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**Interlinkage and Synergies between Selected other
Policy Areas and Energy Efficiency -
National Report for Italy**

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INTERLINKAGE AND SYNERGIES BETWEEN SELECTED OTHER POLICY AREAS AND ENERGY EFFICIENCY

D.1.3

**PART OF WORK PACKAGE 1: MAPPING OF ENERGY EFFICIENCY POLICY INSTRUMENTS AND
AVAILABLE TECHNOLOGIES IN BUILDINGS AND TRANSPORT**

NATIONAL REPORT FOR ITALY

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ACKNOWLEDGEMENTS

GLOSSARY

ACRONYMS

AMAT: Agenzia Mobilità Ambiente Territorio (Agency for Mobility Environment Territory).

ATM: Azienda Trasporti Milanesi.

CNG: Compressed Natural Gas.

CoM: Covenant of Mayors.

D.I.: Decreto Interministeriale (Inter-ministerial Decree).

D.L.: Decreto Legge (Law Decree).

Dlgs: Decreto Legislativo (Legislative Decree).

D.M.: Decreto Ministeriale (Ministerial Decree).

D.P.R.: Decreto del Presidente della Repubblica (Decree of the President of the Republic).

EEA: European Energy Agency.

EIB: European Investment Bank.

ESCO: Energy Service Company.

EU: European Union.

EU-ETS: EU- Emissions Trading System.

FCS: Fondo per la Crescita Sostenibile (National Fund for Sustainable Growth).

FIT: Fondo Rotativo per l'Innovazione Tecnologica (Fund for Technological Innovation).

GDP: Gross Domestic Product.

GSE: Gestore dei Servizi Energetici.

JRC: Joint Research Centre of the European Commission.

L.: National Law.

LPG: Liquefied Petroleum Gas.

MATTM: Italian Ministry for the Environment and the Protection of Land and Sea.

MISE: Italian Ministry of Economic Development.

MIT: Italian Ministry of Infrastructures and Transport.

NGO: Non-Governmental Organization.

OECD: Organisation for Economic Co-operation and Development.

ON-RE: Osservatorio Nazionale Regolamenti Edilizi per il Risparmio Energetico (National Observatory on Building Regulations for Energy Saving).

PATRES: Public Administration Training and Coaching on Renewable Energy Systems (EU-project).

POE: National Operational Plan for Research and Competitiveness.

PUMS: Piano Urbano della Mobilità Sostenibile (Sustainable Urban Mobility Plan).

SEAP: Sustainable Energy Action Plan.

SME: Small and Medium-sized Enterprise.

TEE: Titoli di Efficienza Energetica (Energy Efficiency Titles, other name for the White Certificates issued within the related system).

TEP: tonnellata equivalente di petrolio (tonnes of equivalent oil).

TOE: tonnes of equivalent oil.

ZTL: Zona Traffico Limitato (Limited Traffic Zone).

EXECUTIVE SUMMARY

Several policy instruments, not targeting specifically energy efficiency or not prioritizing it, may have the potential to deliver energy efficiency benefits. The following report analyses the energy efficiency implications of a set of policy instruments currently in force in Italy, ranging from the national to the local level. Four cases are analysed, two for the buildings sector and two for the transport one. For each sector, a policy instrument with a “direct” link to energy and one with an “indirect” link to energy are considered.

For each case, the report describes the main features of the policy instrument and its relation to energy efficiency. Subsequently, each policy instrument is put in relation with another instrument specifically targeted to energy efficiency and/or CO₂ reduction, in order to analyse their interactions along a series of aspects: objectives, target groups, rules-influencing mechanisms, implementation network / governance structures.

Specifically, with respect to the **direct link to energy** the following cases are examined:

Buildings: Municipal building regulations. These instruments are used to regulate several aspects of building construction/renovation practices in a municipality, including comfort and aesthetic aspects. By setting innovative standards and requirements, they can contribute to boost energy efficiency and to enhance building quality in new constructions and renovations.

Transport: Excise tax on petrol and diesel. The excise is a purpose tax applied to achieve certain goals and to finance interventions to cope with natural and other events. Combined with the effects of economic crisis, high levels of taxation on petrol/diesel in Italy have affected fuel consumption, as evidenced by the related consumption trends.

For the **indirect link to energy**, the following cases are examined:

Buildings: National Fund for Sustainable Growth (FIT/FCS).

This instrument envisages financial support to research areas related to ‘sustainable industrial activities’ and provides effective support to the technology deployment. In the present report, the case of ‘white goods’ for households are considered. Although energy efficiency is not explicitly mentioned as a final objective of this fund, it contributes to support firms in efficiently conducting research and generating new technical change to be embodied in new appliances, that can have a relevant impact on energy use.

Transport: Urban road pricing policy. For the city of Milan, urban road pricing is a policy instrument mainly thought to address the relevant traffic, congestion and air pollution problems affecting the city. However, the reduction of traffic and of motorized vehicle travel, together with the impulse to vehicle stock renewal, have enabled a reduction in CO₂ emissions from traffic in the city centre.

The analysis provides, where available, quantitative data on the energy efficiency/energy saving effect obtained in the four cases.

CHAPTER 1: ACHIEVING ENERGY EFFICIENCY THROUGH INTEGRATION IN OTHER POLICY AREAS

In current debates the multiple benefits of energy efficiency are broadly discussed and available analyses are growing in number (e.g. IEA 2014 report on multiple benefits). However, in some cases energy savings can rather be seen as the co-benefit of other policies or measures, which do not target energy efficiency by original design.

The aim of this task is to identify policy areas suitable for combination with energy efficiency policies and systematically analyse how they may contribute to improve energy efficiency, particularly if untapped energy saving potentials still exist.

For **Italy**, the report describes the following four cases:

(1) policy instruments with a direct link to energy:

- a. for the buildings sector, the case of Municipal building regulations;
- b. for the transport sector, the case of the excise tax on petrol and diesel.

(2) 2 policy instruments with an indirect link to energy:

- a. for the buildings sector, the case of the National Fund for Sustainable Growth;
- b. for the transport sector, the case of the Ecopass/Area C urban road pricing policy of the City of Milan.

1.1 POLICY INSTRUMENTS WITH A DIRECT LINK TO ENERGY

1.1.1 CASE STUDY FOR THE BUILDINGS SECTOR

Introduction

Please provide information about the following issues:

- Full name of the energy policy instrument that may contribute to improve energy efficiency

Municipal building regulations (“Regolamento edilizio comunale”)

Municipal building regulations are instruments through which each Italian municipality regulates the construction modes within its territory, “with particular attention to the respect of the technical-aesthetic norms, hygienic-sanitary norms, safety and liveability of buildings and their appurtenances” (art. 4, D.P.R. 6 June 2001, n. 380). Regions contribute to the elaboration of municipal buildings regulations mainly in two ways: they either set a template of building regulations for the municipalities of their territories, or they provide criteria or orientation guidelines to elaborate them (Zara, 2007).

Building regulations have a direct link to energy, as far as both energy efficiency and renewable energy aspects are concerned. Since they address technical and procedural aspects of the building construction and renovation process, they can specify requirements for high-energy efficiency and environmental performances, as well as for the use and production of renewable energy, contributing to promote energy efficiency in the building sector. They can act through mandatory requirements, as well as through voluntary requirements, supported by incentives¹.

According to Zara (2007), the main topics where the link between building regulations and energy can be seen are: installation of solar thermal and photovoltaic panels; renovation of window fixtures; external insulation; excavations for external heat pumps; substitution/installation of heating systems; building orientation.

The National Observatory on Building Regulations for Energy Saving (ON-RE “Osservatorio Nazionale Regolamenti Edilizi per il Risparmio Energetico”) maps since 2008 the Italian municipal building regulations that include innovations regarding energy and environment-related aspects, going beyond national and regional laws in force. The 2013 ON-RE report (Cresme, Legambiente, 2013) identified 1.003 energy and environmentally innovative building regulations, which correspond to 12,4% of total Italian municipalities and a population over 21 million inhabitants (one third of the Italian population). Over time, the number of innovative regulations has increased significantly (188 in 2008, 705 in 2010 and 855 in 2011) (*ibid*).

A recent law² foresees that the Government, Regions and autonomous local authorities find an agreement to adopt a national template of municipal building regulations, with the aim to simplify and level out the norms. The template will define the performance requirements of buildings, regarding in particular safety and energy saving.

¹ Cresme and Legambiente (2013) identify three main typologies of incentives promoting energy efficiency and environmental quality in municipal building regulations: fiscal, economic and urban planning incentives.

² L. 11 November 2014, n. 164 “Conversione in legge, con modificazioni, del decreto-legge 12 settembre 2014, n. 133, recante misure urgenti per l'apertura dei cantieri, la realizzazione delle opere pubbliche, la digitalizzazione del Paese, la semplificazione burocratica, l'emergenza del dissesto idrogeologico e per la ripresa delle attività produttive”.

- **Specific focus of the policy instrument and target group**

The focus of the instrument are buildings (residential, commercial, tertiary). They can also address interventions on public spaces (e.g. public gardens...).

Its target groups are the public administration itself, all the actors involved in the building design and construction sectors, as well as buildings owners and more in general citizens.

- **Objective of the policy instrument**

The objective of building regulations is to set the rules for the construction modes within a municipality, as far as technical-aesthetic norms, hygienic-sanitary norms, safety and liveability of buildings and their appurtenances are concerned.

Relation to Energy Efficiency

Please provide information about the following issues:

- **Are there already impacts on energy efficiency due to the policy instrument? Are the impacts positive or negative?**

The ONRE report (Cresme, Legambiente, 2013) has mapped more than a thousand municipal building regulations in Italy that include innovative requirements and prescriptions in terms of environmental and energy performances of buildings. A comprehensive estimation of all the impacts already achieved by these innovations is not available yet. An idea of impacts can be gathered from projects such as the EU-Funded PATRES³, which has promoted in Italy and other 6 EU countries the elaboration or the updating of codes and regulations for new buildings or buildings renovation with a specific attention to sustainable energy. The project implemented a wide range of training, technical assistance and coaching activities for local authorities, public utilities and social housing bodies. In addition, the PATRES project identified best practices of building regulations that promote energy efficiency and renewable energy and have already achieved impacts⁴.

- **What are existing barriers / reasons for not considering energy efficiency so far by the policy or measure?**

As shown above, energy efficiency is considered in several municipal buildings regulations, and 12,4% of Italian municipalities adopt an innovative approach on the topic (Cresme, Legambiente, 2013). However, the scale of the targets on CO₂ emission reduction, energy efficiency and energy performances of buildings at European and national level would require a wider diffusion of innovative approaches throughout Italian municipalities. According to several stakeholders, providing a national template of municipal building regulations - as it is currently being discussed (see note 2

³ PATRES – Public Administration Training and Coaching on Renewable Energy Systems, <http://www.patres.net/>, funded by the European Commission through the IEE – Intelligent Energy Europe Programme, involved 7 countries (Austria, Croatia, Estonia, Italy, The Czech Republic, Romania, Spain).

⁴ Among these, the municipality of Carugate (14.396 inhabitants), in the province of Milan, adopted innovative building regulations in 2003, which in the following years obtained impacts on renewable energy production. See at: <http://www.patres.net/ita/best-practice.aspx>

above) - could promote energy and environmental innovation in the building sector at local level, identifying shared procedures for buildings energy renovation and simplifying bureaucracy⁵.

The national template would also help overcoming the issue of the multiple buildings regulations, which currently causes a high complexity and fragmentation of rules and norms across regions and municipalities and has been recognized as a key barrier to energy efficiency in the building sector.

- Are revisions / additional measures necessary in order to address energy efficiency improvements? How big could potential benefits be?

As stated in the previous point, the elaboration and provision to municipalities of a reference document such as the national template for building regulations would help overcoming barriers to a wider integration of energy efficiency into these instruments.

Estimates on the potential benefits are not available.

- Which actors would benefit from a full consideration of energy efficiency?

A further consideration of energy efficiency could benefit installers of energy efficiency systems/buildings renovation companies; and building owners, that would benefit from the quality and increased energy efficiency performances of buildings.

Interaction between objectives

Two policy instruments interact when they have common primary or secondary objectives. *Please provide information for the selected policy instrument and the energy efficiency policy instrument(s) showing interlinkages and synergies on the following issues:*

- Which common objectives expressed either quantitatively or qualitatively are given?

A policy instrument targeting specifically energy efficiency and interacting with the municipal buildings regulations are the Sustainable Energy Action Plans (SEAPs) elaborated by municipalities within the Covenant of Mayors (CoM). The CoM initiative was launched in 2008 by the European Commission to support local authorities in Europe to reach and go beyond the 20-20-20 targets on CO₂ emission reduction, energy saving and renewable energy in their territories. CoM signatories commit to adopt a SEAP, which identifies and describes the set of actions selected by the Local Government to reach the CO₂ reduction and energy targets at territorial level. According to JRC data (2015), by mid-May 2014 CoM signatories were 5.132 representing 160 million inhabitants, of which 2.731 signatories were from Italy representing 33 million inhabitants (counting for 52% of total signatories and 18% of total CoM population).

The objectives of SEAPs are to reduce CO₂ emissions in a specific local context, to promote energy saving and energy efficiency, as well as the use and production of energy from renewable sources. CoM signatories are requested to adopt in their SEAPs a commitment of reducing current emissions by at least 20%, however several signatories adopt more demanding targets⁶. The buildings sector, together with transport, is the main field of action of SEAPs actions.

⁵ <http://www.legambiente.it/contenuti/comunicati/innovazione-e-semplificazione-edilizia-verso-il-regolamento-nazionale-0>

⁶ In the sample of cities analysed by JRC (2015), the overall estimated reduction was of more than 28%.

The general objectives of a municipal buildings regulation have been described above. Sustainable building regulations explicitly aim to promote the quality of the urban environment, identify design parameters that boost building quality, orientate design and building practice consistently with environmental protection and they usually have a specific annex dedicated to sustainable and efficient energy use (Curcuruto, 2012). Therefore a sustainable building regulation is totally consistent with the SEAP objectives and can contribute to the achievement of its targets. The text of the Covenant of Mayors itself⁷ recalls the interlinkage between the regulatory role of local governments regarding energy performance and renewable energy in buildings - which for Italy is implemented through the building regulations - and the objectives of the Covenant.

- Which impacts on objectives due to the parallel implementation of the policy instruments based on official comments or data can be regarded?

Several municipalities are currently implementing a SEAP in parallel with innovative building regulations integrating energy aspects, however detailed data on SEAP implementation are not available yet. Many municipalities are undertaking SEAP monitoring activities and part of them have already concluded these activities. As soon as detailed monitoring reports will become available on the CoM website, they will provide useful insights on the implementation of these policy instruments.

Interaction between target groups

Two policy instruments may be imposed on the same target groups or on specific sub-sets. In order to get a feeling on the extent of interaction, *please provide information for the selected policy instrument and the energy efficiency policy instrument(s) showing interlinkages and synergies on the following issue:*

- Do common target groups exist, and if yes, which are these target groups?

Target groups of a SEAP depend on the sectors targeted and by the actions included in the plan. In general terms, a SEAP can target all public and private actors of a specific local context. JRC (2010) provides a list of stakeholders that could be important for a SEAP:

- local administration: relevant municipal departments and companies (municipal energy utilities, transport companies, etc.);
- local and regional energy agencies;
- financial partners such as banks, private funds, ESCOs;
- institutional stakeholders like chambers of commerce, chambers of architects and engineers;
- energy suppliers, utilities;
- transport/mobility players: private/public transport companies, etc.;
- the building sector: building companies, developers;
- business and industries;
- supporting Structures and energy agencies;
- NGOs and other civil society representatives;

⁷http://www.eumayors.eu/IMG/pdf/covenantofmayors_text_en.pdf

- representatives of the civil society, including students, workers etc.;
- existing structures (Agenda 21, ...);
- universities;
- knowledgeable persons (consultants, ...);
- where relevant, representatives of national/regional administrations and/or neighbouring municipalities, to ensure coordination and consistency with plans and actions that take place at other levels of decision;
- tourists, whereby the tourist industry represents a large share of the emissions.

Almost all these target groups are also targeted by municipal building regulations, either for their economic activity (e.g. building companies, developers) or since they own buildings that are subject to these regulations.

Therefore there is a clear overlap between the target groups of the two policy instruments.

Interaction between Rules-Influencing Mechanisms

Two policy instruments may interact due to tradeable permits / certificates or due to regulations. Please provide information for the selected policy instrument and the energy efficiency policy instrument(s) showing interlinkages and synergies on the following issues:

- Which market trading commodities (White Certificates, ERUs, etc.) interact with the selected policy instrument? The specific type of interaction is recognized when two policy instruments have rules for the same trading commodity, i.e. emission permits or green certificates. Therefore, the question to be answered is, does the interacting policy instruments affect the relevant market or not?

A market trading commodity interacting with municipal building regulations and SEAPs are the white certificates (also named "Titoli di Efficienza Energetica" - TEE)⁸, since there are several interventions on residential and tertiary buildings that are eligible to obtain them (e.g. interventions related to heating/cooling and water heating; small electricity production systems and cogeneration; interventions on the building envelope to reduce energy needs for heating/cooling or lighting...)⁹.

Building regulations influence the technical features of interventions that can be realized on buildings located in a specific territory, therefore they are part of the regulatory framework that must be taken into account when designing an intervention that could apply for white certificates.

SEAPs usually include several actions to reduce CO₂ emissions from energy use in buildings. Among these, some actions could generate white certificates and others could be supporting measures for

⁸ The White Certificates system was introduced in the Italian legislation by D.M. 20 July 2004 and subsequent amendments. It foresees that electricity and natural gas distributors reach annually specific quantitative goals of primary energy savings, expressed in tonnes of equivalent oil saved (TOE). A certificate is equivalent to saving 1 ton of oil equivalent (TOE). Electricity and natural gas distributors may fulfil their obligations by implementing energy efficiency projects entitle to obtain white certificates, or by buying white certificates from other parties in the Energy Efficiency Certificates Market organised by GME (Gestore dei Mercati Energetici). Projects can regard industrial processes, the residential/agricultural/tertiary sectors, public and private lighting, transport systems, efficiency in electricity/gas networks. Projects must meet a certain energy saving threshold to be eligible for applying to deliver white certificates.

⁹ See the technical information sheets of projects eligible for white certificates published by GSE – Gestore dei Servizi Energetici:

<http://www.gse.it/it/CertificatiBianchi/Modalit%C3%A0%20di%20realizzazione%20dei%20progetti/Schede%20tecniche/Pagine/default.aspx>

stakeholders to reduce energy use in buildings that could also generate certificates (e.g. supporting help-desks for companies and citizens willing to renovate their properties...).

It should be noted that projects applying for white certificates must meet a certain energy saving threshold to be eligible¹⁰, therefore some projects aggregate a certain amount of small interventions, under the management of a specific subject (e.g. ESCo).

The impact of the interaction between the two policy instruments on the market of white certificates has not been assessed. However, white certificates are combinable with other incentives for energy efficiency interventions recognized at regional and local level¹¹. Therefore it could be argued that innovative buildings regulations and SEAPs could jointly stimulate the realization of technical interventions on buildings that could generate white certificates.

Interaction between the Implementation Network / governance structures

The same pertinent authorities may be responsible for the implementation of two policy instruments with the same set of responsibilities or with properly distributed – and not overlapping – responsibilities. *Please provide information on the performance of the policy instruments under the respective criteria / sub-criteria of the evaluation method AMS, i.e. (see Konidari et al. 2014)*

- capacity of the implementation network (ability of all national competent parties to design, support and ensure the implementation of the policy instruments)

The implementation network of both policy instruments is at municipal level. The implementation of municipal building regulations is usually upon a specific department of the local authority. The implementation of the SEAP can entail action from several departments, depending on the typologies of actions included in the plan. Since the implementation of building regulations can contribute to reach the SEAP objectives, it can be argued that there is a direct collaboration and synergy between the activities of departments involved in the two policy instruments.

- administrative burden (aggregate work exerted by the regulatory implementation network during the enforcement of the policy instruments)

Given the interactions between the two instruments described above, the aggregate work for their implementation can be optimized by the collaboration and synergies between the departments involved.

- financial feasibility (property of the policy instrument to be implemented with low overall costs by the pertinent regulatory authorities)

As soon as detailed monitoring reports on SEAPs implementation will become available on the CoM website, they will provide useful insights also on implementation costs and financial feasibility aspects.

¹⁰ Depending on the typology of project (“standardized”: 20 tep/year; “analytical”: 40 tep/year; “consumptive” projects: 60 tep/year).

¹¹ See: <http://www.gse.it/it/EnergiaFacile/faq/CertificatiBianchi/Pagine/default.aspx>: “Cumulabilità”.

1.1.2 CASE STUDY FOR THE TRANSPORT SECTOR

Introduction

Please provide information about the following issues:

- Full name of the energy policy instrument that may contribute to improve energy efficiency

Excise tax on petrol and diesel

- Specific focus of the policy instrument and target group

The excise is an indirect tax that affects certain productions. It involves the individual production and individual consumption. It is indirect because the producer pays the tribute which subsequently falls upon the consumer. In Italy the most important excises are those relating to energy products, electricity, alcohol and tobacco.

- Objective of the policy instrument

The excise duties in Italy are regulated by the legislative decree n. 504/1995 (Dlgs. 26 October 1995, n. 504: "*Testo Unico delle disposizioni legislative concernenti le imposte sulla produzione e sui consumi e le relativi sanzioni penali e amministrative*"). The second chapter defines how the fuel price is composed: i) the excise tax; ii) a regional tax ; iii) the value added tax (Dlgs. n. 504/1995).

The excise is a *purpose tax* that is applied to achieve certain goals and it was introduced to finance interventions to cope with natural and other events.

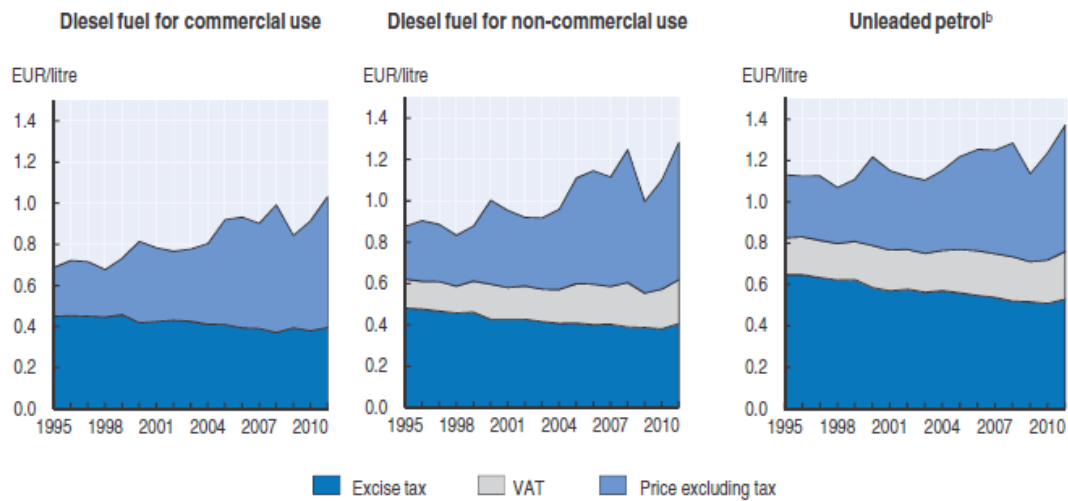
However, with regard to energy taxation, the definition of the structure and the amount of tax on mineral oils have been influenced by other factors. These factors are: *transport policy* (competition between different types of transport or the transparent distribution of infrastructure costs), *environmental policy* (less pollution, eg. by establishing minimum levels of excise duties for different gasoline and unleaded), the overall *energy policy* (balance between different energy sources, such as coal, oil, natural gas, nuclear power, etc., and between local energy sources and imported,) *agricultural policy* (eg. the proposal, withdrawn in 1999 on reduced rate of excise duty on biofuels), and finally the *employment policy* (fiscal strategy to encourage a switch from the taxation of labour to that of other sources of revenue, including taxing the use of raw materials and energy) (Kolassa, 2014).

The rates of excise duties on energy products mentioned with effect from 1 January 2015 are set forth with determination of the Director of the Customs Agency n. RU 88789 of 9 August 2012 and confirmed by art. 1, paragraph 487, L. 24 December 2012, n. 228..

Specifically, on the basis of the mentioned legal sources, from 1 January 2015 the rates of excise duty on petrol and leaded petrol and gas oil used as fuel are applied as follows:

- Petrol and leaded petrol: 728,40 €/1000 l;
- Diesel used as fuel: 617.40 €/1000 l (Agenzia delle Dogane, 2015).

**Figure 1: Road fuel prices and taxes^a
1995-2011**



a) At constant 2005 prices.
b) Unleaded premium (95 RON).
Source: OECD-IEA (2012), *Energy Prices and Taxes*.

Source: OECD-IEA, 2012.

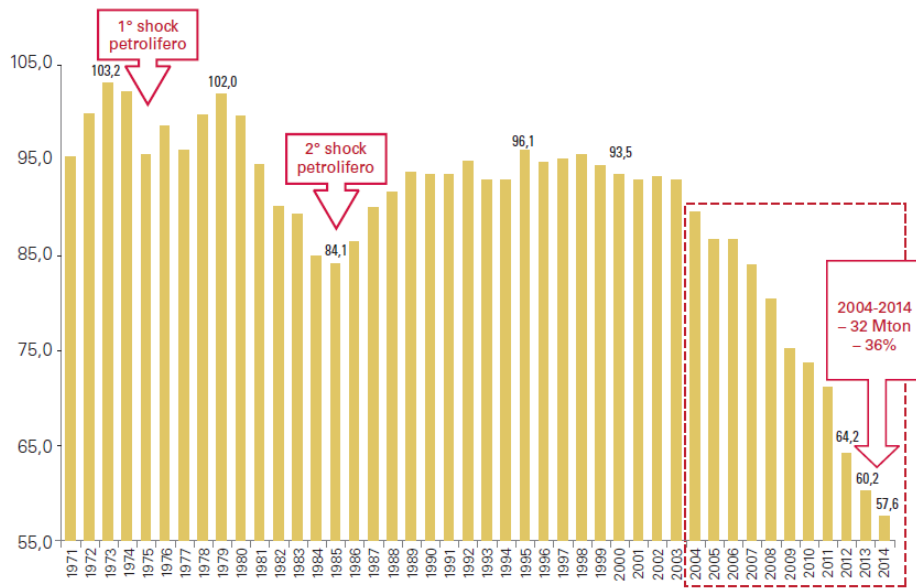
Relation to Energy Efficiency

Please provide information about the following issues:

- Are there already impacts on energy efficiency due to the policy instrument? Are the impacts positive or negative?

In Italy oil products are subjected to high taxation and the demand for fuel consumption is considered inelastic (Graham and Glaister, 2002), so the excise duties are an instrument to ensure certain revenue for the state and were increased during the years with no evident consequences on the consumes. In Italy since 2005 the excise affected the use of fuel, also with the emergence of the first signs of the economic crisis. This phenomenon has increased over the years, generating a significant decline in consumption: the growth of the excise corresponded to a decline in fuel consumption (Figure 3).

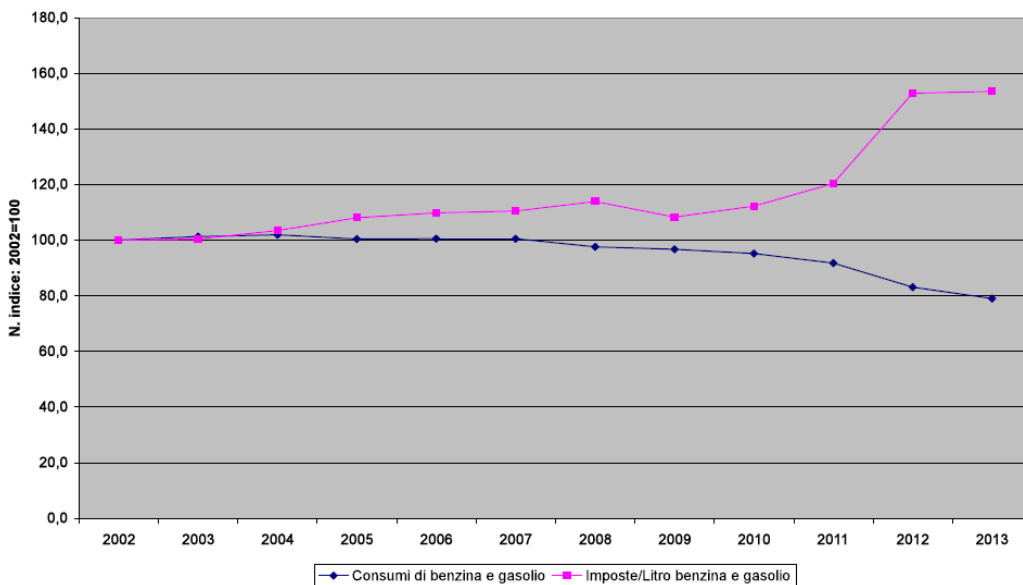
Figure 2: Italy – Consumption of petroleum products (Millions of tons)



Source: Unione Petrolifera, 2015

The phenomena described are represented in the graph below, which shows the trend in consumption of petrol and diesel against the trend registered by its withdrawal. At a 54% increase in the level of taxation, consumption reported a decrease of 21% (FAIB Confesercenti, 2013).

Figure 3: Petrol and diesel: rise of taxation, fall of consumption



(Consumption of petrol and diesel (blue line); Tax/liter petrol and diesel (pink line))

Source: FAIB Confesercenti, MISE data elaboration, 2013

- What are existing barriers / reasons for not considering energy efficiency so far by the policy or measure?

In Italy in 2008, the excise tax on gasoline (0.562 euro per litre) implied a carbon price of 247 €/t, while that on diesel (0.421 euro per liter) a rate of 161 €/t (Cingano, Faiella, 2013). These values are higher than the prices of the EU ETS and than the external costs of climate change (Lombard et al., 2005). We may conclude that the taxation of greenhouse gas emissions implied in excise duties is therefore already very high (Cingano, Faiella, 2013). Revenue from environmentally related taxes, even if only a limited share of it has been used for environmental purposes, accounted for 2.6% of GDP and 6.1% of total tax receipts in 2010, higher than the corresponding shares for the OECD as a whole (OECD, 2013). However, their role declined during the last decade, and the real tax burden on energy decreased. Nevertheless, the tax burden on energy, and the tax rates on petrol and diesel, are among the highest in Europe. From an environmental point of view, there is scope to restructure these taxes to better capture environmental externalities.

These estimates, however, consider the excise tax on fuel as well as Pigouvian taxes intended for correction of externalities related to CO₂ emissions (Cingano, Faiella, 2013). Instead only a small part of the external costs generated by transport is environmental, in fact the main component related to traffic congestion and the costs arising from accidents is not covered by insurance (Cingano, Faiella, 2013). Taking into account these additional costs, the implicit price of CO₂ emissions is reduced and can become negative. These considerations suggest that, despite the high level of taxation on energy products, there is room to draw a policy to reduce emissions of the transport sector that will integrate measures for energy efficiency and the spread of biofuels, using the taxation (OECD, 2013).

For example, excise duties vary greatly among fuels and users and do not provide a consistent price for carbon. The excise duty on diesel was still 23% below that on petrol in 2011, a difference that is not environmentally justified (OECD 2013). Vehicle taxes do not take full account of CO₂ and other emissions, especially for freight vehicles. Several partial or total exemptions apply to different uses of fuel, which lower end-use prices and reduce incentives to use energy efficiently. For example, such exemptions apply to fuels used for electricity generation, in agriculture, in industrial facilities, and for road freight transport. Special tax provisions on energy and transport were estimated to result in revenue losses of 0.2% of GDP in 2010 (OECD, 2013).

There are duties on all fuels used for both stationary purposes (such as heating and industrial processes) and transport. The revenue from taxes on transport fuels is dominant. Excise rates on energy products exceed the minimum levels required under EU legislation, with the sole exception of natural gas used for transport fuel. While nominal tax rates on the main transport fuels (petrol and diesel) were increased repeatedly in the 2000s for revenue raising purposes, they have not kept pace with inflation. As a consequence, real tax rates on transport fuels have declined in the last decade. Together with the rise in world oil market prices, this has led to a decline in the share of taxes in fuel prices. In 2011, excise duties accounted for 39% of petrol prices and 32% of diesel prices (OECD, 2013).

A further barrier can be identified in the heterogeneous taxation when different regions are considered, as the excise is not the same in all Italian regions but it varies. In 1999 in Italy the fiscal federalism has been introduced with law n. 133/1999 (L. 13 May 1999, n. 133), and the Italian regions gained autonomy also in the decision for the excise value.

- Are revisions / additional measures necessary in order to address energy efficiency improvements? How big could potential benefits be?

Improvements applicable to excise regime could relate to the follow points:

1. excise duties vary greatly among fuels and users and do not provide a consistent price for carbon.
2. excise duty on diesel was still 23% below that on petrol in 2011, a difference that is not environmentally justified (OECD, 2013).
3. exemptions apply to fuels used for electricity generation, in agriculture, in industrial facilities, and for road freight transport. Special tax provisions on energy and transport were estimated to result in revenue losses of 0.2% of GDP in 2010 (OECD, 2013).
4. fiscal federalism was introduced with the law n. 133/1999, so excises vary from region to region.

It is difficult to assess what would be the benefits of implementing specific changes in the system of excise duties. A given example regards point 3: the tax provisions on energy and transport were estimated to result in revenue losses of 0.2% of GDP (OECD, 2013).

- Which actors would benefit from a full consideration of energy efficiency?

The actors that would benefit from a full consideration of energy efficiency are:

- citizens;
- biofuel producers and distributors;
- stakeholders involved with the production of LPG and electrical vehicles.

Interaction between objectives

Two policy instruments interact when they have common primary or secondary objectives. *Please provide information for the selected policy instrument and the energy efficiency policy instrument(s) showing interlinkages and synergies on the following issues:*

Excise interacts synergistically with the car incentives because the *ecobonus* incentive encourages the use and purchase of electric or LPG cars. Therefore the *ecobonus* represents an instrument able to enhance the negative trend in fuel consumption that is already determined also by the increase in excise duties. In Italy the car incentives also called *ecobonus* are in force (L. 23 December 2014, n. 190 "Provisions for the preparation of the annual and multi-state," Stability Law 2015). Cars purchased by December 31, 2014 will get a bonus of up to 20% of the total cost, the discount varying according to the amount of vehicle CO₂ emissions. Regarding the purchase of vehicles in 2015, the *eco-bonus* will be calculated up to 15% of the total cost of the car. Scrapping is no longer required in particular for companies and for individuals, if one decides to buy a car that has CO₂ emissions of up to 95 g/km. The *ecobonus* is higher for the purchase of electric and LPG or CNG or hybrid vehicles (MISE, 2014).

No official documents evaluating the interlinkage of the respective two policy instruments are available.

- Which common objectives expressed either quantitatively or qualitatively are given?

The specific objective of the excise is to cope to natural or governmental emergencies, for this reason at the moment there are no common objectives between excise and ecobonus.

The ecobonus objectives are defined to:

- Incentivize the use of alternative power sources
- Reduce CO₂ emissions
- Encourage the use of new, cleaner technologies
- Avoid dependence on non-renewable energy.

However, if the excise purpose were modified there would be overlapping on the policies objectives.

- Which impacts on objectives due to the parallel implementation of the policy instruments based on official comments or data can be regarded?

The increase in fuel excise duties over the last years has stimulated the purchase of LPG or electric vehicles fostering the use of the ecobonus incentive.

Anyway, since the excise tax and the ecobonus do not have explicit common objectives, at the time there are no studies or data that describe the impact of the parallel implementation of the two policy instruments.

Interaction between target groups

Two policy instruments may be imposed on the same target groups or on specific sub-sets. In order to get a feeling on the extent of interaction, *please provide information for the selected policy instrument and the energy efficiency policy instrument(s) showing interlinkages and synergies on the following issue:*

- Do common target groups exist, and if yes, which are these target groups?

These policy instruments can be imposed on the same target groups. In this case the target groups are: private citizens, transport companies, agriculture sector. Both the excise tax and the *ecobonus* are applied to all target groups listed. In this way a cumulative effect can be obtained, strengthening the strategy to achieve energy efficiency targets. In the case of the transport and agriculture sector this effect is less significant since annual refunds are applied for the excise on the fuel used.

Interaction between Rules-Influencing Mechanisms

Two policy instruments may interact due to tradeable permits / certificates or due to regulations. Please provide information for the selected policy instrument and the energy efficiency policy instrument(s) showing interlinkages and synergies on the following issues:

- Which market trading commodities (White Certificates, ERUs, etc.) interact with the selected policy instrument? The specific type of interaction is recognized when two policy instruments have rules for the same trading commodity, i.e. emission permits or green certificates. Therefore, the question to be answered is, does the interacting policy instruments affect the relevant market or not?

In Italy there are exonerations or reductions of the excises for the some uses of fuels: these exonerations can represent a disincentive for energy efficiency. These exemptions, for example, concern the fuels used to produce electricity, which result in a loss of revenue of 0.2% of GDP in 2010

(OECD, 2013) as well as a disincentive for reducing the use of polluting substances. In 2010 the Ministry of Finance launched the first comprehensive analysis of the effects of tax exemptions (GSE, 2014). This is an important initiative to identify and change the incentives and tax exemptions that are economically, socially and environmentally inefficient.

White certificates are negotiable instruments that certify the achievement of energy savings in end-use energy through actions and projects to increase energy efficiency (GSE, 2014). These require distributors of electricity and natural gas annually to reach certain targets of primary energy savings, expressed in tons of oil equivalent saved (TEP). A certificate is equal to the saving of one ton of oil equivalent (TEP). The companies can carry out their obligation realizing energy efficiency projects (GSE, 2014). So the white certificates, which are directly addressed to companies that produce and distribute energy as an instrument of market trading commodities, are effective in containing the negative impact produced by the excises exemptions on excise for companies producing electricity.

Interaction between the Implementation Network / governance structures

The same pertinent authorities may be responsible for the implementation of two policy instruments with the same set of responsibilities or with properly distributed – and not overlapping – responsibilities. *Please provide information on the performance of the policy instruments under the respective criteria / sub-criteria of the evaluation method AMS, i.e. (see Konidari et al. 2014)*

- capacity of the implementation network (ability of all national competent parties to design, support and ensure the implementation of the policy instruments)

The main stakeholders of the implementation network for the management of the excise are the Ministry of Economy and Finance, the *Agenzia delle Dogane e dei Monopoli* (Italian Customs Agency) and the Regions. Instead, for the *ecobonus* management the main actors are the Ministry of Economic Development and the *Agenzia delle Entrate* (Italian Revenue Agency). In this case there are no overlapping of competences and the management of the two instruments in object is independent of each other.

- administrative burden (aggregate work exerted by the regulatory implementation network during the enforcement of the policy instruments)

As outlined in the previous point, the bodies that are responsible for the management of the two policy instruments are different and independent of each other. So, in this case since there is no overlap of responsibilities the administrative burden is equally distributed.

- financial feasibility (property of the policy instrument to be implemented with low overall costs by the pertinent regulatory authorities)

The two policy instruments have opposite nature: the excise is a tax and the *ecobonus* is an incentive. The excise implementation costs are really low because of the nature of the instrument: it is an indirect tax that involves the individual production and individual consumption, hence the producer pays the tribute which subsequently falls upon the consumer.

The ecobonus is a governmental incentive so the costs of implementation weighs entirely on the state. The State provides incentives for a total of 100 million euro (EIB funds) for the period 2013-2015 to promote the purchase of low-emission vehicles (law n. 134/2012).

1.2 POLICY INSTRUMENTS WITH AN INDIRECT LINK TO ENERGY

1.2.1 CASE STUDY FOR THE BUILDINGS SECTOR

Introduction

- Full name of the policy instrument not directly related to energy that however may contribute to improve energy efficiency

National Fund for Sustainable Growth

In order to guarantee a flourishing and effective research development in the EU countries, the EU Commission promotes specific actions aimed at sustaining economic efficiency and the state-of-the-art in the research processes in the EU industrial context (EU Commission, 2006). In Italy, the most important instrument devoted to this aim is the *Fund for Technological Innovation* ('Fondo Rotativo per l'Innovazione Tecnologica', FIT), initially established in 2001. The fund was provided by the Ministry of Economic Development (MISE) within the larger National Operational Plan for Research and Competitiveness (POE) 2007-2013¹². The FIT envisaged financial support to research areas identified by the MISE (9 research areas, in which energy and energy efficiency is explicitly mentioned) and strictly related to 'sustainable industrial activities'. The research activity referred to new products and prototypes, processes, or modification of these as far as the existent technology is significantly improved. In 2012, the FIT has been adapted to the new European context and replaced by the *National Fund for Sustainable Growth* ('Fondo per la Crescita Sostenibile', FCS)¹³. Among different research areas to be financed, the MISE program envisages specific interventions aimed at sustaining R&D projects within the Horizon 20-20 (H2020) framework, in particular those projects proposing significant technological advances in strong relationship with the H2020 objectives, including energy efficiency¹⁴. In addition, the D.M. 8 March 2013 explicitly mentions as a priority those projects aimed at minimizing the environmental impacts and at favouring the 'green transition' (MISE, 2013).

¹² POE represents the instrument through which Italy contributes to the Development and Cohesion Policies envisaged by the EU Commission in favour of the most disadvantaged areas. At 2014, one billion Euro have financed 154 projects of industrial research. Further details at: <http://www.ponrec.it/programma/interventi/ricerca-industriale/>

¹³ See Italian Law n. 134/2012.

¹⁴ <http://www.sviluppoeconomico.gov.it/index.php/it/incentivi/impresa/fondo-per-la-crescita-sostenibile/caratteristiche-del-fondo>

- **Specific focus of the policy instrument and target group**

All industrial and transport firms can benefit from the FCS, including independent research centres which operate in behalf of specific private companies. Recipient firms can also participate to the selection process in collaboration with universities or public institutions, as long as private subjects detain a minimum of 30% of risk capital. In some cases the MISE can also identify a series of specific categories of subjects to be specifically targeted by the fund.

Relation to Energy Efficiency

- **Are energy questions already considered indirectly in some part by the policy? If yes, please give details.**

Although the FCS aims at financing research on those firms producing energy efficient products, the final objective of reducing the energy consumption, through the adoption of such new products, is not explicitly considered. Nevertheless, this policy instrument provides effective support to the technology deployment in the residential sector, and in particular, at household level. For instance, in the case of 'white goods' for households, the mechanism is straightforward. By participating to some extent to capital risk, FCS provides firms with R&D subsidies in order to reduce the uncertainty of research outcome. Hence, firms can efficiently conduct research and generate new technical change to be embodied in new appliances. Once new energy-efficient appliances are produced, available on the market and purchased by households (which can benefit from eco-bonus¹⁵), a large amount of energy can be saved in consequence of using more efficient appliances.

Although there are no studies or statistics which put in relationship the impact of R&D subsidies and the amount of energy saved, there exists large evidence on the positive effects of R&D subsidies to boost eco-innovation, including energy efficiency, and on the crucial role of public policies in sustaining technical change to address the issue of energy saving (Verdolini and Galeotti, 2011; Noailly, 2012; EU Commission, 2011; Costantini *et al.*, 2014; Filippini *et al.*, 2014). Moreover, the EU Eco-Innovation Action Plan highlights the importance of supporting sustainable innovation, of which energy efficiency is relevant part, both in terms of invention and diffusion of technologies (OECD, 2011).

Official statistics on the amounts received by candidate companies are partially available on the MISE website. With respect to the requests obtained in 2013, data describe a financial endowment of Eur. 524 Mil., of which around 70% allocated to SMEs (Table 1) and 23,62% devoted to the promotion of H-2020 targets (MISE, 2014).

¹⁵ The Eco-bonus represents tax deductions which aim at facilitate the renewal of dwellings and substitution of furniture. They include insulated windows and roofs, heating systems and 'white goods' to be substituted with more efficient equipment or devices. In the case of appliances, the Eco-bonus requires the purchase of devices with a minimum energy consumption class equals or higher than A+. Currently (2015), the amount of tax deduction (50%) is split over ten years with a maximum of Eur 10,000.

Table 1: FCS financial endowment and recipient companies by size

Company size	Number of requests	Financed investment (Euro)
Large	86	205.818.645,19
Medium	101	200.116.706,88
Small	84	118.993.639,12
Total companies	271	524.928.991,19

Source: MISE (2014)

- What are existing barriers / reasons for not considering energy efficiency so far by the policy or measure?

Barriers are not explicitly related to energy efficiency, as the MISE-FCS is not specifically aimed at diffusing new energy efficiency technologies. Some (indirect) barriers can be identified in the difficulty in presenting necessary documentation to access the fund, although the requests in both 2013 and 2014 have exceeded the resources previously assigned to the Ministry, with an extra allocation of Euro 535 Mil in 2014¹⁶. Moreover, the candidature process has been significantly improved by implementing a digital platform which allows companies for directly accessing and sending all the necessary documentation¹⁷.

- Are revisions / additional measures necessary in order to address energy efficiency improvements? How big could potential benefits be?

Although the single contribution in energy saving of a more efficient appliance is modest, their aggregated sum, due to the large diffusion of white goods among Italian households, is able to produce a large impact. However, additional measures to the supply side, which would target both Italian and international producers of most energy efficient appliances as specific beneficiaries with preferential access to the FCS, could generate additional effects in terms of technology invention.

- Which actors would benefit from a full consideration of energy efficiency?

In the case of 'white goods', Italian and international companies producing appliances in the Italian territory with specific innovative content aimed at reducing energy consumption.

Interaction between objectives

Two policy instruments interact when they have common primary or secondary objectives. *Please provide information for the selected policy instrument and the energy efficiency policy instrument(s) showing interlinkages and synergies on the following issues:*

- Which common objectives expressed either quantitatively or qualitatively are given?

No common objectives with other instruments are expressed within the MISE-FCS guidelines.

¹⁶ See <http://www.ponrec.it/programma/interventi/ricerca-industriale/>

¹⁷ <https://fondocrescitasostenibile.mcc.it/mise-fcs/>

- Which impacts on objectives due to the parallel implementation of the policy instruments based on official comments or data can be regarded?

No data or official comments exist for measuring the impacts of parallel implementation with other instruments in order to obtain energy efficiency gains. However, since firms receiving R&D incentives can efficiently generate technical change embodied in the appliances aimed at reducing the amount of energy used, once new energy-efficient appliances are available on the market, households can benefit from energy saving by purchasing new and more efficient appliances. The diffusion of new appliances might be significantly enlarged with further economic policy instruments on the demand side, such as Eco-bonus, in order to induce households to substitute old appliances with more efficient ones (i.e. appliances classified in Italy as Class AA/AA+).

Interaction between target groups

Two policy instruments may be imposed on the same target groups or on specific sub-sets. In order to get a feeling on the extent of interaction, *please provide information for the selected policy instrument and the energy efficiency policy instrument(s) showing interlinkages and synergies on the following issue:*

- Do common target groups exist, and if yes, which are these target groups?

There are no common target groups. Households and firms are different subjects and the two policy instrument do not envisage interaction between the two subjects.

Interaction between Rules-Influencing Mechanisms

Two policy instruments may interact due to tradeable permits / certificates or due to regulations. Please provide information for the selected policy instrument and the energy efficiency policy instrument(s) showing interlinkages and synergies on the following issues:

- Which market trading commodities (White Certificates, ERUs, etc.) interact with the selected policy instrument? The specific type of interaction is recognized when two policy instruments have rules for the same trading commodity, i.e. emission permits or green certificates. Therefore, the question to be answered is, does the interacting policy instruments affect the relevant market or not?

None.

Interaction between the Implementation Network / governance structures

The same pertinent authorities may be responsible for the implementation of two policy instruments with the same set of responsibilities or with properly distributed – and not overlapping – responsibilities. *Please provide information on the performance of the policy instruments under the respective criteria / sub-criteria of the evaluation method AMS, i.e. (see Konidari et al. 2014)*

- capacity of the implementation network (ability of all national competent parties to design, support and ensure the implementation of the policy instruments)

The MISE is responsible of the fund allocation. In order to guarantee an efficient and regular fund allocation, the MISE subscribes specific agreements with banks ('dealers') which assume the responsibility to evaluate all the administrative requirements of the candidate companies as well as the technical and economic feasibility of their projects. For what concerns the assessment of the

technological feasibility of the projects, the dealers take advantage of specific commissions of external experts, chosen by the MISE¹⁸.

- administrative burden (aggregate work exerted by the regulatory implementation network during the enforcement of the policy instruments)

There are no coordination mechanisms between the FCS and other instruments. It is worth mentioning that when also Eco-bonus is considered, the two policies are managed by different institutions, namely MISE for FCS and Agenzia delle Entrate (an Agency managed by the Ministry of the Economy and Finance) for Eco-bonus allocation. As a consequence, the burden for administrative management can be relevant and could be significantly reduced whereby both the FCS and the Eco-bonus would be implemented by the same institution.

- financial feasibility (property of the policy instrument to be implemented with low overall costs by the pertinent regulatory authorities)

For the reasons previously explained, when considering the joint mechanism due to the coordinated action given by the combination of technology-push FCS measure and demand-pull Eco-bonus, the administrative policy cost-efficiency is also relevant, as the two policies are currently managed by different institutions and follow different guidelines, with absence of coordination.

1.2.2 CASE STUDY FOR THE TRANSPORT SECTOR

Introduction

Please provide information about the following issues:

- Full name of the policy instrument not directly related to energy that however may contribute to improve energy efficiency

Ecopass/Area C urban road pricing, enforced by the City of Milan (Italy)

Full name: “Measures to contain vehicular traffic. Approval of access regulation to the Limited Traffic Zone Cerchia dei Bastioni” - Deliberation n. 588/2013 of 27/03/2013 of the City Council (title of the deliberation defining the policy as structural measure, after an experimental period started in 2012 and previously - from 2008 until 2011 - with a pollution charge named “Ecopass”).

- Specific focus of the policy instrument and target group

Located in Lombardy, Northern Italy, the city of Milan has 1,3 million inhabitants and is the centre of the largest metropolitan area of the country, a conurbation with more than 3,5 million inhabitants.

The Milan area is crossed every day by intense flows of passengers and freight vehicles. According to 2012 data, collected at the municipal boundary, about 750.000 vehicles enter every day the city of Milan, of which about 15% are commercial vehicles. The car flows are composed for 60-65% by

¹⁸ For further details, see <http://www.sviluppoeconomico.gov.it/index.php/it/incentivi/impresa/fit-fondo-innovazione-tecnologica>

people living outside Milan who enter the city, the remaining quota by Milan residents coming back home (Comune di Milano, AMAT, 2013).

Traffic, together with heating, is among the major sources of air pollution, which is one of the most severe environmental problems for the city, the metropolitan area and the region. In the city of Milan alone, PM10 daily limit values have been exceeded for 106 days in 2009, 85 in 2010, 132 in 2011, 107 in 2012 and 81 in 2013 (Comune di Milano, AMAT, 2015a) much more than the maximum number of days allowed by EU regulations (35 days).

The severe congestion and pollution problems of the city have led to the decision of implementing since January 2008 a pollution charge ("Ecopass"), charging vehicles proportionally to their PM10 emissions to enter the densest city area, the inner historical centre. In January 2012, Ecopass was replaced by a congestion charge ("Area C"), characterized by a flat charge. The concerned area of both Ecopass and Area C coincides with a Limited Traffic Zone (ZTL - Zona Traffico Limitato) named "Cerchia dei Bastioni". It is 8,2 kmq and corresponds to about 4,5% of the total municipal area (Comune di Milano, AMAT, 2015b). This area is a major attractor because of the activities and services localized here, attracting daily about 500,000 people. The main focus of the Ecopass/Area C road pricing policy instrument is therefore the regulation and reduction of traffic congestion and related externalities within this specific area, targeting both vehicles for the transport of people and of goods.

Several deliberations adopted over time¹⁹ have defined the system regulating the access to the charged area (ZTL Cerchia dei Bastioni). Currently, the limitations to the circulation of vehicles are active from 7.30 AM to 7.30 PM during working days between Monday and Friday and foresee²⁰:

- a total prohibition to enter Area C for most polluting vehicles;
- free access for ecological vehicles and specific categories of authorized vehicles;
- access subject to the payment of a daily charge (5€) for the remaining vehicles.

- **Objective of the policy instrument (qualitative information might be sufficient)**

The **objectives** of "Area C" are (as stated by the City of Milan)²¹:

- decreasing road traffic in "Cerchia dei Bastioni";
- improving public transport networks;
- raising funds for soft mobility infrastructures: cycle lanes, pedestrian zones, 30kph zones;
- improving the quality of life by reducing the number of accidents, uncontrolled parking, noise and air pollution.

Relation to Energy Efficiency

Please provide information (if available) about the following issues:

- Are energy questions already considered indirectly in some part by the policy? If yes, please give details.

¹⁹ For Ecopass: n. 1788/2007 of 20.07.2007 and following modifications; For Area C: n. 2526/2011 of 4.11.2011; n. 1402 of 29.06.2012; n. 1404 of 29.06.2012; n. 1694/2012 of 6.9.2012; n. 588/2013 of 27.03.2013.

²⁰ Except on Thursdays, during which limitations end at 6 pm. Information on the functioning of Area C are from: Comune di Milano, AMAT, 2015.

²¹ http://www.comune.milano.it/wps/portal/ist/en/area_c

Ecopass/Area C is focused on the reduction of traffic and related externalities, namely accidents, noise and of local air pollutants, which as shown above is a key environmental problem for the city. Nonetheless, energy questions are indirectly considered by the policy, since the policy aims to create the conditions to improve, protect and develop the public transport network and sustainable mobility (namely walking, biking, low-speed traffic) in the area, thus also creating the conditions for a more energy efficient transport. The policy also aims to raise monetary resources that are to be devoted to the development of sustainable mobility, thus further contributing to support energy-efficient mobility in the city centre and the wider city area, an example of ‘win-win’ policy.

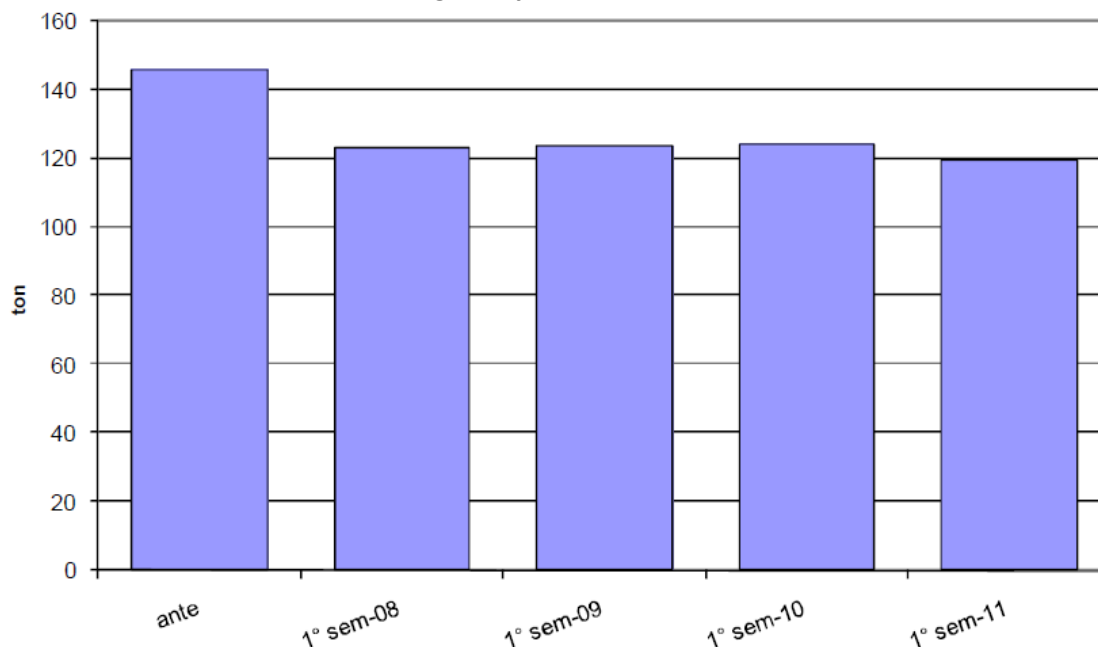
- Are there already impacts on energy efficiency due to the policy instrument? Are the impacts positive or negative?

The Ecopass/Area C scheme has obtained traffic and congestion reduction, which also have an impact in terms of energy use and GHG emissions reduction thanks to the decrease of the number of circulating vehicles, reduction in vehicle travel and the increase of the efficiency of traffic flows. Between 2008 and 2010, Ecopass has reduced traffic in the charged area by 16,2 % with respect to the pre-Ecopass situation (AMAT, 2011a). Between January 2012 and June 2014, Area C has reduced traffic by 28-30% (Comune di Milano, AMAT, 2015b).

Positive impacts in terms of energy saving have already been achieved by the policy and estimated by AMAT (2013) in terms of a CO₂ emissions reduction from circulating vehicles.

In the period 2008-2011, average daily CO₂ emissions from road traffic referred to the first semester have decreased by 18%, from 146 ton/day in the pre-Ecopass period to 120 ton/day in 2011 (AMAT, 2011b)

Figure 4: Historical trend of average daily emissions from road traffic in the Ecopass Area
Average daily carbon dioxide emissions

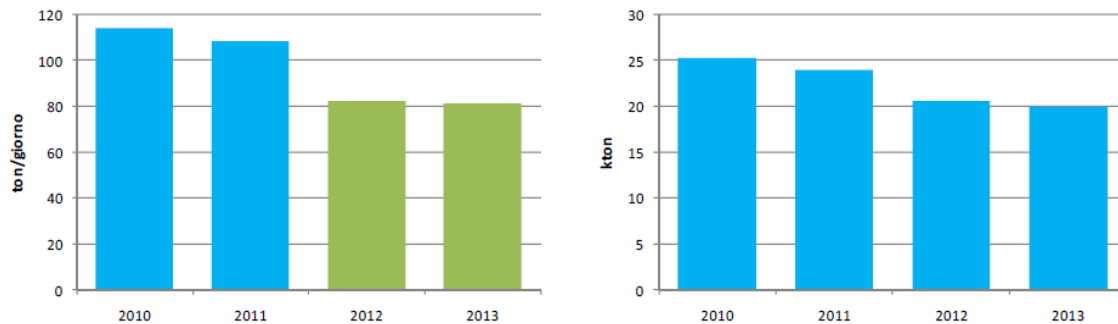


Source: AMAT (2011b)

Between 2010 and 2013, average daily CO₂ emissions due to circulating vehicles in Area C during daytime of working days in the monitoring period (January-June) have decreased by 29%, and total

CO₂ emissions in the monitoring period (all days included) have decreased by 21% in the same time frame (AMAT, 2013b).

**Figure 5: CO₂ average daily emissions during daytime (ton/day) (left graph)
CO₂ total emissions (kton) in the monitoring period (January-February) (right graph)**



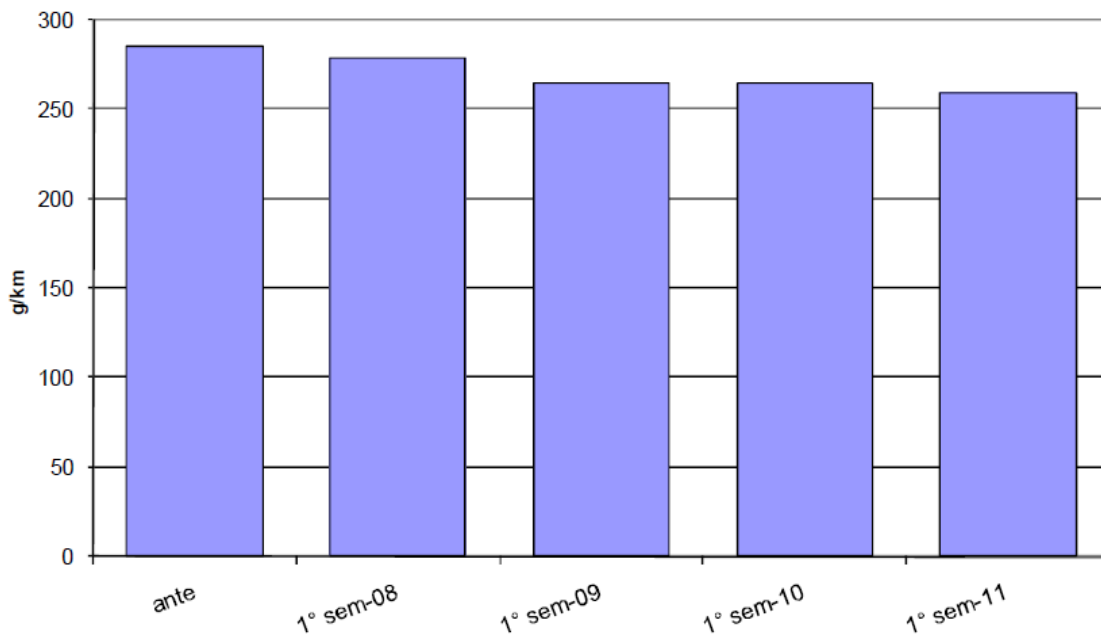
Source: AMAT (2013b)

A further element to be considered is the decrease of the average CO₂ emission factor of vehicles circulating in the charged area. Ecopass has stimulated relevant changes to the composition of vehicles entering the area. In fact, between the pre-Ecopass situation and June 2011, the number of most polluting vehicles (in terms of local pollutants) had diminished by 48,1% and the number of ecological vehicles had increased by 478% (namely: electric, hybrid, methane and LPG-fuelled vehicles) (AMAT, 2011a). The AMAT study shows also that the increase of new ecological vehicles is evident also within the Milan city and province area, with a rate significantly higher than the increase rate at national level (32%-82% in comparison with the national rate of 14%-27%) (AMAT, 2011a).

Between 2008 and 2011, comparing the first semester of each year, the average CO₂ emission factor of circulating vehicles has decreased from 285 g/km (pre-Ecopass value) to 259 g/km in 2011 (- 9% reduction over the entire period and average annual reduction of -2%) (AMAT, 2011b).

The following graph shows the average CO₂ emission factor of vehicles circulating in the charged area:

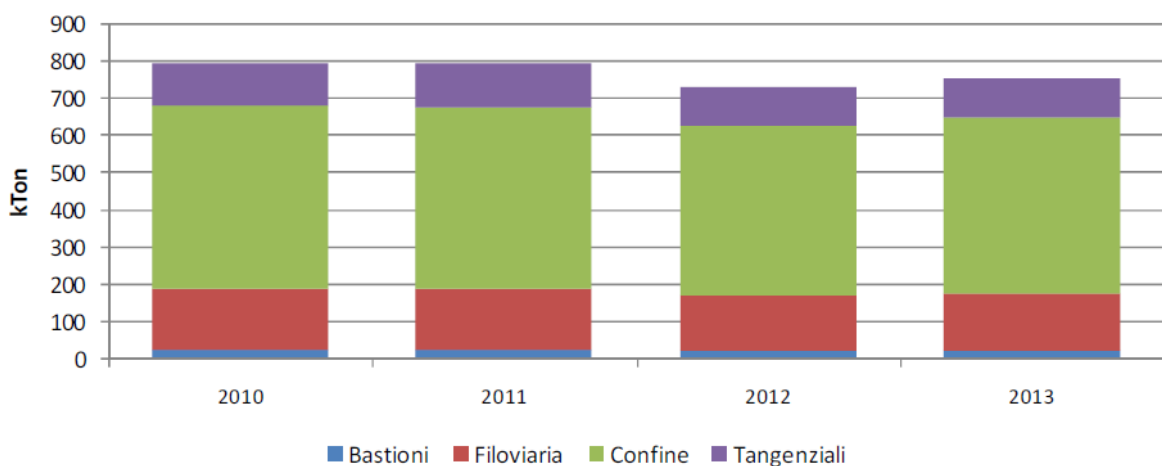
Figure 6: Average CO₂ emission factor



Source: AMAT (2011b)

The impact of Ecopass/Area C on energy saving must be placed within the overall context of CO₂ emissions and energy use from transport in the overall Milan city area. CO₂ emissions from vehicles circulating in the charged area are 3% of total CO₂ emissions of the city due to traffic (AMAT, 2013b). Looking at the trends of CO₂ emissions due to circulating vehicles in the overall city area, emissions have decreased by 5% between 2010 and 2013, for the effects of two phenomena: the reduction of kilometres travelled with motorized vehicles and the renewal of the circulating vehicles stock (average CO₂ emission factor has decreased by 2%) (AMAT, 2013b). The pollution and congestion charge have contributed to these two phenomena.

Figure 7: Carbon dioxide due to circulating vehicles in Milan (divided according to zones)



Source: AMAT (2013b)

- What are existing barriers / reasons for not considering energy efficiency so far by the policy or measure?

As recalled above, Milan has a severe problem of local air pollution, which is exacerbated also by local geographic and climate conditions which limit the dispersion of particulate matter (Comune di Milano, AMAT, 2015b). Therefore, the main policy priority of Milan's road pricing policy, beyond road traffic reduction, regards the pollutants reduction. Nonetheless, the City of Milan is committed to climate protection and sustainable energy policies and has adhered to the Covenant of Mayors. Within the CoM, the city has the target to reduce overall CO₂ emissions by 20% below 2005 levels by 2020 (Comune di Milano, AMAT, 2015c). Therefore, sustainable mobility measures promoted by the city, including also the congestion charging scheme, can be referred to a broader view on sustainable mobility which also considers CO₂ emission reduction, energy efficiency and energy saving.

- Are revisions / additional measures necessary in order to address energy efficiency improvements? How big could potential benefits be?

Different options for revising the system have been considered, including: (i) the extension of the area subject to charge; (ii) the extension of the area subject to charge coupled with the creation of two concentric areas delimited by cordons and the application of a charge when passing each cordon; and (iii) the variation of the charge. Critical aspects have been identified for the area extension option (possible traffic increase in the city centre) and the two-cordons option (possible implementation difficulties) (Comune di Milano, AMAT, 2015b).

The most recent mobility strategic plan (Sustainable Urban Mobility Plan of the City of Milan - PUMS Piano Urbano della Mobilità Sostenibile)²² defines the revision of the policy as a long-term horizon intervention, and it focuses on a solution which would extend the area subject to charge and reduce the charge by 50%. The plan binds the implementation of this solution to the realization of further improvements to accessibility to the area and to parking regulation controls, which are considered as necessary for an effective implementation of this policy revision.

The mobility plan estimates that this revision of Area C (extension of the area coupled with reduction of the charge) would further reduce energy use by 3% in addition to reductions deriving from the implementation of the other policies set by the plan. It should be noted that energy efficiency improvements would not be the main focus of this policy revision, but would be coupled with the other objectives that the policy is targeting.

- Which actors would benefit from a full consideration of energy efficiency?

A full consideration of energy efficiency in the revision of the policy would need to be coupled with the other targets that the policy is currently prioritizing (i.e. air pollutants reduction).

A strengthened urban road pricing policy would benefit users of public transport, since public transport supply in the area would be further improved; pedestrians and bicyclers, thanks to a further reduction of traffic, congestion and circulating vehicles; car users and freight vehicles, who would benefit from more fluid traffic flows and improved speeds; local residents, who would benefit from improved air quality and reduced noise.

²² Approved in March 2015 by the City Council, the PUMS is a strategic "plan of policies" setting directions for the development of mobility in Milan for the next decade, also considering the newly established Metropolitan City Area (previously named Province of Milan).

Interaction between objectives

Two policy instruments interact when they have common primary or secondary objectives. *Please provide information for the selected policy instrument and the energy efficiency policy instrument(s) showing interlinkages and synergies on the following issues:*

- Which common objectives expressed either quantitatively or qualitatively are given?

A policy instrument addressing greenhouse gases reduction and energy efficiency interacting with Ecopass/Area C is the set of European policies aimed to reduce CO₂ emissions from vehicles. This includes binding targets for CO₂ emission reduction of new cars²³ and vans²⁴, CO₂ labelling of cars²⁵ and measures to reduce GHG intensity of vehicles fuels²⁶. The European legislation on this topic aims to reduce GHG from road transport, unique sector in Europe where GHG emissions are still increasing and which still contributes in a significant way to EU total CO₂ emissions (one-fifth).

Since Milan's road pricing policy is focused on congestion reduction and local air pollution, whereas this set of EU policies are focused on CO₂, no common objectives can be identified. However certain interactions can be identified looking at the impacts of the two policies (see next paragraph). No official documents describing and evaluating the interlinkage between the two instruments are available.

- Which impacts on objectives due to the parallel implementation of the policy instruments based on official comments or data can be regarded?

The urban road pricing scheme has been in place since 2008 as a pollution charge (Ecopass) and since 2011 as a congestion charge (Area C). The EU regulation on CO₂ emissions from vehicles is in place since 2009 and is periodically updated. Therefore the two policy instruments are implemented in parallel.

As anticipated above, Ecopass/Area C do not set specific GHG or CO₂ reduction objectives, nevertheless it has been estimated that they have enabled a CO₂ emissions reduction from vehicles circulating in the city centre of Milan and a decrease of the average CO₂ emission factor of circulating vehicles, as detailed in the previous sections.

These results have been determined by the numerous policies on transport in place, including the application in Italy of European legislation on CO₂ emissions from vehicles. Specific studies that analyse the contribution of each policy to these results on CO₂ reduction and renovation of the stock of circulating vehicles are not available.

Interaction between target groups

Two policy instruments may be imposed on the same target groups or on specific sub-sets. In order to get a feeling on the extent of interaction, *please provide information for the selected policy instrument and the energy efficiency policy instrument(s) showing interlinkages and synergies on the following issue:*

- Do common target groups exist, and if yes, which are these target groups?

The main target groups of Ecopass/Area C are drivers of private motorized vehicles (for people and freight transport), and, indirectly, the users of public transportation.

²³ http://ec.europa.eu/clima/policies/transport/vehicles/cars/documentation_en.htm

²⁴ http://ec.europa.eu/clima/policies/transport/vehicles/vans/documentation_en.htm

²⁵ http://ec.europa.eu/clima/policies/transport/vehicles/labelling/documentation_en.htm

²⁶ http://ec.europa.eu/clima/policies/transport/fuel/index_en.htm

The main target groups of EU policies on CO₂ emissions from vehicles are vehicles producers (targeted by the binding targets for CO₂ emission reduction of new cars and vans), consumers (targeted by the CO₂ labelling of cars) and fuel suppliers (targeted by fuel quality legislation).

Therefore there are interlinkages among the target groups of the two policies. Purchasers of new vehicles are affected by the effects of EU policies when purchasing a new car and when purchasing fuels, at the same time they are affected by the urban road pricing policy when entering Milan's city centre.

A possible synergy between targets groups of these policy instruments could take place during information campaigns to drivers. Such campaigns could jointly communicate the rationale of the two policy instruments to raise drivers' awareness on the environmental impacts of their purchasing and driving behaviours.

Interaction between Rules-Influencing Mechanisms

Two policy instruments may interact due to tradeable permits / certificates or due to regulations. Please provide information for the selected policy instrument and the energy efficiency policy instrument(s) showing interlinkages and synergies on the following issues:

- Which market trading commodities (White Certificates, ERUs, etc.) interact with the selected policy instrument? The specific type of interaction is recognized when two policy instruments have rules for the same trading commodity, i.e. emission permits or green certificates. Therefore, the question to be answered is, does the interacting policy instruments affect the relevant market or not?

The urban road pricing regulations define rules and criteria for the access to Milan's city centre, as well as sanctions for non compliance, which are imposed to drivers of vehicles entering the area.

European policies on CO₂ emissions from vehicles define rules and sanctions which are imposed to car manufacturers (with reference to the compliance with the binding targets for CO₂ emission reduction of new cars and vans). EU policies on fuel quality foresee the possibility for national authorities to impose penalties where samples of fuels are found to be out of the directive specification (EC, 2015).

No interactions can be identified between the rules-implementing mechanisms of the two policy instruments.

Interaction between the Implementation Network / governance structures

The same pertinent authorities may be responsible for the implementation of two policy instruments with the same set of responsibilities or with properly distributed – and not overlapping – responsibilities. *Please provide information on the performance of the policy instruments under the respective criteria / sub-criteria of the evaluation method AMS, i.e. (see Konidari et al. 2014)*

Please use official comments or data if available

- capacity of the implementation network (ability of all national competent parties to design, support and ensure the implementation of the policy instruments)

The implementation network of Ecopass/Area C is mainly at local level and is composed by the following parties:

- The City Council of the Municipality of Milan, which has designed, adopted and enforced the policy instrument;
- the municipal mobility agency (AMAT – Agenzia Mobilità Ambiente Territorio), which is involved in the monitoring of the policy instrument's performances;
- the local public transport company (ATM – Azienda Trasporti Milanesi), which manages the ticketing system.

The implementation network of EU policies on CO₂ emissions from vehicles in Italy is composed by the following parties:

- Ministry of Economic Development (MISE), Ministry of the Environment (MATTM), Ministry of Infrastructures and Transport (MIT); in particular MISE, MATTM and MIT are responsible to develop annually a guide for consumers on cars' CO₂ emissions and on fuel saving²⁷; MISE and MIT collect data and communicate them to EU/EEA (European Energy Agency) in relation with the binding targets for CO₂ emission reduction of new cars and vans.

Mainly because the implementation scale is different, there are no interactions between the implementation networks of the two policy instruments and therefore on their implementation capacity.

- administrative burden (aggregate work exerted by the regulatory implementation network during the enforcement of the policy instruments)

The administrative burden weighs on different entities which operate at different levels, therefore it is not possible to foresee an interaction to optimize the aggregated work.

- financial feasibility (property of the policy instrument to be implemented with low overall costs by the pertinent regulatory authorities)

Investment costs for Ecopass amounted to 7 million € and mainly regarded the monitoring infrastructure (installation of video-cameras, system software) (Croci, Ravazzi, forthcoming). A traffic management centre was already in place in the city and was used also to manage the pollution/congestion charge scheme. This availability of technological infrastructure contributed to contain investment costs (*ibid*). Operating costs of both Ecopass and Area C schemes amount to 14 million € per year, directly funded by the scheme's revenues (entrance fees and sanctions to system violators) (*ibid*). Annual revenues changed over time (12.1 million € in 2008, 5.9 in 2011 during Ecopass; 11.2 in January-June 2012 with Area C). Revenues are mainly used to fund improvements in public transports (*ibid*).

Regarding the implementation of EU policies on CO₂ emissions from vehicles in Italy, estimates on the implementation costs are not available.

Since the instruments have diverse implementation networks, objectives and financial management, no interactions on the financial feasibility can be noticed.

²⁷ As foreseen by directive 1999/94/CE, adopted in Italy with DPR 84/2003.

ANNEXES

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