

The Strait of Corfu

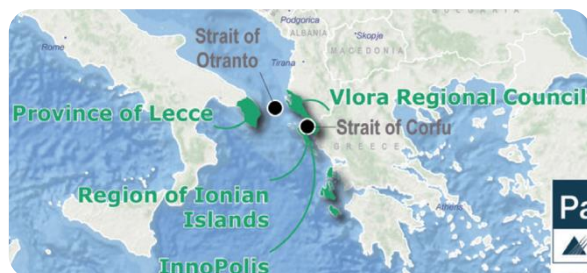


PASSAGE project partnership

Region of Ionian Islands (EL)
InnoPolis: Centre for innovation and culture (EL)
Regional Council of Vlorë (AL)

Partner of the European Straits Initiative (ESI)

<http://www.europeanstraits.eu/Partners/Strait-of-Corfu>



IDENTITY OF THE STRAIT

The strait in a nutshell

The Strait of Corfu is located between the Albanian shores and the Greek island of Corfu. It is at the junction between the Adriatic Sea to the north and the Ionian Sea to the south

The strait specificities

- Recent development of the port of Igoumenitsa
- Importance of the other small-scale ports
- Potential for LNG, short sea shipping to be assessed

Main findings

- 358 ktCO_{2e} were emitted within the Strait of Corfu's boundary in 2016, equivalent to the average emissions of about 52 700 inhabitants in Europe¹, which is 0.4% of Greece emissions and 4% of Albanian emissions in 2014².
- The local maritime cruise represents the main emitter of the strait, with 60% of the emissions.
- The road transport linked to the goods and passengers passing by the strait's ports (Corfu, Saranda and Igoumenitsa) is also an important emitter of the strait.
- The residential and commercial activities of the regions represent a large part of the emissions of the strait.

Decarbonization paths

- Greece and Albania have ambitious targets of reduction of GHG emissions implemented in national strategies:
 - Reduction of emissions by 60% to 70% by 2050 compared to 2005
 - Reduction of emissions by 11.5% by 2030 compared to the baseline scenario in Albania
- The decarbonization path, based on the national targets applied to the strait's emissions, results in a reduction of the GHG emissions by 13% by 2030 compared to 2016

¹ Considering 6.8 tCO_{2e}/capita. Source: Service of Observation and Statistics in France, based on data by EDGAR, World Bank, 2015

² Considering emissions of 84 MtCO_{2e} in Greece and 9 MtCO_{2e} in Albania in 2014. Source: CAIT Climate Data Explorer, World Resources Institute

THE ORGANIZATIONAL PERIMETER

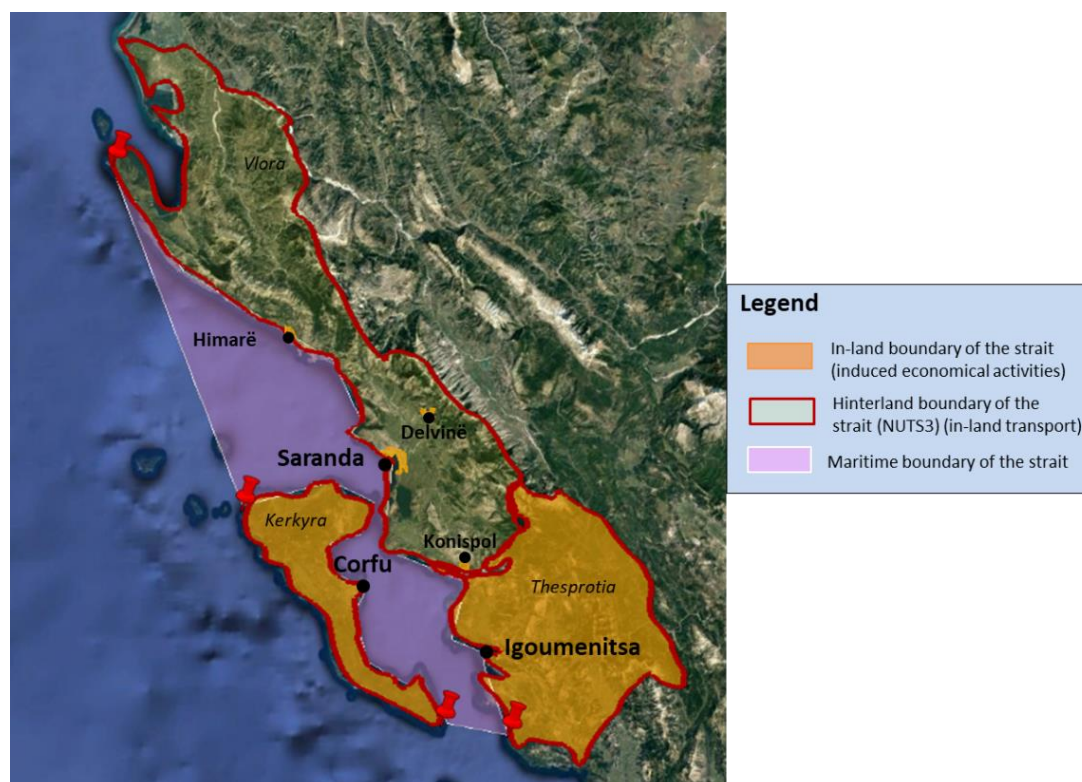
Region of Ionian Islands, Innopolis centre and Regional Council of Vlorë are the PASSAGE administrative authorities. The table below presents the main respective features of their respective regions.

<i>The Strait of Corfu</i>	GREECE	ALBANIA
The PASSAGE administrative authorities	Region of Ionian Islands	Regional Council of Vlorë
Inhabitants	207 855	183 105 inhabitants
Area (km ²)	2 306	2 706
Density (inhab./km ²)	90	138
Number of district authorities	Corfu Zakynthos Kefalonia, Lefkada and Ithaca	Districts of Vlorë, Saranda, Delvine. 7 municipalities.
Coastline (km)		244
Main city and Inhabitants (urban area)	Corfu Igoumenitsa	Vlorë Saranda

The boundaries of the strait were determined as following:

- The maritime boundary is set according to the boundaries of the NUTS 3³ region (Kerkyra and Thesprotia regions in Greece and Vlorë region in Albania);
- The Greek border boundary is the Kerkyra and Thesprotia regions (NUTS 3);
- The Albanian border boundary is Saranda, Konispol, Delvinë and Himarë cities.

The following map shows the boundaries of the strait considered here:



Geographical boundary of the strait of the Strait of Corfu (Source: I Care & Consult)

³ Nomenclature of territorial units for statistics (hierarchical system for dividing up the economic territory of the EU).

THE FUNCTIONAL & OPERATIONAL PERIMETER

Within the strait area, different activities take place and might generate significant GHG emissions, that are not necessarily under the control of the PASSAGE authorities. The perimeter is extended to include the port of Igoumenitsa, due to its significant industrial and freight activity. The section below aims to list the main activities within the considered perimeter.



PORTS

Although the **port of Igoumenitsa** is not part of the PASSAGE administrative perimeter, it is relevant to include it into the operational perimeter. Indeed, the new Port of Igoumenitsa is one of the biggest Ro-Ro ports of international transport in Greece and the Eastern Mediterranean. However, not many information was provided by the Port of Igoumenitsa, which means that the emissions are not estimated in their entirety.

Igoumenitsa changed overnight with the opening of Egnatia Odos highway which now connects Turkey with the Adriatic. It is no longer a small provincial town of a few thousand inhabitants close to the Albanian border.

The Greek Port of Igoumenitsa is a freshly discovered destination (2.5 million passengers consisting of both cruise and ferry) that is on the port of calls list for 6 cruise ship companies, namely Costa Crociere, Holland America Line, Oceania Cruises, Louis Cruises, Saga Cruise and Silversea.

The Port of Corfu is mainly a passenger port. In 2011, the port accepted the visit of 453 cruise ships, carrying 594.000 passengers, of which over 60% disembarked in order to visit the island. The total number of vehicle movements exceeded 400.000 and passengers over 2.000.000 arriving from mainland Greece and Italy.

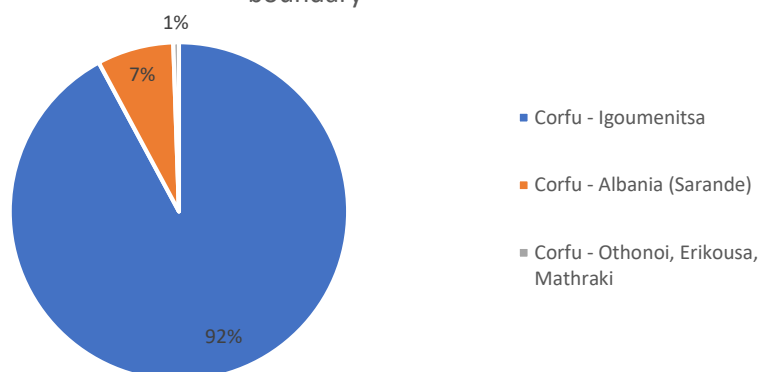


MARITIME TRAFFIC

As suggested by the literature review, the sea-based activity must be the main GHG source of emissions within a strait. The key figures of the **main maritime traffic** occurring in the Corfu and Otranto straits are reported below:

- **The local maritime traffic** concerns the trips, by ferries, between Corfu and Igoumenitsa, Corfu and Sarande and Corfu and Othonoi, Erikousa and Mathraki. This traffic represents almost 15 400 trips in 2016, mainly in the Corfu-Igoumenitsa line, according to the Port of Corfu. About 1.6 million passengers were transported across the strait.

Number of passenger on the ferry lines within the strait's boundary



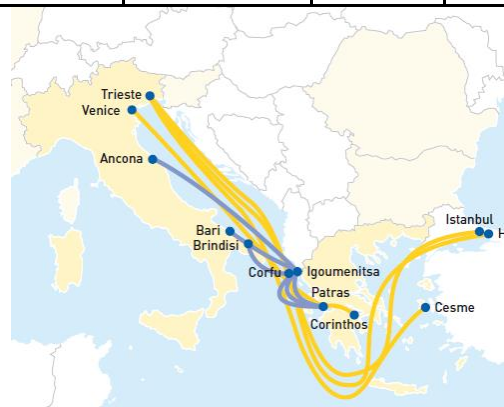
Repartition of passengers on the ferry lines of the local maritime traffic (Source: I Care & Consult based on data provided by the Port of Corfu)

- **The maritime traffic with calls at the strait's ports** (Corfu, Igoumenitsa and Saranda) concerns all the ships arriving at and leaving from the strait's ports, except for the ferries that are included in the local maritime transport. The Port Call Statistics of each port contains information about the type of vessel

calling to the port, as well as the port of origin and destination, the weight carried and other information about the size of the ship.

The Port of Igoumenitsa handled more than 247 000 trucks and 2.4 million passengers in 2016 (including the passengers travelling between Corfu and Igoumenitsa, representing 1.5 million passengers). The Ancona-Igoumenitsa-Patras route is the main link between continental Europe and the South-East Med (in 2011: 1,7 Million of Tons (86,5% of Ancona freight traffic on Ro-Ro), 103.992 Trucks, 10.460 Trailers). The average characteristics of vessels in the South-Eastern European Motorways of the Sea Corridor are presented below (Source: Fundación Valencia Port (2014) based on the MED Short-Sea Lines database).

Route	Traffic	No Vessel	GT	Year built	Service speed
ANCONA - IGOUMENITSA - PATRAS - IGOUMENITSA	RO-PAX	3	154 739	2008	22,5
BRINDISI - CORFU - IGOUMENITSA - PATRAS	RO-PAX	2	51,979	2003	21.2
PATRAS - IGOUMENITSA - BARI - IGOUMENITSA	RO-PAX	2	51,275	2008	21.6



Major routes (source Fundación Valencia port, 2014)

The Port of Corfu is mainly a passenger ports, more than 1.7 passengers passed through the port in 2016, representing more than 16 000 calls (mainly on the Corfu-Igoumenitsa line).

The Port of Saranda handled 8 386 tonnes of freight in 2016 and 251 311 passengers. 8 general cargoes and 38 cruise ships called to the Port of Saranda in 2016.

- **The transit maritime cruise** concerns the vessels passing through the Strait of Corfu without any calls to the strait's ports. This doesn't represent a lot of vessels and was considered negligible in this study.



IN-LAND TRAFFIC

In this section, the traffic related to the ports is considered, as it induces the majority of freight and passengers induced by the strait.

In Igoumenitsa, the planned creation of a freight center is estimated to greatly strengthen the commercial traffic and turn the city of Igoumenitsa into an international logistics centre.

All the goods are transported to their next destination by road in Greece and in Albania as no railways serve the strait. A distance of 56 km in Greece and 248 km in Albania was considered to estimate the GHG emissions from road transportation. Concerning the passengers, a distance of about 24 km in Corfu, 470 km in Igoumenitsa and 248 km in Saranda was considered.

The following table presents the quantity of goods that were handled in the ports and transported in the hinterland:

Port	Quantity of goods	Number of passengers
Corfu	88 333 trucks	1 782 581
Igoumenitsa	247 003 trucks	2 426 880
Saranda	8 386 tonnes	251 311



INDUSTRIES

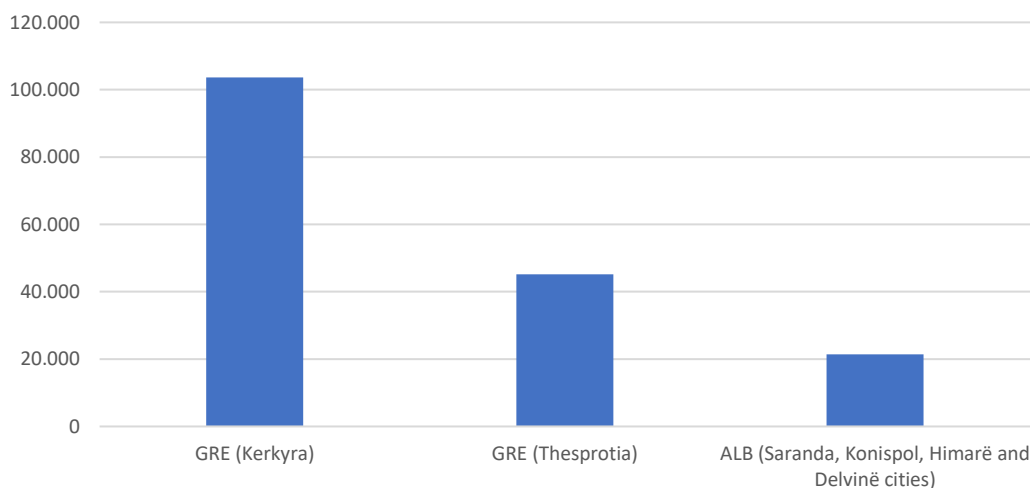
There is little specific industry linked to the strait. Only one industry was identified in Igoumenitsa, *Yioi Nikoy A.E.B.E.*, a manufacture of ceramics.



CITIES

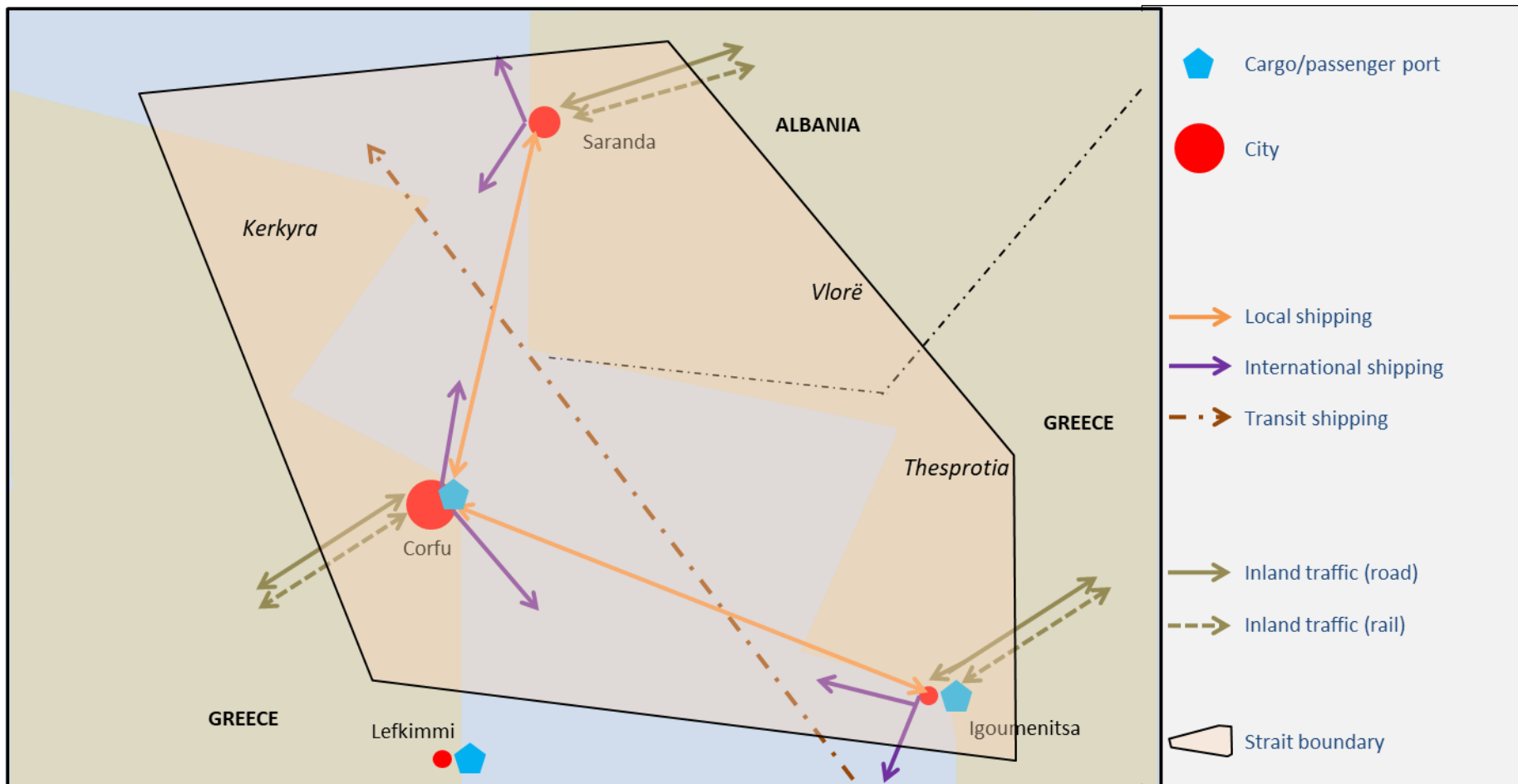
The regions of Kerkyra (Greece) and Thesprotia (Greece) and the cities of Saranda, Konispol, Himarë and Delvinë (Albania) also present emissions due to the energy consumption in the residential and commercial sectors. Those emissions are estimated based on the population of the strait's main regions and cities and the national GHG inventory.

Population of the strait's regions



Population of the main regions of the Strait of Corfu (Source: I Care & Consult from data by Eurostat – NUTS 3)

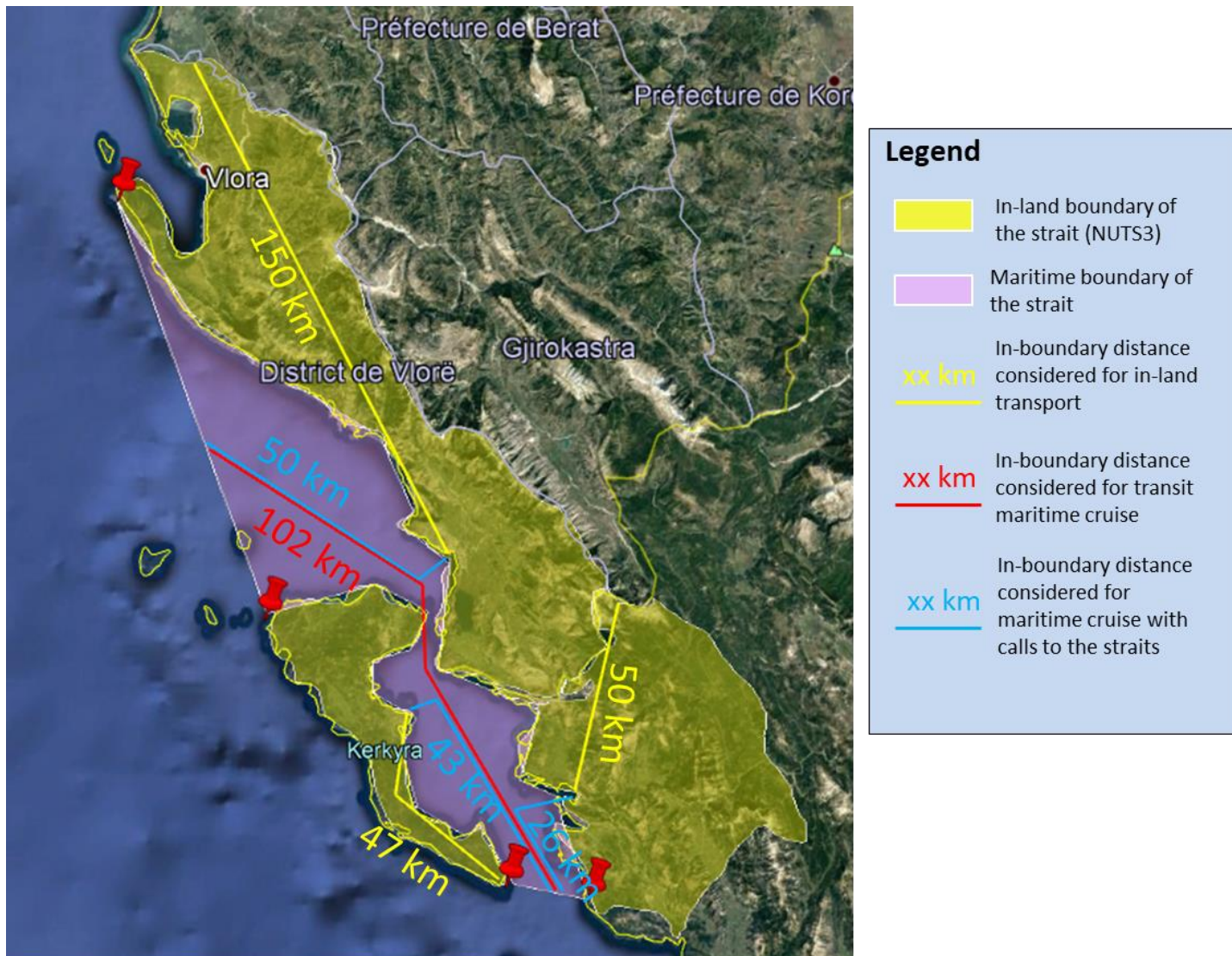
SCHEMATIC “CHOREME” REPRESENTATION OF THE STRAIT



Schematic “choreme” representation of the Strait of Corfu (Source: I Care & Consult)

GEOGRAPHIC REPRESENTATION OF THE STRAIT

This map presents the main distances considered within the boundary based on the geographic boundary of the strait, as defined in the methodological note. The NUTS3 regions were considered to delimit the maritime boundary of the strait.



Representation of the geographical boundary of the strait (Source: I Care & Consult)

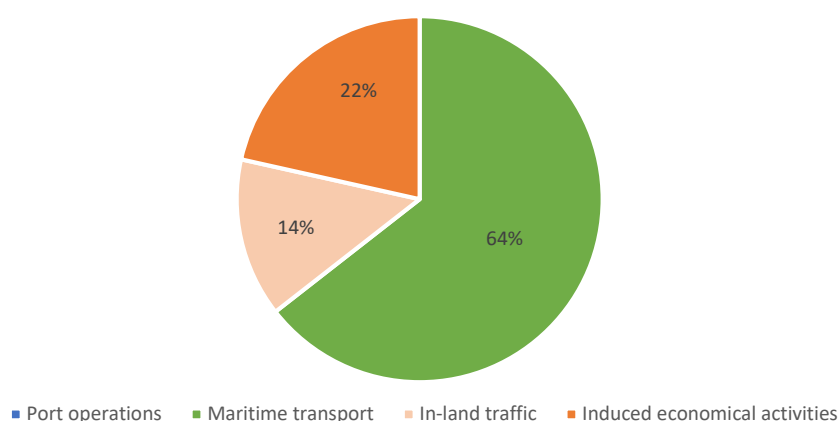
THE MAIN GHG EMISSIONS SOURCES

This section aims to gather the main GHG emissions sources within the strait perimeter.





The latter are calculated thanks to the data collected from existing studies carried out by the PASSAGE administrative authorities, the local stakeholders, the literature reviews, and processed by I Care & Consult.

The Strait of Corfu emitted **358 ktCO₂e** in 2016. The main source of emission is the maritime transport with 64% of the total emissions, followed by the induced economical activities representing 22% of the total emissions and the in-land transport representing 14%. The emissions are mainly impacted by the emissions from the local maritime cruise between Corfu and Igoumenitsa, representing 52% of the emissions within the strait's boundary. It is important to note that some emission sources were not estimated based on a lack of data (such as the emissions from the ports operations as well as the emissions from the maritime transport with calls to the Port of Igoumenitsa).

Emissions within the Strait of Corfu's boundary



Repartition of emissions from the Strait of Corfu (Source: I Care & Consult)

Emission source (within the strait's boundary) <i>in tCO₂e</i>		Albania	Cross-border	Greece
Port operations 	Energy consumption	NC		NC
	Ships in port areas	NC		NC
Maritime transport 	Local maritime cruise		214 443	
	Maritime cruise with calls to the strait's ports		16 435	
	Transit maritime cruise		0	
In-land traffic 	Road transport	4 888		45 420
	Railway transport	0		0
Induced economical activities 	Industries	0		1 556
	Cities	9 302		66 167
TOTAL		14 189	230 878	113 143

The emissions due to the strait's activity but emitted outside of the boundary (due to in-land and maritime transport outside of the boundary) were also estimated. Considering these indirect emissions, the strait is responsible for the emissions of 520 ktCO₂e, from which 69% are emitted within the boundary. It is important to note that some of the indirect emission sources could not be estimated due to lack of information (such as the out-boundary maritime transport from cruises calling to the Ports of Corfu and Sarandë).



PORTS

These emissions concern the emissions from the energy consumption of the ports and from the ships in port areas (manoeuvring and at berth, consuming energy for the main and auxiliary engines). These emissions are occurring within the strait's boundary. Due to a lack of information, they were not estimated in this study.



MARITIME TRAFFIC

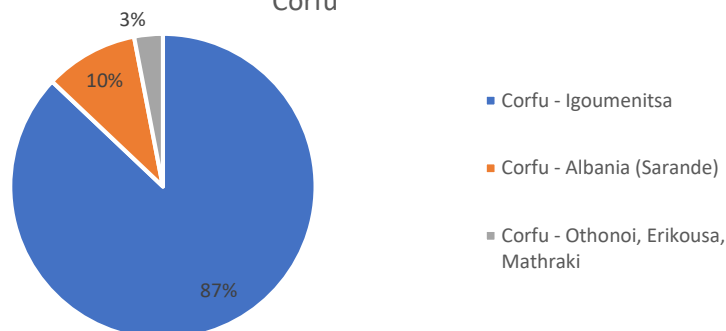
These emissions concern the emissions from the maritime transport within the strait's boundary. They represent 64% of the total emissions.

- **Local maritime cruise**

This source of emissions concerns the ferries navigating between Corfu and Igoumenitsa, Saranda and the Othonoi, Erikousa and Mathraki islands and occurs only within the strait's boundary. It represents **214 ktCO₂e**, 93% of the emissions from maritime transport and more than 60% of the total emissions.

In 2016, more than 1.6 million passengers travelled between the ports of the strait, mainly between Corfu and Igoumenitsa (more than 1.5 million passengers and 13 367 trips).

Emissions from the local maritime cruise in the Strait of Corfu



Repartition of emissions from local maritime transport (Source: I Care & Consult, based on data provided by the Port of Corfu)

- **Maritime cruise with ships calling at the strait's ports**

This source of emissions concerns all the ships calling at each of the strait's ports (Igoumenitsa, Corfu and Saranda) travelling to or from a port outside of the strait. It represents **16.4 ktCO₂e**, 7% of the emissions from maritime transport. This only includes the part of the trip that is realized within the strait's boundary. It is important to note that, due to a lack of information on the number of calls and origin/destination of the vessels in the port of Igoumenitsa, the emissions could not be estimated. This emission source is then likely to be underestimated.

Most of the emissions come from the Port of Corfu (826 vessels calling at the port). Most of the emissions from the ships calling at the Port of Corfu are from the cruise ships, as well as the ferries. The main emissions from the Port of Saranda (46 vessels calling at the port) come from the general cargo ships and the cruise ships.

- **Transit maritime cruise**

The transit maritime cruise is considered to be negligible.



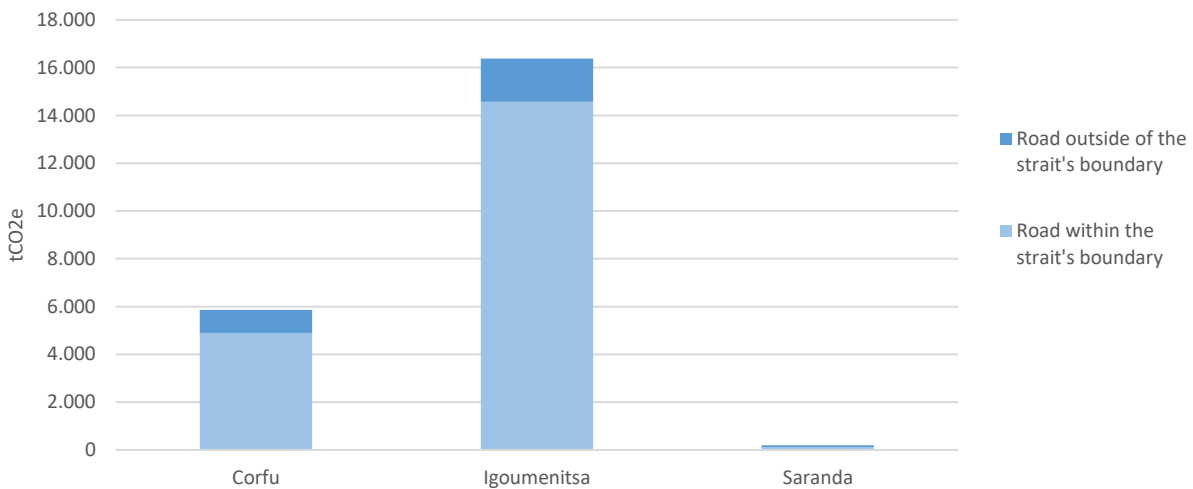
IN-LAND TRAFFIC

These emissions concern the emissions from the in-land transport (road and railway transport) within the strait's boundary. They represent 14% of the total emissions.

The road transport is the most important source of in-land traffic emissions and represents about **50.3 ktCO₂e**.

Concerning the freight traffic, the port of Igoumenitsa presents the higher emissions due to high number of trucks handled in the port. The road transport is the most important source of emission and most of the emissions occur within the strait's boundary.

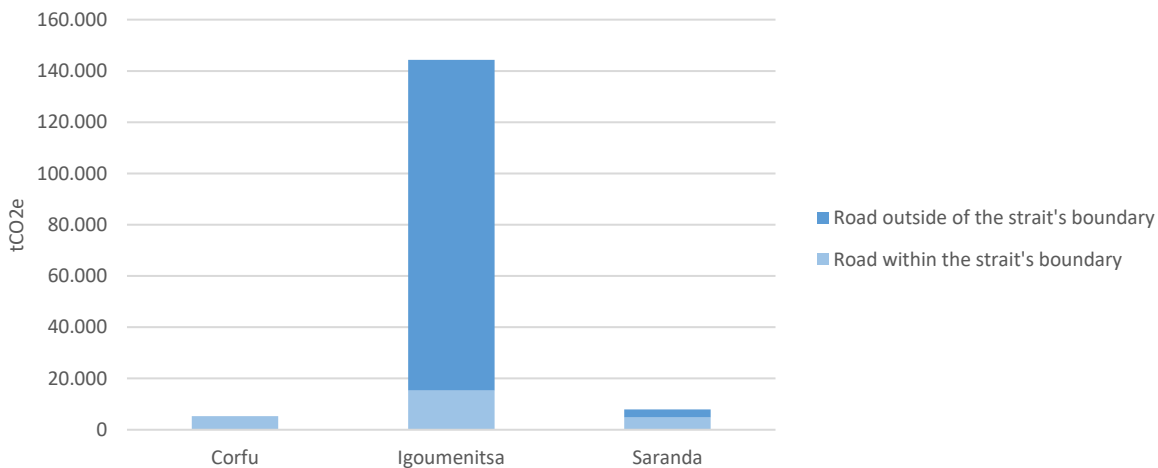
Emissions from in-land traffic of freight in the Strait of Corfu



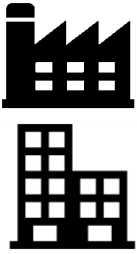
Emissions from in-land traffic of freight in the Strait of Corfu (Source: I Care & Consult)

Concerning the passenger traffic, as the Port of Igoumenitsa welcomed more passengers than the Port of Corfu and Saranda, the emissions are higher. The out-boundary emissions from Corfu are lower than the out-boundary emissions from Saranda, even though the number of passengers is higher, because the distance travelled outside the boundary is lower, Corfu being an island.

Emissions from in-land traffic of passengers in the Strait of Corfu



Emissions from in-land traffic of passengers in the Strait of Corfu (Source: I Care & Consult)



INDUCED ECONOMICAL ACTIVITIES

This source concerns the emissions from the industries and from the cities (residential and commercial emissions from energy consumption) which occur only within the strait's boundary. It represents **77 ktCO₂e**, which represents 22% of the total emissions.

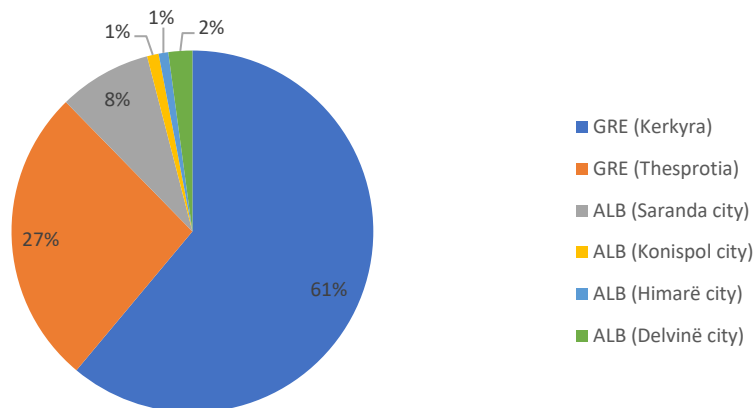
- **Industries**

Only one industry was identified close to the Port of Igoumenitsa. It emitted **1.6 ktCO₂e** in 2016. It represents less than 1% of the emissions within the strait's boundary.

- **Cities**

The emissions from the cities were estimated based on the number of inhabitants in the NUTS 3 region which shore correspond to the strait (Kerkyra, Thesprotia) and the cities on the Albanian coast (Saranda, Konispol, Himarë and Delvinë). They emitted about **75.5 ktCO₂e** in 2016.

Emissions from the induced economical activity (residential and commercial) in the strait's regions



Emissions from the Strait of Corfu's regions and cities (Source: I Care & Consult)

DECARBONIZATION PATHS

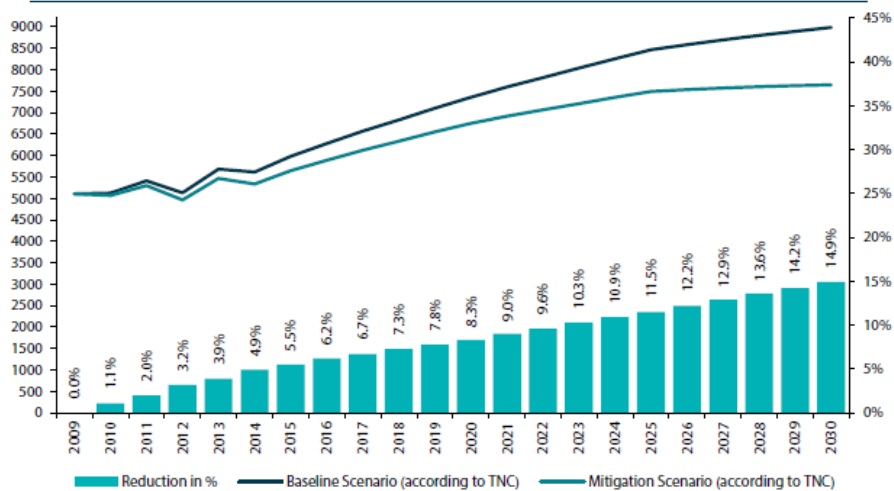
In the last years, the threat of climate change is being addressed globally by the United Nations Framework Convention on Climate Change (UNFCCC). The EU emissions represent about 10% of total global emissions and its Member States have ratified the UNFCCC's Kyoto Protocol in 1997 and the Paris Agreement in 2015, setting emission targets to limit the global emissions and keep global warming below 2°C. The EU aims to decarbonize its energy system and cut its greenhouse gas emissions by 80% to 95% by 2050. To achieve this goal, it has set a binding target of reducing emissions by at least 40% compared to 1990 levels by 2030. Many European countries have adopted national programmes aimed at reducing emissions.



ALBANIA

Albania's emissions represent only 0.017% of global emissions and the net per capita GHG emissions was 2.76 tCO₂e, which is less than a quarter of the emissions from high-income countries. Even though, Albania is a country with a low-carbon economy and a low per capita GHG emissions, the Albanian government adopted the INDC (Intended Nationally Determined Contributions) document in 2015 and submitted it to the UNFCCC Secretariat. Albania is committed to reduce its CO₂ emissions by 11.5% as compared to the baseline scenario for the period 2016 to 2030 and to decouple greenhouse gas emissions from its economic growth. This reduction is equivalent to a CO₂ emissions reduction of 708 ktCO₂e by 2030 and to an increase of the emissions by 47% by 2030 compared to 2009 in the Energy & Transport sector. The long-term goal is to achieve 2 tCO₂e/capita in 2050.

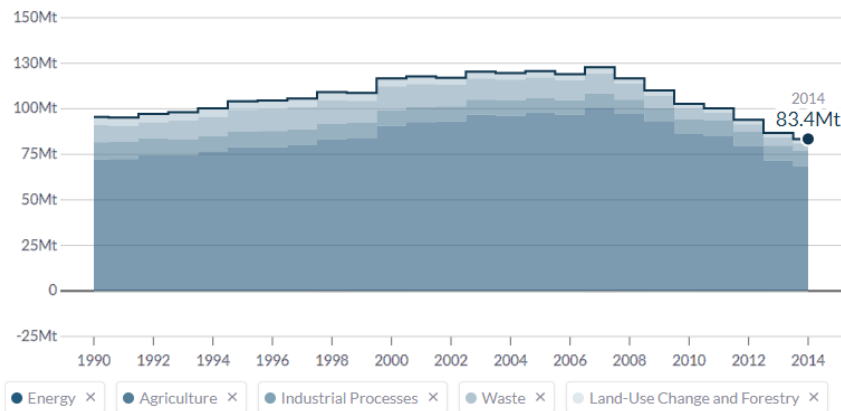
Figure 5.23 Baseline Scenario, Mitigation Scenario and the evaluated reduction potential of GHG emissions (in Gg of CO₂ eq.) from the energy&transport sector



Evolution of Emissions from energy & transport in the Baseline and Mitigation scenarios (Source: Third National Communication of the Republic of Albania on Climate Change)

In the context of the EU Accession process, Albania also transposes and implements parts of the EU legislation, including legislation on climate change. As one of the Contracting Parties of the Energy Community Treaty, and in line with the EU 20-20-20 objectives, Albania had to adopt a binding national target of 38% of renewables in the final total energy consumption of the country in the year 2020 compared to 2009, within the preparation and adoption of a National Renewable Energy Plan, which was adopted in 2016. Moreover, the first endorsed National Energy Efficiency Action Plan also sets a binding target of 9% of energy efficiency in 2018 compared to 2009.

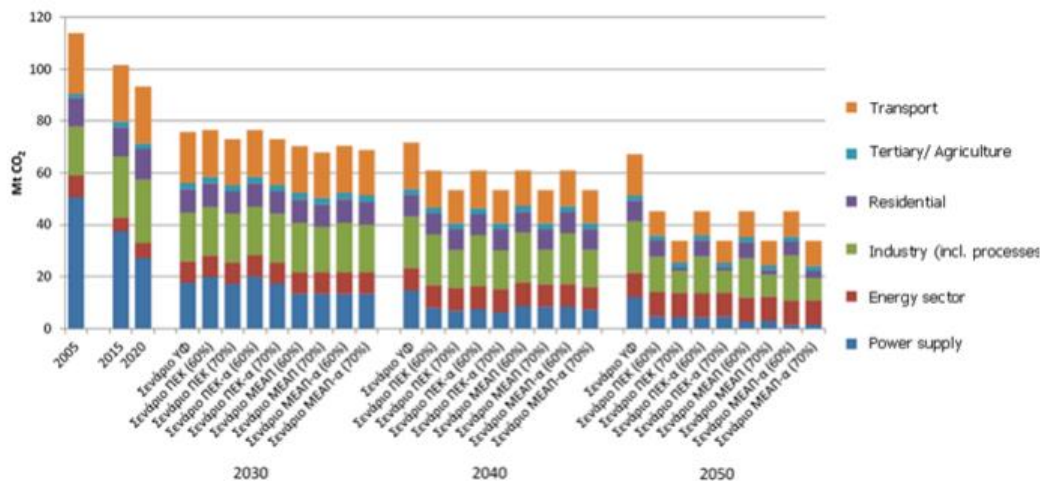
Greece already achieved a 31% emissions reduction between 2005 and 2015.



Greenhouse gas emissions evolution in Greece (Source: ClimateWatch from CAIT data)

According to the European Commission on the third report on the State of the Energy Union in November 2017, Greece is at an initial stage regarding the development of an integrated national energy and climate plan for the years 2021 – 2031. Greece is planning to establish a ministerial steering committee and will be supported by technical working groups with the participation of different authorities and research centres institutions. No targets for energy efficiency and renewable energy beyond 2020 have yet been set.

The Greek 2050 Energy Roadmap was published in 2012 and aims at a reduction of 60 to 70% of CO₂ emissions from the energy sector by 2050 compared to 2005. Considering the “existing policies” scenario, in 2030, a reduction of emissions by 33% compared to 2005 can be observed.



Scenarios

- *ΥΦ*: Existing policies
- *ΠΕΚ*: Least-cost environmental measures
- *ΠΕΚ-α*: A variation of ΠΕΚ with two CCS units in existing lignite power stations of 1.1 GW during 2035–2040
- *ΜΕΑΠ*: Measures for maximising the penetration of renewables (note: 100 percent penetration in power supply)
- *ΜΕΑΠ-α*: As ΜΕΑΠ, but with electricity imports
- Percentages in parentheses refer to the reduction in CO₂ emissions in the relevant year compared to the year 2005

CO₂ emissions in the Greek energy sector in the different scenarios in Greece’s existing 2050 Energy Roadmap (Source: National Energy Plan: Roadmap to 2050, Low-Carbon Policy Paper, National Observatory of Athens, 2014)



INTERNATIONAL SHIPPING SECTOR

Maritime transport emits around 1 000 MtCO₂e annually and is responsible for about 2.5% of global greenhouse gas emissions (3rd IMO GHG Study). Shipping emissions are predicted to increase between 50% and 250% by 2050, depending on future economic and energy developments. According to the 2nd IMO GHG Study, ship's energy consumption and CO₂ emissions could be reduced by up to 75% by applying operational measures and implementing existing technologies. The EU and its Member States have a strong preference for a global approach led by the International Maritime Organization (IMO) to reduce the energy consumption and GHG emissions of the shipping sector⁴. The European Commission's 2011 White Paper on transport suggests that the EU's CO₂ emissions from maritime transport should be cut by at least 40% from 2005 levels by 2050, and if feasible by 50%. However international shipping is not covered by the EU's current emissions reduction targets.

In 2013, a strategy was set out by the Commission to include maritime emissions into the EU's policy for reducing its domestic GHG emissions. The strategy consists in three steps:




- Monitoring, reporting and verification of CO₂ emissions from large ships using EU ports
- Greenhouse gas reduction targets for the maritime transport sector
- Further measures including market-based measures in the medium to long term

From 2018, the MRV companies (ships over 5000 gross tonnes loading/unloading cargo/passengers at EU maritime ports) are to monitor and report their related CO₂ emissions, submit to an accredited MRV shipping verifier a monitoring plan and submit the verified emissions through THETIS MRV (a dedicated European Union Information system currently under development by the European Maritime Safety Agency).





STRAIT OF CORFU

At the strait level, the application of the national objectives (disaggregated by sector) results in a reduction of the emissions **by 13% by 2030**, compared to 2016. The following table presents the main hypothesis made to estimate the decarbonization path of the Strait of Corfu.

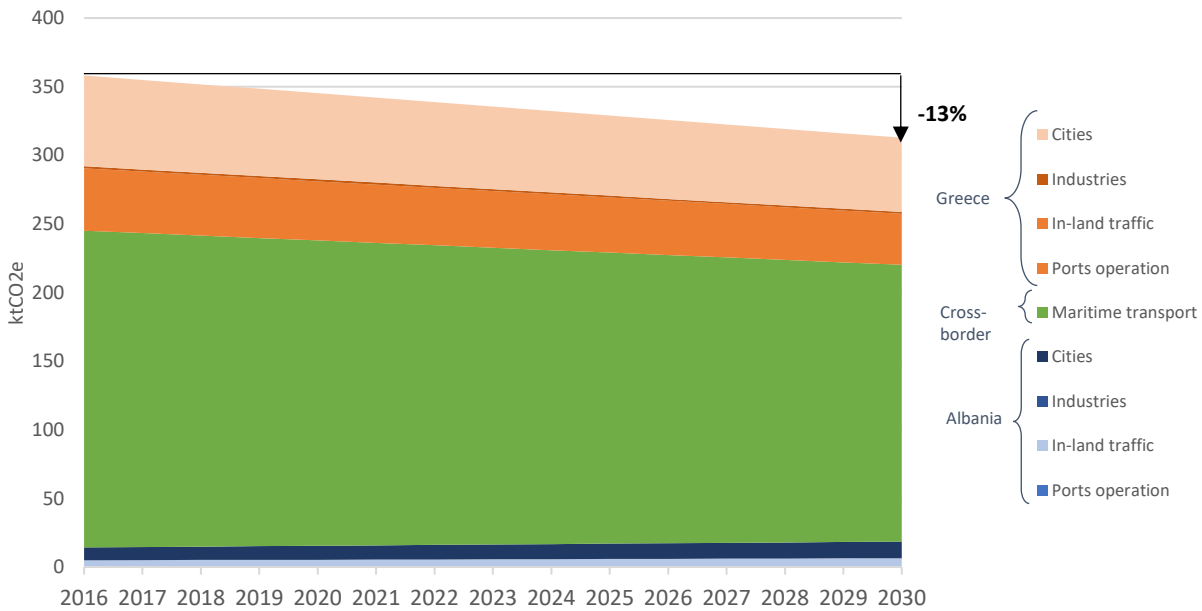
Emission source (within the strait's boundary)	Source of hypothesis	% of reduction	Emissions 2016 (tCO ₂ e)	Emissions 2030 (tCO ₂ e)
Port operations 	European Commission's target on CO ₂ emissions from maritime transport	-40% between 2005 and 2050 (corresponding to -12.3% between 2016 and 2030)	NC	NC
Maritime transport 	European Commission's target on CO ₂ emissions from maritime transport	-40% between 2005 and 2050 (corresponding to -12.3% between 2016 and 2030)	230 878	201 718
In-land traffic 	Greek 2050 Energy Roadmap and Albania's Target in INDC	GR: -33% between 2005 and 2030 (corresponding to -18.2% between 2016 and 2030) AL: +47% between 2009 and 2030 (corresponding to +30.6% between 2016 and 2030)	50 308	43 537

⁴ Reducing emissions from the shipping sector, European Commission https://ec.europa.eu/clima/policies/transport/shipping_en

Industries 	Greek 2050 Energy Roadmap and Albania's Target in INDC	GR: -33% between 2005 and 2030 (corresponding to -18.2% between 2016 and 2030) AL: +47% between 2009 and 2030 (corresponding to +30.6% between 2016 and 2030)	1 556	1 273
Buildings 	Greek 2050 Energy Roadmap and Albania's Target in INDC	GR: -33% between 2005 and 2030 (corresponding to -18.2% between 2016 and 2030) AL: +47% between 2009 and 2030 (corresponding to +30.6% between 2016 and 2030)	75 469	66 273
TOTAL			358 210	312 800

This reduction is due to the actions implemented at all the levels (national, regional, local) and corresponds to the path that is being taken with the actual strategies. The emissions can also be reduced by implementing new actions specifically on the strait's boundary.

Decarbonization path for the Strait of Corfu



Decarbonization path for the Strait of Corfu, based on the national sectorial targets (Source: I Care & Consult)




ACTION PLAN

The Strait of Corfu elaborated a joint action plan with the Strait of Otranto contributing to the reduction of the strait's emissions. The action plan is declined in 5 main actions. These actions are mainly cross-border actions to strengthen the cooperation between the three regions:

- "Local government supporting climate change mitigation": this action consists in supporting the cities of the strait engaging in the Covenant of Mayors and creating a "Covenant of Otranto Strait Mayors", as well as establishing an Otranto strait network for mitigation and adaptation to climate change and establishing a Memorandum of Understanding for Climate resilience between the regions (Region of Puglia, region of Ionian Islands and Regional Council of Vlora).
- "Energy efficiency certificate for the port buildings": this action consists in proposing energy efficiency certificate and measures for the port buildings in Vlora, Corfu and Brindisi, as well as promoting the methodology to be recommended for all public buildings in the regions.

- “Energy efficiency on maritime transport vessels – Green shipping”: this action consists in promoting a green shipping model, securing energy efficiency in maritime vessels by promoting sustainable shipping drivers, research and innovation and policy recommendation.
- “Energy Communities info pack & Awareness raising”: the local communities need to be sensitized regarding energy efficiency, climate change and low carbon economy. A web platform will be developed acting as a knowledge reference point for the support of energy communities.
- “Green certificate for tourism”: this action consists in creating green certificate for the tourism sector.

The following table presents the actions reducing emissions from each source.

Thematic axes		Cross-border
Port operations		<ul style="list-style-type: none"> • Energy efficiency certificate for the port buildings
Maritime traffic		<ul style="list-style-type: none"> • Energy efficiency on maritime transport vessels – Green shipping
Induced economical activities		<ul style="list-style-type: none"> • Local government supporting climate change mitigation • Green certificate for tourism

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