CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

Transport measures for Article 7 implementation in Greece

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National energy efficiency obligation scheme

Energy savings target in the period 2014-2020 under Article 7(1) and (2) of Directive)

Year	Annual energy savings - ktoe							Total
2014	100 2							100 2
2015	100 2	100 2						200 5
2016	100 2	100 2	125 3					325 8
2017	100 2	100 2	125 3	125 3				451 0
2018	100 2	100 2	125 3	125 3	150 3			601 4
2019	100 2	100 2	125 3	125 3	150 3	150 3		751 7
2020	100 2	100 2	125 3	125 3	150 3	150 3	150 3	902 1
Total								3 332.7

Article 7 Energy Saving Target: 902.1 ktoe in 2020

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National energy efficiency obligation scheme

Adoption of appropriate equivalent policy measures to ensure energy savings among final consumers, without setting up an energy efficiency obligation scheme for obligated parties (retail energy sales companies and energy distributors).

Target group **-** final energy consumption sectors:

- residential
- tertiary
- ***transport sector***

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List of measures in transport sector

S/N	Policy measures	Number of interventions	Implementation period of the measure	Lifetime of the measure	Calculated final energy savings (ktoe)	Calculation approach
1	Replacing old public and private light trucks	10 000 vehicles	2015-2020	2014-2024+	11.3	Projected savings
2	Replacing old private passenger vehicles	50 000 vehicles	2011-2015	2014-2024+	22.7	Projected savings
3	Promotion of CNG and LPG-powered private passenger vehicles	35 000 vehicles	2015-2020	2014-2024+	10.4	Projected savings
4	Thessaloniki Metro development		2017-2020	2017-2024+	21.4	Projected savings
5	Extension of Athens Metro		2013-2020	2013-2024+	29.3	Projected savings

Total Savings: 95.1 ktoe

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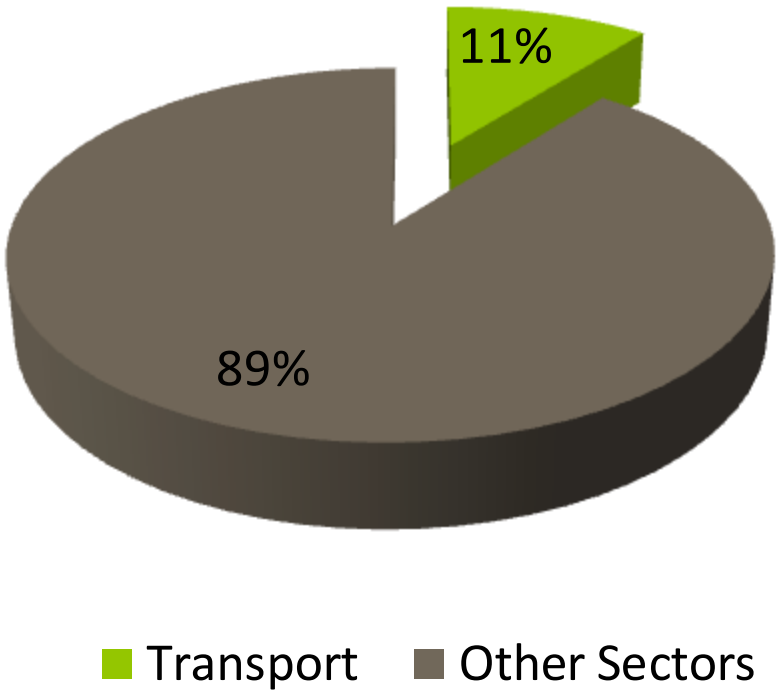
National energy efficiency obligation scheme

Energy savings target in the period 2014-2020 under Article 7(1) and (2) of Directive)



1. Replacing old public and private light trucks

Participating parties	The Ministry of Finance, the Ministry of Infrastructure, Transport and Networks, the Ministry of Environment, Energy and Climate Change, the Ministry of Administrative Reform and e-Governance, public bodies and the private sector.
Targeted sectors	The whole public and private sector
Level of energy saving target	The total new energy savings in the period 2014-2020 are estimated to be 11.3 ktoe
Period of implementation	The implementation period of the measure will be from 2015 to 2020. The lifetime of the measure is more than ten years.
Eligible categories of measures	Replacing old public and private light trucks which meet EURO III standards with new vehicles which meet EURO V standards.

2. Replacing old private passenger vehicles

Participating parties	The Ministry of Finance, the Ministry of Infrastructure, Transport and Networks, the Ministry of Environment, Energy and Climate Change, and owners of passenger vehicles
Targeted sectors	Private sector (private vehicle owners)
Level of energy saving target	The total new energy savings in the period 2011-2015 are estimated to be 22.7 ktoe
Period of implementation	The implementation period of the measure will be from 2011 to 2015. The lifetime of the measure is more than ten years.
Eligible categories of measures	Replacing old private passenger vehicles which meet EURO III standards with new vehicles which meet EURO V standards.

3. Promotion of CNG and LPG private passenger vehicles

Participating parties	The Ministry of Finance, the Ministry of Infrastructure, Transport and Networks, the Ministry of Environment, Energy and Climate Change, and owners of passenger vehicles
Targeted sectors	Private sector (private vehicle owners)
Level of energy saving target	The total new energy savings in the period 2014-2020 are estimated to be 10.4 ktoe
Period of implementation	The implementation period of the measure will be from 2015 to 2020. The lifetime of the measure is more than ten years.
Eligible categories of measures	Changing the fuel used by existing private passenger vehicles from petrol to liquefied petroleum gas (LPG) or natural gas (CNG)

4. Thessaloniki Metro development

Participating parties	The Ministry of Finance, the Ministry of Infrastructure, Transport and Networks, Athens Metro S.A. and passengers in Thessaloniki
Targeted sectors	Passengers in Thessaloniki
Level of energy saving target	The total new energy savings in the period 2017-2020 are estimated to be 21.4 ktoe
Period of implementation	The implementation period of the measure will be from 2017 to 2020. The lifetime of the measure is more than ten years.
Eligible categories of measures	Development of the underground railway (metro), to serve passengers and thereby replace private means of transport

5. Extension of Athens Metro

Participating parties	The Ministry of Finance, the Ministry of Infrastructure, Transport and Networks, Athens Metro S.A. and passengers in Athens
Targeted sectors	Passengers in Athens
Level of	The total new energy savings
energy saving target	in the period 2017-2020 are estimated to be 29.3 ktoe
Period of implementation	The implementation period of the measure will be from 2013 to 2020. The lifetime of the measure is more than ten years.
Eligible categories of measures	Development of the underground railway (metro), to serve passengers and thereby replace private means of transport

Methods for energy saving calculation

Development of methods:

- Centre for Renewable Energy Sources
- Ministry of Environment and Energy

Decision of the selected methods:

- Availability of data
- Reliability of data
- Existing studies that confirm the reliability of the results

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Data sources

- ***EU Transport in figures, Statistical Pocketbook 2013, European Commission***
  - ✓ transport loads (tkm)
  - ✓ passenger traffic by mode (pkm)
  - ✓ Stock of vehicles

- ***Association of Motor Vehicle Importers Representatives – AMVIR***
  - ✓ Sales of new vehicles by type of vehicle

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Data sources

- ***Country Energy Balance***
  - ✓ Energy consumption of transport sector by mode (road, rail, etc,) and by fuel (diesel, NG, LPG, etc.)
- ***CRES studies***
  - ✓ Specific consumption by type of vehicle and fuel
  - ✓ Average yearly distance covered by vehicle type
- ***ODYSSEE-MURE***
- ***ATHENS METRO S.A. study***
- ***Market data***
  - ✓ Specific consumption of new vehicles

Case Study: Thessaloniki Metro development

The calculation methodology is based on a study by the company ATHENS METRO S.A.

The calculation methodology to be used for energy savings achieved will be projected energy savings, based on facts on:

- passenger traffic,
- the replaced vehicle-kilometres,
- Specific energy consumption of private passenger vehicles

Case Study: Thessaloniki Metro development

Study estimations:

- passengers served daily by the 13 main project stations, which is the main project (***247,000 passengers***)
- extension of METRO line to Kalamaria with 5 stations (***63,000 passengers***)

Consequently, the total daily passenger traffic in the stations will be ***310,000 passengers***.

Case Study: Thessaloniki Metro development

Calculation of energy savings based on:

- specific consumption of vehicles
- average kilometres covered by vehicles replaced by the use of the underground railway network.

Case Study: Thessaloniki Metro development

According to existing data:

- an average passenger vehicle's specific consumption is 9 lt/100km
- the daily average distance covered per vehicle per passenger is 15.2 km.
- the kilometres covered by the vehicle are changed by a rate of
  - ✓ 1.2 due to finding a parking space (increasing),
  - ✓ 1.5 because of the ratio of passenger to private vehicle, i.e. 1 vehicle represents 1.5 passengers (decreasing)
- 22% of the metro passengers use otherwise a private vehicle.

Case Study: Thessaloniki Metro development

Formula for energy saving calculation:

$$ESo=SCp*D*C1/C2$$

where:

ESo: Energy savings

SCp: Specific energy consumption of vehicles

D: Average distance covered daily

C1: coefficient of increase in distance due to finding a parking space

C2: correlation coefficient between passengers and private vehicles

Case Study: Thessaloniki Metro development

Formula for energy saving calculation:

$$ESo=SCp*D*C1/C2$$

ESo = 15.2 km/vehicle *(9 lt/ 100 km)*1.2 / 1.5 private vehicle passenger/vehicle = **1.09 lt/ private vehicle passenger**

Eso = 0.72 kg/lt * 1.09 lt/ private vehicle passenger = 0.78 kg/ private vehicle passenger = 0.78kg/ private vehicle passenger * 12.222 kWh/kg = **9.53 kWh/ private vehicle passenger**

OR

0.00000082 ktoe/ private vehicle passenger

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Case Study: Thessaloniki Metro development

Assuming that 22% of the metro passengers used private vehicles before, the annual energy savings are:

ES_{yr} = 310,000 passengers/ day * 22% * 0.00000082 ktoe/ private vehicle passenger * 365 days/ year

ES_{yr} = 21.4 ktoe

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Thank you for your attention!!

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