

## Proposal for a Green Tax Reform in Cyprus

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### Abstract

Cyprus is faced with serious energy and environmental challenges, which may be exacerbated in the future because of climate change. This paper formulates a proposal for a fiscally neutral green tax reform, which can significantly contribute towards the transition to a path of economically and environmentally sustainable development. We propose the gradual implementation of a carbon tax to those sectors that are not subject to the EU Emissions Trading System, a water scarcity charge and a landfill tax for municipal and industrial waste that is disposed of in landfills. We demonstrate the environmental benefits and the increase in public revenues that these taxes will bring about in the medium and long run, and assess the effect of these taxes on firm competitiveness and social equity.

**Keywords:** Carbon Tax, Environmental Fiscal Reform, Landfill Tax, Water Charge.

### 1. Introduction

European countries generate most of their revenues by levying taxes on labour and income. In 2012-2013, for example, direct taxes (comprising income taxes, corporate taxes, capital taxes and social security contributions) accounted for two thirds of total tax revenues in the European Union (EU) – and for 57% of the corresponding revenues of the government of Cyprus (European Commission and Eurostat, 2015). At the same time, activities causing environmental degradation and depletion of scarce natural resources (such as consumption of electricity, fuels and water as well as production of waste) account for a small fraction of government finances: in 2014 they accounted for 6.2% and 9% of total tax revenues in the EU and Cyprus respectively. As a fraction of Gross Domestic Product, these revenues have receded in the last decade (European Commission and Eurostat, 2014)<sup>1</sup>. Thus the current structure of European tax systems endangers economic growth and employment by causing high labour costs, while rewarding (or not discouraging) over-exploitation of natural resources. At the same time it encourages tax evasion and undeclared labour.

Moreover, the low taxation levels of resource depleting and polluting activities constitute a hidden environmentally harmful subsidy because these activities are often taxed below their socially optimal levels, i.e. the costs of pollution or resource depletion are not covered by the existing taxes. According to international organisations, these subsidies amount globally to many billions of Euros each year, thereby causing a significant loss of tax revenues and discouraging international attempts to mitigate climate change and improve the efficient use of scarce natural resources (IMF, 2015; OECD, 2013).

Environmental fiscal reform can correct this disparity by shifting the focus of government taxes and levies from labour and income to environmentally harmful

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<sup>1</sup> See also summary statistics on environmental taxes on Eurostat's webpage: [http://ec.europa.eu/eurostat/statistics-explained/index.php/Environmental\\_tax\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Environmental_tax_statistics).

and resource-depleting activities. Market-based policy instruments that can be used for this purpose are carbon taxes, emissions trade, water abstraction charges, levies on the production of waste or the use of e.g. plastic bags, traffic congestion charges, CO<sub>2</sub>-based vehicle taxes etc. Another instrument is phasing out the above mentioned environmentally harmful subsidies.

This paper provides a proposal for a green tax reform in the Republic of Cyprus – the first that has been submitted in this country up to now – to be implemented over a period of six years. It consists of three major parts – carbon, water and waste taxation, in the form of a carbon emissions tax, a water charge and a landfill tax respectively. We provide an assessment of the annual tax revenues generated and – where possible – an estimate of the corresponding environmental improvement, in the form of energy savings, emission reductions and water savings, as well as the effects on firm competitiveness and social equity. As the intention of our proposal is to implement a revenue-neutral fiscal reform, the additional revenues can be used to lower labour or other taxation, in order to increase employment and economic output; the latter part, however, is out of the scope of this paper.

## **2. Benefits of a Green Tax Reform based on International Experience**

As shown in the review of Withana et al. (2013), several European countries have already introduced environmentally oriented fiscal reforms. Apart from saving energy and improving the environment, environmental taxes can produce better economic results than conventional taxes: Many studies and best practices show that, depending on whether and how the additional public revenues generated from environmental taxation are recycled in the economy, an environmental fiscal reform may also be beneficial for economic growth. Even energy taxation, although leading to rising energy bills, tends to produce a benefit for consumers overall when judged against other forms of taxation (European Commission, 2013; Vivid Economics, 2012).

If the environmental tax increases are accompanied by reductions in labour taxation, the overall effect can be beneficial in both macroeconomic and environmental terms. Such a reform reduces distortions on economic activity and changes relative economic prices, thereby fostering innovation and encouraging investment in green economy sectors, which can create a competitive advantage for the economy. The revenues of green taxes may also be used by countries to pay back public debt (Rausch, 2013) or broaden the tax base in countries with a large informal labour market (Markandya et al., 2013). According to Edenhofer et al. (2015), some of the revenues should be used for infrastructure investments that enhance productivity. Higher levels of public infrastructure have been shown to be related to economic growth, reduced inequality and improvements in human well-being (Jakob and Edenhofer, 2014).

Major international organisations such as the OECD, the IMF and the World Bank have underlined that Green Tax Reforms are the most efficient way to ensure both fiscal sustainability and environmental protection (OECD 2013, Parry et al. 2014). This is also in line with the EU's strategic initiative for a resource-efficient Europe achieving a 'circular economy' (European Commission, 2014).

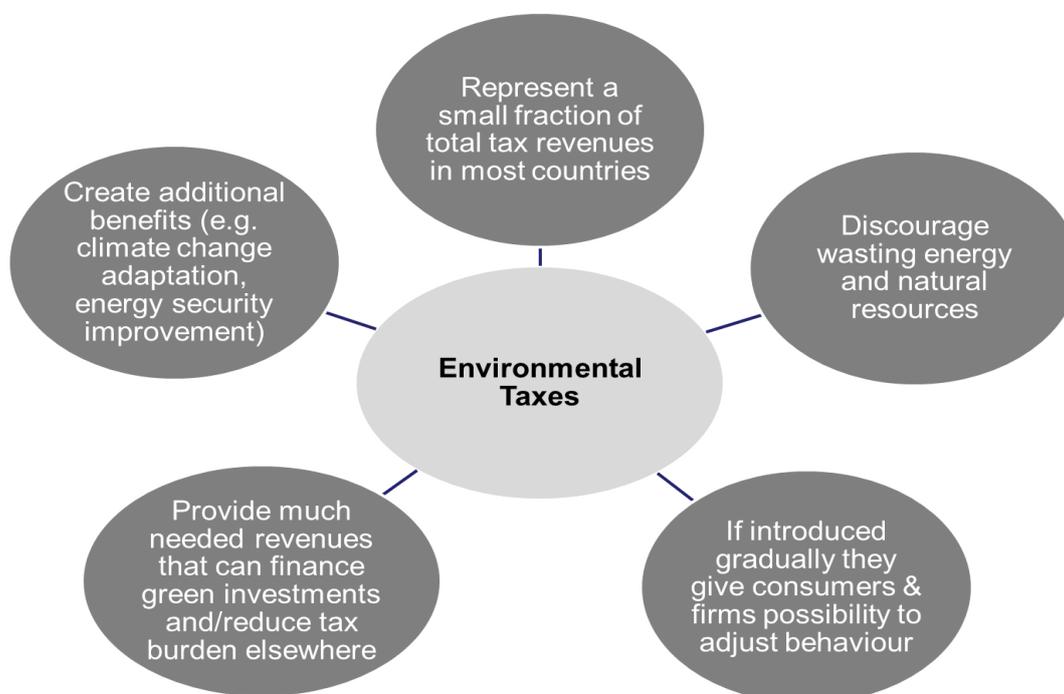
As illustrated in Figure 1, a Green Tax Reform has multiple environmental benefits. Individuals and enterprises will gradually adjust their investment decisions and

consumption behaviour in order to adapt to the new tax system, thereby reducing the use of energy in industry, buildings and motor vehicles, and substituting towards low-carbon or zero-carbon energy sources. This in turn will:

- Reduce the energy import dependency of Cyprus, and thereby improve its persistent current accounts deficit;
- Improve air quality by reducing the emissions of other air pollutants too; and
- Contribute to climate change adaptation since e.g. a better insulated building is less vulnerable to high external temperatures, and a less water intensive agricultural sector is less dependent on water availability.

FIGURE 1

*The multiple benefits of a Green Tax Reform.*



### 3. Current status of environmental taxes and environmentally harmful subsidies in Cyprus

#### 3.1. Structure of tax revenues

In 2014, total tax revenues of the government of Cyprus amounted to approximately 6 billion Euros or 34% of national Gross Domestic Product – well below the EU average of 40%. Indirect taxes accounted for 44% of these revenues, while the shares of direct taxes and social security contributions was 40% and 36% respectively (European Commission and Eurostat, 2014; 2015).

Environmental taxes – as defined by Eurostat – amounted to 3.1% of national GDP – quite higher than the EU average of 2.5% – and accounted for 9% of total tax

revenues; this fraction was lower than a decade ago when environmental taxes accounted for 12.3% of total revenues. Three quarters of all environmental tax revenues came from fuel taxation. Conversely, there is currently no taxation on pollution or the consumption of natural resources, therefore revenues from such taxes were zero, and Cyprus ranks last in the EU in this category of taxes.

### 3.2. Environmentally harmful subsidies

The term 'environmentally harmful subsidies' denotes broadly economic measures that – directly or indirectly – distort competition between technologies and lead to lower relative prices (and hence preferential treatment) of activities that cause environmental degradation or overconsumption of resources.

In line with this general definition and with findings of relevant studies (e.g. Umweltbundesamt, 2014), we have identified the following environmentally harmful subsidies in Cyprus:

- According to the Excise Taxes Law 91(I)/2004, liquid fuels used for power generation are exempt from excise taxes. This exemption constitutes a subsidy of fossil fuel based power generation in comparison to renewable power generation. On the basis of data from 2014, the revenues foregone by the government due to the lack of excise taxes on fuels used by the Electricity Authority of Cyprus (and the corresponding value added tax) amount to around 14 million Euros per year.
- According to a regulation of year 2003, agricultural gas oil is also exempt from excise taxes, thereby discouraging energy conservation and the use of renewable energy in this sector. Revenues foregone amount to a few thousand Euros per year.
- Automotive diesel oil enjoys a lower excise tax rate than automotive petrol. As diesel powered vehicles generally cause greater health problems due to the higher emissions of particulate matter and nitrogen oxides, the preferential tax treatment of diesel oil constitutes an indirect subsidy. Several EU countries (such as Belgium and France) have recently started the process of equalising excise taxes on petrol and diesel.
- Although Cyprus suffers from the highest water stress than any other EU country (Eurostat, 2015), water prices do not include any charge that accounts for the costs of water scarcity and the costs of environmental pollution due to this scarcity. This is an indirect subsidy that encourages the over-exploitation of valuable water resources and the increased use of energy-intensive desalination. The size of the subsidy is especially pronounced in the case of irrigation water.
- There is no tax or charge applying to the production of municipal waste in proportion to the amount of waste generated. This leads to high amounts of waste being disposed of in landfills and discourages waste reduction and recycling initiatives. It should be noted that waste generated per capita in Cyprus is among the highest in Europe (Eurostat, 2014).

It is important to keep in mind that these subsidies have historically been granted by the government in order to achieve other general policy goals such as social equity or rural development. Although they lead to environmentally harmful behaviour, it is not recommended to abolish all of them nor to do this immediately. It is important,

however, to be aware that these subsidies exist and cause both environmental and fiscal costs to society; and to keep them in mind when designing tax policy reforms.

#### 4. Proposed introduction of environmental taxes

##### 4.1. Carbon tax

It is recommended to introduce a carbon tax for the use of fuels in all sectors that are not subject to the EU Emissions Trading System. The tax can be introduced gradually over the six-year period 2017-2022, at annual increments of 20 Euros per tonne of carbon dioxide (CO<sub>2</sub>). This means that the carbon tax could reach 120 Euros/tonne CO<sub>2</sub> in 2022, and should remain at this level at real prices afterwards, i.e. it should be adjusted for inflation for each year after 2022.

This carbon tax will affect all economic sectors except those of electricity, cement production and brick and tile production, as these sectors are subject to the EU ETS. As a result, the implementation of the tax will not affect electricity prices but will affect the prices of oil products depending on their carbon content, as shown in Table 1.

TABLE 1

*Increase in the excise tax of oil products used in Cyprus due to the gradual introduction of the proposed carbon tax*

<i>(Eurocents' 2015 / litre)</i>	2017	2018	2019	2020	2021	2022-
Petrol	4.60	9.20	13.80	18.40	23.00	27.60
Automotive diesel	5.43	10.86	16.29	21.71	27.14	32.57
Heating diesel	5.43	10.86	16.29	21.71	27.14	32.57
LPG	3.04	6.08	9.12	12.17	15.21	18.25
Fuel oil	6.04	12.09	18.13	24.17	30.21	36.26

In order to assess the changes in fuel consumption, public revenues and carbon emissions, we employed recent projections of an energy forecast model that we developed and is used by national energy authorities (Zachariadis and Taibi, 2015). Table 2 displays the projected net change in public revenues for two cases: one using the price elasticities of our model, thereby assuming that higher retail fuel prices will reduce fuel demand and thereby reduce some of the anticipated tax revenues; and a second case with the assumption of an entirely inelastic fuel demand. It is evident that the expected additional tax revenues (both from excise and value added tax) will gradually increase and stabilize around 360-430 million Euros (at 2015 prices).

As regards the effect on energy consumption, Figure 2 shows the demand forecast for a baseline case without a carbon tax and for the linearly increasing carbon tax as proposed in this study. It is apparent that the proposed tax will mainly affect the road transport sector as it will lead to an increase in fuel prices. Conversely, energy consumption in residential and commercial buildings is expected to be affected only marginally because the proposed tax will not affect electricity prices, and the residential and tertiary sectors of Cyprus are highly electrified.

At any rate, from 2022 onwards the carbon tax is expected to lead to energy savings of the order of 100-150 thousand tonnes of oil equivalent (ktoe) per year or 6-9% of total energy demand. Apart from environmental benefits, this change will reduce the energy dependency of Cyprus and can lead to savings of 60-95 million Euros'2015 per year thanks to lower fuel imports. This can help substantially reduce the current accounts deficit of the Republic of Cyprus. At the same time, it is worth noting that the implementation of such a tax is not sufficient to decarbonise the economy of Cyprus as much as is required so that the country can comply with its commitment to reduce greenhouse gas emissions of non-ETS sectors by 24% in 2030 compared to 2005.

The increase in fuel taxes shown in Table 1 will lead to higher fuel prices and hence increased expenditures by households and firms. After 2022, when the full amount of carbon tax will be in force, fuel prices will be 27-42% higher than those in 2014-2015. Percentagewise, prices will increase less for automotive petrol, whose price is already relatively high, and will rise most for heating oil which has comparatively low prices and a relatively high carbon content.

As regards the effect of the carbon tax on the cost of living of households, Table 3 reports their maximum anticipated additional expenditures due to higher prices of automotive and heating fuels by net income decile. The average additional burden is expected to lie at 576 Euros per household per year, or 1.3% of the average net income. This will range between 168 and 989 Euros for the poorest and richest households respectively; with the exception of the top income groups, the additional burden corresponds to an almost constant fraction (1.4-1.7%) of the income of other income groups. This means that the effects of the carbon tax will be uniform across most Cypriot households. It should be stressed that these additional expenditures are similar to the reduction in fuel expenditures that households have enjoyed during the last three years due to the significant decline in international oil prices.

As regards the effect of the carbon tax on the production costs and competitiveness of Cypriot enterprises, it is possible to draw some conclusions from an earlier study that explored the effects of higher fuel and electricity prices by sector of the economy (Ketteni et al., 2013). This study showed that, although energy is complementary to capital and labour in most sectors, higher energy prices lead to very low adverse effects on investments and employment in Cypriot firms. Sectors with a comparatively higher share of fuel costs are a) mining and quarrying and b) transport and communications, but even there the effects of the carbon tax seem to be manageable. It has to be reminded that firms could cope with high fuel prices that prevailed some years ago (when the international price of oil exceeded 100 US dollars per barrel), whereas the proposed carbon tax does not lead to equally high retail fuel prices. In any case, as a part of the green tax reform, the government can foresee temporary tax credits or other rebates that can alleviate the adverse effects of selected economic sectors. On the other hand, the implementation of the carbon tax should be seen by firms as an opportunity for energy efficiency investments that can increase firm productivity and hence offer economic benefits in the medium term.

TABLE 2

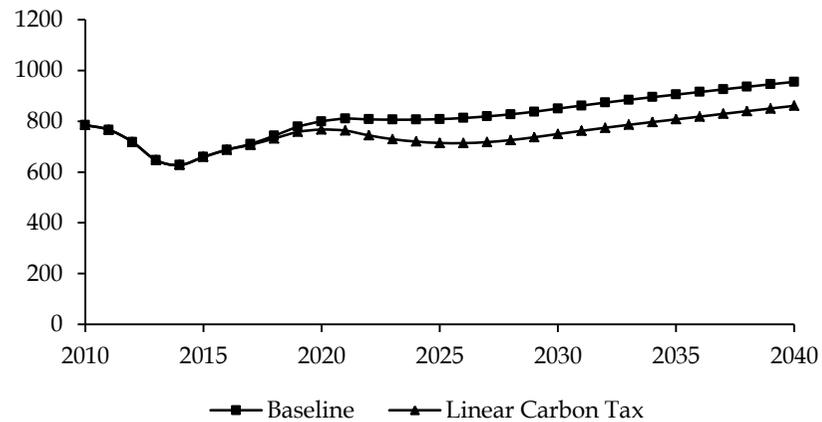
*Projected net increase of government revenues up to 2040 after implementation of the proposed carbon tax.*

(million Euros' 2015)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
according to energy model	127.4	196.6	262.5	321.2	370.8	354.8	342.1	331.9	325.1	321.5	320.7	321.8	323.7	324.5	325.2	325.6	325.8	325.6	325.4	325.0	324.5	323.7	322.7
assuming inelastic fuel demand	64.0	135.1	213.3	292.0	367.8	437.8	434.8	431.9	429.5	428.1	427.6	427.8	428.8	430.7	431.4	432.0	432.2	431.9	431.2	430.5	429.6	428.4	426.9

FIGURE 2

*Projected evolution of final energy demand in buildings and transport in Cyprus after implementation of the proposed carbon tax.*

*Final energy demand in Cyprus (ktoe)-Road transport*



*Final energy demand in Cyprus(ktoe)-Buildings*

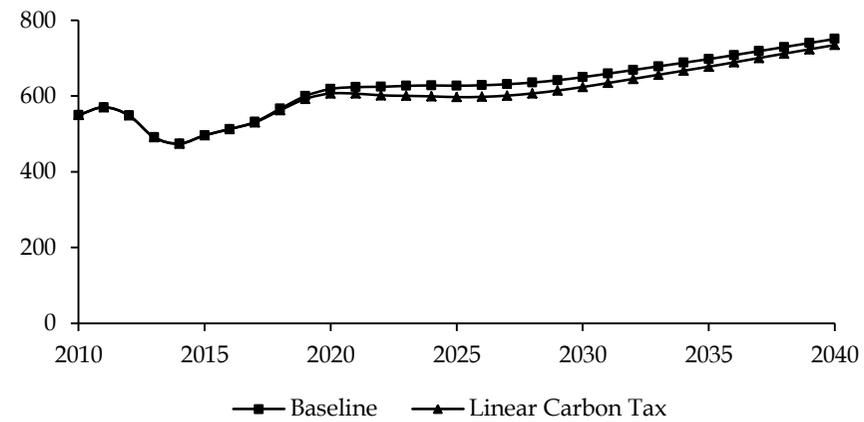


TABLE 3

*Additional expenditures of households by income group in year 2022 due to the introduction of the proposed carbon tax*

(Euros'2015)	Extra expenditure for heating fuels	Extra expenditure for transport fuels	Total extra expenditure	Fraction of net income
Lowest 10%	58.17	109.45	167.61	1.4%
10%-20%	83.38	195.67	279.05	1.5%
20%-30%	84.04	304.99	389.03	1.7%
30%-40%	91.21	352.41	443.62	1.5%
40%-50%	125.59	415.58	541.17	1.5%
50%-60%	131.21	472.97	604.18	1.4%
60%-70%	176.56	519.22	695.78	1.4%
70%-80%	201.66	623.94	825.59	1.4%
80%-90%	192.01	607.39	799.40	1.1%
Top 10%	314.71	674.62	989.33	0.9%
All households	146.07	430.13	576.20	1.3%

*Source:* Family Expenditure Surveys of Cyprus for 2009, processed by Alexandros Polycarpou.

#### **4.2. Water scarcity charge**

It is proposed that an additional water charge is implemented for both domestic and irrigation water supply, of the order of 10 Eurocents'2015 per cubic metre (c.m.), phased in gradually over two years – 5 Eurocents/c.m. in 2018 and additional 5 Eurocents/c.m. in 2019. From 2020 onwards this charge should be kept at least constant in real terms, i.e. should be adjusted for inflation every year.

The amount of 10 Eurocents/c.m. comes from studies carried out for the Water Development Department of Cyprus so that the country achieves recovery of the full costs of water supply, in line with requirements of the EU Water Framework Directive 2000/60/EU (WDD, 2010). More specifically, this amount corresponds to the estimated water scarcity cost (resource cost) and the environmental cost from overexploitation of water resources. Although national Regulation 128/2014, adopted by the

government of Cyprus in February 2014, provides for the implementation of such charges, no such decision had been made by December 2016.

Based on official statistics about the quantities of water billed to residential, industrial and agricultural consumers, this water charge is estimated to bring additional revenues of the order of 10 million Euros'2015 per year – 6 million Euros from water charges for domestic and industrial water and 4 million Euros from charges for irrigation water. All households, firms and farmers are expected to pay this charge. Revenues will be collected through water bills. According to the national Regulation mentioned above, revenues from charges for the resource and environmental cost of water will go to the general government budget; no specific earmarking of any revenues is foreseen.

The water saving potential of such a charge can be assessed on the basis of two existing studies: an econometric analysis of residential water demand in the three major urban areas of Nicosia, Limassol and Larnaca (Polycarpou and Zachariadis, 2013) and a simulation of long-term effects of water scarcity (Zachariadis, 2010). According to these studies, long-term price elasticity of residential water demand lies around -0.25 to -0.3; this could lead to potential water savings – if the proposed water pricing is implemented – in the order of 1.5 to 2 million cubic metres per year of residential and industrial water. Another 1-2 million cubic metres per year could be saved through the enforcement of proper irrigation water pricing in agriculture in line with the full cost recovery principle. Such water savings would help enrich groundwater aquifers, especially those in coastal areas that are increasingly suffering from salinization. Moreover, these savings could help reduce the dependence on water from desalination plants, which may cause damage to marine ecosystems in their proximity; these plants also require large amounts of electricity to produce freshwater and, since most electricity in Cyprus is produced in thermal power plants burning fuel oil and gas oil, desalination is the cause of substantial carbon and air pollutant emissions as well.

Water pricing is politically sensitive in view of the fact that water is an absolutely necessary good. It is therefore important to assess the social equity effects of such a policy. As far as residential water consumers are concerned, Zachariadis (2010) conducted a preliminary (ex-ante) analysis of distributional impacts from the adoption of water pricing. According to the Family Expenditure Surveys carried out by the Statistical Service of Cyprus for the years 2003 and 2009 (Statistical Service of Cyprus, 2006; 2011), domestic water expenditures represent less than 0.5% of total

household expenditures on average, and this fraction becomes somewhat higher – but still less than 1% – for the poorest 20% of households.

This means that water expenditures of Cypriot households are regressive but represent a low fraction of household income. If the proposed water charge is imposed (i.e. €0.10 per cubic metre), the average household may have to pay €19-28 more per year for water; this may range between €12-17 for low-income households (or 0.1% of their income) and €27-40 for high-income households (or 0.05% of their income). Thus the concerns of consumer associations and some policymakers over social equity are somewhat exaggerated and should not necessarily deter authorities from adopting these water charges.

#### **4.3. Landfill tax**

Municipalities and firms are charged with different amounts per tonne of waste that they dispose of, depending on the landfill in which they deliver their waste. In the modern Koshi landfill site, for example, where the waste of the Larnaca and Famagusta areas is disposed of, charges have reached €80 per tonne, whereas in the old landfill sites of Kotsiatis and Vati, serving the areas of Nicosia and Limassol respectively, landfill charges have been less than €10 per tonne. Apart from the unequal and hence unfair treatment of citizens of the country, depending on where they live, the low landfill rates constitute an environmentally harmful subsidy. They lead to inefficient waste management because they do not encourage reducing, reusing or recycling waste streams. This comes in sharp contrast with the legal commitments of the Republic of Cyprus in view of the EU's Circular Economy Package, which requires that very small fractions of total waste should be disposed of in landfills until 2030 (European Commission, 2014).

It is therefore recommended to introduce gradually a uniform landfill tax in all areas of Cyprus, which could reach €60 per tonne of waste by 2021 (at prices of year 2015) – starting with €15 per tonne in 2018 and increasing by €15 per tonne each year up to 2021. A part of this tax is meant to recover the financial costs of waste treatment, and the rest would correspond to a green tax encouraging alternative waste management options in line with the relevant EU policies. It should be mentioned that this tax is in line with practices in most EU countries, and has been recently recommended by the European Commission for Cyprus in the frame of an ongoing technical assistance study.

The expected revenues from the landfill tax amount to about €15-20 million (at 2015 prices) when the full tax will be implemented. These revenues, however, should be expected to decrease after some years, because the amount of waste reaching landfills will be reduced as a result of this tax. Obviously, in order to reap the anticipated environmental benefits in waste treatment, proper surveillance should be enforced in order to avoid illegal waste dumping.

The implementation of a landfill tax need not have adverse distributional consequences. If local authorities collect waste charges from their citizens with 'pay as you throw' systems which impose a waste charge that depends on the weight of waste generated in a household, then they can collect the required revenues to pay the landfill taxes in a socially fair and environmentally effective way.

## **5. Conclusions**

Cyprus is faced with serious energy and environmental challenges, which may be exacerbated in the future because of climate change. Compared with European countries, it has low energy productivity, high amounts of waste per capita and the worst water scarcity problem. National commitments for implementing EU legislation in the fields of greenhouse gas emission reduction and improved waste management will be increasingly difficult to meet in the near future.

In view of these challenges, a fiscally neutral green tax reform can significantly contribute towards the transition to a path of economically and environmentally sustainable development. This paper has outlined a proposal for one part of the tax reform – the implementation of environmental taxes at a level that is comparable to the economic costs that these environmental issues pose to society. More specifically, we propose the gradual implementation of a carbon tax to those sectors that are not subject to the EU Emissions Trading System, a water scarcity charge and a landfill tax for municipal and industrial waste that is disposed of in landfills. We have demonstrated, to the extent possible, the environmental benefits and the increase in public revenues that these taxes will bring about in the medium and long run. We have also assessed the effect of these taxes on firm competitiveness and social equity, underlining that potential adverse impacts of these measures will be manageable and should not be used as an excuse for not proceeding with a green tax reform.

This paper has not dealt with the second part of the reform, namely the reduction on labour or other taxes that can proceed thanks to the increased government revenues from green taxation. This is an equally important part of the reform since the government can spend the higher public revenues by providing targeted aid to vulnerable households in order to alleviate adverse distributional impacts, and reducing labour costs, thus boosting employment in the economy.

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