836	20.17524	20.99712	21.80472	22.59873	23.37981
TOTAL	19.042202	19.41149	19.44702	19.40484	19.918	20.42828	20.93582	21.44143	21.94548	22.4485	22.95149	23.45519	23.96103	24.47019	24.98406	25.48832	25.99349	26.49954	27.00643	27.51412	28.02258	28.53178	29.04169	29.55227
30% RECOVERY of deep unmanaged and managed from 2020				30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
biogas recovered (Gg CH4)	0.0	0.0	0.0	5.2	5.4	5.6	5.7	5.9	6.1	6.3	6.4	6.6	6.8	6.9	7.1	7.3	7.5	7.6	7.8	8.0	8.1	8.3	8.4	8.6
W5 emissions (Gg CH4)	19	19	19	14	15	15	15	16	16	16	17	17	17	18	18	18	19	19	19	20	20	20	21	21
4B Biological Treatment of Solid Waste																								
increase composting to 10% in 2021 and keep constant																								
BaU M composted, 1000 t wet waste	33.120	45.696	46.362	47.007	47.713	48.417	49.143	49.878	50.627	51.406	52.210	53.063	53.957	54.903	55.317	56.070	56.823	57.577	58.330	59.083	59.836	60.590	61.343	62.096
increase AD to 5% in 2021 and keep constant																								
W4 AD (1000t) from Feb2018 PROJ					67.9	68.4	69.0	69.7	70.3	71.0	71.7	72.5	73.4	74.4	74.6	75.3	76.1	76.8	77.5	78.3	79.0	79.7	80.5	81.2
4D Wastewater Treatment and Discharge																								
4D1 Domestic Wastewater Treatment and Discharge - **T2**																								
Population	846200	869498.6	874924.1	880555	886165.7	891704.9	897159.6	902472.3	907628	912591.4	917356.4	921897	926225.1	930356.8	934281.2	938024.4	941589.4	945020.4	948335.7	951544.3	954676.4	957762.1	960780.4	963766.5
SEPTIC SYSTEMS																								
Ui	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%	23.8%
Ti,j	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
TREATED: CENTRALISED AEROBIC - WELL MANAGED																								
Ui	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%	76.2%
Ti,j	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
P	846200	869498.6	874924.1	880555	886165.7	891704.9	897159.6	902472.3	907628	912591.4	917356.4	921897	926225.1	930356.8	934281.2	938024.4	941589.4	945020.4	948335.7	951544.3	954676.4	957762.1	960780.4	963766.5
Protein, kg/person/yr	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81	28.81
P	846200	869498.6	874924.1	880555	886165.7	891704.9	897159.6	902472.3	907628	912591.4	917356.4	921897	926225.1	930356.8	934281.2	938024.4	941589.4	945020.4	948335.7	951544.3	954676.4	957762.1	960780.4	963766.5
TPLANT , %	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%
5D2 Industrial Wastewater Treatment and Discharge																								
	4.23	4.043249	3.820768	3.380806	3.0443	2.7	2.5	2.3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Industrial production (t)	assuming growth proportional to GDP																							
alcohol	631	656	681	704	726	745	764	781	797	813	829	846	863	880	898	916	934	953	972	991	1,011	1,031	1,052	1,073
beer	39,140	40,723	42,279	43,708	45,039	46,255	47,411	48,502	49,472	50,461	51,470	52,500	53,550	54,621	55,713	56,828	57,964	59,123	60,306	61,512	62,742	63,997	65,277	66,583
soft drinks	15,070	15,679	16,278	16,828	17,341	17,809	18,254	18,674	19,047	19,428	19,817	20,213	20,617	21,030	21,450	21,879	22,317	22,763	23,219	23,683	24,157	24,640	25,132	25,635
dairy products	108,113	112,484	116,782	120,730	124,405	127,764	130,958	133,970	136,650	139,383	142,170	145,014	147,914	150,872	153,890	156,967	160,107	163,309	166,575	169,907	173,305	176,771	180,306	183,912
meat & poultry	88,304	91,874	95,384	98,609	101,611	104,354	106,963	109,424	111,612	113,844	116,121	118,444	120,812	123,229	125,693	128,207	130,771	133,387	136,054	138,775	141,551	144,382	147,270	150,215
refinery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
soaps & detergents	8,543	8,888	9,228	9,540	9,830	10,095	10,348	10,586	10,798	11,014	11,234	11,458	11,688	11,921	12,160	12,403	12,651	12,904	13,162	13,425	13,694	13,968	14,247	14,532
vegetable oils	12,217	12,711	13,196	13,643	14,058	14,437	14,798	15,139	15,442	15,750	16,065	16,387	16,714	17,049	17,390	17,737	18,092	18,454	18,823	19,200	19,584	19,975	20,375	20,782
vegetables, fruits & juices	76,012	79,085	82,107	84,883	87,467	89,828	92,074	94,192	96,076	97,997	99,957	101,956	103,995	106,075	108,197	110,361	112,568	114,819	117,116	119,458	121,847	124,284	126,770	129,305
wine	8,810	9,166	9,516	9,838	10,137	10,411	10,671	10,917	11,135	11,358	11,585	11,816	12,053	12,294	12,540	12,790	13,046	13,307	13,573	13,845	14,122	14,404	14,692	14,986