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A First Assessment of the Economic Impact of the "Fit for 55" Energy and Climate Policy Package in Cyprus

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Abstract

The climate emergency is one of the most important challenges of modern society. A transition to low carbon economies can mitigate some of the adverse impacts of climate change but requires investments at an unprecedented pace and scale. The European Green Deal aims to achieve a carbon-neutral European economy by 2050, while the 'Fit for 55' package attempts to set EU member states, already in 2030, on a path that aligns with this long-term goal. This paper provides an overview of the impact of this package on Cyprus. Our analysis concludes that the balance between costs and benefits of 'Fit for 55' in the medium term depends on the revenue to be secured by the Republic of Cyprus through the auctioning of allowances in the shipping sector. Some elements of the package may adversely affect the cost of living, with subsequent impacts on employment, public finances, and the need for social support. However, it can clearly be beneficial in the longer term as it will decrease dependence on energy imports, drastically reduce the cost of imported fossil fuels that burdens the trade balance, increase economic productivity, and improve quality of life, as a result of low greenhouse gas and air pollutant emissions.

Keywords: Decarbonisation, European Green Deal, Fiscal Impact, Macroeconomic Impact

1. Introduction

The 'Fit for 55' energy and climate policy package was released by the European Commission in July 2021 and has been under negotiation in European Union bodies since then. It aims at the achievement of the European Green Deal (EGD), which is a very ambitious plan of the EU that sets an example for the rest of the world regarding climate change mitigation and sustainable development. Beyond the contribution to climate stabilisation, the EGD has the strategic goal of reducing dependence on fossil fuels. This shift would have normally occurred under a longer timeframe, to enable a smoother transition for economies and societies. However, as the observed rate of climate change seems to confirm the worst projections of climate scientists, it calls for implementing climate change mitigation actions at unprecedented scale and pace.

Even though the concurrent ongoing conflict in Ukraine adds further financial pressure and demands short-term funding and regulations that give the impression that the green transition can wait, it is also a reminder of the strategic importance and economic benefits to

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be expected by the diversification of energy and raw material supply, both for the EU as a whole and specifically for Cyprus.

It is worth noting that both the core goal of the 'Fit for 55' package (i.e., reduction of greenhouse gas emissions by 55% in 2030 as compared to 1990 levels) and the broader net-zero emission goal by 2050 are legally binding. This is due to the 'European Climate Law' (Regulation (EU) 2021/1119) that was approved by EU leaders in July 2021.

The present paper aims to provide an overview of the potential economic impacts in Cyprus of the 'Fit for 55' package. It should be mentioned that this package includes more than fifteen pieces of legislation (Directives and Regulations) on aspects of taxation, energy supply and use, road transport, aviation, shipping, forestry, and other environmental targets. There is no precedent in the EU of an attempt to change so many legislative items across such a spectrum of policy sectors at the same time. Since negotiations for this legislative package were ongoing by the time of this writing (November 2022), the estimation of impacts is uncertain but important – both in order to provide national authorities with critical information during the negotiation process, but also in order to communicate to all stakeholders the expected changes across society and economy to be brought about by these policies.

To assess these impacts, we employed three separate mathematical models:

- A long-term energy forecast model that is used to project final energy demand in the electricity and heating and cooling sectors and annual energy consumption expenditure of households.
- A technoeconomic cost-optimisation model (OSeMOSYS-Cyprus) that is used to project the technology and energy mix in the electricity supply and transport sectors, while it also facilitates the estimation of necessary investments in the heating and cooling sector to satisfy the demand projected in the first model.
- An economic input-output model, which uses the investments outlook and the operational costs of all technology options, to assess the economy-wide impacts on economic output and employment across the different sectors of the Cypriot economy.

More information on the modelling framework is available by Taliotis et al (2020). These model results have been complemented with simpler calculations in several steps of the assessment presented in this paper.

2. Economic impact for each sector affected by 'Fit for 55'

This section provides an overview of the information collected and assessed, along with results from simulations of the energy and economy models mentioned above.. Wherever possible, estimated impacts focus on (a) cost of living, (b) public finances, and (c) the broader effect on economic growth, competitiveness and productivity. The following categories or sectors are analysed:

- Greenhouse gas emissions, distinguishing between those subject to the EU Emission Trading System (ETS) and the Effort Sharing Regulation (ESR).
- Energy Efficiency
- Renewable Energy Sources (RES)
- Road Transport
- Aviation

- Shipping
- Carbon Border Adjustment Mechanism (CBAM)
- Taxation of energy products (Energy Taxation Directive – ETD)

Many calculations shown below are provided in a summary form; detailed calculation tables are available upon request.

2.1 Increased ambition for greenhouse gas emissions reduction in sectors subject to the current EU Emissions Trading System

Sectors subject to the EU ETS in Cyprus are power generation and the production of cement, ceramics and tiles. The 'Fit for 55' target is to reduce ETS emissions by 61% in 2030 compared to 2005, in contrast to the current legislation that foresees a 43% reduction in 2030.

2.1.1 Cost of Living

The annual cost for purchase of emission allowances by the Electricity Authority of Cyprus, as well as by possible independent power producers, during the period 2022-2030 is estimated to be €180-250 million for the first few years (assuming an ETS price of €60-80), while it will reduce in the latter part of the period as much as 20-45% by 2030, due to a shift to gas-fired generation and an increase in the contribution of renewable energy sources. The total cost for the period 2022-2030 is estimated to be in the range of €1.1-1.5 billion, which will have to be passed on to electricity consumers. The development and operation of grid interconnections by 2028 can reduce this cost, as it can allow integration of higher shares of renewable electricity, thus reducing fossil-fired generation and, hence, greenhouse gas emissions. Additionally, due to a gradual decline in the amount of free allowances granted to the Vassiliko cement plant by 2026 due to the commencement of the CBAM (see section 2.9), an additional cumulative cost of €100 million can be expected – also to be passed through to consumers.

2.1.2 Fiscal impact

Auctioning of ETS allowances is expected to bring €600-800 million in revenue for the Republic for the period 2022-2030. This revenue is substantially lower than the aforementioned cost of allowances in the power sector, while it is about 15% lower than the revenue to be expected with the previous ETS target, which was less ambitious and allowed more emissions; this would thus result in the auctioning of a greater number of allowances. Contrary to current practice, all this revenue will have to be allocated either for climate or social support measures.

2.1.2 Broader economic impact

A delay in the reduction of greenhouse gas emissions in electricity generation and the subsequent need to purchase a greater number of allowances will result in an electricity price increase. This in turn will adversely affect business competitiveness and economic growth.

2.2 Inclusion of Building and Road Transport Fuels in a New Emissions Trading System

2.2.1 Estimated changes in retail fuel prices

Under the 'Fit for 55' package, the European Commission proposed a revision of the Effort Sharing Regulation (European Commission, 2021a) which includes, inter alia, a proposal for

the creation of a new Emissions Trading System for fuels used in buildings and road transport, which can be merged with the current ETS in a joint scheme after 2030.

According to the Impact Assessment accompanying that proposal, under the Commission's preferred scenario ("MIX" – a combination of regulatory policies and modest carbon pricing), the carbon price of this "new" ETS is expected to reach 48 Euros'2015 by 2030. Taking into account the carbon content and the energy content of the main fuels used in buildings and road transport in Cyprus, a carbon price of 48 Euros'2015 per tonne of carbon dioxide corresponds (Zachariadis, 2016) to an additional excise tax of the order of:

- 11 Eurocents'2015 per litre for automotive petrol
- 13 Eurocents'2015 per litre for automotive diesel and heating gas oil
- 7 Eurocents'2015 per litre for LPG
- 14 Eurocents'2015 per litre for light fuel oil – which however will not be subject to the new ETS as it is used by firms, while the proposal is to include the fuels used in buildings and road transport.

Considering a GDP deflator of around 1.15 between 2015 and 2020 according to official national accounts, and using the current retail prices for the three major fuels used in Cyprus (automotive petrol, automotive diesel and heating gas oil), it turns out that with today's fuel prices such an ETS price would increase retail prices by 9.5% for petrol, by 11.5% for automotive diesel, and by 18% for heating oil[1].

2.2.2 Impact on households

To assess the direct effect of these price increases in the cost of living of households, the Impact Assessment of the National Energy and Climate Plan (NECP), which was completed in 2019, provides useful indications. Table 1 shows the annual expenditures of Cypriot households on main energy items (electricity, heating fuels and transport fuels), both in absolute terms and as a fraction of their annual income. This information comes from the Household Budget Survey conducted by the Statistical Service of Cyprus on a representative sample of 2,700 households in year 2015. According to this information, Cypriot households used to spend on average about 3,100 Euros per year on fuels and electricity or 10.6% of their income in year 2015; poorest households spent around 1,300 Euros (19% of their income) while richest ones close to 5,000 Euros per year (6% of their income). This means that overall the expenditures on energy goods are regressive. Half of these expenditures are for transport fuels on average, but the distribution among income groups is quite different: the poorest spend more both on electricity and automotive fuels, and the rich spend more on automotive fuels. Regressivity is strongest in the case of electricity, where poor households spend (as a fraction of their income) over three times more than rich households do. This means that a change in the prices of electricity has a greater distributional effect than a change in the prices of other energy commodities.

[1] Assuming retail prices valid at end of September 2021 – 1.3 Euros per litre for automotive petrol and diesel, and 0.84 Euros per litre for heating oil – based on official data: http://www.consumer.gov.cy/meci/cyco/cyconsumer.nsf/page54_gr/page54_gr?opendocument?OpenDocument

TABLE 1

Annual expenditure of Cypriot households on energy goods in year 2015

Income Group	Expenditures in Euros'2015 for: Electricity	Heating Fuels (oil, LPG, biomass)	Transport Fuels (gasoline, diesel)	All Energy Goods
Poorest 10%	426	164	710	1300
10%-20%	517	222	1059	1797
20%-30%	607	278	1325	2210
30%-40%	696	312	1466	2474
40%-50%	815	311	1677	2803
50%-60%	863	353	2227	3442
60%-70%	940	425	2197	3562
70%-80%	1002	554	2646	4203
80%-90%	1042	592	2701	4335
Richest 10%	1383	788	2786	4957
All households	**829**	**400**	**1879**	**3107**

Income Group	Expenditures as % of annual income for: Electricity	Heating Fuels (oil, LPG, biomass)	Transport Fuels (gasoline, diesel)	All Energy Goods
Poorest 10%	6.3	2.4	10.4	19.1
10%-20%	4.7	2.0	9.6	16.2
20%-30%	4.3	2.0	9.4	15.7
30%-40%	4.0	1.8	8.4	14.2
40%-50%	3.8	1.4	7.8	13.0
50%-60%	3.3	1.4	8.6	13.3
60%-70%	3.0	1.4	7.1	11.4
70%-80%	2.7	1.5	7.0	11.1
80%-90%	2.2	1.2	5.6	9.0
Richest 10%	1.8	1.0	3.5	6.3
All households	**2.8**	**1.4**	**6.4**	**10.6**

Source: Cyprus NECP (Republic of Cyprus, 2020). Data come from the Household Budget Survey 2015 of the Statistical Service of Cyprus and were analysed by the Economics Research Centre of the University of Cyprus.

The new ETS proposed by the European Commission will not affect electricity prices but those of heating and road transport fuels. Using the information from the bottom part of Table 1, since low-income households spend 12-13% of their income on heating and transport fuels, and for a weighted average price increase of 11% for the three fuels mentioned above, it follows that the projected new ETS may increase the cost of living of poor households by 1.4%, of medium-income households by 1%, and of higher-income groups by 0.6%. At today's prices, these increases would correspond to additional fuel expenditures of the order of 130, 300 and 450 Euros per year for low-income, medium-income and high-income households respectively.

A similar assessment of the impact on households is provided in the relevant impact assessment of the European Commission (European Commission, 2021b).

2.2.3 Impact on businesses

It is important to consider whether the higher fuel prices due to the new ETS will lead to significantly raised production costs for the production sector of the economy. If so, this can endanger the competitiveness of businesses and may cause increases in the prices of other goods and services, thereby increasing further the cost of living for Cypriot citizens.

The only available study for Cypriot businesses (Ketteni et al., 2013), which is also mentioned in Section 5.2.1.4 of the Cyprus NECP (Republic of Cyprus, 2020), was conducted in 2012-13 and found that fuel price increases of the order of 7% for fuels and 12% for electricity were expected to affect production costs by less than 0.4%, so that no competitiveness concerns should arise. If such a finding is still valid today, then economy-wide effects from the new ETS can be regarded as manageable.

On the other hand, these average effects may hide some significant negative impacts on a part of the Cypriot businesses that heavily rely on transport fuels for their operation. For this purpose, we examined the cost structure of firms in all main sectors of the Cypriot economy, with the aid of data available from the Cyprus Statistical Service, to calculate the importance of energy costs in the operational expenses of firms. Figure 1 provides a summary for 2018, the latest year with available data. Note that the proposed new ETS will only affect the costs of transport fuels, i.e. the upper part of each column in the graph.

Apart from the sector of non-metallic minerals that will not be affected by the new ETS (the sector includes the Vassiliko cement plant and the bricks and tiles plants, which are already subject to the current ETS), it turns out that the most vulnerable sectors from the increases in road transport fuels are the beverage industry, waste management, trade, and transport and storage. These are obviously the sectors that operate many vehicles for transporting raw materials and final products. Still, with the exception of waste treatment and management, all other sectors seem to have fuel costs that are less than 5% of their operational expenses according to data from the Cyprus Statistical Service (Cystat). An increase in these less-than-5% costs by about 11%, to be introduced *gradually* after 2025 as foreseen with the introduction of the new ETS, does not seem to entail large risks for their competitiveness – if all other cost items remain at the same levels. As such, this observation confirms the findings of the 2013 study of Ketteni et al. (2013) mentioned above. It is still possible, however, that individual firms may face significantly higher-than-average cost increases, which will have to be addressed accordingly, e.g. through tax rebates or lump sum payments to those who can prove a very high rise in their transport costs.

2.2.4 Fiscal impact

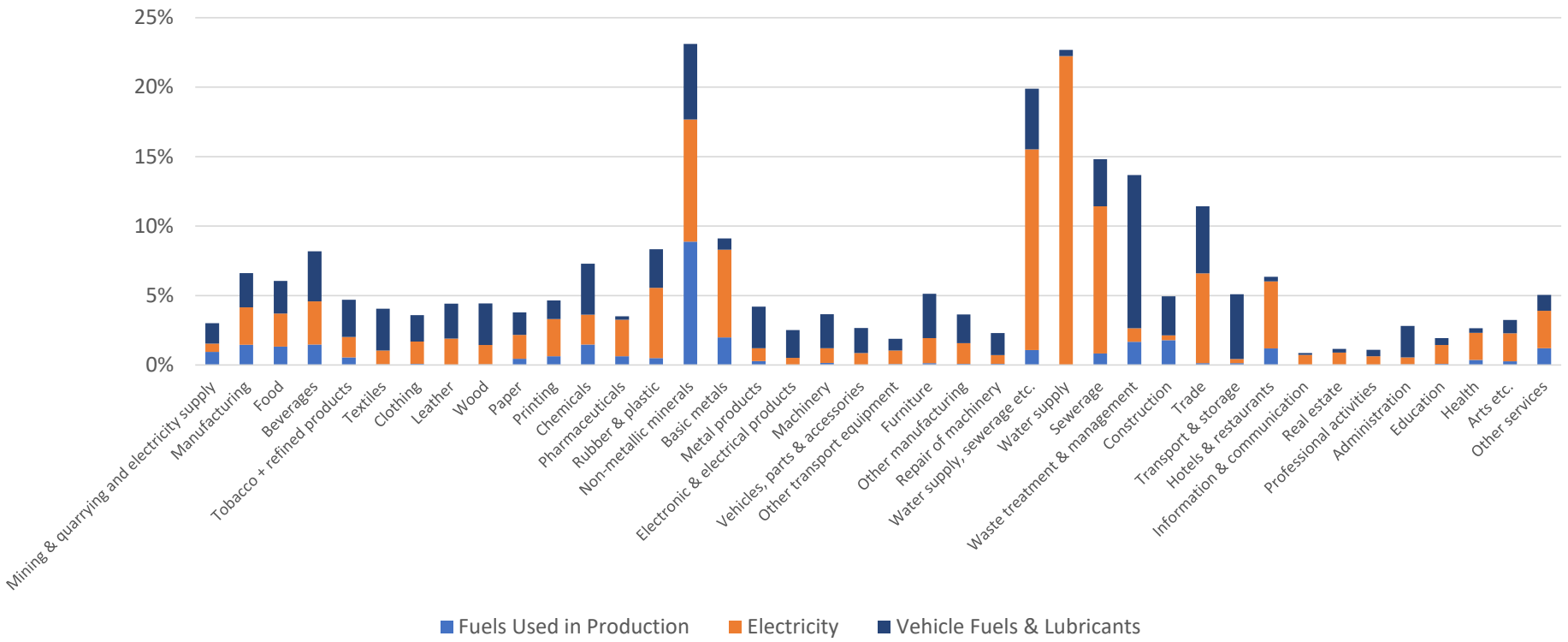
Auctioning of allowances in the new ETS can result in €600 million in revenue for the period 2026-2032, or €425 million up to 2030. Half of these funds will be allocated to the Social Climate Fund (SCF) – a new EU-wide fund that has been proposed by the European Commission to alleviate adverse equity impacts of the new ETS – and will be used to fund actions in Cyprus that will ameliorate the social impact of the 'Fit for 55' package. The Commission has proposed that Cyprus receives €146 million from the SCF, which is roughly the amount that it will contribute according to estimates of the European Commission.

2.2.5 Broader economic impact

According to the analysis provided by the adopted modelling framework for scenarios with and without the implementation of the new ETS proposal, energy savings by the new ETS can range between 117 and 130 ktoe. At the same time, this legislation can decrease the imported fuel cost by €60-100 million by 2030.

FIGURE 1

Energy Costs as a fraction of total costs by economic sector in Cyprus, 2018



Source: Statistical Service of the Republic of Cyprus (Cystat, 2021a) and various publications and data available online on industrial, construction, trade and service sector statistics.

2.3 More ambitious targets related to the Effort Sharing Regulation (ESR)

2.3.1 Cost of Living

Most of the emission reduction in the sectors falling under the ESR (i.e., light industry, road transport, buildings, agriculture, animal husbandry and waste) will be associated with energy efficiency improvements in buildings and road transport. Hence, substantial capital investments are needed by households and businesses for building renovations (see section 2.4) and electrification of road transport (see section 2.6).

2.3.2 Fiscal impact

Already accounting for the measures included in the NECP, an additional cost in the range of €20-165 million is to be expected. Specifically, the revised ESR target, which raises the emission reduction goal from 24% to 32%, cannot be achieved with the previous NECP policies and measures; this creates a necessity for the purchase of additional allowances by the Republic with a cost of €20-25 million by 2030. To estimate this sum, we have taken into account the "flexibility mechanisms" offered to address the excess emissions through allowances from natural carbon sinks by measures related to land use change and forestry.

However, this cost can increase significantly by up to an additional €140 million, as the NECP's road transport emission projections were quite optimistic. This additional cost figure has been estimated through the development of scenarios with the OSeMOSYS-Cyprus model, in which a lower social acceptance of public transport measures and greater dependence on private passenger cars as compared to the NECP were assumed. By 2030, this results in cumulative emissions of 1,400 thousand tonnes of equivalent carbon dioxide (kt CO_{2eq}), which in turn leads to a higher need for allowance purchases.

It is worth noting that the cost can increase even further if the price of allowances greatly exceeds the €100/tonne CO_2 with which these calculations were conducted. The price of emission allowances for ESR sectors will be independent from the price for ETS sectors and will be determined by whether there is a shortage or excess in emissions allowances across EU member states.

2.3.3 Broader economic impact

In comparison to what was foreseen in the NECP, the necessary measures to achieve the ESR greenhouse gas emissions reduction by 32% will lead to liquid fuel savings of about 100 ktoe in 2030 or approximately 400 ktoe for the entire period 2022-2030. As such, the cost for fuel imports will decrease by about €200-300 million by 2030.

2.4 New targets related to Energy Efficiency

2.4.1 Cost of Living

The NECP had included measures with a cost of €180 million to support energy efficiency interventions through public investments or grants, with a realistic goal for total public and private investments of €800 million by 2030; these relate to building renovations in 65,000 residential and 15,000 commercial buildings (Republic of Cyprus, 2020). Even though this target can be deemed as optimistic, it is realistically achievable according to an earlier Technical Support study conducted for the Republic of Cyprus (Vougiouklakis et al., 2017). Investments foreseen by new EU funds (i.e., the

Recovery and Resilience Plan of Cyprus and the European Structural and Investment Funds) has accounted for energy upgrade projects of up to €200 million in investments through public and private funds. Taking into account the sharp increase in construction material costs, as well as the lack of the necessary skilled workforce to carry out the energy upgrades, we maintain the assumption that the maximum feasible level of energy upgrades will reach €800 million by 2030. These may be sufficient for the attainment of the previous energy-related targets but will not be enough for achieving the more optimistic 'Fit for 55' energy efficiency target. The attainment of this will necessitate the implementation of a tax reform involving a high carbon tax, since taxes on energy products beyond the taxation thresholds can be considered as an eligible energy efficiency measure with great effectiveness. Nonetheless, this tax would need to reach a level far greater than those envisioned for the new ETS.

Based on these considerations, the Republic of Cyprus has requested – during the 'Fit for 55' negotiations – a continuation of the derogation for a reduced energy efficiency improvement until 2030 that is currently in force for Cyprus and Malta. This is also justified by relevant European Commission analysis, which shows that the Energy Efficiency Directive target exceeds the economic potential for energy efficiency in Cyprus.

2.4.2 Fiscal impact

In case no derogation is provided for compliance with the ambitious EU-wide energy efficiency target, additional funds will be needed for energy upgrades. Nevertheless, the plausibility for implementation is unknown, given the shortages in skilled workforce and administrative capacity.

2.4.3 Broader economic impact

There are many energy efficiency interventions that can be cost-effective in the short term, and thus improve energy productivity and subsequently economic productivity, potential output and employment, while improving society's resilience to climate change. However, these apply only if there is availability in financial, administrative and human resources that can implement additional energy upgrades than those already envisioned; Cyprus currently does not seem to meet these requirements.

2.5 Revised Renewable Energy targets

2.5.1 Cost of Living and Fiscal Impact

No substantial change to the cost of living is expected in regard to increased renewable energy contribution as foreseen in the proposed revision of the Renewable Energy Directive. Planned investments from EU funds (i.e., the Recovery and Resilience Plan, the Structural Funds and the Just Transition Fund) for RES installations and modernisation of the transmission and distribution grid are likely sufficient for the achievement of renewable energy targets in the power sector; this is especially true if the EuroAsia Interconnector project is successfully completed, as is currently scheduled for 2028. The 'Fit for 55' package also suggests sectoral RES targets, for instance in buildings and industry, some of which are demanding. Their cost, though, cannot be easily quantified before finalization of the package's negotiation process.

2.5.2 Broader economic impact

The energy system model projections indicate that increasing RES contribution beyond the levels foreseen in the NECP, can lower natural gas consumption in electricity generation by 70-130 ktoe in 2030 or 200-400 ktoe cumulatively for the period until 2030. This leads to reduced imported fuel cost by €70-200 million by 2030.

2.6 Road Transport

The road transport sector is affected by many legislative changes in the 'Fit for 55' package, primarily from the more ambitious ESR targets (since motor vehicles account for more than half the emissions of the sectors subject to the ESR), the proposed new ETS for heating and transport fuels (see Section 2.2), and the more stringent CO_2 emission standards for new vehicles. The latter measure is not expected to have a noticeable impact on the Cypriot economy since there is no vehicle manufacturing activity in the country.

2.6.1 Cost of Living

Implementation of the European Green Deal involves a substantial penetration of electric vehicles (passenger cars, light trucks, and buses) by 2030 that will allow EU member states to comply with several energy and climate related obligations included in legislative proposals of the 'Fit for 55' policy package. According to the European Commission's assumptions used in their relevant modelling work (and adopted by the energy system model of Cyprus that we have developed), the purchase cost of battery electric vehicles is much higher than that of conventional vehicles today, but the cost difference is expected to drop strongly in the coming years, and a large number of electric vehicle models will be available in the market after 2025. Combined with much lower fuel costs for electric vehicles compared to those of petrol- and diesel-powered ones, OSeMOSYS-Cyprus simulations indicate that electric vehicles will have lower lifetime costs than conventional ones, so that they may account for 20-30% of the passenger car stock in 2030; most of them are projected to enter the market from 2026 onwards. Another 25-30% of the market is projected to consist of hybrid vehicles. At the same time, a shift from cars to other passenger transport modes (public and non-motorised transport) – although challenging to implement – is an important ingredient of decarbonisation in transport.

The road transport sector is responsible for approximately half of the greenhouse gas emissions by sectors under the ESR. The stricter ESR target will affect road transport users in the following aspects:

- Higher vehicle purchase cost for battery electric vehicles, which is counterbalanced by lower operational costs.
- Moderate cost for an enhancement in the use of sustainable biofuels in blended diesel and gasoline.

Based on the European Commission assumptions, which are also adopted in our modelling framework, electric vehicles are €600-900 cheaper to run per year than a gasoline vehicle. Taking into account the projected electric vehicle fleet, both by our models and those of the European Commission, it is estimated that cost savings of up to €300 million can be expected by 2030.

In summary, no major changes are expected in the medium-term cost for households and businesses due to road-transport related policy changes in 'Fit for 55', but this will require a substantially higher upfront cost for vehicle purchases; this might be a concern for low- and medium-income households if support schemes or other financing options are not available. It is worth noting that if the modal shift envisioned in the NECP does not materialise and public transport maintains a very low share in total mobility, additional investments for private passenger car purchases can reach up to €2 billion by 2030, according to our OSeMOSYS-Cyprus model projections.

2.6.2 Fiscal impact

Model-based projections indicate that the electrification of transport will necessitate additional investments of €2-3 billion by 2030, mainly for the purchase of 130,000-190,000 battery electric vehicles. These relate to private investments for passenger cars and trucks, which are expected to occur after 2025, when the purchase cost of battery electric vehicles is expected to decrease and more vehicle models will be available on the market. It is estimated that public grants will only be needed in the first few years of the decade, a portion of which is already included in the Recovery and Resilience Plan, when the purchase cost will still be quite high.

The most important fiscal impact is expected to arise from public infrastructure investments to promote sustainable mobility (i.e., public transport, bus stops, bus lanes, bicycle lanes, pedestrian walkways, etc.). Compared to what has been officially declared as part of the NECP, there appears to be a funding gap of €800 million, so additional funds should be made available through the public budget. As indicated in section 2.3, in a failure to achieve the envisioned modal shift, up to €140 million will be needed for the purchase of emission allowances by the Republic of Cyprus. Additionally, the adoption of sustainable modes of transport is dependent on long-term infrastructure projects and entails changes in social behaviour; hence, any delays may complicate the achievement of legally binding emission reduction targets after 2030.

2.6.3 Broader economic impact, with a focus on employment prospects

The above developments are expected to pose risks for employment in NACE sector G (Trade and Repair of Automotive Vehicles and Motorcycles), because of reduced economic activity for i) the import of fuels, ii) the import of motor vehicles and iii) the repair and maintenance of vehicles. Based on national statistics and model simulations, it turns out that about 10,000 people (owners and employees in these sectors) may be affected by such a development. More specifically:

i. If fossil fuels are going to be phased out (in transport but also economy-wide), economic output of fuel importers will be affected, because renewable biofuels may only partly replace conventional fuels, and the rest of energy demand will be met by electricity. The downstream sector of fuel imports, i.e. distribution of oil products to end consumers (petrol stations and trucks delivering heating fuel to customers - NACE sector 47.3), employs about 2-3% of people in the total sector of retail trade (Cystat, 2018), or about 1,200-1,600 people in recent years (Cystat, 2021b). To avoid large losses in activity, fuel importers will need to transform petrol stations to places that offer additional services, such as fast charging of electric vehicles, supply of renewable fuels, mini markets etc. Their staff may be able to be re-trained to the extent that they will continue to service the energy needs of vehicles.

ii. Imports of motor vehicles, new and used, will be affected as long as national decarbonisation policies lead to a reduced demand for private cars and trucks. With regard to freight transport, it is difficult to find an alternative to trucks in Cyprus, as no train connections exist or are foreseen to be built. Therefore, in freight transport the "risk" of lower imports of vehicles can only result from better logistics and operations management; such a change can only be gradual and have small or modest effects in truck imports. Replacement of the existing fleet with low- or zero-carbon vehicles will lead to continuous activity of vehicle importers.

iii. With regard to passenger mobility, promotion of public and non-motorised transport, if successful, may cause a decline in imports of cars. NACE sector 45 (Wholesale and retail trade and repair of motor vehicles and motorcycles) employs about 7,000-9,000 people in total (Cystat, 2021b), out of which 20-30%, or about 2,000 people, in sales of vehicles (NACE sector 45.1) (Cystat, 2018). A large part of the economic output of this subsector may not be affected as it will focus on importing low- and zero-carbon vehicles (electric cars etc.). As infrastructure investments in other transport modes take time to materialise, and the behaviour of car users changes slowly, it can be expected that vehicle importers and their employees will have adequate time to adjust to the new conditions.

iv. The outlook may look different for enterprises that are active in maintenance and repair of vehicles and motorcycles and sales of their parts and accessories (NACE subsectors 45.2, 45.3 and 45.4). Electrification of the vehicle stock may reduce the demand for maintenance services because electric car engines have fewer parts and are simpler to operate. These subsectors employ about 8-10% of the total sector of retail trade (Cystat, 2018) or 6,000-7,000 persons in Cyprus today; some of these people may be redundant if electrification of cars proceeds fast, and most of the remaining workforce will need to be re-trained in new vehicle technologies. It is very likely that many of these technicians, especially those employed in workshops of authorised car dealers, will be re-trained by car manufacturing companies themselves. Still, there will probably be a need for downscaling some of these maintenance and repair activities, so that redundant personnel may need to be re-trained to obtain different skills and work in other economic sectors.

v. On the other hand, if significant investments in public transport materialise (e.g. introduction of a tram in Nicosia as foreseen in the plans of the Ministry of Transport), they can lead to increased economic activity in sectors such as construction and manufacturing of metal products, machinery and equipment. Although a part of these investments will be implemented through imports, it is expected that a significant portion of these activities will be materialised through local supply chains and local labour, thereby slightly promoting the employment prospects of technicians in these sectors.

The above considerations have been reinforced by analysis with our economic input-output model. Using the latest input-output table of the Cypriot economy available from Cystat for year 2018, we have computed the direct and indirect jobs affected by the above-mentioned sectors. These are summarised in Table 2. As is usual with the tertiary sector of the economy, the economic output and jobs of other sectors that are indirectly affected are relatively limited. In total, more than 12,000 jobs are affected. As regards the indirectly affected jobs, a full list of impact per NACE sector is available upon request.

TABLE 2

Employment in sectors affected from a transition to sustainable mobility

NACE code	Sector	Direct jobs	Indirect jobs	Total jobs
45.1	Sale of motor vehicles	1,987	326	2,314
45.2, 45.3, 45.4	Maintenance and repair of motor vehicles; Sale of motor vehicle parts and accessories; Sale, maintenance and repair of motorcycles	7,043	1,157	8,200
47.3	Retail sale of automotive fuel in specialised stores	1,609	214	1,823
	Total	**10,639**	**1,697**	**12,336**

Source: Input-output model of the Cypriot economy (Taliotis et al., 2020)

2.7 Aviation

Four of the proposed legislative changes are expected to have an impact on the aviation sector, while at least three of these will directly affect aviation fuel cost and hence air travel cost. The following analyses are considered for this sector:

i. According to estimates from the Department of Civil Aviation, after 2030 once all measures are enforced (Energy Taxation Directive (ETD), new ETS, 'RefuelEU Aviation' Regulation), there will be an additional air travel cost that corresponds to 1.1% of the national GDP of Cyprus; this is considerably higher than the EU average. This change will be gradual over a long timeframe, especially for the aviation fuel tax that is suggested in the revised ETD. In any case, this can have a significant impact on tourist arrivals from EU countries and the United Kingdom, as neighbouring extra-EU tourist destinations will be far less impacted. This is due to the fact that only one of the legislations will affect flights to and from extra-EU countries.

ii. A European Parliament study on the impact of including the aviation sector in the ETS has shown that ticket cost for intra-EU flights will increase by 6-9% in 2030 (CE Delft and DLR, 2021).

iii. Various impact assessments of the European Commission provide estimations:

- The revision of the ETD can lead to a 3.5-4.5% decrease in the output and employment of the aviation sector in the EU by 2030-2035 (European Commission, 2021c).
- The impact on ticket prices is expected to be quite low; €1-3 within the EU (European Commission, 2021d).
- The RefuelEU Aviation Regulation may cause an increase of 3.3% on the fuel cost due to imports of Sustainable Aviation Fuels (SAF) (European Commission, 2021e). As verified by the International Air Transport Association (IATA, 2019), fuel cost corresponds to 17-25% of the total airfare costs, hence the associated expected increase on flight ticket costs

is expected to be 0.8%. Nonetheless, this may be higher in low-fare flights, in which the fuel cost represents a higher share of the total airfare cost.

- No quantitative estimation on the impact of fuel cost by the revised RED II Directive is provided, but a potential increase is acknowledged (European Commission, 2021f).

2.7.1 Cost of Living

The information presented above does not give a clear indication of the impact on households. According to Cystat data, about 10-15% of the imported goods' value is imported through air travel. Even though cargo flights are exempt from most of the 'Fit for 55' legislations, an increase on some of the imported goods carried via commercial flights could be expected.

2.7.2 Fiscal impact

The most significant impact on public finances relates to imposed taxes on aviation fuel and is examined in section 2.10. The inclusion of the aviation sector in the ETS after 2027 may bring approximately €40 million in revenue for the Republic (European Commission, 2021d); this figure may increase if the ETS price is higher than anticipated. However, the potential need to support the aviation and tourism sectors may result in a more substantial (negative) fiscal impact.

2.7.3 Broader economic impact

Given the aforementioned changes and the high elasticity for demand for tourist services in relation to airfare cost, a potential decrease by 15% in air travel and tourism demand was simulated using the input-output model of Cyprus, using the latest input-output table of the Cypriot economy available from Cystat for 2018 (Cystat, 2021b). Specifically, the following were assumed:

- A drop by 15% in demand for air transport services (i.e., a reduction by €92 million from a total output of €604 million).
- A drop by 15% in demand for the tourism sector (i.e., a reduction of €405 million from a total annual revenue of €2.7 billion, according to statistics for 2017-2019). Based on Cystat data and a previous assessment (Nicolaidou et al., 2005), this impact was split as indicated below:
    - 80% of the reduction affecting hotels, food and beverage services.
    - 20% of the reduction affecting the retail sector.

Simulation results indicate a reduction in GDP by 1.7% and in employment by 2.6%. This leads to a loss of 10,000 jobs, mainly in the hotels, food and beverage services, and retail sectors. It should be noted that these figures refer to the total impact from an immediate decline in tourism activity without any adjustment by the sector to the new conditions and without any structural or technological changes in the economy. In reality, implementation of the 'Fit for 55' package will be gradual and the cost increase will occur over a decade, in case there are no legislative changes. Additionally, according to Cystat data, 10-15% of imported goods' value and 20-25% of exported goods' value are transported by air. Hence, the competitiveness of businesses may be affected, but it is difficult to quantify this.

2.8 Shipping

Five of the proposed 'Fit for 55' legislations are expected to have an impact on the shipping sector, while four of these will directly affect fuel cost and hence export and import costs of commodities. Cystat data indicate that 80-90% of the imported goods' value and 70-80% of the exported goods' value are transported by sea. These percentages are greater when considering the tonnage of the transported goods. The following analyses are considered for this sector:

i. According to estimates provided to national authorities by the Cyprus Marine and Maritime Institute, the inclusion of shipping in the ETS can gradually increase the cost of traded goods by 3.5% in 2023 and 26% in 2030 for intra-EU routes and by half of these percentages for extra-EU routes.

ii. The impact assessment of the ETD estimates that "intra-EU transport will represent approximately 16% of all fuel use in the waterborne transport sector in 2030" (European Commission, 2021c). Hence, the impact on cost will be half of what is mentioned in the previous point. However, in the case of Cyprus, the percentage of intra-EU transport is higher than the EU average, due to its geographical location away from the centre of the EU.

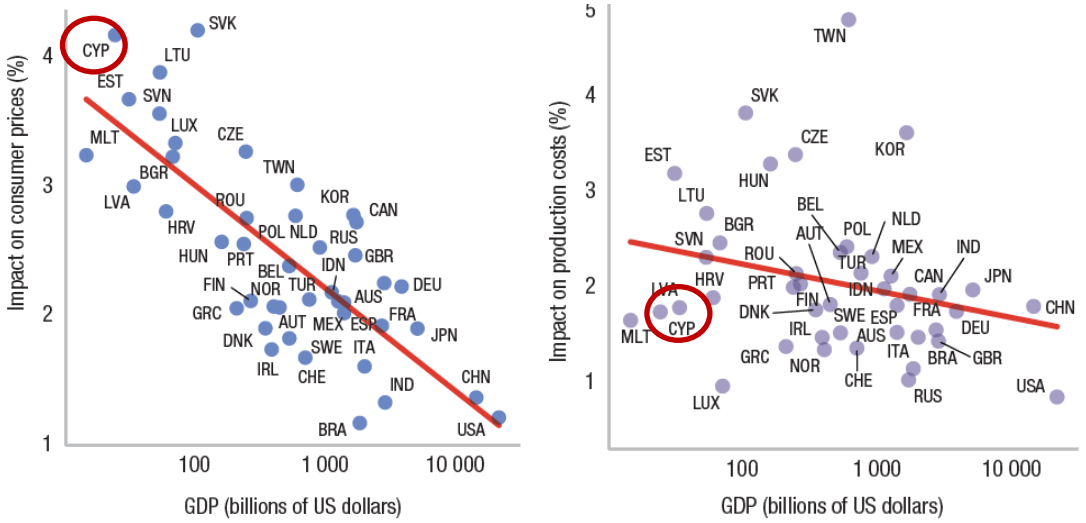
iii. The impact on the cost of goods depends on the percentage of the transport cost on the total value of the products and the ability of suppliers to adjust the prices of the respective goods. The possibility of passing the cost increase to consumers also depends on contractual agreements between the ship owner and the charterer and whether the demand for the specific product is affected (CE Delft and DLR, 2021).

iv. According to the United Nations Conference on Trade and Development, a 243% increase in container freight rates between August 2020 and August 2021 has caused subsequent increases on a global scale by 11% on import prices and 1.5% on consumer prices (UNCTAD, 2021). For Cyprus, which is an island state with a small economy and is dependent on imports by sea, UNCTAD estimates an increase by 4% in consumer prices, due to an increase in import prices (Figure 2 – left), and an increase by 1.8% in production costs, due to higher intermediary good costs (Figure 2 – right).

    The increase caused by the 'Fit for 55' package on maritime transport cost is expected to be far lower than the 243% rise experienced due to the COVID-19 pandemic, and hence the impact will be lower. On the other hand, any changes driven by the 'Fit for 55' package will be additional to the rest of the price increases associated with the pandemic and the war in Ukraine.

FIGURE 2

Expected impact on consumer prices (left) and cost of production (right) in developed countries due to a rise by 243% in container freight rates between August 2020 and August 2021 (UNCTAD, 2021)



v. The impact assessment carried out by the European Commission estimates an increase in the total costs for the maritime sector by 7% due to its inclusion in the ETS, assuming an emissions allowance price of €45/tonne CO_2 (European Commission, 2021g); an allowance price of €100/tonne CO_2 could cause a cost increase of 15%. In addition, this impact assessment estimates the impact on consumer prices to be lower than 1% in 2030.

vi. Impact assessment reports regarding other 'Fit for 55' legislations have showed the following:

- The impact assessment for the FuelEU Maritime Regulation projects that fuel costs can increase by 2.9-3.2% and total costs by 2.6-2.8%in 2030 relative to the baseline (European Commission, 2021h).
- The Energy Taxation Directive revision will decrease the output and employment in the maritime sector by less than 1% (European Commission, 2021c).
- No quantitative estimation regarding the impact from higher renewable energy shares on fuel cost by the revised RED II Directive is provided, but the potential increase is expected to be passed on to the consumers (European Commission, 2021f).

2.8.1 Cost of Living

The combined effect of the proposed legislative changes may lead to a gradual rise in maritime transport costs by up to 30-50% in 2030. According to unofficial preliminary estimates by the Ministry of Finance, this may increase inflation by 0.5%, with subsequent adverse effects on the purchasing power of households.

2.8.2 Fiscal impact

The inclusion of the maritime sector in the ETS after 2027 will lead to approximately €40 million in revenue for the Republic until 2030 through emission allowance auctions. This amount may grow substantially if the Republic's negotiating argument for a higher allocation of auctioned allowances than the current figure of 0.287% is accepted. Even though auction revenues may be quite high, they might still be lower than the cost of purchase for emission allowances by maritime companies – which may indirectly have an adverse impact on public finances.

2.8.3 Broader economic impact

As already mentioned, the 'Fit for 55' can raise the cost of maritime transport by 30-50% and lead to an increase in inflation by 0.5% in 2030. Assuming the demand for imports of products by sea is inelastic, a negative impact on GDP can be expected. Competitiveness of certain sectors can be affected even more adversely due to an increase in raw material cost, as well as transport costs for exported goods.

2.9 Carbon Border Adjustment Mechanism (CBAM)

2.9.1 Cost of Living

A review of analyses indicates that this measure will have a very low impact on the average cost of living across the EU; this is what is also illustrated by the European Commission's impact assessment (European Commission, 2021i). However, no detailed analysis has been conducted for the case of Cyprus. Given that this measure will be implemented on raw materials (i.e., aluminium, iron, steel, cement, fertilisers and electricity) imported from extra-EU countries and not on final products, an increase on the cost of production in certain sectors is to be expected. Nonetheless, it is not clear to what degree the cost of production will be affected or whether a potential cost increase can be passed on to the consumers.

2.9.2 Fiscal impact

No primary impact on public finance is expected from CBAM as the revenue from implementation of the tax/excise duty related to CBAM will be directed to the EU budget. Additionally, the revenue from auctioning of emission allowances from the cement plant, which are presently provided for free, is likely to be directed to specific EU funds.

2.9.3 Broader economic impact

Due to the gradual halt in provision of free emission allowances to the cement factory, and if no emission abatement measures are adopted, its cost of production is expected to increase cumulatively by up to €100 million by 2030. This will drastically affect its competitiveness for exports to extra-EU countries. Simulations from the input-output model of Cyprus estimate that this can affect 264 direct and 179 indirect jobs connected to the operation of the facility.

As regards other raw materials (i.e., aluminium, iron, steel, fertilizers) to be imported from extra-EU countries, an increase in the cost of production for some sectors can be expected. The associated impact on production cost and competitiveness cannot be easily quantified because it is not clear to what degree the additional cost will be passed on by businesses to consumers, given that final products using the same raw

materials imported from third countries will not be subject to CBAM, hence the prices of these imported goods will not be affected.

2.10 Energy Taxation Directive (ETD)

2.10.1 Cost of Living

Due to the already higher taxation rates implemented in Cyprus, the suggested change on the minimum rates will not substantially affect key energy products (i.e., gasoline, automotive diesel, electricity), unless a further increase is decided at a national level. Additionally, the impact on imported goods via maritime transport will be negligible, as the suggested taxation rates for maritime fuels are low. Finally, a small increase on the taxation rates for agricultural diesel can be expected.

2.10.2 Fiscal impact

In the case of road transport fuels, their consumption is projected to decrease by 10-20% by 2030 according to estimates by the European Commission and our models. In case taxation rates do not change, a gradual decline in public revenue can be expected, which can range between €40 and €80 million in 2030 and cumulatively by €200-250 million for the period 2022-2030.

At the same time, revenue from taxation of aviation fuel, which will grow linearly in the period 2023-2030, can be expected. The estimated annual revenue ranges between €10 and €100 million and it will cumulatively reach €300 million for the period until 2030. Similarly, a small positive impact from taxation of maritime fuels is projected, as the cumulative revenue is estimated at €50 million for the period 2022-2030.

2.10.3 Broader economic impact

According to the European Commission's impact assessment (European Commission, 2021c), the revised Energy Taxation Directive will have a very low impact on GDP and employment across the EU; this will be limited to 0.5% for the period 2030-2035 as compared to a baseline scenario. Given that no substantial changes on taxation rates are expected in Cyprus, this conclusion is unsurprising. The only exception relates to the tourism sector due to taxation of aviation fuels, as discussed in section 2.7.

3. Overview of estimated impact

Tables 3 and 4 summarise the estimated costs, benefits, revenue and direct and indirect impacts that were presented in the previous sections. Table 5 provides an overview of the potential annual revenue and expenditure evolution regarding the direct fiscal impact of the 'Fit for 55' package, despite the uncertainty since the negotiation of all legislative changes was ongoing by the time of this writing (November 2022). It should be noted that estimates on revenue from the inclusion of various sectors in the emission trading systems (existing and future ETS) should be approached with caution, as a substantial portion of these will have to be earmarked to be used for specific climate and social support actions; hence, they may not be available to national economic authorities for other uses. Moreover, the share of revenue to be distributed to member states or allocated for specific actions in various EU funds is still under negotiation.

TABLE 3

Estimates on the additional direct costs and benefits from the 'Fit for 55' package for Cyprus

	Additional direct cost/benefit up to 2030 compared to current legislation and compared to existing projections of the 2020 National Energy and Climate Plan (for the entire period 2022-2030, in mio Euros'2020)			
	Cost (additional direct expenditures of public & private sector)		**Benefit (additional revenues and reduced expenditures)**	
Compliance with new, more ambitious greenhouse gas emission reduction targets	Cost of purchase of emission allowances by power plants and cement plant, to be passed through to consumers	€1,2-1,6 bn	Public revenues from auctioning of emission allowances for stationary sources	€600-800 mio
	Revenue losses due to auctioning of fewer allowances for stationary emission sources because of lower emission target	€150 mio	Public revenues from auctioning of emission allowances for aviation	€20-40 mio
	Cost of purchase of emission allowances from fuel suppliers in the frame of new ETS for buildings and road transport, to be passed through to consumers	€400-500 mio	Public revenues from auctioning of emission allowances in the frame of new ETS for buildings and road transport	€400-500 mio
	Public expenditures for purchase of allowances by the country due to eventual non-compliance with Effort Sharing Regulation	€20-165 mio	Reduction of compliance cost with ESR due to introduction of new ETS	€35 mio
	Cost of purchase of emission allowances from Cyprus-based aviation and shipping companies, to be passed through to the cost of air and sea fares	?	Public revenues from auctioning of maritime emission allowances - can increase substantially if the amount of auctions allocated to Cyprus increases	€69 mio up to ?
Compliance with new Energy Taxation Directive	Reduced public revenues from fuel taxes due to reduction in their sales	€250 mio	Increased public revenues from introduction of excise tax on aviation fuels and (to a lesser extent) shipping fuels	€350 mio
Compliance with new targets for energy efficiency and renewable energy	If the country's request to maintain some derogations on energy savings targets is not fulfilled, there will be additional compliance cost that cannot be estimated at this stage.			
Total, excluding maritime		**€2,0-2,6 bn**		**€1,4-1,7 bn**

TABLE 4

Estimates on the broader (secondary) costs and benefits from the 'Fit for 55' package for Cyprus

Broader cost/benefit up to 2030 on competitiveness, economic growth and cost of living (for the entire period 2022-2030, in mio Euros'2020)			
Cost		**Benefit**	
Increased electricity cost because of higher ETS allowance prices (impact on competitiveness of all production sectors)	€200-250 mio	Improved trade balance thanks to reduction on fuel import costs because of a) energy savings in buildings and industry, b) electric mobility and c) higher use of renewables.*	€650-900 mio
In case of non-adaptation of the sectors, gradual decline in tourist income by 15-20%, with impact on GDP by up to -1,7% and risk for 10.000 jobs.	€350-500 mio	If sustainable mobility investments, which lead to achievement of «Fit for 55» targets, are delayed: up to €2 bn additional costs for purchase of additional vehicles and fuels	€2 bn
Increased production cost and reduced competitiveness of cement plant and bricks & tiles plants if they do not adapt.	?		
Higher shipping transport costs by up to 30% in 2030, leading to 0,5% higher inflation, lower purchasing power of households, and 0,5% negative GDP impact.**	€100-150 mio		
Higher public+private investments of €2-3 bn for the purchase of electric vehicles and energy renovations. They will lead to net benefits over their lifetime because of lower operation costs, but aubtantial public+private capital is required for the initial investments.	€2-3 bn		
Total	**€2,5-4 bn**		**€2,5-3 bn**

Notes: * Based on calculated energy savings up to 2030 from scenarios of our energy models. Cost savings will be even higher over the lifetime of these investments, e.g. up to 2040, and will exceed the initial investments of €2-3 bn mentioned in the left column of this table.

** Preliminary assessment of GDP impact by the Finance Ministry, for a 30% rise in shipping costs. Needs elaboration by Finance Ministry's staff working on growth forecasts.

TABLE 5

Estimates of additional public revenue and expenditure derived from projections on the implementation of the 'Fit for 55' package for Cyprus

Preliminary assessment of the fiscal impact of "Fit for 55"										
Additional public revenues/expenditures compared to current legislation and compared to existing projections of the 2020 National Energy and Climate Plan										
Assuming that the additional public investments required will come from re-allocation of existing budget ceilings and not from additional public expenditures										
(mio Euros'2020)	2022	2023	2024	2025	2026	2027	2028	2029	2030	**Total**
Energy Taxation		6	7	8	9	15	21	27	28	**121**
Automotive fuels			*-5*	*-15*	*-25*	*-30*	*-40*	*-50*	*-60*	***-225***
Aviation fuels		*5*	*10*	*20*	*30*	*40*	*55*	*70*	*80*	***310***
Maritime fuels		*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	***36***
Purchase of additional Emission Allowances from the Republic of Cyprus if the targets of the revised Effort Sharing Regulation are not achieved		0	0	0	0	-6	-17	-30	-41	**-93**
ETS auction revenues		3	3	4	85	82	74	66	58	**373**
Existing ETS sectors		*0*	*-3*	*-5*	*-12*	*-19*	*-27*	*-34*	*-41*	***-141***
Full inclusion of aviation in ETS						*5*	*5*	*5*	*5*	***20***
Inclusion of maritime emissions in ETS		*3*	*6*	*9*	*12*	*11*	*10*	*10*	*9*	***69***
New ETS for heating and transport fuels					*85*	*85*	*85*	*85*	*85*	***425***
Total		9	10	12	94	91	77	63	45	**401**
Total without ETS		6	7	8	9	9	4	-3	-13	**28**

4. Investment requirements

The achievement of the greenhouse gas emission reduction targets envisioned by the 'Fit for 55' package requires additional public investments, as well as grants and other financial tools to support private investments. Based on data from both the national budget and the various EU Funds, on earlier assessments provided by the authors to the Cypriot Ministry of Finance, and on the model-based analysis that was outlined in the previous sections of this paper, it is possible to assess whether the already planned investments are sufficient for the achievement of the national energy and climate targets. Given the shortages in financial and human capital, a realistic first approach under current conditions is as follows:

- In the energy sector, the primary focus should be given on the successful implementation of already scheduled projects (i.e., energy efficiency upgrades, modernisation of the transmission and distribution grid network, electricity storage infrastructure) and the corresponding absorption of secured EU funds.
- In the road transport sector, considerable investments of up to €3 billion are required, of which most relate to private investments. However, since the learning rates for electric vehicles are high and their cost might decline in the future, it is quite plausible that for certain technologies, which seem expensive and currently need public support, purchases may be conducted without any support in a few years. Additionally, besides the existing support schemes and infrastructure projects in this sector, the development of a regulatory environment that maximises the benefits of electrified transport is crucial.

Moreover, as it is necessary for all medium-term budgets of national Ministries to be aligned with the European Green Deal priorities, it is recommended to consider increasing public investments in the following sectors:

- Energy efficiency: in theory, further action is needed at a faster pace. Public and private investments of €800 million are already planned, but it should be investigated whether more projects can be pursued by 2030, so that additional funds can be committed.
- Renewable Energy Sources: A timely modernisation of the grid network is necessary, so that all available RES can be fully integrated and exploited. The Transmission and Distribution System Operators (TSO and DSO) are currently experiencing severe complications in the deployment of further RES capacity. By "deployment" we do not simply refer to securing a connection to the grid, but also a full exploitation of the generation output through appropriate grid stability infrastructure and storage technologies.
- Road Transport – since this sector is crucial, it should be tackled on two fronts by:
  - Development of infrastructure to support electrification, additional to what is already included in the Recovery and Resilience Plan.
  - Increasing investments for sustainable mobility (public transport, bicycle lanes, infrastructure upgrades), which is necessary for the achievement of the 2030 targets and the legally binding net-zero emission target for 2050.
- Maritime shipping: infrastructure in ports to supply electricity to ships should be promoted.

5. Conclusions and policy recommendations

The 'Fit for 55' energy and climate policy package, which aims at achieving the objectives of the European Green Deal, is a very ambitious plan of the EU in line with the scientific consensus that climate change mitigation actions must be implemented at an unprecedented scale and speed in order to avoid very serious climate change. It is probably the first time in EU's history that so many legislative changes are happening simultaneously, and this is inevitably associated with large uncertainties on their economic impact. This paper has attempted to provide an assessment of some of the economic impacts of this package in the economy of Cyprus, based on a detailed review of the 'Fit for 55' provisions and a close collaboration with governmental authorities that have been participating in the negotiations of the package. Our assessment has been based on a combination of simulations with energy and economic models and simpler calculations. These results have been used up to summer 2022 by the Cypriot government to formulate negotiating positions in different European Council configurations. A re-assessment of these impacts is due for the first half of 2023, after several of the 'Fit for 55' legislation is scheduled to have reached final agreement by all EU bodies. In summary, our main findings are the following:

- The proposed new Emissions Trading System for heating and transport fuels could modestly increase the cost of living of Cypriot households.
- Because of increased environmental requirements from the aviation sector, air transport activity may gradually decline by about 15% up to 2030; this can lead to a 1.7% decline in GDP and a 2.6% decrease in employment (or 10,000 jobs) in hotels, restaurants, and retail trade by 2030. However, these effects may be considerably milder if energy efficiency improvements and the use of cleaner fuels in aviation are achieved thanks to technological progress.
- Consumer prices will increase due to more stringent environmental policies in the shipping sector that will lead to higher costs of imports and exports of goods; the basic assessment does not point to serious price increases, but many uncertainties surround these estimates, so that this issue should be closely monitored.
- No serious distributional issues are expected from excise tax changes in heating and transport fuels if the Energy Tax Directive is revised; however, the broader green transition policies can have serious fiscal implications leading to a decline in public revenues from fuel taxation.
- As regards employment, the gradual electrification of transport that will result from the 'Fit for 55' package can affect about 12,000 jobs in economic sectors related to vehicle and fuel sales and vehicle maintenance, while cost increases in energy-intensive industries could affect 17,000 direct and 18,000 indirect jobs. This by no means implies that so many jobs are in danger, but authorities and societal stakeholders must keep an eye on these sectors to avoid adverse consequences. The green energy transition can lead to a shift in employment patterns of some low- and middle-skilled workers, reducing employment in some sectors and increasing the number of jobs in others such as renewable energy and new transport infrastructure. Employees of affected sectors may need to be re-skilled to adapt to the changing needs of the labour market. It is therefore essential for national authorities (Ministries of Finance, Labour, Education, and the Human Resource Development Authority) to take coordinated action for re-skilling workers who

may become redundant as well as providing the necessary green skills to students in the secondary and tertiary technical education.

Overall, the European Green Deal can enable the transition to low-emission economies that are much less reliant on energy imports and can ensure a good quality of life for citizens. However, until these benefits are realised in the medium term, strong investments are needed both from the public and the private sector, at a time when labour shortages and supply chain disruptions create barriers to the fast implementation of green investments. Despite these challenges, it is important for European and national policies not to be distracted from the strategic goal of greening the economy, because it is widely confirmed that the costs of this transition are clearly lower than the costs of climate change induced damages.

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