CYPRUS GREEN TAXATION REFORM

DELIVERABLE 2: BEST PRACTICES REPORT

Technical Support Instrument

Supporting reforms in 27 Member States

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1. INTRODUCTION

Green Taxes is a flagship support programme within TSI (Technical Support Instruments) at DG REFORM[1]. This project was commissioned under the TSI Regulation with the aim of providing technical support to Cyprus on preparing and implementing environmental (green) taxation reform. The main environmental challenges faced by Cyprus today relate to 1) Climate Change/Air Pollution, 2) Circular Economy/Waste Management and 3) Water Pollution and Water Management. This study will aim to address these three areas by recommending a set of tax reform measures in a fiscally neutral manner.

This report sets out to explore best practices in green taxation in (mostly) European countries in th three target intervention areas: water availability and water pollution, air pollution and climate change, and waste management and circular economy.

2. CYPRUS CONTEXT

With regards to the three areas in scope, Cyprus has a unique set of circumstances and challenges, which are also being addressed through ongoing initiatives. One of the most relevant initiatives is the Recovery and Resilience Plan (RRP) which will bring significant reforms and investments in Cyprus, including green taxation reform (this study).

Table 1 Summary of challenges, ongoing initiatives and international best practices per intervention area

Intervention Area	***Challenges***	***Ongoing initiatives in Cyprus and international best practices***
Water pollution and water management	■ Cyprus suffers from one of the highest level of water stress in Europe, particularly during years of excessive drought, and has a Water Stress Index of 65% (abstraction / availability ratio). ■ This is due to its semi-arid climate, the absence of natural surface water bodies (lakes and rivers), being characterised by many small catchments without significant runoff and directly dependent on precipitations, and over-abstraction of underground aquifers in the past. ■ Deficiencies in the system include a high % of non-revenue water (non-invoiced water) compared to what is deemed the efficient amount, ageing infrastructure and high water leakage/loss. ■ Current water pricing is too low, with prices failing to reflect and internalise its scarcity as a resource and the cost to the environment of its use (environment & resource cost) ■ There is no full cost recovery ■ Water pollution is not a main area of concern	**Ongoing initiatives:** ■ RRP Component 2.3 Smart and sustainable water management ■ Water Fee Regulation (KDP 48/2017, KDP10/2020 and KDP270/2021) ■ Water Pricing Policy Regulation (KDP128/2014) ■ Water Management and Drought Response Strategy **International best practices:** ■ France ■ Bulgaria ■ Malta ■ Australia
Climate change and air pollution	**Climate change** ■ Cyprus is among the EU Member States with the highest GHGs/capita at 11.6 tonnes of CO2 eq./capita (EU average 8.8) & one of the most vulnerable regions in Europe in terms of climate change consequences.	**Ongoing initiatives:** ■ RRP Component 2.1 Climate neutrality, energy efficiency and renewable energy penetration, Component 2.2 Sustainable transport ■ National Energy and Climate Plan (NECP) 2021-2030

[1] European Commission, *Greening taxes – applying polluter pays principle in practice* https://ec.europa.eu/info/sites/default/files/b1-greening_taxes.pdf

Intervention Area	*Challenges*	*Ongoing initiatives in Cyprus and international best practices*
	■ Transport has been identified as a main culprit for GHG emissions (over 50% of emissions other than the non-ETS sectors). ■ High landfilling (both legal and illegal) of MSW (link to next Intervention Area) ■ The Commission's assessment of Cyprus' NECP proposes that Cyprus shall take measures to improve energy efficiency. **Air pollution** ■ Cyprus is largely on track to meet EU air quality standards, although improvements can still be made. ■ Health-related external costs from air pollution In Cyprus are above EUR 549 million/year. ■ Intensive rearing of poultry and pigs represent 65% of IED[2] installations	■ European Commission ongoing revision of IED and AAQ directives ■ European Commission ongoing revision of the Energy Tax Directive[3] **International best practices:** ■ Sweden ■ Spain ■ Hungary ■ UK
Circular Economy and Waste Management	■ Total waste generation of municipal waste is one of the highest in the EU. ■ Diverting the large levels of municipal waste (79.5% in 2017) from being landfilled. ■ Mitigation/elimination of the uncontrolled and illegal dumping of waste. ■ Providing appropriate infrastructures for the collection of recyclable materials, green waste, electrical and electronic equipment waste, bulky waste, etc. in remote rural areas and communities. ■ Achieving the EU biowaste reduction targets stated in the Waste Framework Directive 2018/851/EU. ■ Site selection and licensing for reuse and repair for waste prevention and promotion of circular economy.	**Ongoing initiatives in Cyprus:** ■ RRP Component 3.2 New growth model and diversification of the economy ■ PAYT pilots in a few municipalities which includes composting to decrease biowaste. ■ Cyprus Action Plan for the transition to a circular economy 2021-2027 **International best practices:** ■ France ■ UK ■ Austria

This section will be further expanded after discussions with the relevant ministries and stakeholders.

We can already see that the three intervention areas cannot be discussed in isolation since there are many interdependencies with the economic activities in Cyprus, as shown in Table 2 below.

Table 2 Interdependencies between intervention areas and economic activities (dark blue for a strong link, light blue for a weaker link)

Intervention Area	*Agriculture*	*Energy*	*Waste*	*Transport*	*Industry*	*Households*
Water pollution and water management	Water use and water pollution	High energy consumption from de-salination plant	Water pollution		Water consumption	Water use

[2] Industrial Emissions Directive
[3] https://ec.europa.eu/taxation_customs/green-taxation-0/revision-energy-taxation-directive_en

Intervention Area	*Agriculture*	*Energy*	*Waste*	*Transport*	*Industry*	*Households*
Climate change and air pollution	Pigs and poultry generate air pollution	Targets for renewable energy in primary production and targets for energy efficiency	Emissions from landfills	Main contributor to GHG emissions	Air pollution and GHG emissions	Energy consumption, Air pollution and GHG emissions
Circular Economy and Waste Management	Opportunity for more circularity, e.g. animal-by-products	Efficient use of resources reduces energy requirements	Waste management		Resource consumption and waste generation	Resource consumption and waste generation

3. WATER POLLUTION AND WATER MANAGEMENT

CURRENT SITUATION IN CYPRUS

WATER SUPPLY

Government Water Supply Systems (GWSS) are part of the infrastructure of the Government Water Works that supply drinking water for human consumption to the Local Water Supply Authorities. Local Water Supply Authorities are comprised of the three Urban Water Boards (in the urban areas of Nicosia, Limassol and Larnaca), Municipalities and Communities. These authorities then distribute water to the consumers of their areas through their own water supply distribution networks.

GWSS are managed by the Water Development Department (WDD) and nowadays serve more than 180 Local Water Supply Authoroties, providing over 80% of the total drinking water demand of Cyprus. The GWSS provide drinking water for the Nicosia, Limassol and Larnaca Water Boards (which, in turn, serve a great number of residents in the municipalities and communities of urban and sub-urban areas), as well as the municipalities and communities acting as independent Local Water Supply Authorities. Some of the LWWA which buy water from the GWSS have also their own drinking water sources (boreholes) which they use depending on the water status. Note that the Local Water Supply Authorities which are not served by the GWSS (mainly small communities on the mountain areas) have their own resources, mainly boreholes.

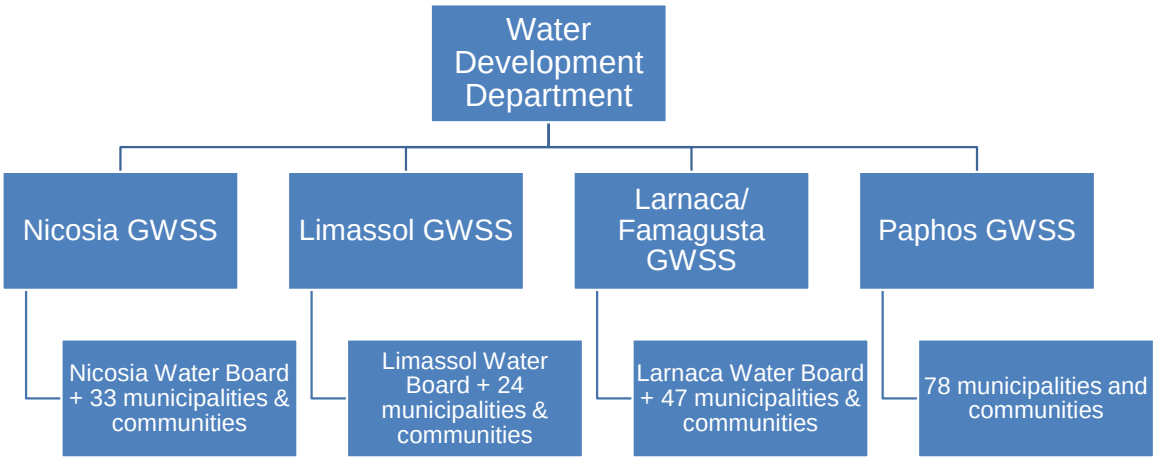
Nowadays, there are four GWSS, as follows:

- **Nicosia GWSS**: The Nicosia GWSS is supplied with drinking water from the desalination plants in Larnaca and Vassilikos, and also from the water treatment plants in Tersefanou and Kornos to which water is conveyed from the dams of Kouris, Kalavasos, Dhipotamos and Lefkara.
  - Nicosia GWSS supplies water to the **Nicosia Water Board** (which supplies water to the urban and sub-urban municipalities of the wider Nicosia area), and also to other 33 municipalities and communities.
- **Limassol GWSS:** The Limassol GWSS is supplied with drinking water from the Episkopi desalination plant as well as from the Limassol water treatment plant to which water is conveyed from Kouris dam. Drinking water is also abstracted from the Germasoyia aquifer which is recharged from Germasoyia dam.
  - Limassol GWSS supplies water to **Limassol Water Board** (which supplies water to the urban and sub-urban municipalities of the wider Limassol area), and also to other 24 municipalities and communities.
- **Larnaca/ Famagusta GWSS**: The Larnaca-Famagusta GWSS is supplied with drinking water from the desalination plants in Larnaca, Dhekelia and Vassilikos, and also from the water treatment plants in Tersefanou and Chirokitia to which water is conveyed from the dams of Kouris, Dhipotamos and Kalavassos.
  - Larnaca/ Famagusta GWSS supplies water to **Larnaca Water Board** (which supplies water to the urban and sub-urban municipalities of the wider Larnaca area), and also to other 47 municipalities and communities.

- **Paphos GWSS:** The Paphos GWSS is supplied with drinking water from the water treatment plants in Anarita (Asprokremmos) and Kannaviou to which water is conveyed from Askrokremmos and Kannaviou dams. Drinking water to the Paphos GWSS ia also supplied from the Paphos desalination plant.
  - Paphos GWSS supplies water to the Paphos urban area and to other 78 municipalities and communities.

Figure 1 summarises the structure of the Governmental Water Supply System in Cyprus:

Figure 1 Structure of the Governmental water supply system



Water supply fees

The WDD supplies drinking water to the Local Water Supply Authorities, in bulk, for a unified unit tariff determined according to the Pricing Policy Regulation (KDP128/2014). The fees are updated in accordance with the legislation and in accordance with the cost per cubic meter. The following tables show the current water supply tariffs, as approved by the Council of Ministers and the Water Management Advise Committee set by the WDD, with fees set according to use (drinking water, irrigation), according to whether the water is supplied by government or non-government water works, and according to pipeline/area. These are set out in the Water Fee Regulations (KDP 48/2017, KDP10/2020 and KDP270/2021)[4].

Drinking Water – Drinking Water supply from **Government** Water Works / Government Water Supply Systems to Local Water Supply Authorities

	EUR / m3		
Source	Financial tariff	Environment & Resource tariff	**Total tariff**
From the Unified Southern Conveyor Project	0.77	0.05	**0.82**
From the Paphos Gov. Water Supply System	0.59	0.05	**0.82**
From the Pissouri Gov. Water Project to the Communities Pissouri, Avdimou, Alectora, Fasoula and Archimandrita	0.60	0.05	**0.65**
From the Souni-Zanatzia Gov. Water Project to the Community of Souni-Zanatzia	0.34	0.05	**0.39**

Drinking Water – Water abstraction from other sorces (**non-Government** Water Works, e.g. from private boreholes, drilling, underground aquifers, surface springs, rivers)

[4] http://www.moa.gov.cy/moa/wdd/WDD.nsf/All/9321CBCA37E34520C22583E50026697C?OpenDocument

	EUR / m3		
Use	Financial tariff	Environment & Resource tariff	**Total tariff**
Fees to Local Water Authorities: Water supply intended for home water supply and other water supply uses	Financial cost by the Local Water Authority	0.05	**0.05**
Fees to Local Water Authorities: Water supply for water resellers (tankers / bottlers)	Financial cost by the reseller	0.12	**0.12**
Fees to sellers of drinking water with tanks, in drinking water bottles or for other drinking water uses.	Financial cost by the reseller	0.12	**0.12**

Irrigation – Supply of **fresh untreated irrigation water** from **Government** Water Works / Government Irrigation Networks

	EUR / m3		
Use	Financial tariff	Environment & Resource tariff	**Total tariff**
Fixed annual fee (per ten-hectare of land)	2.40		**2.40**
For agricultural use or livestock use, or aquaculture	0.15	0.02	**0.17**
To Irrigation organizations for agricultural use (in bulk)	0.10	0.02	**0.12**
For industrial consumption	0.23	0.02	**0.25**
For industrial use (with return of quantities to the network) – the quantity that does not return to the network is charged	0.23	0.02	**0.25**
Irrigation for other uses: lawns for soccer and sports fields, parks and other green spaces falling within the competence of Local Authorities	0.21	0.02	**0.23**
Irrigation for other uses: lawns for private soccer and sports fields, and private green spaces and hotel gardens	0.34	0.02	**0.36**
Overconsumption charges (for the quantities exceeding the annual allocated, according to the annual water allocation plan)			

Irrigation – Supply of **recycled water** from tertiary wastewater treatment plants falling within the competence of the Government State Regulations 6 (2) and 7 and Annex III

	EUR / m3		
Use	Financial fee	Environment & Resource fee	**Total fee**
Fixed annual fee (per ten-hectare of land)	2.40		**2.40**
For a**gricultural use**	0.06	0.01	**0.07**
To Irrigation organizations for agricultural use (in bulk)	0.01	0.01	**0.02**
For industrial consumption	0.15	0.02	**0.17**
Irrigation for other uses: lawns for soccer and sports fields, parks and other green spaces falling within the competence of Local Authorities	0.10	0.02	**0.12**
Irrigation for other uses: lawns for private soccer and sports fields, and private green spaces and hotel gardens	0.15	0.02	**0.17**
Irrigation for other uses: irrigation of golf courses	0.15	0.08	**0.23**

	EUR / m3	
Overconsumption (for quantities exceeding the annual allocated according to the annual water allocation plan).	Double the above fees	

Irrigation– for all uses of irrigation water and recycled water by the KYE / KAD

Type	EUR
Water meter connection	200
Water meter reconnection	20
Filter connection (per ten-hectare of land)	5

Irrigation – Water abstraction from **non-Government** Water sources

	EUR / m3		
Use	Financial fee	Environment & Resource fee	**Total fee**
For agricultural or **livestock use**, **and aquaculture**	Paid by the source user	0.01	**0.01**
For other uses as follows: **(a) lawn irrigation of soccer fields and sports fields**		0.02	**0.02**
(b) irrigation of parks and other green spaces competence of State / Local Authorities		0.02	**0.02**
c) I**rrigation of private green spaces and gardens** (**hotels / houses**)		0.10	**0.10**
(d) industry		0.10	**0.10**
For golf course irrigation **(a) from surface sources – licensed private dams**		0.11	**0.11**
(b) from aquifers enriched with recycled water		0.23	**0.23**

As shown in the above table, the WDD is already introducing a dedicated "Environment & Resource fee" to reflect the environment and resource cost of water use. In short, this fee charged is based on the environmental (external) cost of water consumption. The environmental cost is expressed as the environmental damage in terms of a water body's deviation from its quantity and quality status, from a predetermined target ('good status'). The environmental cost imposed is due to a) pollution from organic or nutrient loads, b) pollution from priority substances and c) lack of ecological flow downstream of dams. The full methodology for how the "Environment & Resource fee" is calculated can be found in the Ministry of Agriculture, Natural Resource and Environment's Reporting Sheets on Economics[5].

The "Environment & Resource fee" raises the total fee charged over the financial cost fee. For water supply for drinking water purposes, for example, an additional fee of €0.05/m^3 is introduced to reflect the environmental and resource cost, which represents a 6%-15% increase on the total water fee, depending on which government water project or supply system one is referring to. Note that this fee is transferred to the final consumer, via the water consumption charge applied by the Local Water Authority and it is separately noted on the water bill so as to show the effect that water consumption has on the environment.

Though this will raise the price of water, it is important to note that the increase in the fee must be large enough to truly reflect the water scarcity in Cyprus, and to truly lead to a change in demand, and better use of water. This project will aim to design a water price that achieves this. To do so, it is important to draw from how water pricing has been designed and implemented in other EU member states.

[5] http://www.moa.gov.cy/moa/WDD/wdd.nsf/All/20EADA3331A78D68C22582CC0022121D/$file/1_EU-summary_Economics-FINAL 1.pdf

Water Board Fees

Once the Water Supply fees are set by WDD, the Local Water Supply Authorities (comprised of Water Boards in the urban areas and the rest Municipalities and Communities) set their own fees for the distribution and supply of water to the end consumers of their areas. These fees vary according to the total cost that each local water authority has for the provision / abstraction of water (from WDD or other sources) plus the cost for the installation and the operation and maintenance of its network plus the environmental and resource cost. Different rates are charged for residential uses, commercial uses and industrial uses. These tend to be structured in the following way: a fixed fee is charged to the user, representing the fixed costs, and then a volumetric block-rising scheme is used, per m^3 of water consumption. Under this scheme, users pay different tariffs for different consumption levels. Block tariffs have a step-wise structure, where higher tariffs are used for higher consumption block, so as to give motive for water use efficiency and water saving.

For example, a residential user in Nicosia who consumes 100 m^3 per year of water will be charged a fixed rate of €8, then a rate of €1.00/ m^3 for the first 20 m^3 of consumption, a rate of €1.50/ m^3 for the next 20 m^3 of consumption (21-40 m^3), €2.00/ m^3 for the next 20 m^3 of consumption (41-60 m^3), €2.50/ m^3 for the next 20 m^3 of consumption (61-80 m^3) and finally €3.00/ m^3 for the final 20 m^3 of consumption (81-100 m^3).

Recovery and Resilience Plan (RRP)

National objectives in Cyprus relating to Water Supply and Sewerage Services, as set out in the Recovery and Resilience Plan (RRP), include:

- Ensuring adequate and uninterrupted supply of good quality potable water;
- Reducing water supply and distribution system water losses; and
- Reducing the non-revenue water and groundwater abstraction.

Reform 1 of Component 2.3 (Smart and Sustainable Water Management) of the RRP, titled Water Resource Management Reform, aims, inter alia, to consolidate and employ pricing policy for more rational usage of water, and takes note of the objective depicted under Component 2.1 “Climate neutrality, Energy efficiency and renewable energy penetration”- Green Taxation Reform, which provides for the gradual introduction of a levy on water that will reflect the scarcity of this natural resource and the cost to the environment of its use, as well as the introduction of a country wide charge on household/landfill waste and a carbon tax for fuels..

WATER POLLUTION

In Cyprus, water pollution originates from:

- Wastewater from municipal sources
- Water abstraction due to the intrusion of seawater
- Dumping of material on the soil that permeates into the groundwater

Treatment

A large proportion of wastewater from municipal sources is collected and treated, and used for irrigation. Some is used for groundwater replenishment. Small villages and agglomerations that have no wastewater treatment plants (WWTP) treat their wastewater through septic tanks and absorption pits. Water Development Department built two wastewater treatment plants one in Nicosia serving Nicosia and Larnaca Districts and one in Limassol. These plants receive some types of industrial wastewater and septic domestic waste. All waste is transferred to these plants by tankers. Wastewater from industrial sources is treated by the industrial plant’s own treatment plants only in a few big industries. This water is then used either for irrigation or discharged to the industrial plants of WDD.

Cyprus has 6 WTP across the country:

- 2 of these, Kannaviou WTP and Pafos-Asprokemmos WTP, are located in the region of Paphos.
- 1 of these, Lemesos WTP, is located in the region of Limassol.
- 3 of these, Choirokotia WTP, Kornos WTP and Tersefanou WTP, are located in Larnaca.

The fees that the Water Boards charge for their services are available online.

As an example, the Larnaca Sewerage and Drainage Board imposed a Sewerage Charge to cover the investment cost for the construction of the Larnaca Sewerage Central System and the Drainage Sewerage System (sewerage

and drainage charges), as well as to cover the operational and maintenance cost of the Sewerage System (usage charges). Three different charges are imposed:

- Sewerage Charge (%): The sewerage charge is imposed to all immovable properties annually and it is divided in two equal instalments payable by June 30th and November 30th of each year.
- Drainage charge (%): The drainage charge is imposed to all immovable properties annually and it is divided in two equal instalments payable by June 30th and November 30th of each year.
- Usage charge (€/m3):
  - It is imposed to all immovable properties served by the sewerage system irrelevant if the property is connected or not.
  - The charge is calculated based on water consumption and is included in the Water Board's bill statements sent to consumers periodically (two-month period, fourth-month period etc.) by the Water Board of the area in which the property is located.

Within the EU, best practice examples of instruments to tackle water scarcity can be drawn from France, Bulgaria, and Malta. Australia can be taken as an example of water markets. In terms of instruments to tackle water pollution, best practice can be drawn from water pollutant taxes in Denmark and Sweden. The following section presents an initial, short review of these best practice instruments, including their design, and impact to date.

Best Practices

Water abstraction charges - France[6]

In France, water abstraction charges have been levied by the Water Agencies for more than 50 years. The levy is paid by all those who abstract water (with some exemptions), and revenues are spent on investments in the protection and improvement of water resources (surface water and groundwater). Rates charged differ by Water Agency, with the highest rates (up to a maximum of €0.10 per m^3) levied on water used for drinking water. Rates are differentiated by source (groundwater or surface water), use (drinking water, irrigation, industry, etc) and zone (to take into account the relative water scarcity and the pressure that the abstraction puts on the available water resources). A substantial part of the water bill is charged at a variable (per m^3) rate. The rate per m^3 water abstracted can differ substantially. For example, the rates applied by the Water Agency Rhône-Méditerranée-Corse in 2016 range from €0.15 per 1,000 m3 for canal filling in zones without a water deficit to €68.31 per 1,000 m3 for drinking water in zones with a water deficit.

Revenue collection: The total amount of revenue from the water abstraction charges in France was estimated at €354 million in 2011. Between 2000 and 2010, the revenues fluctuated around €300 million per year.

Revenue use: The money is earmarked for investments financed by the Water Agencies, according to the principle 'water pays for water'. The revenues are not tied to any specific type of expenditure, but are often used for environmental investments. For example, in 2007 the Water Agencies together spent €87 million on the protection and sanitation of soil groundwater and surface water, and €64 million on the maintenance and restoration of the aquatic environment.

Impact: In practice the impact of the water abstraction charge on the amount of water used has been almost negligible. However, the water abstraction charge is just one of several charges paid by water users in France and included in their water bill. The rate of the charge for water pollution, for instance, is much higher than for the water abstraction rate.

Water abstraction charges - Bulgaria[7]

In Bulgaria, a **water abstraction charge** was implemented in 2001. The main purpose of the charge is to decrease the volumes of water abstracted and therefore to protect water resources. Users are charged according to their consumption level and therefore water saving is encouraged. The price charged varies according to the amount of

[6] IEEP (2017) *Water abstraction charges (Redevances pour prélèvement sur la ressource en eau) in France*. Available at: Link
[7] IEEP (2017) *Water abstraction charges in Bulgaria*. Available at: Link

water and the source of water (where is it abstracted from). In 2012, the tariffs for abstraction of water were separated into abstraction from groundwater and from surface water. The surface water charges varied according to drinking and household needs (€0.01/m^3); irrigation and other farming (€0.0005/m^3); for industrial purposes (€0.023/m^3); among others. The charge covers all aspects of abstraction, but exemptions for emergency situations such as firefighting and civil protection exist. Revenue from the charges is collected by the Enterprise for Management of Environmental Protection Activities (EMEPA) and is then redistributed to environmental projects and initiatives.

Revenue collection: Revenues collected from the water abstraction charge are not known because all taxes and charges in the field of environmental protection are collected by the Enterprise for Management of Environmental Protection Activities (EMEPA), and revenues from the water abstraction charge are not reported separately. However, when the water abstraction charge was increased (and the legislative procedures on water abstraction monitoring and control were reformed) in 2012, the revenue of EMEPA increased from €14.3 million in 2012 to €26.4 million in 2013, and experts believe this rise in revenue could be attributed to the increase in the water charge.

Revenue use: EMEPA uses the revenues raised and European and National funding schemes to finance projects in the field of water and waste management and also redirects funds for biodiversity protection in Bulgaria.

Impact: In terms of its impact, over the years the water abstraction charges have had moderate effects on reducing water use. Water usage in Bulgaria (excluding hydropower production) decreased between 2011 and 2014, with a simultaneous decrease in the total loss of water. However, there was a substantial increase in the amount of water abstracted and used for the production of hydropower. This increase was due to subsidies for energy that is produced by small and medium hydropower plants, and shows that subsidising production of electricity leads to increased water abstraction, and it is not necessarily the best way to achieve sectoral economic or social objectives. The impact of the water abstraction charge is expected to improve as the instrument is reformed and higher charges are introduced.

WATER PRICING - MALTA[8]

Drivers: Household water consumption in Malta was effectively supported until the year 2000. From the mid-1990s, however, awareness began to increase about the need to use water optimally and to make users more accountable for their water consumption. In 2010, following the issuing of a Maltese River Basin Management Plan (RBMP), groundwater abstraction metering fees were adopted, and water supply tariffs were increased.

Design: Water users receiving potable and non-potable water from the public supply pay a water supply tariff. Water supply tariffs are applied to water users based on the amount of water used, and metering allows the correct level of tariffs to be charged. A 'rising block' structure is used: water use to a certain volume is charged at one rate, and water use exceeding that volume is charged at a higher rate. Residential and domestic users are charged a flat-rate annual service charge of €59 per m3 used, as well as a tiered variable consumption charge of between €1.40-5.40 per m3 per person per year. Charges to non-residential users are structured similarly but at different rates. Variable consumption charges account for 70% of revenue, whilst fixed annual charges account for 30%.

Water users from the agricultural and commercial sectors are required to pay metering fees for all significant groundwater abstraction sources they operate. Metering fees are paid for meter installation (€765) and annual metering fees per groundwater source (€143), among others. Some exemptions on metering (and associated fees) can be granted.

Revenue collection: Revenue from the sale of water and related services amounted to EUR 58.65 million in 2015 and EUR 58.8 million in 2014. In 2011 (the latest year for which more detailed data is available), the WSC received around EUR 58 million in revenue from sale of water and related services; around 50% of revenues came from the residential sector, 29% from the non-residential sector and 21% from the domestic sector. Variable consumption charges accounted for 70% of revenue, whilst fixed annual charges accounted for 30%.

Impact on usage and environmental benefits: Consumer charges recovered around 88% of the total costs of water services in Malta in 2014. The water supply tariffs and metering fees do not appear to have had a significant

[8] IEEP (2017) *Water Pricing in Malta*. Available at: Link

impact on the amount of water provided through the public water supply. Groundwater abstraction remains a significant pressure for the country's two main mean sea level aquifer systems. In the period 2004-2014, groundwater abstraction per capita increased by 35% (from 77 m3 to 104 m3), and self-abstraction by the agricultural sector for irrigation purposes (for which no price is charged) doubled. Since self-abstraction of groundwater is not subject to the water supply and metering fees, it has been suggested the water supply fees may be acting as an incentive for self-abstraction.

Future plans: As of 2017, the regulatory authority was developing a proposal to bring about full cost recovery for water services in Malta, through a combination of consumer pricing, application of the 'user pays' principle and Government funding to reflect the environmental benefits of groundwater conservation due to the Water Services Corporation (WSC)'s activities. This would include financial incentives to reduce losses and enhance the recycling of water resources. The Malta Water Association (MWA), however, raised concerns that any significant increase in the WSC water supply tariffs may simply result in users using the WSC supply less and turning to increased self-abstracted water

WATER MARKET - AUSTRALIA[9]

By the 1980s, it had become increasingly evident that many surface water and groundwater systems in Australia were fully or over allocated, and water scarcity had become a critical issue. In response, in the 1990s and 2000s, Australia introduced a series of water policy reforms, including a cap and trade water market. In the new cap and trade system, water users own a right to a share of the available water supply from a defined water resource (i.e. a river or dam), and have the right to trade these shares with other users.

Two water products can be traded in the Australian market – entitlements and allocations. Entitlements are ongoing rights to a share of water from a water resource each year, and therefore trade in entitlements represents a permanent transfer of water access rights. Allocations are the volume of water allocated to an entitlement in a given year, usually expressed as a percentage of entitlement volume, and therefore trade in allocations involves the temporary transfer of water within an irrigation season. Trade allows water to be reallocated from lower value to higher value uses; allocation trade helps irrigators adjust to short term shocks, while entitlement trade facilitates longer term structural adjustment. Since the 1980s, trade in allocations and entitlements has increased, due to the combination of water reform, reductions in transaction costs and increases in water scarcity.

Water trade involves the voluntary transfer of water rights, and the main options for accessing water markets are through water brokers and electronic exchanges.

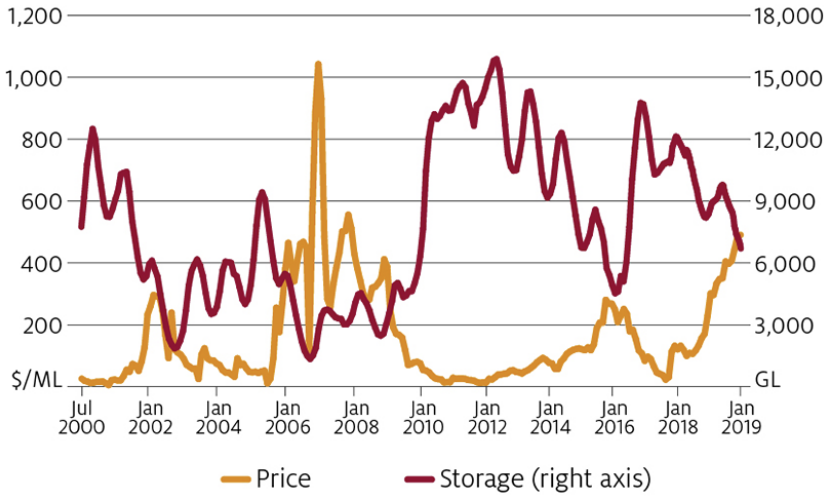
Agriculture is the main consumer of water in Australia, accounting for around 70% of all extractions for consumptive use, and therefore irrigators are the main participants in Australian water markets. Other participants, however, include urban water utilities, environmental water managers and investors. Most Australian water markets are highly localised, involving trade between users within a single river catchment (due to physical constraints on transporting water across river catchments).

The primary driver of water prices is the supply of water allocations. Water allocations are determined by state government agencies based on volumes of water held in storage. As a result, allocation prices are highly dependent on weather. Water prices are also dependent on other factors such as water demand, which is driven by changes in irrigation practices and changes in world commodity prices (e.g. cotton, fruit and nuts, which require irrigation).

The following figure compares water allocation prices with storage volumes in the south Murray-Darling Basin (sMDB) between July 2000 and January 2019. It shows that allocation prices have more or less moved in inverse to storage (reflective of water availability). Allocation prices peaked during the worst of the Millennium drought before declining to near zero during the 2011 and 2012 floods.

[9] Australian Government (2021) *Snapshot of Australian water markets*. Available at: Link

Figure 2 – Comparison of water allocation prices and storage volumes in south Murray-Darling Basin (Australia)



The introduction of carryover, which allows irrigators to store water by transferring allocations between seasons, has smoothed water supply and water prices: allowing more water to be set aside in wetter years to provide additional supply in dry years. Carryover also changes the dynamics of the water market, with allocation prices not only dependent on current storage levels, but also on expectations of future inflows (and therefore weather forecasts).

One challenge of the Australian water markets has been around the provision of market information, particularly around prevailing market prices. At present water market price data collected by state government agencies is subject to a number of quality issues. Further, while water price data is available from various private exchanges and brokers, each account for only a small proportion of market activity.

WATER POLLUTANT TAXES – DENMARK AND SWEDEN

Pesticide tax in Denmark[10]

A pesticide tax refers to an individual tax level for each pesticide based on the pesticides risk profile. The risk profile refers to the pesticide's negative effects including those on human health, their environmental toxicity, and their effects on non-target organisms.

Drivers: Some main drivers for the development of the Danish pesticide tax have been the Danish green tax reforms of the 1990's and a strong norm among Danes (citizens and politicians) for having untreated tap water from groundwater sources.

Design: In 1972, Denmark implemented a pesticide fee, and in 1982, they supplemented this with a pesticide tax (covering households). The fee and tax were reformed to become a general ad valorem tax covering all types of pesticide consumption (including agricultural) taking effect from 1996.

From 2013 a reformed tax was implemented, changing the pesticide tax to a tax based on environmental load, and tax levels were increased on average.

Revenue collection: The 1972 fee and the 1982 tax generated a total revenue of EUR 6 million annually. The 1998 tax generated an average of EUR 67 million annually. Ex ante assessments estimated that revenue would increase to EUR 87 million annually after the 2013 reform.

Revenue use: Tax collection is administered by tax and custom authorities, and the revenue from the pesticide tax is recycled to the agricultural sector – primarily through a reduction in land value taxes. After some changes in

[10] IEEP (2017) *Pesticide Tax in Denmark*. Available at: Link

2003, 83% was recycled as reduced land value taxes, while the remaining 17% were distributed to different activities in the sector (e.g. research).

Impact on usage and environmental benefits: Over the years, the pesticide taxes have only had small effects on pesticide use.

Future plans: Expectations are that the reformed tax will have more significant effects, since those pesticides with largest environmental load now face substantially higher price levels. The aim of the Danish pesticide policy was that the tax, together with other policy instruments, would reduce the pesticide load by 40% before the end of 2016. Whether this has happened will need to be determined.

Fertiliser Tax in Sweden[11]

A fertiliser tax refers to a tax imposed on the use of mineral fertilisers such as nitrogen and phosphorus, which in excess can cause water quality issues.

Drivers: In 1984, Sweden introduced a tax (which has since been revoked in 2009) on mineral fertilisers for health and environmental reasons to curb leaching of nitrogen into drinking water and the Baltic Sea. The fertiliser tax provided an incentive to reduce generous and excessive 'insurance' applications of fertiliser which were common practices among many farmers as a precautionary measure. It also promoted substitution through improved utilization of nutrients in organic fertiliser from farm animals and could facilitate manure trade between livestock and arable crop farmers.

Design: Initially the tax targeted both nitrogen (N) and phosphorus (P), but cadmium (Cd) present in phosphorus replaced the latter taxation base after the first ten years. The tax rate for nitrogen set at €0.18 per kg N was relatively modest, whilst the tax rate for cadmium at €3 per gram Cd was more significant. The tax rate for phosphorus reached €0.12 per kg P. The tax on mineral fertilisers applied to importers and manufacturers. There were no opportunities for reductions. Manufacturers and importers were under a duty to register, submit returns and pay the tax on quantities of mineral fertilisers delivered each month.

A separate price regulation charge on mineral fertilisers was levied between 1982 and 1992. Its tax base related to the contents of nitrogen, phosphorus and potassium (NPK). This charge effectively increased the price of the mineral fertiliser tax.

The combined price regulation charge and fertiliser tax on nitrogen peaked in 1991 with €0.24 per kg N and €0.50 per kg P respectively.

Revenue collection: Annual revenues from the fertilizer tax amounted to about EUR 35 million from 1994 (when it reached its final level) until it was abolished at the end of 2009. Annual revenues relating to cadmium have not exceeded EUR 0.37 million.

Price and cost impacts: Following the peaking of world market prices for mineral fertilisers and the financial crisis in 2008-2009, pressures from farmers were building up to abolish the fertiliser tax. The prices of mineral fertilisers up to 2008 increased by about 15-20%. The fertiliser tax prior to these developments amounted to about 20% of the costs of mineral fertilisers.

Fertiliser accounts for about 15% of farmers' operating costs in Sweden, implying that a 10% tax corresponds roughly to 1.5% of operating costs.

Impact on usage and environmental benefits: Two recent analyses have been able to disentangle impacts of the tax with advanced methods, finding a net reduction in nitrogen use of about 6%, corresponding annually to about 10,000 tonnes of N. The cadmium tax component has previously been found to have been effective.

According to estimates from the National Board of Agriculture, the tax lowered the optimal fertiliser dose – for instance for wheat from 145 to 135 kgN/ha.

Future plans: Sweden's tax on mineral fertilisers had been in place for 25 years when it was suddenly revoked in 2009 in response to the financial crisis. Environmental NGOs have advocated for a reintroduction of the fertiliser tax, whereas farmers oppose it. A parliamentary majority advised the government against its announced plan to

[11] IEEP (2017) *Fertilizer Tax in Sweden*. Available at: Link

reintroduce the tax. The proposal remains a controversy, particularly among farmers, and as of 2017, appeared to be stalled.

APPLYING BEST PRACTICE EXAMPLES AND EXPERIENCE TO CYPRUS

Reviewing best practices and past experiences of other countries who have implemented **water abstraction charges (and other forms of water pricing such as water markets)** can allow us to apply lessons learnt to improve the design of water pricing and abstraction charges in Cyprus. The Cypriot RRP is already contemplating employing pricing policy for more rational usage of this scarce resource, as explained above, but lessons must be drawn from these other countries to ensure the pricing is designed appropriately, and extra charges (to reflect the environmental cost) are set high enough to have a significant impact on consumption in Cyprus. Care must be taken to ensure market distortions in related sectors do not have unintended consequences, such as what happened in Bulgaria.

Preliminary discussions with stakeholders, such as WDD and the Ministry of Agriculture, suggest that increasing water prices further would be neither viable nor impactful. In terms of its viability, the Ministry of Agriculture suggested that increasing water fees would hurt farmers and given the link between water prices and food prices, would drive up food prices, impacting food security. In terms of its potential impact on consumption (to reduce water scarcity issues), the WDD have suggested that the price elasticity of water is very low, meaning any further increases in water fees would have a negligible effect on consumption. They further added that water fees were already relatively high when compared to its European counterparts.

When discussing water markets, WDD mentioned that these had been discussed in the past for Cyprus' river basin, but the conclusion was that they were not suitable for Cyprus. WDD preferred to allocate water themselves to users rather than rely on a market.

In terms of water quality, two of the main drivers of nitrate pollution in Cyprus are the use of artificial mineral fertilisers, and run-off from untreated agricultural and animal waste. Both of these are drivers of water pollution in the country. Further conversations with the Ministry of Agriculture will need to be undertaken to discuss the type of instrument that could be useful to tackle the issue of excess nitrates in the country. A form of fertiliser tax could potentially be implemented.

From discussions with the Ministry of Agriculture, pesticides are not a major issue in Cyprus and therefore a pesticide tax may not be needed. A pesticide tax, however, would be beneficial at least in sending a price signal about their use, which is detrimental to the environment and water quality.

4. CLIMATE CHANGE AND AIR POLLUTION

CURRENT SITUATION IN CYPRUS

Air Quality monitoring and management in Cyprus is governed by the provisions of the Air Quality Law (Law 77(I)/2010, Law 3(I)/2017 and Law 20(I)/2020), as well as a number of regulations that define air quality limits for specific pollutants (R.A.A. 111/2007, R.A.A. 38/2017, R.A.A. 327/2010, R.A.A. 37/2017 and R.A.A. 83/2020)[12]. The main objectives of the aforementioned legislations are:

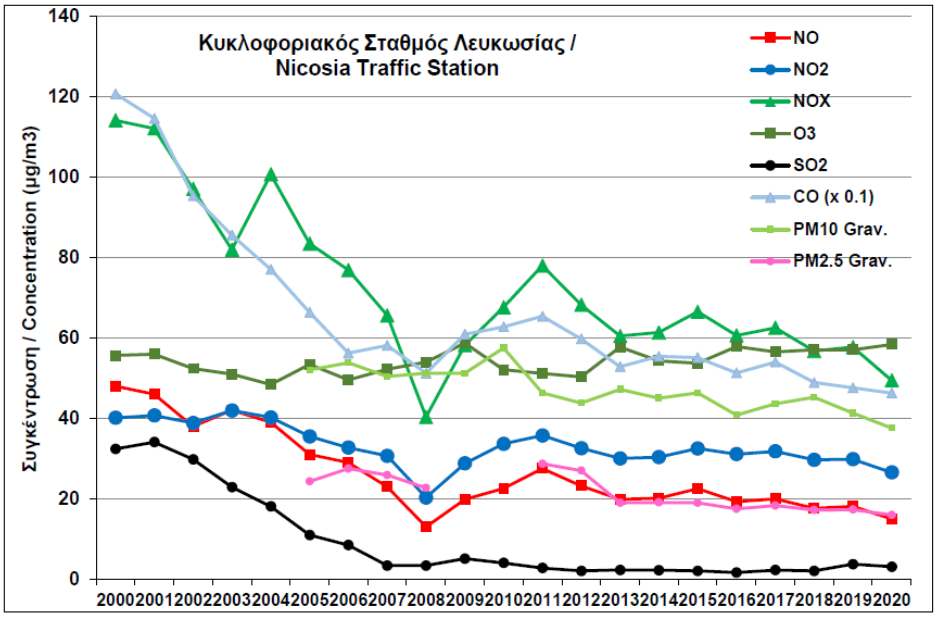
- To define and establish objectives for ambient air quality.
- To assess the ambient air quality
- To obtain information on ambient air quality
- To ensure that such information is made available to the public
- To maintain and improve air quality
- To promote increased cooperation in reducing air pollution

[12] Annual Technical Report on Air Quality, Cyprus, 2019, Ministry of Labour, Welfare and Social Insurance, Department of Labour Inspection

Furthermore, in 2008 the National Action Plan for the improvement of Air Quality in Cyprus was approved and in 2018 it was revised. The National Action plan includes measures to improve air quality and in particular to reduce the concentration of PM_{10} and $PM_{2.5}$ in the atmosphere. Furthermore, it includes measures concerning mobility (e.g. preparation of Integrated Plans for Mobility in all urban areas, and use of biofuels or other renewable fuels for transportation), energy (e.g. promotion of RES and connection of Cyprus with the European energy network in the sector of natural gas through East Med) and industry (e.g. installation of antipollutant systems in the new Power Plant Units)[13].

Figure 3 presents the annual variations of the mean concentration of different pollutants of the 2000-2020 period. The results are based on the measurements carried out by the Nicosia Traffic Station. The decrease observed in most of the pollutants' concentrations is the result of the improvement of the fuel quality, the import of new technology vehicles equipped with catalysts and the periodic inspection of vehicles.

Figure 3 Annual Mean Concentrations of NO, NO_2, NO_x, O_3, SO_2, CO, PM_{10} and $PM_{2.5}$ in Nicosia Traffic Station[14]



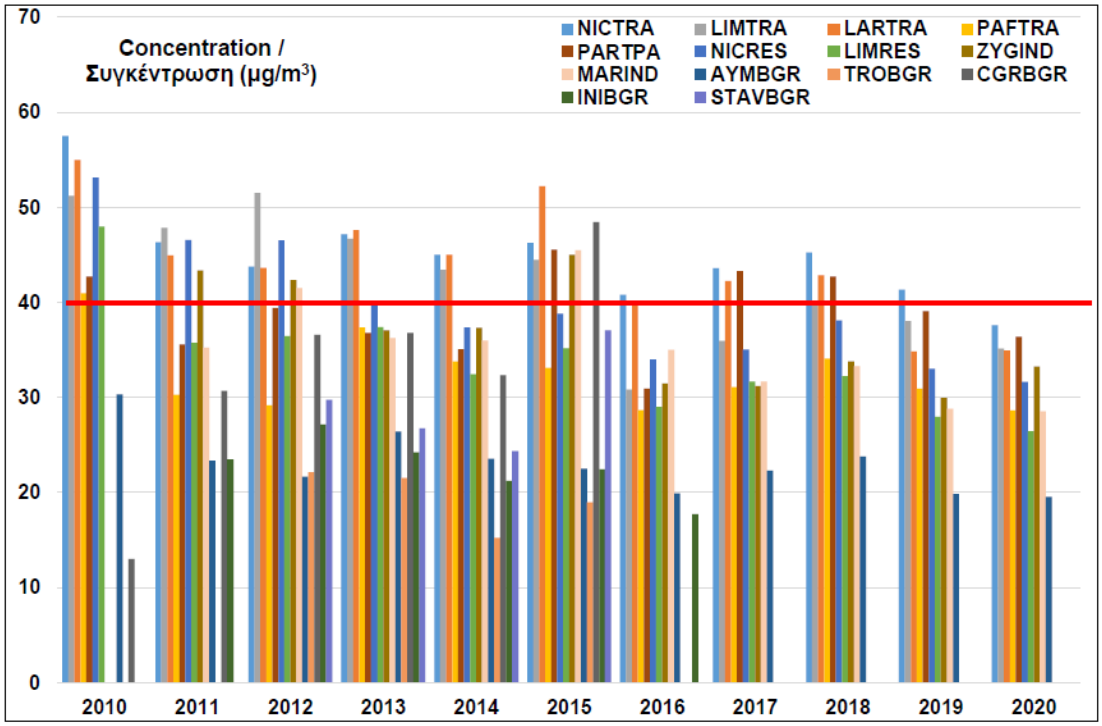
As presented in the Annual Air Quality Report (2020) PM_{10} is a pollutant of concern, as only in 2020 its mean value was below the maximum allowed limits for all the Monitoring Stations (Virtually all economic activities contribute to climate change, so this study will focus on the areas with most emissions, and also areas that are not already being addressed in other initiatives. As shown in Figure 5, energy supply and transport are the top two contributors.

Figure 5). Furthermore, there are on average 35 exceedances of the maximum allowed limits annually. Similar conclusions are drawn also for $PM_{2.5}$.

[13] Review of the National Action Plan on Air Quality improvement in Cyprus, 2018, Ministry of Labour, Welfare and Social Insurance, Department of Labour Inspection

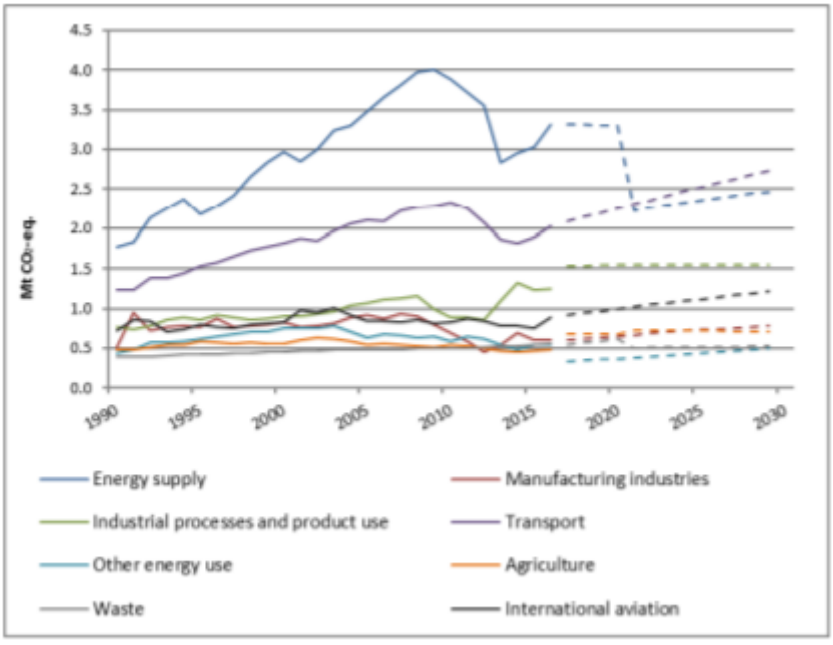
[14] Annual Technical Report on Air Quality, Cyprus, 2020, Ministry of Labour, Welfare and Social Insurance, Department of Labour Inspection

Figure 4 PM_{10} annual mean concentration in the Air Quality Monitoring Stations, according to the Annual Air Quality Report.



Virtually all economic activities contribute to climate change, so this study will focus on the areas with most emissions, and also areas that are not already being addressed in other initiatives. As shown in Figure 5, energy supply and transport are the top two contributors.

Figure 5 Greenhouse gas emissions by sector (Mt. CO2-eq.). Historical data 1990-2016. Projections 2017-2030



RRP's component 2.1 ''Climate neutrality, energy efficiency and renewable energy penetration'' focuses on the implementation of measures and policies aiming to minimise Cyprus' carbon footprint and contribution to climate change. From component 2.1, there is 1 Reform and 5 Investments related to GHGs emissions and -to a lesser extent- air pollution:

- **Reform 1:** Green Taxation.
- **Investment 1:** Promotion of energy efficiency investments in SMEs, municipalities, communities and the wider public sector.
- **Investment 2:** Promotion of renewables and individual energy efficiency measures in dwellings and tackling energy poverty in households with disabled people.
- **Investment 3:** Encouragement of the use of renewables and energy savings by local/wider public authorities as well as NGOs and facilitation of local communities towards climate mitigation & adaptation
- **Investment 4:** Reduction of CO_2 emissions in industries, businesses and organisations.
- **Investment 8:** Monitoring and reduction of GHGs in agriculture.

RRP's component 2.2 "Sustainable Transport" focuses on those measures and policies related to reducing the climate and air quality impacts of transport. From component 2.2, there is 1 Reform and 1 Investment related to GHGs emissions and air pollution:

- **Reform 3:** Progressive phase out of the most polluting vehicles, especially in the most heavy polluted urban areas
- **Investment 3:** Promotion of widespread use of EVs, LEVs and alternative means of transport.

Examples of best practices focusing on decreasing the use of private means of transport through taxation and taxes focusing on air pollution were found in Sweden, Spain and Hungary.

EU LEGISLATION

EMISSIONS TRADING SYSTEM (EU ETS)

The ETS is the first major and remains the biggest one carbon market EU's key tool to reduce GHG emissions in a cost-effective way. It operates in all EU countries, as well as Ireland, Liechtenstein and Norway aiming at limiting emissions from around 10,000 installations in the power, manufacturing and airlines sectors, covering around 40% of the EU's GHG emissions[15]. The legislative framework of the European carbon market is described in the ETS Directive[16].

The EU ETS is based on the 'cap and trade' principle, which means that a cap is set on the total amount of GHGs that can be emitted by the installations covered by the system and within the cap businesses can buy or receive emissions allowances, which they can trade. The cap is reduced over time so that the total emissions will fall, while at the same time it ensures that they will have a value. At the end of each year, the installations must surrender allowances to fully cover its emissions, otherwise heavy fines are imposed. Industries have the option to keep potential spare allowances (e.g. in years when its emissions are lower than its allowances) to cover future needs or sell them.

The EU ETS focuses on emissions that can be measured, reported and verified with a high level of accuracy. Gases and sectors included in the EU ETS are presented in Table 3.

Table 3: Sectors and gases covered by the EU ETS

Carbon Dioxide (CO_2)	Nitrous Oxide (N_2O)	Perfluorocarbons (PFCs)
Electricity & Heat generation	Production of nitric, adiplic and glyoxylic acids	Aluminium
Energy-intensive industry	Production of glyoxal	
Commercial aviation		

[15] https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets_en
[16] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:02003L0087-20180408

Participation in the EU ETS is mandatory for all the EU-based companies in these sectors, however specific exemptions are applied (based on the size of the installations).

According to the 2020 Report from the Commission to the European Parliament and the Council on the Functioning of the European Carbon Market the EU ETS is proven an effective emissions reduction and cost-effective tool, as installations covered by the ETS reduced emissions by about 43% between 2005 and 2019[17].

Cyprus' ETS-related emissions are forecast to fall by 17% in 2030 in comparison with the 2005 levels. In 2030 ETS sectors will continue to account for the majority of the emissions reductions, which highlights the significant impact of the EU ETS in Cyprus climate change policies. Indeed, a sharp decrease in the ETS emissions is expected on account of the planned substitution of heavy fuel oil with natural gas by the end of 2021[18].

ENERGY TAXATION DIRECTIVE

The Energy Taxation Directive (2003/96/EC) is the European Union's framework for the taxation of energy products including electricity, motor and most of the heating fuels. As well as setting out structural rules to avoid potential distortions of competition across the EU, the ETD sets minimum rates of excise duty with the intention of encouraging a low-carbon and energy efficient economy. The Commission provides Member States with the flexibility to design their own taxes within the framework of the ETD.

In July 2021 the EC announced its intention to reform the ETD as part of the Fit for 55 plan, including the following:

- The introduction of tax rates per type of fuel based on its energy content and environmental impact (Table 4).
- A widening of the tax base to include energy contents and processes that were previously not in scope.
- The recognition of new energy products such as hydrogen.
- Measures to prevent double taxation of stored electricity.
- A significant reduction in the ability of member states to exempt or reduce the rate applicable to energy products, processes and sectors.
- An increase in the minimum rates of tax to reflect current pricing, and annual adjustments to those minimum rates based on the Eurostat price index.
- A five-yearly review safety net to keep the ETD up to date.

Table 4: ETD reform proposed minimum tax rates per type of fuel

Fuel types	Examples fuels	Minimum tax rates
Conventional fossil fuels and non-sustainable biofuels	Gas oil, petroleum	10.75 €/GGJ
Fossil- based fuels supportive of decarbonization in the short term	Natural gas, LPG	For the first 10 years 7.17 €/GGJ for motor fuel and 0.6 €/GGJ for heating.
Sustainable but not advanced biofuels	Food crop derived biofuels, wood mass derived biofuels	5.38 €/GGJ for motor fuel and 0.45 €/GGJ for heating
Electricity, advanced sustainable biofuels, biogas and renewable non-biological fuels	Renewable hydrogen	0.15 €/GGJ

The revised ETD is expected to come into force in January 2023[19].

[17] https://ec.europa.eu/clima/system/files/2021-10/com_2021_962_en.pdf
[18] https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/696195/EPRS_BRI(2021)696195_EN.pdf
[19] https://home.kpmg/xx/en/home/insights/2021/08/energy-taxation-directive.html

STOCKHOLM CONGESTION TAX - SWEDEN

The Stockholm congestion tax is one of the oldest and most tested tax instruments aiming at the reduction of traffic congestion and the improvement of the environmental situation/air quality in central Stockholm. It is a congestion pricing system implemented as a tax levied on most vehicles entering and exiting central Stockholm. The congestion tax, after a seven-month trial period in 2006, was implemented on a permanent basis on August 2007. The funds collected through the congestion tax are used for new road constructions in and around Stockholm. In 2016 congestion taxes were increased in the inner parts of Stockholm, while its enforcement was expanded in Essingeleden motorway. The implementation of the congestion tax in Essingeleden led to a 22% in traffic only after one week[20].

The amount of tax paid depends on enter or exit from the congestion tax area time. Furthermore, there no charge during the weekends, on public holidays and the days before the public holidays, during the night and during July.

The congestion tax was increased in 2016, with the highest increase corresponding to the two highest rush hour periods: 7:30 to 8:29 and 16:00 to 17:29. A detailed pricing structure is presented in Table 5.

Table 5 Stockholm congestion tax, hourly pricing structure[21]

Time of day	Tax Inner City (€)	Tax Essingeleden (€)
00:00 - 06:29	0	0
06:30 - 06:59	1.5	1.5
07:00 - 07:29	2.5	2.2
07:30 - 08:29	3.5	3
08:30 - 08:59	2.5	2.2
09:00 - 09:29	1.5	1.5
09:30 - 14:59	1.1	1.1
15:00 - 15:29	1.5	1.5
15:30 - 15:59	2.5	2.2
16:00 - 17:29	3.5	3
17:30 - 17:59	2.5	2.2
18:00 - 18:29	1.5	1.5
18:30 - 23:59	0	0

In the control points the vehicles that enter and exit the congestion tax areas are registered. Then, a bill is sent to the vehicle owner at the end of each month.

A tax deductibility framework is in place: the congestion tax may be deducted from taxable income for both individuals and businesses:

- Individuals can deduct the congestion tax for business journeys, and for travelling from or to their workplace, if the distance is at least 5 km and the time saved by travelling by car compared to public transport is at least 2 hours per day.
- The first 10,000 SEK (€ 100) cannot be deducted (the public transport pass inside Stockholm costs € 84 (reference year 2016).
- Businesses may deduct all congestion tax expenses, also private driving with company cars.

Some classes of vehicles are exempt from the congestion tax: emergency services vehicles, busses, diplomatic corps, motorcycles, military vehicles, electric vehicles (EVs) and cars with parking permit for disabled persons.

An average of CAD 107 million of annual revenues is achieved through the Stockholm congestion tax[21].

[20] https://www.transportstyrelsen.se/globalassets/global/vag/trangselskatt/congestion-tax-a4.pdf
[21] € prices estimated based on the 29/10/21 exchange rate

TAX ON FLUORINATED GREENHOUSE GASES[22] - SPAIN

The tax on fluorinated GHGs (G-gases) was enforced in Spain in 2014 to address the limited efficiency of the previous charges applied on F-gases in industrial processes which generated significant emissions on these gases.

F-gases are mostly used for refrigeration systems and while they represent a low share of total GHG emitted, their global warming potential is significantly higher than other GHGs. At the EU level, a new regulation to reduce F-gases - Regulation EU No 517/2014 of the European Parliament and of the Council came into effect in January 2015, repealing Regulation (EC) No 842/2006. In 2013, several individual Member States (i.e. Denmark and Slovenia) already applied specific taxes on F-gases while others were considering the implementation of similar measures.

The tax on F-gases is an indirect tax levied on the consumption of certain F-gases according to their global warming potential. The tax is levied on the "final consumer" which in practice is the economic agent acquiring F-gases for use in production processes. The tax only applies to companies which install or repair equipment for refrigeration using less than 3kg of F-gases and companies installing air conditioning in vehicles. The tax can only be levied once along the value chain.

Tax rates are set on a weight basis (per kg of gas) so that they are proportional to the Global Warming Potential (GWP) of each gas between 150 and 4300. For F-gases of GWP above of 4300, a constant tax rate of €100 per kg is applied. This approach implies that the emissions of the most harmful gases are proportionally cheaper. A summarised (non-exhaustive) list is presented in Table 6.

Table 6 Spanish F-gases tax, indicative tax rates list

Type of gas	Global warming potential (GWP)	Rate [€/kg]
Sulphur hexafluoride	22,200	100
HFCs	> 4,300	100
	3,400	68
	1,100	22
	330	6.6
	< 150	n/a
PFCs	> 4,300	100

During the first two years of implementation Spain ensured € 31 and € 66 million correspondingly. The revenues from the tax do not finance a specific activity, as in other examples. According to studies, it is assumed that the introduction of the tax may have contributed to consolidating the existing trends, however further analysis is required to assess the impacts of the tax.

NO_X AND SO_2 TAXES[23] - SWEDEN

Sweden introduced a sulfur tax, levied on the fuels with the highest sulfur content. The aim of the measure was to reduce SO_2 emissions from combustion of peat, coal, coke and other solid or gaseous fuels. Since the introduction of the tax the rates have remained unchanged at € 3/kg sulfur for solid fuels and € 2.7 for each thousandth of sulfur content by weight in oils. Fuels with sulfur content below 0.05% by weight are exempted from the tax, as well as the following: fuels for the production of lime, stone and cement, fuels used in boilers for recovering soda in forestry, diesel and fuel oils in shipping and trains and aviation fuels.

[22] Tax on fluorinated gases in Spain (2017) IEEP Link
[23] IEEP - NOx and SO2 taxes

In 1992 a tax on NO_x emissions form stationary combustion facilities was also introduced. The primary aim of the tax was to provide incentives to reduce emissions beyond the limit values, to combat acidification. The tax was applied to energy produced for space heating, electricity production and industrial processes. The tax was imposed on all combustion plants with a minimum input of 10 MW/year. Initially the tax rate was € 4/kg NO_x emitted for all types of fuel. In 2008, the rate was raised to € 5/kg.

The total revenue of the tax (minus any administrative costs) is reimbursed to the group of taxed plants to reduce and potentially negative impact on competitiveness. The reimbursement mechanism is based on how energy efficient the plants are.

SO_2 emissions in Sweden presented a significant decrease from 1990 to 2014. Furthermore, according to studies, 59% of the reduction in sulfur emissions from manufacturing can be attributed to the implementation of the tax.[24]

Figure 6 provides an overview of the total annual revenues achieved through the NOx and Sox taxes in Sweden.

Figure 6: Revenues from Sox and NOx taxes, million SEK, 2016 prices

AIR POLLUTION LOAD CHARGE[25] - HUNGARY

The air pollution load charge was introduced in Hungary in 2003 targeting emissions of nitrogen oxides (NO_x), sulfur dioxides (SO_2) and non-toxic dust (PMs). The charged enforced through the Act LXXXIX of 2003 on environmental charges.

The air pollution load charge taxes the aforementioned emissions, with the tax rates being calculated as follows:

$$LTD = (Mi \times Pi)$$

[24] The Determinants of Sulfur Emissions from Oil Consumption in Swedish Manufacturing Industry, 1976-1995. In the Energy Journal 22:2, pp.107-126.
[25] IEEP – Air pollution load charge in Hungary

Where:

- LTD: the charge to be paid annually [€/year]
- Mi: the annual emissions of the pollutant [kg/year]
- Pi: the flat rate of each specific pollutant:
  - € 0.16/kg for SO2
  - € 0.38/kg for NOx
  - € 0.09/kg for non-toxic dust

An introductory phase of the load charge was applied, during which emitters were required to pay 40%, 75%, 90% and 100% of the charges correspondingly for the years 2004, 2006, 2007 and 2008.

The charge is paid by point-source emitters, mainly in the industry and power sector. Exemptions are applied to domestic emitters, district heating suppliers and to all emitters in emergency situations.

One of the main barriers that affected the introduction of the air pollution load charge was resistance by the industry and power sector, which argued that the tax would have negative economic impacts. However, the concerns were overcome through multiple discussion platforms organised by the government prior to the introduction of the instrument.

The implementation of the measure has helped Hungary to achieve important improvement in combatting air pollution, however it is still a major problem especially with regards to emissions of NO_x, PM and ozone pollution. In contrast, as a result of the improvements in the power sectors and the quality of fuels SO_2 is no longer a major concern.

According to an IEEP report in 2015 the total revenues from the three environmental load charges on air, water and soil amounted to approximately EUR 18 million, however there is no breakdown available on these revenues[26].

COMPANY CAR TAX - UK

The UK government requires taxes to be paid by individuals or families using a company car privately, including for commuting to work. The taxes are being determined based on the value the car provides to the individual, which depends on things like how much it would cost to buy and the type of fuel it uses. This value of the car is reduced if: (i) someone has it part-time, (ii) someone pays something towards its cost and; (iii) it has low CO_2 emissions. Furthermore, it the employer pays for fuel used for personal journeys; the individual shall pay tax on this separately.

The tax amount equals: the value of the car (PD11) **x** the business-in-kind (BIK) rate (see Figure 6 below) **x** the income rate of the taxpayer. HMRC has an online tax calculator available[26].

[26] HMRC, Company Car and Fuel Benefit Calculator: http://cccfcalculator.hmrc.gov.uk/CCF0.aspx

Figure 7 Petrol-powered and hybrid-powered cars for the tax year 2021 to 2022

95 to 99	–	24	23
100 to 104	–	25	24
105 to 109	–	26	25
110 to 114	–	27	26
115 to 119	–	28	27
120 to 124	–	29	28
125 to 129	–	30	29
130 to 134	–	31	30
135 to 139	–	32	31
140 to 144	–	33	32
145 to 149	–	34	33
150 to 154	–	35	34
155 to 159	–	36	35
160 to 164	–	37	36
165 to 169	–	37	37
170 and above	–	37	37

CO2 emissions g/km	NEDC %	WLTP %
100 to 104	25	24
105 to 109	26	25
110 to 114	27	26
115 to 119	28	27
120 to 124	29	28
125 to 129	30	29
130 to 134	31	30
135 to 139	32	31
140 to 144	33	32
145 to 149	34	33
150 to 154	35	34
155 to 159	36	35
160 to 164	37	36
165 to 169	37	37
170 and above	37	37

Source: https://www.gov.uk/guidance/company-car-benefit-the-appropriate-percentage-480-appendix-2

In cases of hybrid cars, if the company car has CO_2 emissions of 1 to 50 g/km, the value of the car is based on its zero-emission mileage figure, or 'electric range'. This is the distance the car can go on electric power before its batteries need recharging[27].

In 2019/20 the amount of tax collected from company car drivers and their employers reached £2.5 billion[28].

ROAD USE CHARGES- EUROVIGNETTE

Road charging is a national choice in the EU, which means that Member States can choose whether to introduce it on their territory. However, if they do opt to levy charges, they must follow certain common rules laid down in the Eurovignette directive, which aim is to ensure that the imposition of road charges does not discriminate against international traffic or result in the distortion of competition between transport operators.

In November 2021, the European Council approved stronger and wider road charging rules to incentivise cleaner and more efficient transport operations[29].

The new Vignette Directive aims at phasing out time-based vignettes for heavy-duty vehicles, giving the option to MS of setting up combined charging system, which would bring together distance- and time-based elements

[27] https://www.gov.uk/tax-company-benefits/tax-on-company-cars
[28] https://www.fleetnews.co.uk/news/fleet-industry-news/2021/09/15/hmrc-tax-take-increases-despite-fall-in-number-of-company-cars
[29] https://www.consilium.europa.eu/en/press/press-releases/2021/11/09/eurovignette-road-charging-reform-adopted-by-council/#:~:text=Road%20charging%20is%20a%20national,down%20in%20the%20Eurovignette%20directive.

integrating the 'user pays' and 'polluter pays' principles while allowing MS the necessary flexibility to design their own road charging systems.

The basic principle of road charging will be that MS retain the freedom to apply tolls and user charges for different categories of vehicles, such as heavy-duty, heavy goods vehicles, coaches and buses, light-duty vehicles, light commercial vehicles, minibuses and passenger cars, independently of one another, For example, MS may decide not to charge buses at all.

Furthermore, a new EU-wide tool will be introduced for varying infrastructure and user charges for heavy-duty vehicles based on CO_2 emissions. Member States will use revenues generated to address congestion issues or to develop sustainable transport and mobility.

One of the most successful implementation examples can be found in Austria where a distance-based charging scheme called Go-Maut was implemented in Austria for all vehicles over 3.5 tonnes on motorways in 2004. In addition, all vehicles under 3.5 tonnes are required to buy sticker or vignette to access the Austrian motorway network, which is owned and operated by a state-owned company called ASFINAG. The vignette enables the vehicle to use almost the entire motorway network in Austria for a specific period of time, with the lower charge set at €8 for 10 days. However, for selected routes, such as long tunnels and expensive routes through the Alps, there is an additional toll charge[30]. The 2022 rates are presented in Figure 7.

Figure 8: Austrian Road Charges: Go-Maut, Rates 2022

Rates 2022

Distance-related toll including surcharges for air and noise pollution for motor vehicles with a maximum permissible weight of over 3.5 tonnes

Rate groups	Category 2 2 axles		Category 3 3 axles		Category 4+ 4 axles and more	
	Day	Night**	Day	Night**	Day	Night**
Drive type E/H2*	0,05010	0,05050	0,07077	0,07169	0,10577	0,10693
EURO-emission class EURO VI	0,20310	0,20350	0,28497	0,28589	0,42332	0,42448
EURO-emission class EURO V and EEV	0,21250	0,21290	0,29813	0,29905	0,43966	0,44082
EURO-emission class EURO IV	0,21940	0,21980	0,30779	0,30871	0,45070	0,45186
EURO-emission class EURO 0 to III	0,24000	0,24040	0,33663	0,33755	0,48366	0,48482

Rates in EUR per km, excl. 20% VAT, valid from 1 January 2022

* Drive type E/H2 covers purely electric drives and hydrogen fuel cell drives.
** The night rates apply between 10 p.m. and 5 a.m.

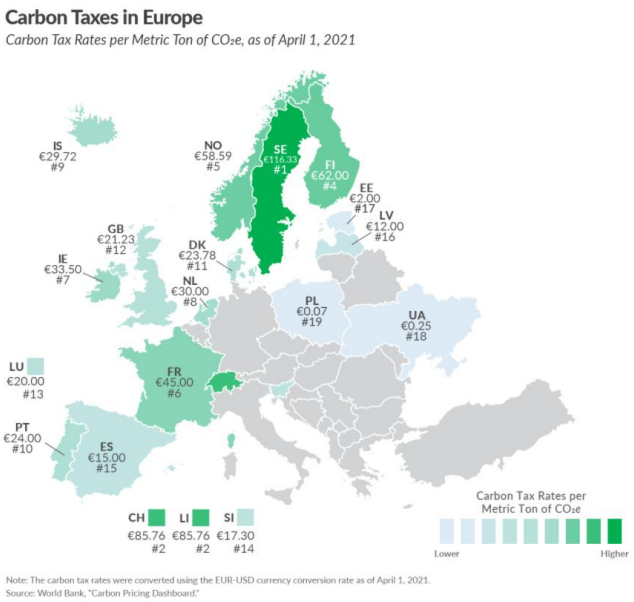
Go-Maut revenues in 2020 was approximately EUR 1.5 million[31].

CARBON TAX

During the past decades several European countries have introduced carbon taxes as a financial mechanism to reduce CO_2 emissions. The first country to do so was Finland in 1990 and since then 18 countries have followed. The carbon taxes range from less than €1 per metric ton of carbon emissions in Poland and Ukraine to more than €100 in Sweden (Figure 8) [32].

[30] http://roadpricing.blogspot.com/2012/05/mileage-based-usage-fees-distance-based.html
[31] https://www.asfinag.at/en/about-us/facts-figures/
[32] https://taxfoundation.org/carbon-taxes-in-europe-2021/

Figure 9: Carbon taxes in Europe, 2021



In general, carbon taxes are being levied on different types of GHGs (CO_2, CH_4, N_2O, and fluorinated gases). The scope of a country's carbon tax might differ from others'. For examples Spain's carbon tax only applies to fluorinated gases, taxing only 3% of the country's total GHGs emissions. On the contrary, Norway recently abolished most exemptions and reduced rates, now covering more than 60% of its GHGs emissions.

An overview of the carbon taxes in Europe is presented in Table 7[33].

Table 7: Carbon taxes in Europe, 2021

Country	Carbon Tax Rate (€/ton of CO_2-eq)	%GHGs emissions covered	Year of implementation
Denmark	23.78	35	1992
Estonia	2.00	6	2000
Finland	62.00	36	1990
France	45.00	35	2014
Iceland	29.72	55	2010
Ireland	33.50	49	2010
Latvia	12.00	3	2004
Liechtenstein	85.76	26	2008
Luxembourg	20.00	65	2021
Netherlands	30.00	12	2021

[33] https://carbonpricingdashboard.worldbank.org/map_data

Country	Carbon Tax Rate (€/ton of CO_2-eq)	%GHGs emissions covered	Year of implementation
Norway	58.59	66	1991
Poland	0.07	4	1990
Portugal[34]	24.00	29	2015
Slovenia	17.30	50	1996
Spain	15.00	3	2014
Sweden	116.33	40	1991
Switzerland	85.76	33	2008
Ukraine	0.25	71	2011
UK	21.23	23	2013

According to Component 2.1 of Cyprus' National Recovery and Resilience Plan, the country plans to introduce a carbon tax for fuels used in sectors of the economy that do not fall under the EU ETS scheme.

APPLYING BEST PRACTICE EXAMPLES AND EXPERIENCE TO CYPRUS

This initial stage of identifying existing climate change and air pollution related tax instruments best practice examples will be fed into the determination and design of the most suitable instruments for the Cyprus context.

Cyprus has already taken significant steps towards the reduction of GHGs generation and the decrease of air pollution through the National Action Plan for the improvement of Air Quality Monitoring, the RRP and the National Energy and Climate Plan (NECP). However, it is still one of the highest per capita GHGs emitting countries, while also struggling to keep PM levels beyond the maximum allowed levels.

Having identified transport and industry/energy generation as the main problem drivers, a range of EU best practices have been identified focusing on those issues. The final selection and design of instruments should be carried out with care to not overlap with other actions focussing on the same issues.

5. WASTE MANAGEMENT

CURRENT SITUATION IN CYPRUS

Type	Cyprus	EU average
Waste generation [kg / capita]	3,576	7,050
% share of waste – mining and quarrying	6.6	26.6
% share of waste – manufacturing	16.3	10.6
% share of waste – energy	0.1	3.4

[34] Portugal's carbon tax is being annually revised based on the previous year's EU ETS allowance price.

Type	Cyprus	EU average
% share of waste – construction and demolition	45.8	35.9
% share of waste – other economic activities	14.5	15.4
% share of waste – households	16.8	8.2
Recycling rate of municipal waste (%)	16.5	47
Hazardous was treatment [kg/capita]	245	180
% recovery – recycling	18	38
% recovery - backfilling	11	20
% energy recovery	6	5
% disposal - landfill and other	43	55
% disposal –incineration without energy recovery	2	0
Domestic material consumption [tonnes/capita]	18	13.5
Non-metallic minerals	12	7
Biomass	2	3
Fossil energy materials	2	2
Metal ores	1	1

Source: Eurostat, 2018 data

When analysing the current situation in Cyprus, it is evident that waste generation is not a major issue. As shown in the table above, Cyprus produces about half the waste in comparison to the EU average. However, waste treatment is an area of improvement for Cyprus. The table above displays the low levels of recyclability with 16.5% of municipal waste being recycled in Cyprus compared to the EU average of 47%.

The table below further displays waste management data in Cyprus.

Table 8: Waste Management Data

Area	Parameter	Value
Population	Total (inhabitants)	1.207.000
Waste generation	Total (tn)	566.19
	Total (kg/cap/y)	643
Waste composition (%)	Organics	41,47
	Paper	25,70
	Plastic	14,77
	Metal	3,25
	Glass	2,66
	Wood	2,08

Area	Parameter	Value
	Other	10,07
Waste management	Waste treated (10^3 tonnes in 2019)	496.47
	Waste recycled (10^3 tonnes in 2019)	76.68
	Waste landfilled (10^3 tonnes in 2019)	379.39
Existing waste management infrastructure	MBT plant in Larnaca	Waste input: 110.000 tn/y (capacity 160.000 tn/y)
	2 composting plants	Total Capacity: ~28.000 tn/y
	10 anaerobic digestion plants (2 of them may accept municipal organic waste)	Total Capacity: ~70.000 tn/y (corresponding to the 2 units currently accepting municipal organic waste)
	20 sorting facilities	Total Capacity: ~130.000 tn/y
	Transfer station in Pafos	Capacity: 5.400 tn/y
	Transfer station in Larnaca	Capacity: 10.000 tn/y
	Sanitary landfill in Pafos	Capacity: ~25.000 tn/y
	Sanitary landfill Larnaca	Capacity: ~50.000 tn/y
	2 non-compliant landfills in Nicosia and Limassol	-

The RRP sets goals of introducing a country wide charge on household/landfill waste. This will be done through a series of investments to help increase Cyprus' waste management infrastructure. The investments will help Cyprus upscale its infrastructure to reach goals set in the Waste Framework Directive to increase recyclability and reduce biowaste disposal in landfills. Cyprus has also been implementing PAYT pilots which have been successful in reducing waste being sent to landfill. For example, in January 2020 the Aglandjia municipality implemented a PAYT pilot with waste being collect in prepaid bags (€2 each) and was collected at the same time as MSW. The pilot was a success with a 99.3% participation by the residents and a reduction of waste by 39%. Under the Cyprus Action Plan for the transition to a circular economy 2021 – 2027, there has been an investment of €25 million to develop a nationwide PAYT scheme to increase waste separation and recycling. The PAYT programme is set to be rolled out in 2022.

The challenges listed in the RRP along with background research reveal that the best way to overcome some of the challenges Cyprus is facing in waste management is to implement a landfill tax and PAYT scheme. As mentioned in the RRP, a country-wide landfill tax will be implemented; however, details of the tax have yet to be formulated. In addition, a PAYT scheme is set to be implemented this year; however, the details of the scheme have yet to be finalised. Therefore, this project aims to suggest specific design elements of the landfill tax and PAYT scheme. In order to successfully design and implement a landfill tax and PAYT scheme, it is critical to look at best practices.

Within the EU, three countries have been identified as examples of best practices for landfill taxes which are France, Austria and the UK. The following will discuss each example.

LANDFILL TAX – FRANCE

France had the issue of arising household waste. As part of the Waste Management Plan, a tax on household (HW) municipal solid waste (MSW) and other mixed industrial waste (MIW), was set up in 1992. Currently, the volume of waste potentially affected by the tax is around 136 million tonnes. In 2021, the rates for the landfill taxes are as follows and is adjusted yearly[35]:

- A: 152 €/t in 'non-authorized' landfills
- B: 37 €/t in 'authorized' landfills with 75% energy recovery from captured biogas

[35] https://www.cewep.eu/wp-content/uploads/2021/08/Landfill-taxes-and-bans-overview.pdf

- C: 47 €/t in 'authorized' bioreactor landfill cells with biogas recovery B + C – 30 €/t
- Other 'authorized' landfills: 54€/t

France has exemptions in place for internal waste disposal sites and landfill sites receiving inert waste. In addition, citizens pay a local tax on household waste collection services offered by their commune or a special fee. In most municipalities, the charge consists of a flat rate per year and inhabitant, which has been steadily increasing since 1993.

In 2010, the overall revenue generated by the landfill tax was EUR 259 million[36]. The revenue raised from the landfill tax finances the Modernisation Fund for Waste Management (MFWM). The aim of the MFWM is to promote innovative means of waste treatment and to equip local authorities with necessary funds. This involves five main objectives[37]:

- Financial aid to develop innovative technology for household and assimilated waste treatment;
- Financial aid to install waste treatment facilities, especially those which make use of innovative technology;
- Financial aid to local authorities on whose territory a new public treatment plant for household and assimilated waste is built;
- Financial aid to Council of Districts which are responsible for waste management planning;
- Financial aid for upgrading public landfill sites and restoring contaminated sites.

The distribution of revenue is heavily focused on infrastructure and equipment to increase capacity, followed by research and development.

The rate of HW, MSW and MIW sent to landfill has drastically decreased since the implementation of the landfill taxes, additionally, the rate of recycling has increased[38]. Furthermore, effects on employment have been positive as employment in eco-industries, including the waste sector, is continuously growing.

LANDFILL TAX – AUSTRIA

The Austrian **landfill tax** was introduced in 1989 through the Clean-Up of Contaminated Sites Act and has been set nationally. The tax rate is currently 87 €/t, but it is dependent on the composition of waste and the standard of the landfill. The tax rate is adjusted on prices which is linked to the annual consumer price index. The only exemptions from the tax are the residues from incineration and co-incineration plants.

The landfill tax is liable to be paid by the owner or operator of any landfill site and anyone using waste to carry out structural work. It is also the responsibility of the landfill operator to provide a yearly statement on the level of waste deposited and the accruing taxes[39]. In addition, the tax also falls on anyone exporting waste from Austria for the purpose of depositing, the tax is due at the beginning of the waste's journey[40].

Total revenues from the tax for the period 1990-2014 were around EUR 1.229 billion, with annual revenues starting at EUR 10 million in 1990, increasing rapidly from 1996 to a peak of EUR 97 million in 2003, before falling due to the effects of the landfill ban and the structure of the tax[41].The revenue raised by Austria's landfill tax finances the containment and treatment of contaminated sites, meaning the revenue is used to pay for externalities arising from landfill. Austria is the only EU Member State (also the case for Switzerland) where revenue from landfill taxes is currently exclusively used for this purpose[42]. The projects that received funding from the landfill tax revenue have

[36] Environment Ministry (2011). Premier bilan de la réforme de la TGAP de 2009 et de la politique de soutien sur les déchets ménagers et assimilés. (In French). First assessment of the reform of the 2009 general tax on polluting activities and financing policy on municipal solid waste. 167 pp
[37] https://ec.europa.eu/environment/enveco/taxation/pdf/ch10_landfill.pdf
[38] https://www.eea.europa.eu/publications/managing-municipal-solid-waste/france-municipal-waste-management
[39] https://ec.europa.eu/environment/enveco/taxation/pdf/ch10_landfill.pdf
[40] Ibid.
[41] https://ieep.eu/uploads/articles/attachments/5bcba177-793e-4ed5-acbb-ffc8e0dc238f/AT%20Landfill%20Tax%20final.pdf?v=63680923242
[42] https://ieep.eu/uploads/articles/attachments/5bcba177-793e-4ed5-acbb ffc8e0dc238f/AT%20Landfill%20Tax%20final.pdf?v=63680923242

resulted in the remediation of contaminated sites and lower environmental impacts at landfill sites, such as reducing greenhouse gas emissions from landfills by over 80% from 1990 to 2014[43].

LANDFILL TAX – UK

The UK **landfill tax** was introduced in 1996 and the tax level was based on reflecting the externalities associated with landfill and incineration. Each part of the UK has its own tax rate as shown below[44]:

Table 9 UK Landfill tax rates

	from 1st April 2020 to 31st March 2021	from 1st April 2021 to 31st March 2022
Standard Rate	£94.15/t	£96.70/t
Lower Rate	£3.00/t	£3.10/t

The lower rate applies to non-hazardous waste streams with low potential for greenhouse gas emissions and low polluting potential in the landfill environment (2011 Order). The rates are adjusted yearly for inflation and cannot fall below £80/t.

UK's landfill tax was designed to be revenue-neutral. At the time the tax was introduced, it was announced that the tax paid by employers in respect of their employees (Employers' National Insurance Contributions, or NICs) would be reduced from 10.2% to 10%[45]. However, now most of the revenue goes to the government's general budget.

In addition to revenue going to the general budget, some of the revenue is allocated to an innovative scheme that was developed to enable the use of some revenue for environmentally and socially beneficial projects. The scheme, the Landfill Tax Credits scheme, was designed in the following way[46]:

- Of landfill operators' tax liabilities, 20% can be put to use in funding projects falling under an agreed set of criteria defined by Government.
- The tax credit received in respect of the funds made available through the scheme would be equivalent to 90% of the funds. Hence, either the landfill operator, or a third party, would have to contribute 10% of the funding for the projects involved.
- To receive funding, projects had to be carried out through an Environmental Body. Registration of such bodies was made the responsibility of a new organisation named ENTRUST.

The revenue raised from the landfill tax was around €277 million in 1997/98 and this rose steadily to a peak of around €1.02 billion in 2013/14, but has since dropped to around €1 billion in 2015/16[47]. The variation in revenues is a result of initially increasing rates of taxation, leading to the peak in 2013/14, and then due to the reduction in the amount of waste landfilled, leading to the more recent decline[48].

There have been three other effects[49] of the tax in the context of employment generation that are worth mentioning. The first is the fact that several companies have begun to employ waste minimisation officers, partly or wholly as a response to the tax.

The second is that the tax has almost certainly had an impact on the recycling of waste. Recycling tends to be more employment-intensive in the sorting and collection phases.

[43] https://www.bmlfuw.gv.at/greentec/abfall-ressourcen/alsag.html
[44] https://www.cewep.eu/wp-content/uploads/2021/08/Landfill-taxes-and-bans-overview.pdf
[45] https://ec.europa.eu/environment/enveco/taxation/pdf/ch10_landfill.pdf
[46] Ibid.
[47] HMRC (2016), Landfill Tax (LFT) Bulletin - April 2016: Historic Receipts and Liabilities Declared.
[48] https://ieep.eu/uploads/articles/attachments/e48ad1c2-dfe4-42a9-b51c-8fa8f6c30b1e/UK%20Landfill%20Tax%20final.pdf?v=63680923242
[49] https://ec.europa.eu/environment/enveco/taxation/pdf/ch10_landfill.pdf

Thirdly, under the Landfill Tax Credits scheme, various projects are carried out by bodies approved by ENTRUST. This would result in job creation through the various projects. Therefore, as a result of the landfill tax, employment generation has, and continues to, occur.

INCINERATION TAX - AUSTRIA

After Austria implemented their landfill tax (as discussed above), there was a quadrupling of HW and MSW being incinerated; therefore, an incineration tax was implemented in 2006[50]. The incineration tax is 8 €/t and has several material exemptions that are listed as follows[51]:

- Animal by-products
- Explosive wastes (military)
- Waste with high biogenic fractions
- Radioactive waste

In 2019, the revenue of the tax amounted to EUR 69 million and accumulated to around EUR 1.5 billion[52]. The revenue collected from the incineration tax funds the clean-up of contaminated sites. The owner/operator of any landfill or incinerator site is liable to pay the tax. The federal financial authorities (Bundesfinanzbehörden) are responsible for the collection of the tax, with provincial authorities reporting possible contaminated sites to the Ministry of the Environment. The Ministry then consults the Federal Environment Agency on further investigations and distributes funds for clean-up operations. Therefore, the revenue from the incineration tax helps to encourage better waste management and treatment

PACKAGING - NORWAY

Norway has a tax imposed on the producers of packaging waste for the amount of packaging they place on the market. The packaging tax was first introduced under the Product Control Act of 1976 and applied to packaging tax only[53]. It was revised in 1994 and consists of two types of tax – a basic tax and an environmental tax[54]. The basic tax is payable for all beverage containers that cannot be reused, and the environmental tax is based on the return rate achieved for the specific packaging materials[55]. The environmental tax encourages higher return rates of packaging and is linked to the EPR schemes in Norway and the deposit refund system[56]. The Government gives permits for the return schemes to the producers and the producers of beverage packaging organise collection through the return schemes[57]. The return schemes report collection rates to the government annually which allows the government to revise the tax rates. Due to the high rates of return achieved for containers in the deposit system, a very small amount of tax linked to return rate is payable and for containers with a return rate greater than 95%, no tax based on return rate is payable[58]. The rate of the basic tax and environmental tax is as follows[59]:

- Basic tax (2021):
  - Basic tax on all single-use packaging: NOK 1.27/ 0.12€
- Environmental tax (2021):
  - Glass and metals: NOK 6.20 per unit/ 0.61€

[50] https://ieep.eu/uploads/articles/attachments/5bcba177-793e-4ed5-acbb-ffc8e0dc238f/AT%20Landfill%20Tax%20final.pdf?v=63680923242
[51] Ibid.
[52] https://ec.europa.eu/environment/system/files/2021-10/Austria.pdf#:~:text=The%20revenue%20of%20the%20tax,collection%20of%20the%20landfill%20tax.
[53] https://www.innovasjonnorge.no/globalassets/0-innovasjonnorge.no/verktoy-og-temasider/verktoy-for-eksport-og-internasjonal-satsning/regionkart/europa/polen/norwegian-regulation-on-beverage-packaging_warsaw_july_2020.pdf
[54] http://norden.diva-portal.org/smash/get/diva2:1304371/FULLTEXT01.pdf
[55] ibid.
[56] ibid.
[57] https://www.innovasjonnorge.no/globalassets/0-innovasjonnorge.no/verktoy-og-temasider/verktoy-for-eksport-og-internasjonal-satsning/regionkart/europa/polen/norwegian-regulation-on-beverage-packaging_warsaw_july_2020.pdf
[58] http://kurs.avfallnorge.no/Nyheter.cfm?pArticleId=41092&pArticleCollectionId=2556
[59] https://www.skatteetaten.no/en/rates/beverage-packaging-tax/

- Plastics: NOK 3.75 per unit/ 0.37€
- Cartons and cardboard: NOK 1.53 per unit/ 0.15€ per unit

There are exemptions from the basic and environmental taxes which include[60]:

- Basic tax exemptions:
  - Milk and milk products
  - Beverages made from cocoa and chocolate or concentrate thereof
  - Products in powder form
  - Cereal and soya-based milk substitutes
  - Breast milk substitutes
- Environmental tax exemptions:
  - Beverages in powder form
  - Breast milk substitutes

The basic and environmental taxes on packaging have contributed to Norway's high plastic bottle recycling rate of 97%[61]. In 2018, the base tax on packaging raised a revenue of NOK 1.9 billion (EUR 200 million) and was estimated to generate around NOK 2.1 billion (EUR 222 million) in revenue in 2020[62] .

PAY AS YOU THROW (PAYT) SCHEMES - BENELUX

PAYT schemes are implemented in Belgium, the Netherlands and Luxembourg (Benelux) where households and businesses are charged a rate based on how much waste they present for collection to the municipality or local authority. The PAYT schemes were implemented to increase recycling and reduce residual waste collected from households. There are numerous methods of applying PAYT schemes with the part of the fee related to the choice or behaviour of residents linked to the following[63]:

- Size of container chosen by the household;
- Frequency of collection of a given container;
- Application of a fee per sack used;
- Weight of waste set out for collection; or
- Combination of the above

In the Netherlands, a system was first introduced in Oostzaan in 1992; in Luxembourg, Koerich and Kopstal piloted a scheme from 1994 to 1997; and in Belgium, pilot schemes took place in Flanders in the early 1990s, before more widespread adoption from 1995[64]. Each scheme used different rates and mechanisms to disincentivise the use of containers for residual waste. For example, the Ghent regional PAYT system in Flanders relies in urban and suburban areas on the differential pricing of residual waste, recyclable and biowaste collection sacks. In more rural areas, the charge is applied via a system of charging residents per waste collection, with higher rates for residual waste than biowaste bins[65]. The scheme showed that to avoid offering free residual waste collection to households, civic amenity sites or container parks should be operated in a way that residual waste is not received free of charge[66]. The scheme in Flanders was partially regulated by the regional government, which sets minimum and

[60] Ibid.
[61] https://phys.org/news/2020-02-norway-bottles-plastic-fantastic.html
[62] https://www.regjeringen.no/contentassets/b9e6b68d98c24080a110636c92910806/tax_prop_1_ls_chap_1.pdf
[63] https://ieep.eu/uploads/articles/attachments/84782562-17b9-4a16-b496-95dca4183fcf/BE-NL-LU%20PAYT%20final.pdf?v=63680923242
[64] Ibid.
[65] OECD (2006). Working Group on Waste Prevention and Recycling. Impacts of Unit-based Waste Collection Charges
[66] Ibid.

maximum tariffs that local authorities may charge for residual waste collection. The regional focus also helped gain backing for PAYT, as it allowed several local authorities to adopt the new system simultaneously, increasing harmonisation across the area. Schemes in all the Benelux nations also link in to extended producer responsibility (EPR) schemes (notably Fost Plus in Belgium, Valorlux in Luxembourg and Nedvang in the Netherlands), as well as other fiscal instruments such as landfill taxes and incineration taxes which together form a package of market-based instruments designed to promote better waste management.

However, in some areas, there have been barriers to the implementation of PAYT. In Flanders, some barriers included the rise in the illegal disposal of waste; avoidance of charges by individuals by travelling to areas not implementing the PAYT scheme to dispose waste[67]; and disagreements over the PAYT regulation between national and regional authorities.

The revenue collected and used differs throughout the schemes as well. Since the schemes are not properly seen as taxes but as a mechanism for partial cost recovery that incentivises the fee-payer to adopt more environmentally friendly behaviour. The revenues raised through the schemes are usually lower than the costs of managing municipal waste so the revenues are usually supplemented by charges raised from fixed fee rates. For example, the funds raised by PAYT in Flanders equate to only around 50% of the funds required for waste management[68]. Across the Benelux countries, the public pay levies directly, either though purchasing sacks at a set price or by paying for the collection of their bins by weight, frequency or size directly to the local authority[69].

In terms of environmental impacts and effectiveness, the various PAYT schemes within the Benelux countries found that the schemes have resulted in a reduction of overall waste generated especially in lower rates of residual waste being disposed of[70]. It has been found that schemes based solely on bin capacity do not bring about the same level of benefits as those based on weight or frequency of collection[71]. This is due to the fact that once the choice of bin size has been made, the household has little incentive to reduce waste generation below the amount that fits in the chosen container. Sack based schemes provide a marginally greater incentive to reduce waste because only full sacks need to be set out and the household is free to purchase any number of sacks. Frequency-based schemes have a similar effect because the households only present bins for collection when they are full which improves the efficiency of logistics and can help reduce the amount of collection staff required. Weight-based schemes appear to give the greatest reduction in waste overall, but the vehicles used in the schemes are more expensive as onboard weighing equipment is required. Considering all this, in areas constrained by space, such as urban areas, sack-based schemes will be the most appropriate.

The main lesson that can be learnt from the implementation of PAYT schemes across the Benelux region is the need for high-quality infrastructure. This will allow residents to recycle easier and to help properly incentivise the application of the waste hierarchy through the implementation of other economic instruments such as landfill or incineration taxes.

TOURISM TAX - SPAIN

Tourism taxes aim to cover some of the negative externalities of tourism, waste management being a clear example. Waste management costs are paid by the citizens and business to the municipalities, but tourists generate waste too – not only in businesses (hospitality, services) but also as littering.

In Spain there are two autonomous communities (out of 17) that have a tourism tax: Balearic islands was the first one in 20002, and Catalonia in 2012. The community of Valencia is planning on implementing it as of 2023, which would allow each municipality to decide whether it wants to apply it.

[67] Linderhof, V; Kooreman, P; Allers, M and Wiersma, D (2001). Weight-based pricing in the collection of household waste: the Oostzaan case. University of Groningen
[68] Interview with J. Wante, 2016
[69] Hogg, D; Sherington, C and Vergunst, T (2011). A Comparative Study on Economic Instruments Promoting Waste Prevention: Final Report to Bruxelles Environnement
[70] Dijkgraaf, E and Gradus, R (2004) Cost savings of unit-based pricing of household waste: The case of the Netherlands. University of Rotterdam
[71] IEEP and Eunomia (2017), Pay-As-You-Throw schemes in the Benelux countries, available at https://ieep.eu/uploads/articles/attachments/84782562-17b9-4a16-b496-95dca4183fcf/BE-NL-LU%20PAYT%20final.pdf?v=63680923242

The Balearic Islands has justified the need for the tax due to the pressure that it exerts on the islands, who receive an average of 16 visitors per inhabitant (before the COVID pandemic). This leads to negative social and environmental impacts, such as an excessive exploitation of natural resources and low-quality employment. The legislative text describes the need to maintain competitiveness and invest in infrastructure for sustainable tourism.

While the legislative text of Catalonia does not describe the drivers, it does state that the tax revenues will be used in a fund for the promotion of tourism.

Table 10 Comparison of tourism tax design in the two Spanish autonomous communities

Topic	Balearic Islands[72]	Catalonia[73]
Applicability	All tourist lodging and cruise ships	
Exemptions	Children under 16 years old, subsidised social programs and trips being done for *force majeur* (or health issues)	
Tax rate	Between EUR 0.50 to 2.00 per person per night	Higher tax rates for the city of Barcelona (EUR 6.75 to 4.25) vs the rest of the community (EUR 0.60 – 3.00)
Tax discounts	50% for all nights after the 8th night, and for all nights in low season	None

According to the Bank of Spain, tourism tax revenues in Spain averaged EUR 3.4 billion from 1993 until 2021, reaching an all-time high of EUR 9.4 billion in August of 2019 and a record low of EUR 0 EUR in April of 2020[74].

Other examples of tourism taxes applied in countries and cities are:

City	Flat rate?	Price per person per night
Amsterdam[75]	No	7% of the room price (excluding breakfast) + EUR 1 to 3 for hotels and camping sites; 10% of the turnover for holiday rentals, bed & breakfasts and short-stay accommodation
Berlin[76]	No	5% of the room price (excluding breakfast), maximum of 21 days, exemption for business travellers
Brussels, Bruges[77], Antwerpen[78]	Yes	Around EUR 2.80
Budapest	No	4% of the room price (excluding breakfast)
Greece	No	EUR 0.50 to 4.00 per room per night
Lisbon, Porto, Faro	Yes	EUR 1 to 2
Oporto	Yes	EUR 2
Malta[79]	Yes	EUR 0.50 (maximum of EUR 5.00)

[72] Ley 2/2016, de 30 de marzo, del impuesto sobre estancias turísticas en las Illes Balears y de medidas de impulso del turismo sostenible, available at http://www.caib.es/eboibfront/es/2016/10470/578257/ley-2-2016-de-30-de-marzo-del-impuesto-sobre-estan
[73] https://atc.gencat.cat/es/tributs/ieet/
[74] https://www.bde.es/bde/en/areas/estadis/
[75] https://www.amsterdam.nl/en/municipal-taxes/tourist-tax-(toeristenbelasting)/
[76] https://www.berlin.de/en/tourism/travel-information/3298255-2862820-city-tax-in-berlin-who-is-to-pay-how-muc.en.html
[77] https://www.visitbruges.be/tourism-tax
[78] https://www.visitantwerpen.be/en/city-tax-226199-en
[79] https://tourism.gov.mt/en/Documents/Environmental_Contribution_-_Notice_to_Guests_-_EN.pdf

City	Flat rate?	Price per person per night
Paris[80]	No	between EUR 0.25 to 5.00 EUR
Prague and other Czech cities	Yes	CZK 21 to 50, equivalent to EUR 0.26 to 2.04
Rome and other Italian cities[81]	No	EUR 3 to 7, only first 10 days
Vienna[82]	No	3.2 percent of the payment made for staying at the accommodation (VAT and breakfast not included, minus 11 percent lump sum deduction)

APPLYING BEST PRACTICE EXAMPLES AND EXPERIENCE TO CYPRUS

As shown in each best practice example, there are various ways to successfully design and implement a landfill tax and utilise the funding to continuously achieve waste management and sustainability goals. Therefore, components of the best practice examples will be included in the landfill tax design for Cyprus. The PAYT learnings will be used to compare with the current design of Cyprus.

[80] https://www.paris.fr/pages/taxes-et-impots-2318#la-taxe-de-sejour
[81] https://www.italyvacations.com/tourist-city-taxes-italy
[82] https://www.wien.gv.at/english/e-government/financial/tax/local-tax.html

6. GLOSSARY

AAQ	Ambient Air Quality
ABP	Animal By-Product
BAT	Best available technologies
ETD	Energy Taxation Directive
ETS	emissions trading scheme
GHG (eq)	Greenhouse Gas (equivalent)
GWP	global warming potential
GWSS	Government Water Supply Systems
HW	household waste
IED	Industrial Emissions Directive
MIW	mixed industrial waste
MSW	municipal solid waste
NECP	National Energy and Climate Plan
NOx	Nitrogen oxides
PAYT	Pay-as-you-Throw
PM	particulate matter
RRP	Recovery and Resilience Plan
SME	Small and Medium Enterprises
SO2	sulphur dioxide
TSI	Technical Support Instrument
WDD	Water Development Department
WTP	wastewater treatment plants

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