D.T2.4.1

Template report for regional energy action plan drafting	Version n°2: 03/2020 (rev. 2021)

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A.T2.4 Regional Energy Action Plan definition

Partners involved

PP 7 - EEE Güssing

Interreg CENTRAL EUROPE

Priority:	2. Cooperating on low-carbon strategies in CENTRAL EUROPE
Specific objective:	2.2 To improve territorial based low-carbon energy planning strategies and policies supporting climate change mitigation
Acronym:	**PROSPECT2030**
Title:	**PROmoting regional Sustainable Policies on Energy and Climate change mitigation Towards 2030**
Index number:	CE1373
Lead Partner:	Piemonte Region
Duration:	01.04.2019 30.09.2021

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1. EXECUTIVE SUMMARY

The Piedmont Region is going through a period of stagnation in final energy consumption, both in terms of total consumption, both in relation to the sectoral breakdown. The civil sector (sum of domestic and tertiary sectors) continues to account for about half of the overall consumption, while the rest is divided between transport (27.3%) and industry (22.5%) with the agriculture sector playing a minor role. A bit less than 19% of final energy consumption is covered by renewable sources and although this share is expected to be increased in the coming years due to endogenous and exogenous factors, a significant change is required to meet the challenging targets fixed by the European Commission in the FIT for 55 Strategy.

The Region drafted in the past a proposal for a Regional Energy Plan, which is nowadays still in the endorsement process. The Plan highlight the following target for 2030:

- expected RES use in final energy consumptions: 2.382 ktoe, 27,5% of FEC
- expected primary energy consumptions: 9.942 ktoe
- expected final energy consumptions: 8.645 ktoe
- CO2 energy related emissions: 17,6 Mton (-40% from 1990).

The document, therefore, figures out the scenario that highlights the way to achieve the carbon neutrality for Piemonte, trying to respect the Fit for 55 targets.

These can be summarized as follows.

	2030	2040	2050
Residential sector	• -40% of thermal needs of buildings • phase out from oil products • Thermal needs after renovation will be covered as follows: natural gas for about 45%; heat pumps for about 40%; DH for about 10%; 5% by other renewables. • Reduction of electric consumption (heat pumps excluded): 20%	• -60% of thermal needs of buildings • Thermal needs after renovation will be covered as follows: natural gas for about 22,5%; heat pumps for about 60%; DH for about 10%; 7,5% by other renewables. • Reduction of electric consumption (heat pumps excluded): 25%	• -80% of thermal needs of buildings • Thermal needs after renovation will be covered as follows: heat pumps for about 80%; DH for about 10%; 10% by other renewables. • Reduction of electric consumption (heat pumps excluded): 30%
Tertiary sector	• -45% of thermal	• -62,5% of thermal	• -80% of thermal

	needs of buildings • phase out from oil products • Thermal needs after renovation will be covered as follows: natural gas for about 45%; heat pumps for about 40%; DH for about 10%; 5% by other renewables. • Reduction of electric consumption (heat pumps excluded): 10%	needs of buildings • Thermal needs after renovation will be covered as follows: natural gas for about 22.5%; heat pumps for about 60%; DH for about 10%; 7,5% by other renewables. • Reduction of electric consumption (heat pumps excluded): 15%	needs of buildings • Thermal needs after renovation will be covered as follows: heat pumps for about 80%; DH for about 10%; 10% by other renewables. • Reduction of electric consumption (heat pumps excluded): 20%
Industry	• -15% of energy consumptions • phase out from oil products • Thermal needs after renovation will be covered as follows: 15% by DH; 85% by natural gas	• Thermal needs after renovation will be covered as follows: 50% of heating by DH; 50% of process heat by electricity	• Thermal needs after renovation will be covered as follows: 100% of heating by DH; 100% of process heat by electricity
Transport	• -15% of energy consumptions • Energy needs after reduction will be covered as follows: 40% by electricity; 15% by biomeethan; 45% by oil.	• -23% of energy consumptions • Energy needs after reduction will be covered as follows: 70% by electricity; 30% by biomeethan.	Same as 2050

In order to start the achievement of such energy transition targets, a set of priorities has been defined for the role of the Piemonte Region, specifically designed for the sustainable energy policies.

The priorities are:

- To act as control room of the territory and to promote synergies between different stakeholders in order to play a leading role in the governance of the energy topic.
- To promote supporting initiatives for municipalities. In this context the reinforcement of the Covenant of Mayor Initiative and the promotion of aggregated projects is envisaged.

- To collect, organize, process and disseminate energy data.
- To make sure that the energy grids are developed according to the regional system needs and especially to boost and optimize the use of district heating (especially promoting co-generation and tending to a net-zero carbon district heating system)
- To promote the development of smart grids coupled with the development of the Energy Communities concept (more efficiency, smart remote management, storage systems, etc.)
- To simplify the authorization procedures for RES and to act as facilitator for the installation of new renewable energy generation plants.
- To provide financial and technical support to municipalities and SMEs.
- To support energy efficiency in public and private buildings, which is the sector that must provide most of the results in terms of energy savings.
- Promote research and studies on new technologies like hydrogen production, small gas heat pumps, electric storage, exchange of electricity between different buildings
- To boost the communication activity aimed at raising citizens' awareness on all energy issues. This is a transversal action and a recurring request coming from almost all the stakeholders.

Related measures and actions are by consequence defined and detailed.

2. INTRODUCTORY OVERVIEW

2.1 Status quo summary

Piemonte is one of the 20 regions of Italy and one of the 21 planning and statistical regions of Italy (NUTS2). It is the second largest Italian region in terms of land area and the fifth considering population, with about 4.4 million inhabitants. It is located in the northwest of Italy and borders with France on the west side and with Switzerland on the north side (also across the border with the Valle d'Aosta). On the east side, it borders mainly with Lombardia and on the south with Liguria.

The capital city is Turin, which with its metropolitan area covers about half of the regional population. From an administrative point of view, the region is highly fragmented with the highest number of municipalities all over Italy (1.197).

The orographic context, with the presence of mountain massifs on three sides and the Po valley in the east side, generates a strong territorial heterogeneity, also from the climatic point of view, mainly due to the strong variation of altitude between the different regional areas.

Its location makes Piemonte a terminal region for national electricity and gas grid networks. It is also a transit corridor for the main infrastructures (both energy and transport) connecting western and central Europe.

The presence of the Po valley and its high population and industrial density have allowed the development of a much more extended infrastructure system than in the rest of the country, with the construction of highly interconnected networks.

Piemonte is historically the seat of the Italian productive poles. The region is closely linked to the manufacturing sector, automotive based. Over the years, the industrial sector has been very concentrated in the territorial area of the city of Turin, which has led to a strongly centralized demographic structure in the capital and its nearby.

In the last decades, from energy point of view, the region has undergone profound changes, following a decline in final energy consumption due to the economic crisis, back to back with an increase in natural gas consumption due to the construction of an indigenous electricity generation park (4,5 GW mainly based on natural gas). The construction of such thermoelectric power plants, mainly operating in a cogeneration, enhanced the development of large district heating networks serving the regional metropolitan areas.

The historical presence of hydropower (2,7 GW + 1 GW of pumped hydro storage) and the recent development of renewable sources, especially solar (1,5 GW), biogas (147 MW) and biomasses (62 MW), allowed the coverage of the regional electricity demand (25 TWh). So, the connection with the main interchange points with Switzerland and France means that Piemonte is essentially a transit for imported electricity.

The exploitation of biomass in the thermal sector, the development of district heating networks and the production of energy from renewable sources, increased the coverage rate of regional final energy consumption (FEC) by renewable energy sources (RES) and derived heat to 24%.

Nevertheless, the regional FEC (126 TWh), covered uniformly by the transport, industry and residential sectors (29% each) and services (12%) is still strongly based on the use of fossil fuels, especially natural gas.

From the environmental point of view, the energy demand is responsible for a generation of CO2 of about 26,8 Mt, mainly related to the transport and industrial sector due to the lower incidence of RES production.

According to the use of the joint tool developed in the PROSPECT2030 project, the baseline data that will be used to build the scenario are the following

Estimation of regional final energy demand (MWh)	Solid fossil fuels	Crude oil and petroleum products	Gas	Renewable energies	Non renewable wastes	Electricity	Derived heat & grid bound thermal system	Total
Agriculture, forestry and fishing	-	1,239,085	-	-	-	345,944	-	1,585,029
Industry, energy, water sewage etc	45,008	3,368,280	13,728,030	153,167	268,537	12,271,248	6,157,736	35,992,006
Construction	-	18,000	194,000	-	-	117,966	-	329,966
Transport	-	33,977,306	388,238	1,082,515	-	908,296	-	36,356,355
Services	-	410,038	6,475,667	350,645	-	6,882,001	674,540	14,792,891
Residential	-	1,230,115	19,427,000	9,776,992	-	4,688,268	2,079,444	37,201,820
Total	**45,008**	**40,242,824**	**40,212,935**	**11,363,318**	**268,537**	**25,213,724**	**8,911,720**	**126,258,065**

2.2 Current development trends

By observing the regional energy balance delivered by the National Energy and Environmental Agency (ENEA), it is possible to highlight the main energy flows that exist in the Piedmont Region. The internal production, almost exclusively linked to renewable energy sources, is limited to 13.6% of total gross internal consumption. The Region therefore depends on external supplies for more than 85% of its total primary energy consumption (nearly 13 Mtoe). Furthermore, the dependence on fossil energy sources and natural gas is particularly evident. A substantial part of the energy flows go through transformation processes before reaching the final uses. The most important

transformations occur for the generation of electricity and heat, to which multiple energy carriers contribute, such as natural gas (primarily), petroleum products (in minor part) and renewable sources. More than 5.5 Mtoe go into this process, 2.6 Mtoe of them are transformed into electricity and 0.8 Mtoe into heat, that are made available to end users.

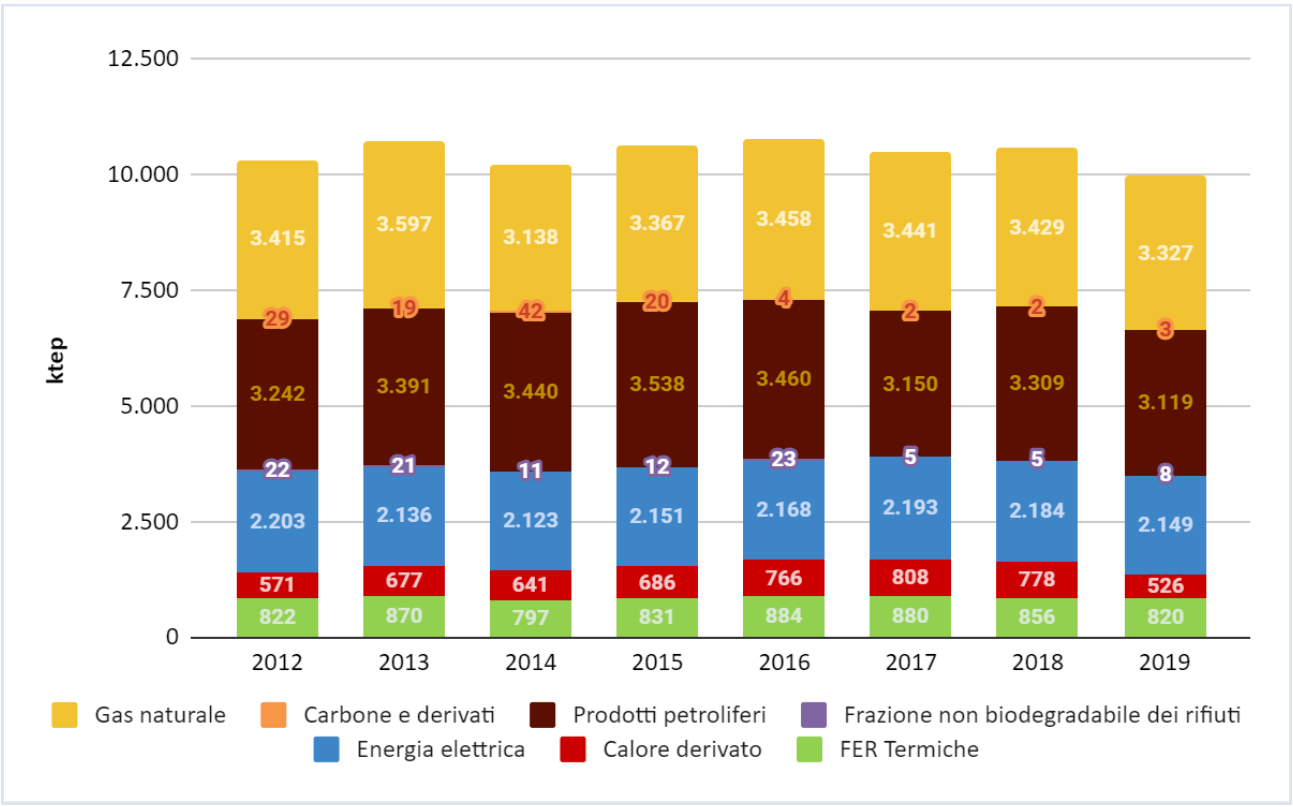
The following tables show the regional energy balance for 2018 and the gross final consumption data starting from 2015. Analyzing these data, it can be stated that the Piedmont Region is going through a period of stagnation in final energy consumption, both in terms of total consumption, both in relation to the sectoral breakdown. The civil sector (sum of domestic and tertiary sectors) continues to account for about half of the overall consumption, while the rest is divided between transport (27.3%) and industry (22.5%). The agricultural sector plays a marginal role.

Energy balance (ktoe)	Total	Solid fossil fuels	Oil products	Fossil gases	RES	Not RES wastei	Derived heat	Electricity
production	1.816	0	16	6	1.719	75	0	
import/export balance	11.235	2	4.072	6.757	687	0	0	-283
Internal Consumption	12.911	2	3.950	6.763	2.405	75	0	-283
Input in transformation	11.135	0	6.310	3.255	1.446	70	0	53
Output from transformation	9.416	0	5.946	0	1	0	848	2.621
Energy sector	484	0	209	39	0	0	71	165
Distribution and Transportation losses	155	0	0	25	0	0	9	122
Energy available for end users	10.554	2	3.376	3.444	960	5	768	1.998
Not energy final consumptions	259	0	244	15	0	0	0	0
Final Energy Consumptions (FEC)	10.295	2	3.132	3.429	960	5	768	1.998
Industry	2.320	2	170	846	12	5	374	912
Transport	2.812	0	2.574	56	105	0	0	77
Other sectors	5.162	0	389	2.527	843	0	394	1.009
civil	4.934	0	202	2.518	842	0	394	979
Agriculture and fisheries	224	0	183	9	2	0	0	30
others	4	0	4	0	0	0	0	0

Sectors	2015	2016	2017	2018
Industry	2.319,2	2.392,2	2.374,4	2.320,0
Transport	2.902,2	2.836,0	2.742,6	2.812,0
Tertiary	1.516,4	1.560,0	1.586,4	1.604,0
Domestic	3.126,1	3.238,2	3.353,1	3.330,0
Agriculture and fisheries	240,3	232,8	164,1	224,0
Total	**10.104,2**	**10.259,3**	**10.220,7**	**10.290,0**

Overall, 18.7% of final energy consumption is covered by renewable sources. In 2019 this share reaches its peak value, which starts to grow again after a period of substantial stationarity. In light of the foreseeable decline in the value of FEC in 2020, due to the impact of the pandemic on transport and industry consumption, a further increase in the percentage is expected in the following year. In the last five years, the energy contribution of renewables has fluctuated between 1,860 ktoe and 1,943 ktoe. The one recorded in 2019 is therefore the lowest value. This means that renewable sources have reduced at a lower rate than final consumption and therefore the ratio between the two has grown. In order to achieve the European objectives defined for 2030, it is, thus, necessary that this value increases in absolute value and in relative terms at a higher rate than in previous years, as figured out in the chapters to come.

Indicators	2012	2013	2014	2015	2016	2017	2018	2019
Final Energy Consumption	10.303	10.709	10.191	10.605	10.763	10.478	10.563	9.953
Electric RES	788	860	898	930	921	925	917	941
Thermal RES	*865*	*986*	*927*	*958*	*1.021*	*1.017*	*965*	*820*
Total RES	1.653	1.846	1.825	1.888	1.943	1.941	1.882	1.860
RES/FEC share	16,0%	17,2%	17,9%	17,8%	18,1%	18,5%	17,8%	18,7%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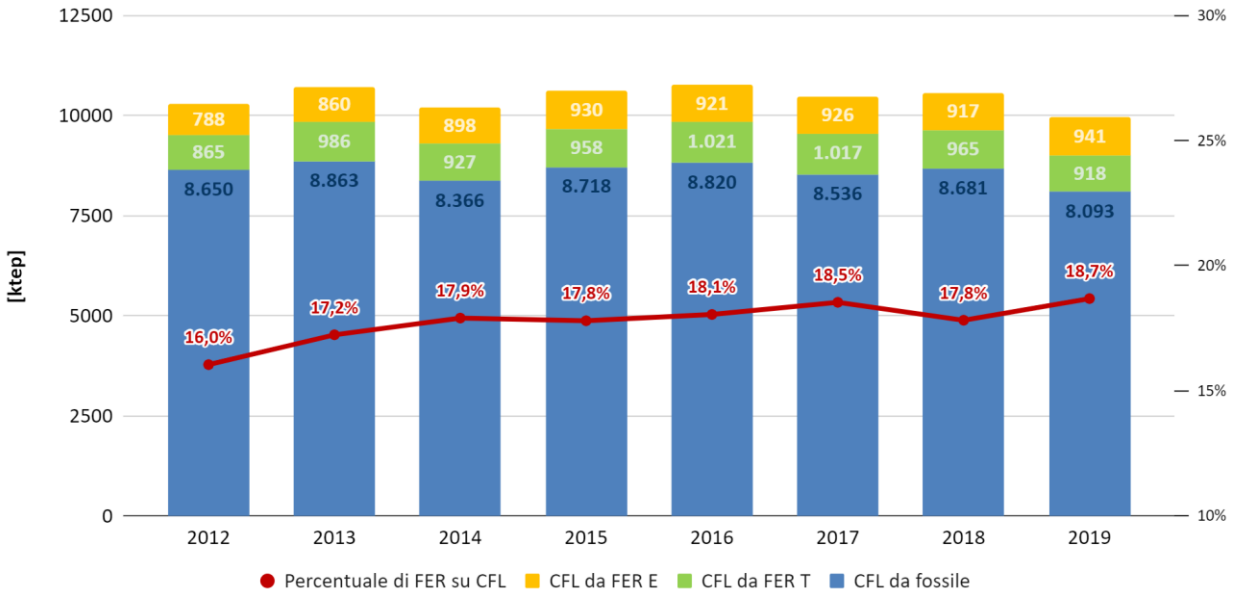
Carbone e derivati
Prodotti petroliferi
Frazione non biodegradabile dei rifiuti
Energia elettrica
Calore derivato
FER Termiche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Percentuale di FER su CFL
CFL da FER E
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CFL da fossile

The Piemonte Region started in the past years a planning process, which PROSPECT2030 is contributing to. In the proposal of Regional Energy Plan under update the main key performance indicators derived by the European Strategy are provided: reduction of energy consumption, increase of the contribution of renewables to final consumption and reduction of greenhouse gases emissions. There is no doubt that in 2020, due to the effects of the pandemic, the data will mark a contingent and, probably, structural change in the ongoing dynamics, therefore it is essential to try to take this variable into consideration when interpreting the actual data.

In the proposal for Regional Energy Plan, the following data are envisaged for 2030:

- expected RES use in final energy consumptions: 2.382 ktoe, 27,5% of FEC
- expected primary energy consumptions: 9.942 ktoe
- expected final energy consumptions: 8.645 ktoe
- CO2 energy related emissions: 17,6 Mton (-40% from 1990).

The actual trends show a distance from the foreseen objectives to 2030, even though none of them seem to be unreachable. For sure, the twenties must be a decade where the pace of the increase of RES and energy efficiency moves to a new level as what recorded in the actual decade is not enough. Besides, we should take into consideration the revision of the European Energy Strategy with the recently launched "FIT for 55" strategy, which provides for a target for 2030 that is well above the previous ones, such as

- at least a share of 40% of RES to FEC
- a reduction of greenhouse gases emissions by at least 55% of 1990 reference data
- a reduction of about 39% of the primary energy consumption in respect of the reference data of 1990, that for Piemonte means about 8.2 Mtoe.

This highlights even more the added values of the analysis provided in the actual report that show at which conditions this would be possible. As described after this would lead to radically change in the use and production of energy from what it is now.

2.3 Development potentials

In Piemonte, significant energy efficiency potentials can be found in the reduction of the heat demand of buildings. Some detailed scenarios are available for residential buildings, which account for 29% of total energy consumption. A basic and economic level of residential building renovation would lead to a reduction of the energy requirements by 20%. Whereas a more incisive retrofit scenario would lead to a reduction of more than 35%. Much more could be achieved with deep renovation approaches which also consider interventions with longer payback periods. The objectives in front of us require such approaches which are very challenging.

Much can be achieved in the transport sector where the transition should lead to a system less based on private mobility and fossil fuel and more on collective means of transport and electrically or biofuelled.

In the industry sector most can be done by increasing the use of electric energy and renewables (mainly biofuels), whereas the potentials of energy efficiency, although important, are less effective.

Consumption of wood fuels cannot be increased in households, as it is already significant compared to sustainable production; however, it could be rationalized and thus replace more fossil fuels. However, this objective will also require a general strengthening of the minor electricity grid, which in Italy has, by now, a reduced capacity.

The production of wood chips for small/medium DH networks, on the other hand, still has ample growth potential. A conservative approach could also be followed for hydropower, by increasing plant efficiency and stabilizing the use of water resources.

Further territorial resources are solar and geothermal energy as well as urban and agricultural waste.

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Concerning the exploitation of low enthalpy geothermal energy sources in the residential sector, due to the severe climatic conditions, it could be carried out only through hybrid thermal heat pump-condensing boilers. The use of this technology would allow an integration of renewable energy sources in buildings equipped with small autonomous boilers, currently installed in all non-metropolitan areas of the region.

The production of biomethane from urban and agricultural waste is a technological perspective of great interest for Piemonte, with some pilot plants of European interest.

A significant challenge will be the modernization of the electricity grid, with extensive integration of energy communities, prosumers, storage facilities and hydroelectric pumping plants.

3. MISSION STATEMENT

3.1 Key energy priorities, priority matrix and timeframes

According to the National legislative framework and the consultation process organized by the Piemonte Region with local stakeholders, the following priorities have been defined.

Short name	Description of the priority
GOVERNANCE	To act as control room of the territory and to promote synergies between different stakeholders in order to play a leading role in the governance of the energy topic.
TERRITORIAL COORDINATOR	To promote supporting initiatives for municipalities. In this context the reinforcement of the Covenant of Mayor Initiative and the promotion of aggregated projects is envisaged.
DATA	To collect, organize, process and disseminate energy data.

GRIDS	To make sure that the energy grids are developed according to the regional system needs and especially to boost and optimize the use of district heating (especially promoting co-generation and tending to a net-zero carbon district heating system)
ENERGY COMMUNITIES	To promote the development of smart grids coupled with the development of the Energy Communities concept (more efficiency, smart remote management, storage systems, etc.)
RES	To simplify the authorization procedures for RES and to act as facilitator for the installation of new renewable energy generation plants.
FINANCE/GRANTS	To provide financial and technical support to municipalities and SMEs.
EE-RES	To support energy efficiency in public and private buildings, which is the sector that must provide most of the results in terms of energy savings.
RESEARCH	Promote research and studies on new technologies like hydrogen production, small gas heat pumps, electric storage, exchange of electricity between different buildings
COMMUNICATION & TRAINING	To boost the communication activity aimed at raising citizens' awareness on all energy issues. This is a transversal action and a recurring request coming from almost all the stakeholders.

3.2 Compliance with European and national targets and strategies

The measures and priorities defined at regional level are compliant with the overall European and National strategies aiming at setting a reduction target of greenhouse gas emissions by at least 55% by 2030 and a long-term vision to reach climate neutrality by 2050.

In this respect, each measure identified can be described as follows.

Priority:	**Governance**
Priority description:	Nowadays, thanks to the Regional Environmental Energy Plan, the Piedmont Region, through measures and projects financed by European funds, already supports the Municipalities and activates incentive systems aimed at increasing energy efficiency, using renewable sources and limiting consumption, in line with the energy policy strategies implemented by the Clean Energy Package. Piedmont Region also coordinates the rationalization and development of infrastructures and energy networks in the area and promotes awareness on energy issues. From now on, the Region must strengthen its governance role in order to act as the leading institution of the local energy transition process. The Region is called to assume a leading role for the governance of all the activities that aim at achieving the challenging objectives in front of us for the future. To this end, continuous dialogue with local stakeholders is essential, both to report the actions implemented and to collect their inputs.

Level of priority	3 - crucial	
Type of priority	policy	
Timeframe of priority	short-term	

Priority:	**Technical support to local authorities**	
Priority description:	From an administrative point of view, Piemonte Region is divided into 8 Provinces, about 1.200 municipalities and several intermunicipal aggregations. The described administrative fragmentation needs a strong coordination and support action from the Region, mostly in the energy sector where the Region is empowered by law by important competences. The transition toward a carbon neutral society in a long-term perspective, requires the involvement of all political and institutional levels. The technical support that can be provided by the Region is essential to drive the transition in the proper way.	
Level of priority	3 - crucial	
Type of priority	policy / technical	
Timeframe of priority	mid-term	

Priority:	**Organize and systematize the energy data collection flow**	
Priority description:	Any investment/planning project or initiative needs reliable data to build on. The institutionalization of the energy data collection and processing is needed in order to have a set of data and a set of processing procedures constantly updated. These databases should be made available, other than the Piemonte Region, to stakeholders that can make better use of them in order to implement projects and sustainable energy investments. Databases should be created in a way that are interconnected with each other, able to get additional information flows on energy and be consistent with the national statistics.	
Level of priority	3 - crucial	
Type of priority	policy / technical	
Timeframe of priority	short-term	

Priority:	**Provide coordination on the gas grid development and management**

Priority description:	The gas grid is one of the most important energy infrastructure in the Region. It is very well widespread and most of the Region is served by the energy vector. Nevertheless, some development potentialities are still in place and these investments should be encouraged, taking into consideration the related environmental impact. Besides, thanks to legislative obligations, gas DSOs are obliged to pursue important energy efficiency targets every year. Taking into consideration that it is still at the starting phase of the procedures of the concessions of the distribution service at local level, it is expected that the system could generate important amounts of energy investments at Regional level, with interesting positive externalities from economic point of view. It is , thus, important to speed up the process and enable the system to make the envisaged investments happen.	
Level of priority	2 - standard	
Type of priority	policy	
Timeframe of priority	mid-term	

Priority:	**Boost and optimize the use of district heating**	
Priority description:	The District Heating System (DHS) is a key technology for the metropolitan area of Torino, as it is one of the largest all over Europe. Besides, several smaller systems are set in different regional areas, using RES or traditional fuels. DHS is, thus, essential for the actual regional energy system and for its development in the short/medium term. It is very likely that it will remain so in the longer term. Nowadays, innovation brings a new concept for DHS and this should be taken into account for the future development of the existing networks and the design of new ones. Indeed, boosting and optimizing district heating is the way to achieve net-zero carbon energy systems in urban areas. It is necessary to evolve the current technical standards of district heating systems towards the so-called fourth generation (4G) : - low temperature heat distribution - use of heat from renewable and waste heat sources - smart thermal grids to supply low-energy buildings	
Level of priority	1 - supportive	
Type of priority	technical	
Timeframe of priority	mid-term	

Priority:	**Development of Energy Communities**

Priority description:	Energy Community is related to the decentralization of the energy system and to the desire to find alternative ways of organising and governing the energy systems. It allows for more participative and democratic energy processes. Recently, Energy Community received a clear status in EU and national legislation. They are incorporated as a non-commercial type of market actors that combine non-commercial economic aims with environmental and social community objectives. Energy Communities are defined in the revised Renewable Energy Directive (EU) 2018/2001 (setting up the 'renewable energy communities') and the revised Internal Electricity Market Directive (EU) 2019/944, introducing the 'citizen energy communities' concept. Both citizen energy communities and renewable energy communities can exercise similar activities, including generation, distribution, supply, aggregation, consumption, sharing, storage of energy and provision of energy-related services. Depending on the activity performed, they must comply with the obligations and restrictions applicable to the other market participants. As a matter of fact at National and Regional level the legislation is evolving trying to turn the Energy Communities as an active player in the development of the energy system. In mountain and rural areas, energy needs and availability of renewable sources are less unbalanced. Energy communities are the the way to increase the use of renewable sources and move towards energy self-sufficiency in these territories, through: - increasing the generation of renewable energy in low-energy buildings and low-energy production processes - promoting self-consumption of renewable electricity and heat - sharing of renewable electricity between different users on local smart grids Public administration buildings and structures can be the starting point to build an energy community project. The involvement of citizens and production activities is a key factor for the development of energy communities
Level of priority	3 - crucial
Type of priority	policy / technical
Timeframe of priority	short-term

Priority:	**Enable the installation of RES in the Region (energy production)**

Priority description:	Renewable Energy Sources (RES) are essential to achieve EU targets set in the energy strategy for 2030 for the carbon neutrality goal to follow. Given the actual level of energy consumption, the RES installations should be sped up. Besides, the envisaged increase of electric consumptions for the future enable further space for RES and so does the new concept of distributed energy system, as there is the need for installation of additional power plants designed for the purpose and thus different from the past ones, in terms of size, location and operational functionality. All these reasons are coupled with a scenario of reduced capital costs for RES and an incentive system still in place, that make RES investments even more attractive than the past. Given that it is urgent to manage the situation and promote the most desirable installations, avoiding the environmental impacts or the social acceptance issues that arise whenever power plants are supposed to be installed.	
Level of priority	3 - crucial	
Type of priority	policy	
Timeframe of priority	short-term	

Priority:	**Provide financial support to municipalities and SMEs**	
Priority description:	The priority is connected to the 2021-2027 Programming Period for the promotion of energy efficiency and RES, by providing financial support and grants to the public sector the SMEs. The interventions will be aimed at reducing energy consumption and by consequence the emissions of CO2 and NOx. The measures should boost the market of deep renovation of buildings (mainly public) and the most innovative technologies of RES installations.	
Level of priority	2 - standard	
Type of priority	policy / technical	
Timeframe of priority	mid-term	

Priority:	**Promote the energy efficiency in residential buildings**	
Priority description:	The civil sector is by far the most energy intensive sector with a lot of potential for savings and production from renewables. However, several obstacles jeopardize the complete exploitation of the saving potentials. The obstacles are mainly not-technical, but are related to economic, procedural and socio-cultural issues. The greatest potential is in energy efficiency, but huge development is still available for thermal and electrical RES. The identified measures can lead, over a decade, to a renewable share of more than 40% of sector needs.	
Level of priority	3 - crucial	
Type of priority	policy / technical	
Timeframe of priority	short-term	

Priority:	**Research**

Priority description:	A further growth of renewable energy collides with some specific limitations (technological and managerial), such as: - the management of electricity flows between different users - the non-overlapping timing between solar energy supply and demand - the conversion of existing anaerobic fermentation plants from biogas to biomethane production These limitations can be overcome through targeted research and development activities. More generally, it is necessary to start a reorganization of energy research activities on the regional territory. The research topics must be consistent with the actual needs of implementation of local energy planning and with the critical issues reported by energy sector operators. In this direction, the coordination and collaboration of Regione Piemonte, universities, research centers, electricity DSO and industry must be relaunched and strengthened.	
Level of priority	2 - standard	
Type of priority	technical	
Timeframe of priority	mid-term	

Priority:	**Communication and capacity building activities**	
Priority description:	Citizens and stakeholders are at the centre of the energy transition, since they can play an essential role for successful energy actions implementation. To boost the communication strategies and capacity building activities aimed at engaging them and raising their awareness on all energy issues is thus crucial. Measures to induce behaviour change and to provide information and training can significantly contribute to the decrease of energy consumption and to a greater awareness of the need to increase energy efficiency and the use of renewable sources.	
Level of priority	3 - crucial	
Type of priority	policy	
Timeframe of priority	mid-term	

4. MISSION MAPPING

4.1 Levels of policy/governance

Given the institutional role of the Piemonte Region, in the process of the drafting of the current action plan, a consultation process has been performed in order to involve regional stakeholders belonging to the following target groups: Local public authorities association, Sectoral agencies, Infrastructure and (public) service providers/Large enterprises, Interest groups including NGOs, Business support organizations and Research institution. Hereafter, the following list of stakeholders have been invited in the consultation:

- AIEL - business group organisation (Biomass)

- AIRU - business group organisation (District heating)
- ANCE- business group organisation (Building Construction)
- ANCI - Association of Municipalities
- ASSOESCO - business group organisation (ESCo)
- Elettricità Futura - business group organisation (Energy Producers)
- EGEA - Utility (DSO)
- ENEA - Energy and Environmental Agency
- ENEL - Utility (DSO)
- ENVIPARK - Research Institute
- FIPER - business group organisation (Energy Producers)
- IREN - Utility (DSO)
- LEGAMBIENTE - Environmental Association
- SNAM S.P.A. - Utility (TSO)

4.2 Spatial focusses

Most of the measures proposed are addressed to urban and rural spaces with different approaches. This is required by the level of governance of the Region which is addressing a huge and diversified territory. More and specific details are provided in the following paragraph.

4.3 Specific measures for the transition

According to the priorities highlighted specific measures for the energy transition are envisaged.

1. GOVERNANCE

Title of measure:	**Governance table**			
Description of measure:	• Establishment of a Governance table with the local authorities (Association of municipality, Metropolitan City, Provinces, etc.) • Establishment of a Governance table with the main regional stakeholders • Annual meeting of the Governance tables			
Affected dimension	decarbonisation	Awareness		
Affected sector	All			
Spatial focus	Urban & rural			
Specific target groups	Regional stakeholders			
Involved stakeholders	Local administrators (Municipalities, Provinces, etc.), Energy Operators, Infrastructures Operators, Associations, Research Institutes, Universities, Banking Foundations			
Implementation responsibility	Piemonte Region			

2. TERRITORIAL COORDINATOR

Title of measure:	**Boost the Covenant of Mayor network**			
Description of measure:	• Increase the number of Municipalities adhering to the COM • Increase the level of participation in the network making sure that Municipalities take care of the drafting, implementation and monitoring of the plans • Design and set up capacity building actions dedicated to the network in order to boost the capacity of the Municipalities in taking profit of opportunities available in terms of financing, technical expertises and supporting services			
Affected dimension	decarbonisation	Awareness		
Affected sector	Public	All		
Spatial focus	Urban & rural			
Specific target groups	Municipalities, Union of Municipalities, Provinces			
Involved stakeholders	Energy Operators, Associations, Infrastructures managers (i.e. DSO, public transport operators, etc.), CSI Piemonte, Research Institutes, Universities, Banking Foundations			
Implementation responsibility	Piemonte Region			

Title of measure:	**Promote the energy management practice at municipal level**			
Description of measure:	• Introduce energy management practices for each public building and street light system of Piemonte in order to promote the rational use of energy and energy savings • Promote the use of standardized and common management tools/data processing methods that can ease the benchmarking activities • Develope the energy performance contracts concept as a way to promote the energy saving culture • Set up monitoring campaigns for specific public buildings			
Affected dimension	energy efficiency	decarbonisation		
Affected sector	Public			
Spatial focus	Urban & rural			
Specific target groups	Municipalities, Union of Municipalities, Provinces			
Involved stakeholders	Energy Operators, Associations, Infrastructures managers (i.e. DSO, public transport operators, etc.), CSI Piemonte, Research Institutes, Universities, Banking Foundations, Professionals			
Implementation responsibility	Piemonte Region			

Title of measure:	**Facilitation of Project Development Assistance services in the Region**

Description of measure:	• Create project pipelines that can be realized with innovative or traditional financial mechanisms • Set up technical assistance services that can ease the process • Promote the replication and standardization of tender documents and good practices			
Affected dimension	energy efficiency	decarbonisation		
Affected sector	Public			
Spatial focus	Urban & rural			
Specific target groups	Municipalities, Union of Municipalities, Provinces			
Involved stakeholders	Energy Operators (DSO, Utilities, etc), ESCOs, Research Institutions, Business developer companies.			
Implementation responsibility	Piemonte Region			

3. DATA

Title of measure:	**Energy data Observatory**		
Description of measure:	• Analysis of a broad synergy and interaction between existing energy databases and their management processes • Definition of a general architecture of a regional information system on energy data • Identification of all data providers and establishment of long-term collaboration • Enable and support the creation of macro-regional initiatives for the creation of Energy Observatories at interregional level or the exchange of best practices, data and methods among neighbouring Regions • Improve the capacity to share data and energy information among the interested stakeholders • Support the energy planning activities of the Region with data and geo-tools		
Affected dimension	decarbonisation	energy efficiency	research, innovation and competitiveness
Affected sector	All		
Spatial focus	Urban & rural		
Specific target groups	Energy Operators, DSOs, Consultants, Research Institutes, Public Authorities		
Involved stakeholders	DSOs, National Statistics Offices, Energy Operators		
Implementation responsibility	Piemonte Region		

4. GRIDS

Title of measure:	**Coordination of gas grid concession procedures**

Description of measure:	The concession procedure for the management of the distribution grid is ongoing for several years. Many bottlenecks, based on a really complicated tendering procedure, are hindering the roll out of the initiative, as planned by the law. Several contracting authorities, in charge of tendering procedures, call for a coordinated action of the Region that could ease the speed up of the ongoing process.			
Affected dimension	internal energy market			
Affected sector	All			
Spatial focus	Urban & rural			
Specific target groups	Public Authorities in charge of the tendering procedures			
Involved stakeholders	Public Authorities in charge of the tendering procedures, DSOs, National Regulation Authority			
Implementation responsibility	Piemonte Region			

Title of measure:	**Boost the informative system of the gas grid infrastructures**			
Description of measure:	Facilitate the development of the gas grid infrastructures in the Region, trying to reduce the authorization process timing and providing addresses and targets to the process			
Affected dimension	internal energy market			
Affected sector	All			
Spatial focus	Urban & rural			
Specific target groups	Network operators, DSOs, TSOs			
Involved stakeholders	DSOs, TSOs			
Implementation responsibility	Piemonte Region			

Title of measure:	**Heat mapping and boosting renewable and waste heat**			
Description of measure:	• detailed mapping of the heat demand for residential, commercial and services, with information about dimensions and use of buildings, heating and cooling plants • detailed mapping of existing district heating systems (generation, grids and users) and potential sources of renewable and waste heat supply • modelling of heat supply and demand in urban areas • investigate synergies between the wood-energy supply chains in mountain areas and district heating projects in foothills urban centers, assess the development of the integration of solar thermal and heat pumps for the valorisation of low temperature heat from geothermal energy or waste heat from industrial processes or services in district heating systems, • increasing the utilisation of the heat recovery from existing municipal waste incinerators.			
Affected dimension	decarbonisation	energy efficiency		

Affected sector	Energy	Residential	Service	Public
Spatial focus	Urban			
Specific target groups	Local DH operators,municipalities			
Involved stakeholders	Renewable and waste heat producers, DH operators, local authorities, Research Center, Universities			
Implementation responsibility	Piedmont Region Sustainable Energy Sector			

Title of measure:	**Promote the rational use of the existing networks**			
Description of measure:	Support behaviour change of end users, promoting a more rational use of the heating systems in the households (along 24 hours, instead of switch on and off attitude, smoothing, thus, the peak load when the demand is suddenly required at the beginning of the morning.			
Affected dimension	decarbonisation	energy efficiency		
Affected sector	Energy	Residential	Service	Public
Spatial focus	Urban			
Specific target groups	Local DH operators,municipalities			
Involved stakeholders	Renewable and waste heat producers, DH operators, local authorities, Research Center, Universities			
Implementation responsibility	Piedmont Region Sustainable Energy Sector			

Title of measure:	**DH strategic planning**			
Description of measure:	• Sharing ideas and development targets of the DHS of the Turin metropolitan area managed by IREN; • Assess the potential for extensive energy saving measures on buildings in urban areas, to achieve low-energy districts • Allow the existing system to enlarge the network to new urban blocks without powering it with additional combined heat and power plants, increasing of use of low-temperature heat; • Promote the introduction of RES in existing networks and new projects			
Affected dimension	energy efficiency	decarbonisation		
Affected sector	Energy	Residential	Service	Public
Spatial focus	Urban			
Specific target groups	Local DH operators, real estate managers, municipalities			
Involved stakeholders	Renewable and waste heat producers, DH operators, local authorities			
Implementation responsibility	Piedmont Region Sustainable Energy Sector			

5. ENERGY COMMUNITIES

Title of measure:	**Promotion and support of the Energy Communities**			
Description of measure:	• Promote the creation of Energy Communities where public authorities and private citizens/operators cooperate together • Boost the existing pilot initiatives by creating working groups and supporting them from legislative and technical point of view • Support the establishment of innovative solutions, disseminating best practices and case studies at EU, National and Regional level • Encourage the development of distributed generation within a secure and integrated electricity system			
Affected dimension	energy efficiency	decarbonisation		
Affected sector	Energy			
Spatial focus	Urban			
Specific target groups	Managers of local energy communities, local authorities			
Involved stakeholders	Managers of public buildings and plants, renewable energy operators, building renovation operators, municipalities			
Implementation responsibility	Piedmont Region Sustainable Energy Sector			

6. RES

Title of measure:	**Update of the regional legislative framework**			
Description of measure:	Review and update of regional legislation, in the framework of the national legal system, aimed at providing the competent authorities (Provinces) with specific "guidelines" for the authorization of projects.			
Affected dimension	decarbonisation	energy efficiency	internal energy market	research, innovation and competitiveness
Affected sector	Energy	Public		
Spatial focus	Urban & rural			
Specific target groups	Public Authorities in charge of the tendering procedures			
Involved stakeholders	Public Authorities in charge of the tendering procedures, Utilities, ESCO, Energy Companies			
Implementation responsibility	Piemonte Region - Sustainable Sector			

Title of measure:	**Identification of areas with specific energy vocation identification of further potentialities for RES**

Description of measure:	Increase the quality of RES installations in terms of environmental impacts, added value for the whole energy system, etc. Increase the social acceptance of RES installations Identify the best locations of RES and their specific development potentialities			
Affected dimension	decarbonisation	energy efficiency	internal energy market	research, innovation and competitiveness
Affected sector	Energy	Public		
Spatial focus	Urban & rural			
Specific target groups	Public Authorities, Energy Companies, ESCO			
Involved stakeholders	Public Authorities in charge of the tendering procedures, Utilities, ESCO, Energy Companies			
Implementation responsibility	Piemonte Region - Sustainable Sector			

Title of measure:	**Information tools to support the installation of RES**			
Description of measure:	• Creation of a shared knowledge framework between the Region, Local Authorities and energy operators regarding the geo-referenced state of the art of all electricity production plants powered by renewable sources. This tool should be, on one hand, a valid support for the assessment activity of the public authorities and on the other hand a useful support for fine tuning the proposals of localization of new RES projects for market operators. • Increase the level of digitalization for the submission and assessment of the requests for new RES projects			
Affected dimension	decarbonisation	energy efficiency	internal energy market	research, innovation and competitiveness
Affected sector	Energy	Public		
Spatial focus	Urban & rural			
Specific target groups	Public Authorities, Market Operators			
Involved stakeholders	Public Authorities, Utilities, market operators			
Implementation responsibility	Piemonte Region, Utilities			

7. FINANCE/GRANTS

Title of measure:	**Promotion of deep renovation of public buildings and facilities**			
Description of measure:	The measure is addressed to boost the deep renovation of public buildings (schools, sports facilities, municipal offices, multifunctional buildings, social housing, etc.). This should be done with an overall refurbishment of the buildings using advanced, innovative and environmentally friendly technologies. Demonstration projects that can play an exemplary role should be privileged. According to recent guidelines of the use of ERDF, energy efficiency interventions can be integrated with seismic adaptation ones and this is an opportunity in order to avoid bottlenecks of the past.			
Affected dimension	decarbonisation	energy efficiency	energy security	Awareness

Affected sector	Energy	Public		
Spatial focus	Urban & rural			
Specific target groups	Public Authorities			
Involved stakeholders	Public Authorities			
Implementation responsibility	Piemonte Region			

Title of measure:	**Promotion of the integration of RES in energy efficient public and industrial buildings.**			
Description of measure:	The measure aims at promoting the most innovative and "less mature" renewable technologies for heating and cooling, in public buildings, social housing and industrial processes of SMEs, with specific forms of grants and financial provisions. On the basis of the results of research in the energy field, it will be possible to: ● integrate the energy efficiency interventions of buildings with the most efficient solutions for the production of energy from renewable sources also through the use of daily or seasonal storage systems, ● promoting biomass plants limited to certain contexts and on condition that the best technologies are used from an energy-emission point of view. Demonstration projects that can play an exemplary role should be privileged.			
Affected dimension	decarbonisation	energy efficiency	energy security	Awareness
Affected sector	Energy	Public		
Spatial focus	Urban & rural			
Specific target groups	Public Authorities			
Involved stakeholders	Public Authorities			
Implementation responsibility	Piemonte Region			

8. EE-RES

Title of measure:	**Promote deep renovation investments in residential buildings and social housing**			
Description of measure:	The measure aims at setting technical standards, protocols and contractual arrangements able to guarantee energy savings performance in residential buildings and social housing. The measure must be implemented with a package of defined and standardized procedures that will be delivered by a one-stop-shop approach in order to build trust among end users. This should be coupled with communications efforts in order to reach the audience.			
Affected dimension	energy efficiency			
Affected sector	Residential			
Spatial focus	Urban			
Specific target groups	Condominium, Social Housing			
Involved stakeholders	Condominium Managers, Social Housing companies, ESCOs, Utilities, Energy Operators, Municipalities, Environmental Associations, Energy experts			

Implementation responsibility	Piemonte Region

Title of measure:	**Renewables share increase in residential thermal uses**			
Description of measure:	• Promoting progressive and significant penetration of thermal renewables in the residential sector • Promoting the spread of technologies, such as hybrid boiler/heat pump devices and solar thermal systems, which can be easily integrated into the current residential energy context • Maintenance of the use of thermal energy where its storage allows to limit electrical uses and storages			
Affected dimension	energy efficiency	decarbonisation		
Affected sector	Residential			
Spatial focus	Urban & rural			
Specific target groups	Citizens and condominium manager			
Involved stakeholders	Local administrators (Municipalities, Provinces, etc.), thermotechnical engineers and operators and their professional associations, ESCOs			
Implementation responsibility	Piemonte Region			

Title of measure:	**Promoting relevance and environmental compatibility of biomass use**			
Description of measure:	• Reduction of energy needs of biomass heated buildings • Massive replacement of biomass generators with low emission generators • Increased awareness and education of final users • Development of local and sustainable supply chains for woody biomass, able to continuously provide quality fuels. Activation of the forestry sector as an essential element in the transformation of biomass consumption from a refuge fuel to a modern renewable resource.			
Affected dimension	energy efficiency	decarbonisation		
Affected sector	Residential			
Spatial focus	Rural			
Specific target groups	Citizens and condominium manager, Forestal sector companies			
Involved stakeholders	Local administrators (Municipalities, Provinces, etc.), thermotechnical engineers and operators and their professional associations, Insurance companies			
Implementation responsibility				

9. RESEARCH

Title of measure:	**management systems for renewable electricity sharing**

Description of measure:	Research, development and experimentation of: ● technical-economic management tools for electricity flows between different subjects and production and consumption sites, ● tools to control and coordinate the demand for electricity on different subjects and consumption sites ● daily and weekly storage systems of heat for industrial and civil users, ● seasonal thermal storage solutions in district heating systems ● small-scale plants for the upgrade from biogas to biomethane ● technical solutions for grid connection and consumer distribution of biomethane production			
Affected dimension	decarbonisation			
Affected sector	Energy			
Spatial focus	Urban & rural			
Specific target groups	universities, research centers, real estate managers, municipalities			
Involved stakeholders	electricity DSO and wholesalers			
Implementation responsibility	Regional energy planning manager, Regional research manager			

Title of measure:	**Supporting the 'hydrogen supply chain' for the decarbonisation of the regional economy**			
Description of measure:	● support the strengthening of the hydrogen supply chain by developing and supporting companies for the development of systems for production and for the implementation of plants in the mobility and energy sectors. ● financially support the R&D investments in the technological production system ● promote and coordinate the supported activities			
Affected dimension	decarbonisation			
Affected sector	Energy			
Spatial focus	Urban & rural			
Specific target groups	innovation cluster, universities, research centers, industry			
Involved stakeholders	research and innovation centers, high education institutions, energy companies, public administrations			
Implementation responsibility	Regional energy planning manager, Regional research manager			

10. COMMUNICATION & TRAINING

Title of measure:	**Boost communication and awareness raising campaign for citizens and local authorities**

Description of measure:	• Set the standards to facilitate local authorities commitment to the implementation of communication and educational activities dedicated to energy efficiency • Boost communication and promotion activities targeted to citizens about actions and behaviours that improve the energy transition • Boost communication and promotion activities targeted to local authorities about actions and measures that improve the energy transition			
Affected dimension	Awareness	energy efficiency	decarbonisation	
Affected sector	All			
Spatial focus	Urban & rural			
Specific target groups	Local authorities, citizens, students			
Involved stakeholders	Associations, Research Institutes, Universities, Professionals			
Implementation responsibility	Piemonte Region			

Title of measure:	**Engagement and networking activities**			
Description of measure:	• Adopt a participatory approach: involve citizens, local authorities and stakeholders in the action plan implementation and monitoring activities • Include stakeholders in the decision making process • Promote networking activities of local authorities which are developing similar projects • Boost the networking activity of Piemonte Region at regional, national and European level			
Affected dimension	Awareness	energy efficiency	decarbonisation	
Affected sector	All			
Spatial focus	Urban & rural			
Specific target groups	Local authorities, citizens, regional stakeholders			
Involved stakeholders	Energy Operators, Associations, Infrastructures managers (i.e. DSO, public transport operators, etc.), CSI Piemonte, Research Institutes, Universities, Banking Foundations, Professionals			
Implementation responsibility	Piemonte Region			

Title of measure:	**Enhance capacity building**			
Description of measure:	Promote training activities targeted to local stakeholders and professionals Promote training activities targeted to local authorities staff Train the building managers on regional legislation and promote their role as energy advisors with the homeowner			
Affected dimension	Awareness	energy efficiency	decarbonisation	
Affected sector	All			
Spatial focus	Urban & rural			

Specific target groups	Local authorities staff, professionals
Involved stakeholders	Energy Operators, Associations, Infrastructures managers (i.e. DSO, public transport operators, etc.), CSI Piemonte, Research Institutes, Universities, Banking Foundations, Professional Orders
Implementation responsibility	Piemonte Region

4.4 Enabling and restraining factors

Title of measure:	**Governance table**	
SWOT	*Description of factors*	*Weight*
Strengths	• Piemonte Region has involved since years local authorities and stakeholders in the decision making process in the framework of the energy policies. • The Regional Law on Energy Planning foresees the meeting of a Regional forum during the endorsement process of a regional Plan • Good personal relationships have been already established with the most relevant players at regional and even national level. • The Region successfully organized several stakeholders meetings	2 - medium
Weaknesses		
Opportunities	• New ideas and cooperation projects could be set up during discussions in forums	2 - medium
Threats		

Title of measure:	**Boost the Covenant of Mayor network**	
SWOT	*Description of factors*	*Weight*
Strengths	• A good number of adhesion to the COM • Available good practices realized in the last 5 years by leading Municipalities • Torino Capital City as EU recognized leading City in fighting Climate Change	2 - medium
Weaknesses	• Large number of very small Municipalities with reduced capacity from technical and financial point of view • Parts of the Region that have never approached seriously the issue, as in the past the adhesion has been pushed by the strong support (financial or technical) made available only in specific areas of the Region • A large number of passive municipalities in the network • No municipalities, save the Capital City, has a dedicated staff assigned to sustainable energy promotion	1- high

Opportunities	• Energy efficiency and promotion of RES will be kept as a top priority even in the upcoming future (next programming period): incentives and opportunities for implementing projects will be available as in the past and even more • Climate crisis is in the political agenda of all parties and is a key priority for the citizens • The number of Unions, Associations and any kind of aggregations of Municipalities is increasing	1- high
Threats	• Availability of data is still an issue in terms of updates and accuracy. DSO and market operators level of collaboration is critical • Limited evidence of tangible benefits in joining the COM • Unusual practice to keep a long-term policy strategy by most of the municipalities	3 - low

Title of measure:	**Promote the energy management practice at municipal level**	
SWOT	*Description of factors*	*Weight*
Strengths	• The experience already gained by Piemonte Region on this topic and envisaged solutions for some defined barriers already focused • Some best practices existing that can be used as inspiration by others	2 - medium
Weaknesses	• Too many municipalities with low technical skills • Energy costs are managed only as a cost and not as consumptions. Lack of clear benchmarking data to compare excessive costs • Lack of structured energy management practice in the municipalities	2 - medium
Opportunities	• Great opportunities to enhance the energy efficiency level of buildings and obtain energy savings only by adopting energy management practice • Budgetary shortage for public authority boosts the need to save costs in their yearly budget • Innovative financing schemes (such as the Energy Performance Contract) can be used to combine deep renovation with sound energy management and attention to the impact of the measures implemented	3 - low
Threats	• Presence on the market of unfair contract conditions that are not creating any incentive to energy saving measures • The urgency of safety issues (asbestos, seismic stability or virus outbreak) can postpone the urgency of a systemic approach to energy consumption of public buildings/street lightning	2 - medium

Title of measure:	Facilitation of Project Development Assistance services in the Region	
SWOT	*Description of factors*	*Weight*
Strengths	• Existence of a certain, though limited, number of successful projects that can be replicated • Presence of aggregation unit on the territory that can act as territorial coordinators	3 - low
Weaknesses	• A very fragmented territory with small projects that can be difficulty bundled together • Presence of staff in the public sector that is not exclusively focused on energy issue	1- high
Opportunities	• Available financing and incentives schemes that can be used to develop sustainable project investments • Legislative standards that push the public sector to keep on investing in energy efficiency • Reduced investment costs for renewable energy installations and for some of the energy efficiency measures • Importance of the topic climate change in the public opinion and to get public consensus. Public buildings or street light are also sectors where citizens put always an eye on, so that their refurbishment is very important	1- high
Threats	• Legislative framework unstable and unclear for most of innovative approaches • The urgency of safety issues (asbestos, seismic stability or virus outbreak) can postpone the urgency of a systemic approach to energy consumption of public buildings/street lightning	2 - medium

Title of measure:	Energy data Observatory	
SWOT	*Description of factors*	*Weight*
Strengths	• pre-existing structuring of information systems on a regional scale (smart data platform) • previous experience in the management of energy statistics for the Covenant of Mayors	1- high
Weaknesses	• huge fragmentation of skills and processes for acquiring and managing energy data • fragmented and widespread number of data providers	2 - medium
Opportunities	• ongoing activities at regional level for the structuring of information tools for energy management in the public administration	2 - medium

Threats	• Privacy rules that could hinder the capacity of sharing data and providing useful open data to the public	3 - low

Title of measure:	**Coordination of gas grid concession procedures**	
SWOT	*Description of factors*	*Weight*
Strengths	# First case studies of tendering procedures implemented till the final phase is in Piemonte. This can be inspiring for others	3 - low
Weaknesses	# Legislative and regulation framework changed several times # The procedure is very complicated with feedback loops from the National Regulation Authority that require to start the process more than once	1- high
Opportunities	# The implementation of the tendering procedures could open the way to a new season of huge investments in the gas grid infrastructures and in energy efficiency measures	1- high
Threats	# Reluctance of actual DSOs to cooperate in the process	3 - low

Title of measure:	**Boost the informative system of the gas grid infrastructures**	
SWOT	*Description of factors*	*Weight*
Strengths	• Widely spread gas network in the Region	3 - low
Weaknesses	• NIMBY effect. Reluctance on the societal acceptance • Environmental Impact of the infrastructures	2 - medium
Opportunities	• Benefits from upgraded infrastructures	3 - low
Threats	• Distraction of investments towards other regions	3 - low

Title of measure:	**Heat mapping and boosting renewable and waste heat**	
SWOT	*Description of factors*	*Weight*
Strengths	• good availability of data on existing district heating plants • good availability of data about thermal demand • widespread presence of existing district heating networks • availability of heat from the existing municipal waste incinerator near the main urban area	1- high

Weaknesses	• missing or inhomogeneous data about building construction and energy plants • missing or inhomogeneous data about building renovations • technical limits of existing district heating systems and users for low temperature heat • lack of coordination in urban planning actions	2 - medium
Opportunities	• data collection during future building renovation campaigns • modernization or change of type in the heating of buildings • revamping period for existing district heating plants • european efficiency and decarbonization campaigns for power production • Green Deal financial opportunities	1- high
Threats	• incomplete analysis, in terms of space and type of user • reluctancy to innovation by traditional operators • reduced investment capacity	2 - medium

Title of measure:	**Promote the rational use of the existing networks**	
SWOT	*Description of factors*	*Weight*
Strengths	• Large DHS networks with a long term vision	1- high
Weaknesses	• Consolidated behaviour of customers that is not matching with the best operational need of the DHS	1- high
Opportunities	• Improve the overall efficiency of the system without hard investments • Reduce the environmental impact of the heating production	2 - medium
Threats	• Resistance to change	2 - medium

Title of measure:	**DH strategic planning**	
SWOT	*Description of factors*	*Weight*
Strengths	• Previous experience acquired in district heating planning for the Turin area	1- high
Weaknesses	• Gaps in the technical competence of district heating operators on low temperature • Failure to update previous planning tools	2 - medium
Opportunities	• Partition of the territory into homogeneous areas of intervention for the sustainable development strategy • Synergistic role of district heating in achieving local air quality	2 - medium
Threats	• Lack of coordination with other spatial planning tools (air quality, urban planning) • Reluctance in setting up transparent and open discussion between district heating operators and planning authorities for long term strategic business plans	2 - medium

Title of measure:	Promotion and support of the Energy Communities	
SWOT	*Description of factors*	*Weight*
Strengths	• regional law and initiative on local energy communities (first in Italy) • diffusion of local energy utilities • diffusion of remote reading of meters on energy networks	2 - medium
Weaknesses	• large gaps in detailed energy data on a local scale • poor energy planning competence at the level of municipalities and local authorities • great fragmentation and inhomogeneity in the technical and organizational methods of energy management in the Public Administration	2 - medium
Opportunities	• recent openings in the European and national regulation of energy exchanges between users through the grid • national incentives for building renovation and installation of renewable sources in buildings • growing needs for energy accountability in the Public Administration • reduction of costs to be achieved in energy management in the Public Administration	1- high
Threats	• residual obstacles in the technical and administrative rules of energy exchanges between users through the network • non-homogeneity and gaps in application in national rules on energy communities • lack of coordination between municipalities	2 - medium

Title of measure:	Update of the regional legislative framework	
SWOT	*Description of factors*	*Weight*
Strengths	• a consolidated technical expertise in the competent body for the authorization procedures	2 - medium
Weaknesses	• risk of more bureaucratic procedures, more documents to be produced • recurrent updating procedure need • different guidelines for every Region can be an obstacle for the free market development	2 - medium
Opportunities	• modern and effective authorization procedures che improve the scheduling of planned investments in RES and provide the framework for better investments attraction and better energy planning procedures	3 - low

Threats	• EU and National rule framework change • fast technology innovation needs recurring new and updated rules • increasing number of requests of installations could create bottlenecks in the capacity of permitting authorities to asses projects in due time	1- high

Title of measure:	**Identification of areas with specific energy vocation identificaiton of further potentialities for RES**	
SWOT	*Description of factors*	*Weight*
Strengths	• a consolidated technical expertise in the competent body for the authorization procedures	2 - medium
Weaknesses	• very demanding work for obtaining an effective tool and a sound regional mapping. The process could, thus, take long and not provide effective answers to the market and the envisaged investments	2 - medium
Opportunities	• increasing the knowledge of the territory can pave the way for an increase thorough planning process • the creation of new investment assessment tool for companies who wants to invest in the Region can provide transparency in the market and derisk the investments program • increased overall awareness about RES potentiality in specific territorial areas can improve the sustainability of new installations	1- high
Threats	• EU and National rule framework change • fast technology innovation needs recurring new and updated rules • increasing number of requests of installations could create bottlenecks in the capacity of permitting authorities to asses projects in due time	2 - medium

Title of measure:	**Information tools to support the installation of RES**	
SWOT	*Description of factors*	*Weight*
Strengths	• a consolidated technical expertise in the competent body for the authorization procedures • a consolidated approach in setting up dialogues with the most relevant stakeholders	2 - medium
Weaknesses	• specific training for the Local Authorities staff must be planned to make the best use of innovative tools • very long and demanding work for obtaining an effective tool • recurrent data updating	2 - medium

Opportunities	• increasing the knowledge of the territory can pave the way for an increase thorough planning process • the creation of new investment assessment tool for companies who wants to invest in the Region can provide transparency in the market and derisk the investments program • increased overall awareness about RES potentiality in specific territorial areas can improve the sustainability of new installations	1- high
Threats	• EU and National rule framework change • fast technology innovation needs recurring new and updated rules • increasing number of requests of installations could create bottlenecks in the capacity of permitting authorities to asses projects in due time	1- high

Title of measure:	**Promotion of deep renovation of public buildings and facilities**	
SWOT	*Description of factors*	*Weight*
Strengths	• the renovation of public buildings has been a key measure for years and it is considered one of the main fields of action for all the Local Authorities, so there is a great acceptance of such interventions in the target group • several good practices are already in place and could be of example in up scaling the renovation wave • financial help for renovation in the public sector is needed • energy and financial saving for the public authorities that own the buildings is a tangible results • there is the opportunity for the dissemination of new technologies in the public schools through the users of such buildings, creating a snowball effect	2 - medium
Weaknesses	• long bureaucratic procedures in the management of funds • difficulty for Local Public Authorities in respecting the deadlines of the calls • difficulty for Local Authorities in finding funds for co-financing the projects • normative restrictions are often an obstacle for good projects • high educated and specifically trained public staff is lacking, mostly in small municipalities	2 - medium

Opportunities	• energy saving and finance saving in the public sector could increase the capacity of Local Authorities to implement additional projects in the future • renovated buildings increase the comfort of users and their quality of life • a set of interesting additional incentives and subsidies are available and are expected to be increased in the future • the energy efficiency and RES market is growing at regional level and additional investments can create new jobs	1- high
Threats	• mismatching between EU fund programmes and economical balances of Local Authorities • Local Authorities resources shortage for co-financing or managing upfront costs • lack of experience and competence in the building companies • since Public Building estate is generally old, any energy saving renovations should involve other maintenance works that would raise the overall investment costs. Unexpected issues could rise along with the implementation of the works, hindering the accomplishments of the projects in due time	2 - medium

Title of the measure	**Promotion of the integration of RES in energy efficient public and industrial buildings.**	
SWOT	*Description of factors*	*Weight*
Strengths	• the renovation of public buildings has been a key measure for years and it is considered one of the main fields of action for all the Local Authorities, so there is a great acceptance of such interventions in the target group • several good practices are already in place and could be of example in up scaling the renovation wave • financial help for renovation in the public sector is needed • energy and financial saving for the public authorities that own the buildings is a tangible results • there is the opportunity for the dissemination of new technologies in the public schools through the users of such buildings, creating a snowball effect	2 - medium
Weaknesses	• long bureaucratic procedures in the management of funds • difficulty for Local Public Authorities in respecting the deadlines of the calls • difficulty for Local Authorities in finding funds for co-financing the projects • normative restrictions are often an obstacle for good projects • high educated and specifically trained public staff is lacking, mostly in small municipalities	2 - medium

Opportunities	• energy saving and finance saving in the public sector could increase the capacity of Local Authorities to implement additional projects in the future • renovated buildings increase the comfort of users and their quality of life • a set of interesting additional incentives and subsidies are available and are expected to be increased in the future • the energy efficiency and RES market is growing at regional level and additional investments can create new jobs	1- high
Threats	• mismatching between EU fund programmes and economical balances of Local Authorities • Local Authorities resources shortage for co-financing or managing upfront costs • lack of experience and competence in the building companies • since Public Building estate is generally old, any energy saving renovations should involve other maintenance works that would raise the overall investment costs. Unexpected issues could rise along with the implementation of the works, hindering the accomplishments of the projects in due time • #new technologies not yet applied in Piemonte Region, the result could, thus, be less effective than expected as need to be tested	2 - medium

Title of measure:	**Promote deep renovation investments in residential buildings and social housing**	
SWOT	*Description of factors*	*Weight*
Strengths	• Good spread of private money saving. Presence of significant and stable public incentive schemes	3 - low
Weaknesses	• Scarce presence of renewables and, consequently, limited information and investment propensity of building owners • The ownership fragmentation can hamper a rapid and extensive integration/replacement of heating systems, as well as necessary.	1- high
Opportunities	• Favourable incentives schemes available • High potential for energy savings and for RES integration	1- high
Threats	• Uneven number of interventions in time and space. • Realization of interventions not driven by energy appropriateness, but by mere economic convenience (for the owner or the contractor).	2 - medium

Title of measure:	**Renewables share increase in residential thermal uses**	
SWOT	*Description of factors*	*Weight*

Strengths	• Significant spread of direct ownership of houses by tenants • Good spread of private money saving. Presence of significant and stable public incentive schemes	2 - medium
Weaknesses	• Scarce presence of renewables and, consequently, limited information and investment propensity of building owners • The ownership fragmentation can hamper a rapid and extensive integration/replacement of heating systems, as well as necessary.	1- high
Opportunities	• Continental climate strongly mitigated by Mediterranean influences, which enable solar and air heat pump technologies to be used effectively • Interesting incentives systems available	1- high
Threats	• Uneven number of interventions in time and space. • Realization of interventions not driven by energy appropriateness, but by mere economic convenience (for the owner or the contractor).	2 - medium

Title of measure:	**Promoting relevance and environmental compatibility of biomass use**	
SWOT	*Description of factors*	*Weight*
Strengths	• Huge potentialities for replacement of past generators	1- high
Weaknesses	• Critical air quality in the Po valley. Wide diffusion of old, poor quality wood biomass generators, mostly not known by thermal cadastre.	1- high
Opportunities	• The market could help the forestry economy and generate positive externalities in rural areas and in the creation of local jobs	2 - medium
Threats	• Widespread use of self collected and not good quality wood in private households	2 - medium

Title of measure:	**management systems for renewable electricity sharing**	
SWOT	*Description of factors*	*Weight*
Strengths	• high potential for new solar power, especially on buildings • high potential for solar heat for buildings and industrial process • widespread presence on the regional territory of biogas production plants from agricultural and agro-industrial activities	1- high

Weaknesses	• difficulty in managing the electricity flows between different subjects, production and consumption sites • difficulty in reconciling solar heat supply and demand on a time basis (daily, seasonal) • current use of biogas entirely oriented to the generation of electricity in small plants (<1 MWe) • unavailability of reliable and economically viable technological solutions for the upgrade of biogas to biomethane	2 - medium
Opportunities	• significant increase in the share of electricity generation from renewables • significant increase in the share of heat generation from renewables • significant increase in the share of renewable fuels in transport	1- high
Threats	• inertia of energy operators and potential self-producers, due to uncertainty on the economic valorisation of the energy produced • inability to exploit the available potentials	1- high

Title of measure:	**Supporting the 'hydrogen supply chain' for the decarbonisation of the regional economy**	
SWOT	*Description of factors*	*Weight*
Strengths	• several research structures in the regional territory that have knowledge and experience in the hydrogen topic • presence of leading enterprises in transport sector that can implement pilot projects	1- high
Weaknesses	• shortage of endogenous financing capacity for research	2 - medium
Opportunities	• great interest in hydrogen research at regional, national and European level • growing market across Europe and interest in the green hydrogen production • excess of electricity production in the region that can be stored as hydrogen	2 - medium
Threats	• actual high costs of hydrogen production	2 - medium

Title of measure:	**Boost communication and awareness raising campaign for citizens and local authorities**	
SWOT	*Description of factors*	*Weight*

Strengths	• Piemonte Region has already carried out several communication campaigns related to energy efficiency both in the context of its institutional activities and in the context of the European projects in which it is involved • The regional institutional communication channels (website, newsletters..) and social media have an impressive number of followers, which is quite a good starting point for dissemination activities	2 - medium
Weaknesses	• The lack of adequate financial resources for communication and education campaigns and for the organization of public events dedicated to energy efficiency	2 - medium
Opportunities	• The increasing number of dissemination campaign and events at national level related to energy and climate topics addressed to raise citizens awareness • A new national financial incentive dedicated to the energy efficiency of buildings is catalyzing Italian citizens' attention on aspects related to energy saving. It works like a sort of indirect communication and awareness raising campaign.	2 - medium
Threats	• Communication is often not perceived as a basic element to support an effective implementation of energy efficiency projects	1- high

Title of the measure	**Engagement and networking activities**	
SWOT	*Description of factors*	*Weight*
Strengths	• Several tables with regional stakeholders have been already set up (i.e. on Action Plan measures , on energy communities) and quite good personal relationships have been already established with the most relevant players at regional and even national level. • Good experience in supporting municipalities to gather in order to work together on a project • Good experience in networking activities at all level	1- high
Weaknesses	• Since now the Piemonte Region attitude toward citizenship involvement has not been so proactive • Engagement actions, in particular those of local authorities, require a considerable amount of time and organizational forces	3 - low
Opportunities	• The scenario offered by the carrying out the activities and monitoring the Action Plan gives the opportunity to open consultation tables in which citizens and stakeholders can actively participate	1- high
Threats		

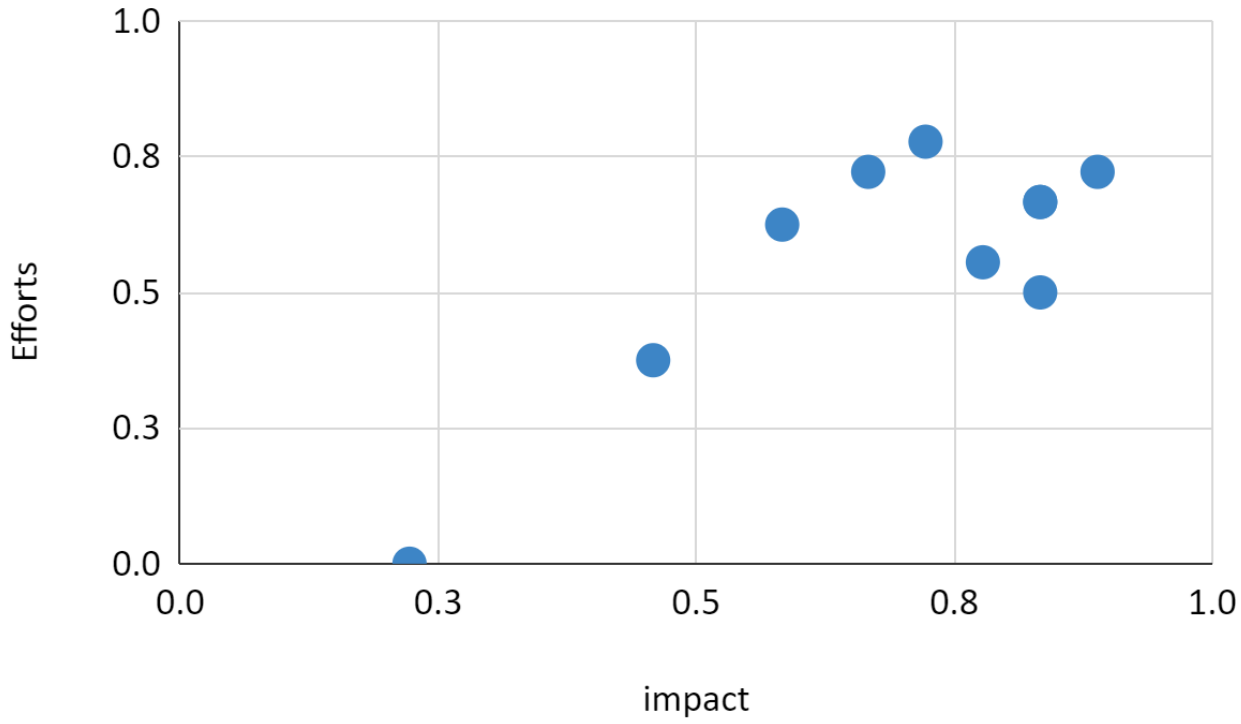
Title of measure:	Enhance capacity building	
SWOT	*Description of factors*	*Weight*
Strengths	• Credibility of Piemonte Region as organizer or promoter of training courses and materials • Good experience • Good relationships with professional orders	1- high
Weaknesses	• Training activities require a considerable effort and a large amount of time and organizational forces	2 - medium
Opportunities	• The COVID situation has lead the public administration to a more intensive use of webinars, which can be a useful tool for training sessions organization as they need less waste of time for participants (no need to move), less financial resources to be organized and at the same time they are a good way to promote energy saving.	3 - low
Threats	• Lack of time to be dedicated to training activities • Limited financial resources of local authorities to be employed for training activities • Italian complex legislative and administrative framework concerning energy thematics	2 - medium

4.5 Challenges, estimation of efforts and impact

An impact efforts assessment of all the priorities has been implemented. The methodology foresaw the qualitative scoring (high, medium, low) of the SWOT analysis. The qualitative assessment was translated into numbers (1, 2, 3). The Impact was based on the scores assigned to Strengths and Opportunities, whereas the Efforts on the basis of the scores to Weakness and Threats. The following table shows the result of the assessment, which is also displayed in a graph. The latter gives an overview of how almost all the priorities are places in the quadrant where impact and efforts are higher.

Priorities	Impact	Efforts
Governance	0.2	0.0
Territorial Coordinator	0.7	0.7
Data	0.8	0.5
Grids	0.9	0.7
Energy Communities	0.8	0.7
RES	0.7	0.8
Finance/Grants	0.8	0.7

EE-RES	0.6	0.6
Research	0.5	0.4
Communication/training	0.8	0.6



5. ACTION DEFINITION

On the basis of the measures described beforehand, it is possible to identify several actions to be put in place. Those actions are grouped according to the following categories:

- Energy efficiency
- Renewable energy supply
- Sustainable infrastructure and spatial development
- Catalyzing factors: awareness, education, information

Some of the envisaged actions have a transversal approach, so they are categorized according to the most pertinent group, as detailed in the following table.

Priority	***Measures***	**Energy efficiency**	**Renewable energy supply**	**Sustainable infrastructure**	**Catalyzing factors**
Governance	*Governance table*				**X**

Territorial Coordinator	*Boost the Covenant of Mayor network*				**X**
	Promote the energy management practice at municipal level	**X**			
	Facilitation of Project Development Assistance services in the Region	**X**			
Data	*Energy data Observatory*				**X**
Grid	*Coordination of gas grid concession procedures*			**X**	
	Boost the informative system of the gas grid infrastructures			**X**	
	Heat mapping and boosting renewable and waste heat			**X**	
	Promote the rational use of the existing networks			**X**	
	DH strategic planning			**X**	
Energy Communities	*Promotion and support of the Energy Communities*		**X**		
Enable the installation of RES in the Region	*Update of the regional legislative framework*		**X**		
	Identification of areas with specific energy vocation identification of further potentialities for RES		**X**		
	Information tools to support the installation of RES		**X**		
Provide financial support to municipalities and SMEs	*Promotion of deep renovation of public buildings and facilities*	**X**			
	Promotion of the integration of RES in energy efficient public and industrial buildings.	**X**			
Promote the energy efficiency/RES	*Promote deep renovation investments in residential buildings and social*	**X**			

in residential buildings	*housing*				
	Renewables share increase in residential thermal uses		**X**		
	Promoting relevance and environmental compatibility of biomass use		**X**		
Research	*Management systems for renewable electricity sharing*				**X**
	Supporting the 'hydrogen supply chain' for the decarbonisation of the regional economy				**X**
Communication and capacity building activities	*Boost communication and awareness raising campaign for citizens and local authorities*				**X**
	Engagement and networking activities				**X**
	Enhance capacity building				**X**

As far as Sustainable mobility is concerned, the actions are not mentioned, as this part is developed in the Regional Transport Plan. Nevertheless the impacts of the energy transition on such sector are included in the following chapter dedicated to the scenarios assessment.

5.1 Energy efficiency

Measure	**Promote the energy management practice at municipal level**
Priority	TERRITORIAL COORDINATOR
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Provision of standardized and automatic data collection procedures for Municipalities • Set up of assessment cloud tools/services to benchmark energy data • Identification and promotion of good practices for energy management (procedures, contract templates, network of energy managers, evaluation studies, etc..) • Construction/promotion of energy mapping of public buildings and street light

	• Promotion of energy audit campaign for public buildings/street light systems • Promotion of the use of smart metering and monitoring campaign for groups of Municipalities
Instruments to	
planning	
policy	
financial	
organisational	Networks
business	
communication	workshops and events, dissemination
technical	online tools

Measure	**Facilitation of Project Development Assistance services in the Region**
Priority	TERRITORIAL COORDINATOR
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Promote actions for the aggregation of the demand (bundling and pooling small investments for promoting bigger projects pipelines that might attract the interest of ESCOs). • Set up financial mechanisms, complementary to the available incentives at national level, in order to achieve deep renovation standards and focus on impact of the investment measures (energy savings, etc..) • Provision of standardized technical and legal support for the promotion of innovative financial mechanism, such as Energy Performance Contracting
Instruments to	
planning	
policy	Policy recommendation, guidelines
financial	Access to EU finance
organisational	Networks and Memorandum of Understanding for the aggregation of demand
business	Standardization of business models and procedures
communication	workshops and events
technical	Project Development Assistance service

Measure	Promotion of deep renovation of public buildings and facilities
Priority	PROVIDE FINANCIAL SUPPORT TO MUNICIPALITIES AND SMES
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Revise the terms of reference of the calls launched in the past, assess the bottlenecks and the overall procedures in order to smooth the process • Design the new terms of reference of the calls trying to reduce the administrative burden and make possible the use of more innovative financing scheme whenever useful • Manage the calls and assess projects • Draft communicative reports on the results achieved and make them publicly available • Set up a catalogue of best practices in order to increase the visibility and dissemination of exemplary solutions
Instruments to	
planning	
policy	Revise the regulatory framework of funding calls
financial	Calls management and assessment
organisational	
business	
communication	Best practices catalog
technical	reports on the results

Measure	Promote deep renovation investments in residential buildings and social housing
Priority	PROMOTE THE ENERGY EFFICIENCY IN RESIDENTIAL BUILDINGS
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Dialogue with market operators in order to define business as usual approach and discuss about the introduction of guaranteed performance in their offers • Dialogue with the demand sector (Condominium managers and social housing associations) for identifying needs, sell the guaranteed performance as a key for deep renovation, etc. • Set up standards, procedures, contracts, etc. that can be offered to the market operators as a new business opportunity in line with the concept of energy efficiency guaranteed performance contracts. The service has to be provided to the market with a one-stop-shop approach. • Engage the demand sector with communication activities in order to promote the one-stop-shop service delivered."
Instruments to	

planning	
policy	Reference documents for energy efficiency renovation
financial	
organisational	Tables of discussion
business	
communication	Communication
technical	Technical assistance (one-stop-shop)

5.2 Renewable energy supply

Measure	**Promotion of the integration of RES in energy efficient public and industrial buildings.**
Priority	PROVIDE FINANCIAL SUPPORT TO MUNICIPALITIES AND SMES
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Revise the terms of reference of the calls launched in the past, assess the bottlenecks and the overall procedures in order to smooth the process • Design the new terms of reference of the calls trying to reduce the administrative burden and make possible the use of more innovative financing scheme whenever useful • Manage the calls and assess projects • Draft communicative reports on the results achieved and make them publicly available • Set up a catalogue of best practices in order to increase the visibility and dissemination of exemplary solutions
Instruments to	
planning	
policy	Revise the regulatory framework of funding calls
financial	Calls management and assessment
organisational	
business	
communication	Best practices catalog
technical	reports on the results

Measure	Promotion and support of the Energy Communities
Priority	DEVELOPMENT OF ENERGY COMMUNITIES
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Provide technical assistance support to those Municipalities and regional areas aiming at establishing Energy Communities. This will be done, on one hand, supporting the verification of portion of distribution network they belong to (in terms of distribution of electricity demand, network constraints and criticalities, its development potential and centralized storage systems), on the other hand supporting the access to detailed energy consumption data and electric peak load management tools • Organize workshops and networking activities in order to share information, visions and analysis among local authorities developing Energy Communities • Support the establishment of Energy Communities with financial support for feasibility studies and planning activities • Harmonize Regional legislation with the National ones • Promote and support initiatives that enables energy communities to tackle the energy poverty issue • Organize training for local public officials and executives on local energy management and energy communities
Instruments to	
planning	
policy	Regional legislation
financial	financial support
organisational	training and networking activities
business	
communication	workshops
technical	technical assistance support

Measure	Update of the regional legislative framework
Priority	ENABLE THE INSTALLATION OF RES IN THE REGION (ENERGY PRODUCTION)
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Update of the resolutions aimed at identifying the "unsuitable areas" for the construction of photovoltaic systems on the ground and biomass; • Approval of the proposals for "unsuitable areas" for the wind and hydroelectric sources. • Both actions should be done pending the definition of "areas with an energy vocation.

Instruments to	
planning	
policy	Guidelines
financial	
organisational	
business	
communication	
technical	

Measure	**Identification of areas with specific energy vocation identification of further potentialities for RES**
Priority	ENABLE THE INSTALLATION OF RES IN THE REGION (ENERGY PRODUCTION)
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Establishment of an intersectoral Working Group within the Region and establishment of a dialogue with the main national energy operators in order to get the following information for each area considered: -census of existing plants; -availability at local level of the energy source; -sizing of the electricity demand; -identification of the constraints and criticalities present on the National Transmission Grid and on the distribution network for the installation of additional RES capacity. • Definition of geo-referenced attraction criteria and environmental/territorial constraints hindering the installation of power plants. • Definition of a proposal of "suitable areas" for each type of RES considered, including cartographic representation and its approval by the political level. • Realization of studies about the potentialities of RES, starting from the potential development of low enthalpy geothermal energy for the winter and summer conditioning of buildings, with closed and open loop systems.
Instruments to	
planning	Geo-referenced tool
policy	Guidelines
financial	
organisational	working group

business	
communication	
technical	Studies

Measure	**Information tools to support the installation of RES**
Priority	ENABLE THE INSTALLATION OF RES IN THE REGION (ENERGY PRODUCTION)
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Create an online GIS database with all power plants installed in order to share information among public sector and market operators about the state of art of the RES installations in the Region. • Creation of a cloud based application, shared between the Region, local authorities and energy operators, which allows the online submission of each authorization application.
Instruments to	
planning	Geo-referenced tool
policy	
financial	
organisational	
business	
communication	
technical	Online tool

Measure	**Renewables share increase in residential thermal uses**
Priority	PROMOTE THE RES IN RESIDENTIAL BUILDINGS
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Introduction of rules that provide, for existing residential buildings, mandatory minimum quotas, progressive over time, of production from renewable sources. • Evolution of the regulatory limit for the replacement of generators: from the compulsory installation of condensing boilers to the compulsory installation of hybrid boilers or, in any case, of integrated heating systems with heat/solar thermal pumps. • Direct economic incentives for thermal mass storage in houses and household appliances using hot water (washing machines, dishwashers).
Instruments to	

planning	
policy	New rules for residential buildings, new regulatory framework for generators
financial	Direct economic incentives
organisational	
business	
communication	
technical	

Measure	**Promoting relevance and environmental compatibility of biomass use**
Priority	PROMOTE THE RES IN RESIDENTIAL BUILDINGS
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Definition of maximum, progressive, energy demand limits for wood-heated buildings (with compulsory insulation in case of higher values). • Control campaign for compliance with the emission limits of biomass generators. Incentives for the replacement of generators linked to the inclusion of the generator in the thermal cadastre. • Progressive fire insurance obligation for biomass heated buildings. • Technical facilitation of the use of wood-fired heating systems in rural areas closest to forests, within the limits of the maximum amounts of wood fuel use allowed by air quality standards and local sustainable forest management. • Definition of free but mandatory training courses for biomass generator conductors • Financing an active role of the forestry sector in the replacement and refueling of biomass generators with quality fuels
Instruments to	
planning	
policy	specific regulations
financial	Incentives for the sector
organisational	
business	
communication	training
technical	Technical facilitations, Emissions Control campaign

5.4 Sustainable infrastructure and spatial development

Measure	**Coordination of gas grid concession procedures**
Priority	PROVIDE COORDINATION ON THE GAS GRID DEVELOPMENT AND MANAGEMENT
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Update the monitoring process in place by the Region about the tendering procedure ongoing • Try to establish a discussion table with the contracting authorities and the regulation Authorities on the main constraints that slowed down the process so far • Support the activity of the contracting authorities in the collection of data and information from DSOs
Instruments to	
planning	
policy	
financial	
organisational	Networks and working groups
business	
communication	
technical	

Measure	**Boost the informative system of the gas grid infrastructures**
Priority	PROVIDE COORDINATION ON THE GAS GRID DEVELOPMENT AND MANAGEMENT
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Drafting guidelines and targets for the development of the national and regional transport network in Piedmont; • Promote the development of network infrastructures by accelerating the authorization procedures of national and provincial competence; • Creation of a geo-referenced database of natural gas transport infrastructures in Piedmont, shared with the other public authorities; • Definition of a methodological proposal for a concerted method for the localization of the main investments
Instruments to	
planning	Geo-referenced online tools

policy	Guidelines
financial	
organisational	Networks and working groups
business	
communication	
technical	

Measure	**Heat mapping and boosting renewable and waste heat**
Priority	BOOST AND OPTIMIZE THE USE OF DISTRICT HEATING
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• strengthening public databases on buildings and energy systems • construction of a georeferenced portal for all data on heat demand • conduct assessment studies on the different RES potentialities to be integrated in the DHS • technical training and support for district heating operators, building renovation operators and urban planning authorities
Instruments to	
planning	Geo-referenced online tools
policy	
financial	
organisational	
business	
communication	Trainings
technical	Studies

Measure	**Promote the rational use of the existing networks**
Priority	BOOST AND OPTIMIZE THE USE OF DISTRICT HEATING
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Prepare and develop a communication campaign on the rational use of DHS
Instruments to	

planning	
policy	
financial	
organisational	
business	
communication	Information campaigns
technical	

Measure	**DH strategic planning**
Priority	BOOST AND OPTIMIZE THE USE OF DISTRICT HEATING
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Monitor the achievement of the targets set in the Strategic DHS Plan delivered in 2009 and make an assessment of the state of play • Develop a Strategic DHS Plan to 2030 and beyond, figuring out the development of the main existing networks to new urban areas and the integration of innovative technical solutions aiming at introducing more and more RES, such as for instance geothermal and solar energy in accordance with the 4G DH concept • review of local building procedures and regulations in accordance with the 4G plan • review of the authorization procedures for energy plants in accordance with the 4G DH plan • limitation policy on non renewable heat consumption in buildings
Instruments to	
planning	Geo-referenced online tools, plans
policy	Guidelines, procedures
financial	
organisational	Working groups
business	
communication	
technical	Studies

5.5 Catalyzing factors: awareness, education, information

Measure	**Governance table**
Priority	GOVERNANCE
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	To keep on summoning the established table with the local authorities (Association of municipality, Metropolitan City, Provinces, etc.), in order to: ● have an open discussion about Piemonte Region policies and actions addressed to Local Authorities; ● report the results of projects, activities and analysis; ● collect feedbacks and inputs To set up a Stakeholders Group with main regional stakeholders and meet them on a annual basis to: ● have an open discussion with them on main Piemonte Region policies and actions; ● report the results of projects, activities and analysis; ● collect their feedbacks and inputs
Instruments to	
planning	
policy	
financial	
organisational	Establishment of formal discussion tables
business	
communication	
technical	

Measure	**Boost the Covenant of Mayor network**
Priority	TECHNICAL SUPPORT TO LOCAL AUTHORITIES
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	● Boost the energy observatory activities in the Region and define easy methodologies to disaggregate data at municipal level

	• Setting up automatic procedures for making sure that the data provision to municipalities is made possible and effective with a reduced internal workload • Organize networking activities showcasing good examples and facilitating the dissemination of good practices • Organize events and workshop to ease the access of EU, national and regional funding opportunities • Define a collection of structured good practices that can be replicated • Setting up energy efficiency awards for the best local energy projects of the year • Provide first level support to municipalities adhering to energy planning activities • Creating conditions for the development of SECAPs into Energy Investment Concepts
Instruments to	
planning	Templates for planning activities
policy	Policy recommendations
financial	
organisational	Networks
business	
communication	workshops and events, dissemination
technical	open data access

Measure	**Energy data Observatory**
Priority	ORGANIZE AND SYSTEMATIZE THE ENERGY DATA COLLECTION FLOW
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Detailed mapping of existing regional-scale bases on energy data, identification of the subjects involved in the data management processes with responsibilities and functions and identification of gaps and/or overlaps in available data • Boost the data collection activity and keep it updated year by year • Realization of a interconnected regional information system on energy data • Realization of a regional information portal on energy data accessible to energy operators and municipalities • Elaboration of Energy Reports and publication available for the public • Take part in networks of Regions at macro-regional level (EUSALP) in order to share experiences, practices and tools.
Instruments to	

planning	
policy	
financial	
organisational	Networks, working groups
business	
communication	Events and workshops
technical	Online datasets, online tools

Measure	**Management systems for renewable electricity sharing**
Priority	RESEARCH
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• funding for targeted calls and research projects • pilot research and development projects • field experimentation in case studies
Instruments to	
planning	
policy	
financial	Access to EU grants
organisational	Networking
business	
communication	
technical	Studies

Measure	**Supporting the 'hydrogen supply chain' for the decarbonisation of the regional economy**
Priority	RESEARCH
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• support the application of targeted calls for pilot research and testing projects • funding of specific training and skills implementation projects • create a regional stakeholders table in order to promote, coordinate and monitor the funded activities

	• participate in dedicated networking activities at national and EU level • participate in EU project dedicated to hydrogen development promotion • promote the partnership between innovation cluster and industry • promote the deployment of hydrogen public transport fleets by service companies starting from urban areas • promote the construction of adequate hydrogen production and supply infrastructures for the mobility system.
Instruments to	
planning	
policy	
financial	Access to EU grants
organisational	Networking
business	
communication	
technical	Studies

Measure	**Boost communication and awareness raising campaign for citizens and local authorities**
Priority	COMMUNICATION AND CAPACITY BUILDING ACTIVITIES
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Insert the communication and education activities of LAs among the requirements for the financeability of ERDF related energy refurbishment projects • Develop and implement an efficient participative Communication Plan to support a tangible change of behaviour in terms of energy efficiency and savings • Realize communication campaigns targeted to citizens by using different media (i.e.: social networks for younger people, specialist press channel for professionals, etc.) and informative materials, with a strong common identity and an integrated approach with other key aspect related to sustainable development • Realize information campaigns targeted to local authorities especially by using the institutional channels and direct contacts (i.e. mailing campaigns, newsletters, etc.) • Organize events (i.e. energy days, awareness raising days) and conferences in order to promote the activities carried out at regional level and raise awareness of general public to benefits generated by energy efficiency • Set up contest among municipalities to prize the best and most innovative energy saving intervention

Instruments to	
planning	Communication Plan
policy	Recommendation for communication activities
financial	
organisational	
business	
communication	communication campaigns, events, contests
technical	

Measure	**Engagement and networking activities**
Priority	COMMUNICATION AND CAPACITY BUILDING ACTIVITIES
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Create local advisory groups in order to commit citizens and stakeholders to play their part in paving the energy transition • Organize periodic workshops and roundtables with the stakeholders in order to share data and results and receive inputs and feedbacks • Organize thematic tables for local authorities which are developing similar projects in order to facilitate their networking activities • Participate as Piemonte Region in networking activities at regional (i.e. other local authorities and institutions), national (i.e. State/Regions table) and European level (i.e. Eusalp)
Instruments to	
planning	
policy	
financial	
organisational	networks
business	
communication	Workshops, roundtables
technical	

Measure	**Enhance capacity building**

Priority	COMMUNICATION AND CAPACITY BUILDING ACTIVITIES
Actions to take (policy, technical, financial) to promote S&O and to minimize W&T	• Organize training sessions, even as webinar, on energy management related issues targeted to local administrations staff and to professionals in order to boost their capacity building • Organize training sessions, even as webinar, on energy management related issues targeted to stakeholders and professionals in order to boost their capacity building • Set up specific training courses for building managers in order to update them on regional legislation and activities and raise their awareness on the need to act as energy advisors with the homeowners • Realize friendly training packages to be widely disseminated through the web
Instruments to	
planning	
policy	
financial	
organisational	
business	
communication	training sessions
technical	

6. SCENARIOS

6.1 Overview on main actions and measures on the time scale

The definition of the 2030 and 2040 scenarios was carried out through the integration of the measures and actions defined within the Prospect2030 project with the planning scenarios developed at national level with a 2050 horizon, published in early 2021.

With reference to the actions described in the previous paragraphs, they are already defined and consistent with the documents drafted at regional level, and more generally with the Regional Energy Plan document currently under review.

Regarding the integration of the above with documents on a national scale, reference has been made mainly to the following documents:

· *Strategia italiana di lungo termine sulla riduzione delle emissioni dei gas a effetto serra, Ministero dell'Ambiente e della Tutela del Territorio e del Mare; Ministero dello Sviluppo*

Economico; Ministero delle Infrastrutture e dei Trasporti; Ministero delle Politiche agricole, Alimentari e Forestali; January 2021

· *Proposta di piano per la transizione ecologica - Inquadramento generale; Comitato interministeriale della transizione ecologica (CITE); July 2021*

And EU document:

· *Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757; July 2021*

In defining the scenarios, with reference to the development of new production capacity in terms of thermal and electrical power, and related technologies, reference was also made to recent EU regulations being published, being transposed by Italy (RED II) but also to EU regulations currently in discussion phase at EU level (RED III) quoted before.

Based on what has been developed and better detailed in the following paragraphs, a brief and not exhaustive summary of the actions and developments foreseen at regional level is provided. The following lines of action have been developed with a 2050 horizon, and subsequently assessed with a 2030 and 2040 horizon according to the priorities and possibilities of intervention in the different sectors:

- Domestic sector: thermal building stock retrofit actions, also considering recent regulations and tax incentives that address mainly the deep renovation approach. Overcoming the use of petroleum products in the sector. Complete shift of heat production to renewable sources (heat pumps, biomass).
- Tertiary sector: thermal building stock retrofit actions in line with the deep renovation approach. Overcoming the use of petroleum products in the sector. Complete shift of heat production to renewable sources (heat pumps, biomass).
- Industrial sector: gradual electrification to replace use of fossil fuels for thermal uses linked to production processes (production of steam or process heat). Overcoming incentives to use fossil fuels (natural gas) to produce heat for heating, with the extension of district heating systems to industrial areas.
- Agriculture sector: replacement of oil products to natural gas, with the aim of increasing the share of biomethane production at regional level.
- Transport sector: electrification of private vehicle fleets, use of sustainable fuels for freight vehicles with local production of biomethane and “import” from other regions, shift towards sustainable mobility systems in order to reduce the energy demand.
- Power/thermal generation: strong development of photovoltaic plants in line with national targets. Drop out of the use of biomass (biogas, forest biomass, bio-oils) for CHP generation, with a focus on installation producing only heat (also coupled with DH systems). Use of biogas for biomethane production only.

According to what summarized the final regional energy balance foreseen the import of sustainable biofuels for about 40% of internal needs, the annual covering of electrical needs and

the complete internal production of thermal needs (mainly shifted on heat pump and electricity needs).

No assumptions have been made regarding the need for electrical storage systems. Considering that in 2050 the main electrical renewable generation for region Piemonte will be photovoltaic systems, the region has to to deal and balance its own domestic production with neighbouring regions which may have potential overproduction in different periods of the year from different renewable sources (e.g. wind in the region of Liguria, hydroelectric in the region of Valle d'Aosta).

6.2 Scenario 2030

6.2.1 General description: Actions and measures in the scenario

The 2030 scenario has been defined by capitalising the objectives of the Regional Energy Plan document in the PEAR 2030 scenario, which is currently being revised. In order to adapt these visions with the 2050 decarbonisation targets and the new European targets of the "FIT for 55" strategy, it was necessary to mainly increase the energy efficiency targets of the residential sector, the fuel shifts and the electrification targets of the transport sector.

In the breakdown of the 2050 targets to 2030 and 2040, some measures can be provided for faster implementation in the 2022-2030 “decade” to reach the “FIT for 55” strategy objectives. In particular, it has been assessed that the residential sector and the tertiary sector are the most rapidly affectable by energy efficiency processes, both with a view to reducing demand(change) and with the consequent introduction of renewable source plants (shift).

6.2.2 State of energy efficiency, renewable energy supply, mobility, infrastructure and spatial development

Sectors demand and scenario analysis

- Civil sector

In the 2016 to 2030 scenario, an important role is given to energy efficiency measures and the use of renewable energy in the residential and tertiary sectors.

Compared to the industrial sector, it is easier in the civil sector to carry out massive retrofits with significant energy saving targets. Analyses on the regional territory identify a potential reduction of thermal needs in the civil sector of up to 80% through the transition to NZEB buildings. As a scenario, on the basis of the already existing incentive policies in terms of energy efficiency in these sectors, in order to meet the objectives of the “FIT for 55” strategy it will be necessary to achieve a 40% reduction in the thermal needs of the building stock by 2030.

Although easier to achieve than interventions in the industrial sector, this target is one of the most challenging objectives included in the scenario.

The thermal needs of the buildings that are currently served by natural gas, thanks to energy efficiency measures, will be decreased by 40%. The remaining thermal need will be covered as follows:

- natural gas for about 45%
- heat pumps for about 40%
- DH for about 10%. 5% by other renewables.

In both sectors, a complete phase-out of fossil liquid fuels for heating is envisaged.

DH systems will also be able to be fed with renewable sources (mainly biomasses), considering the reduced energy needs of the buildings, due to the effect of the retrofit measures.

Considering non thermal electricity needs of the residential sector a reduction of 20% is expected with respect to 2016 values.

· Industrial sector

Three main lines of action are envisaged within the industrial sector:

- a reduction of the consumption estimated at 15% as a result of energy efficiency measures;
- complete phase out of fossil liquid fuels towards natural gas use or electricity;
- an increased use of electricity in order to generate process thermal needs (e.g. steam) and by consequence a reduction in the use of centralised fossil fuelled plants.

· Transport sector

In the transport sector we face a multiple effect, combining on one hand the results expected by changing the transport demand, due to demand reduction (e.g. smart working) and due to the shift toward more sustainable modal transport (e.g. bicycles). On the other hand, we will face the transition to electricity and the increase of the use of natural gas (and biomethane).

The demand reduction is estimated by 15% with respect to current consumption, involving a direct decrease of energy needs and related emissions.

As far as the shift is concerned, it is fixed with an electrification of 40% of the current transport energy demand (mainly related to private cars with electricity only and hybrid vehicles), and the shifting of 15 % to natural gas-biomethane fuelled system (lorry transport).

Generation and fuels scenario analysis

· Liquid fossil fuels phase out

It is foreseen the gradual and complete phase out from liquid fossil fuels for thermal production (diesel, LPG) with replacement by renewables (biomass and heat pumps). This is also an important objective to be achieved which should provide an important contribution in terms of GHGs emissions reduction. This process is partly already underway, since diesel uses are facing a slow but steady reduction trend over the decade (5% of overall reduction between 2015 and 2020 of installed capacity).

- Photovoltaic systems

The development of photovoltaic systems (also according to a national objective of +1000% to 2050) will be a crucial step. The scenario considers a provision of 600% in the increasing of the installed power, back to back with a phase-out of the natural gas fired system and by consequence an increase in the electricity generation up to 40% of the regional production (and electricity needs). This challenging shift from natural gas to renewable will be necessary to overcome the 2030 "FIT for 55" targets.

Considering the current installed power capacity of about 1.5 GW, the final objective will be of 10.5 GW installed.

In the development of such big numbers, the definition of a process of prioritising the conversion of occupied areas and agricultural land will be crucial, in particular the following principles should be followed:

- identification of medium and large occupied areas and brownfield or unusable areas
- use of existing rooftops on industrial areas (potential already estimated at around 3 GW)
- use of rooftops on residential areas (with an estimated potential of around 7-10 GW).

The use of medium and large-scale installations (which have the advantage of shorter construction times compared to the use of private roofs) will also have to be assessed with the view to minimising the occupation of land.

- Wind farms

A similar growing trend like photovoltaic is expected for wind energy capacity (+700%), but in this case the lower current capacity (~19 MW wind farm respect to 1500 MW photovoltaic systems) and installation potential for the region will lead to a reduced effective increased in the electricity production (1% of the expected electricity production in 2030).

- Biomasses

The analysis also focused on the conversion from electricity or co-generative plants fuel by biomass (biogas and wood-chip) to thermal production plants or to the production of alternative fuels, as in the case of biogas plants to biomethane upgrading (50% of the 2016 plants). The use of sustainable bioliquids for electricity production has not been considered as an option for the future, according to first RED III evaluations. The use in cogeneration, already currently marginal, shrinking, and heavily dependent on imports, is also no longer considered. These visions are mainly motivated by the current presence of incentives obtained during the 2010-2015 period for such plants, for electricity production and located in marginal areas with no presence of thermal needs, which will see their complete conclusion by 2030. This should bring to a complete review of the plants and an assessment of their future use.

- Natural gas

The process of thermoelectric and cogeneration production from natural gas is interested in a reduction of 40% with respect to 2016 data. This slow phase-out trend to 2050 will be necessary to reach the "FIT for 55" strategy objectives.

6.2.3 Required investments

The following paragraphs include some preliminary assessments of the investments needed to realise the analysed scenario.

Sectors investment analysis

- Civil sector

Cost estimates were derived for the residential sector based on the assumptions made.

Based on the model data of the regional building stock, orders of magnitude associated with the overall energy efficiency of 50% of the residential buildings in the region have been derived.

This analysis, summarised in the table, carried out on the basis of parametric cost estimates, results in an annual investment for the period 2022-2030 of 3,800 M€/year.

	area 2022-2030 [millions m²]	specific cost [€/m²]	investment [million €]	annual investment [million €/y]
External walls	102	120	12,200	1,350
Windows	16	650	10,200	1,150
Roofs	48	150	7,200	800
Basements	44	120	5,200	580

With respect to the tertiary sector the consumption value is approximately 33% of residential needs. In terms of investment, an initial estimate of the economic needs in this sector can be assumed to be proportional to its contribution, with an annual value for the period 2022-2030 of 1,300 M€/y.

- Industrial sector

No estimates are provided for the industrial sector.

- Transport sector

Concerning the private direct investment in the shift to electromobility, the higher investment related to the purchase of electric cars (~7500 € more than diesel/petrol cars) leads to a total investment of 7400 M€ to reach the 40% shift from petrol/diesel to electricity.

The results are calculated on the basis of the current vehicle fleet (~2.8 million private vehicles) assuming an alignment in terms of vehicle fleet consistent with European figures (from 650 vehicles/1,000 inhabitant to 550 vehicles/1,000 inhabitant) and a 40% substitution to EV. The yearly economic value is therefore about 800 M€/y.

The estimate does not take into account further reductions in the fleet due to shared mobility (especially in main cities) and cost reductions of electric vehicles compared to current standards over the next decade. Neither savings related to reduced mobility needs are considered.

Generation investment analysis

- Photovoltaic systems

The increase in capacity (+600%), if analysed in terms of costs of installation, will involve investments of approximately 11,000-16,000 M€ in the 2022-2030 period (1,200-1,800 M€/y) depending on the type of plants considered (1,200 €/kW in the case of large plants, 1,800 €/kW in the case of distributed residential plants).

- Wind farms

The increase in capacity (+700%), if analysed in terms of costs of installation, will involve ~130 M€ of investment for the 2022-2030 period (14,5 M€/y), considering a specific cost of ~1,000 €/kW.

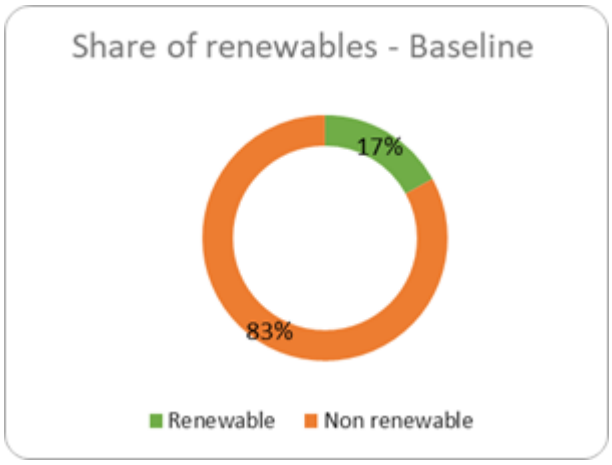
- Biogas to Biomethane

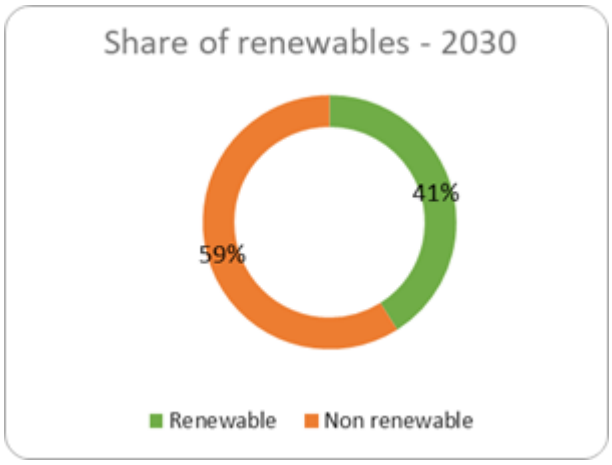
The conversion from the current asset from only-thermoelectric to biomethane upgrading of the biogas plant is evaluated considering a specific cost of about 4.000 €/kW and the conversione of 50% of the 2016 installed electric power.

It would lead to an investment of about 600 M€ (~67 M€/y).

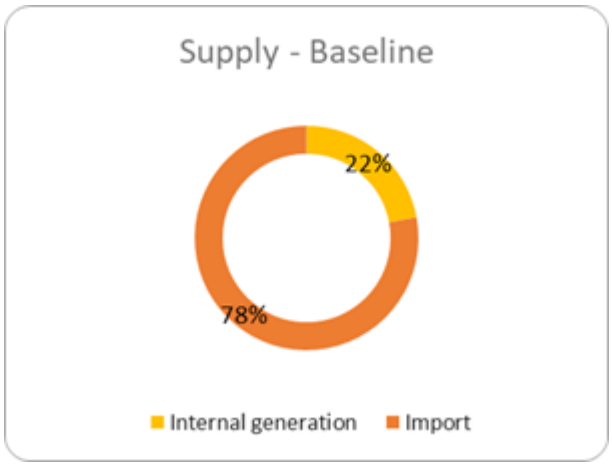
6.2.4 Renewable energy in supply and consumption

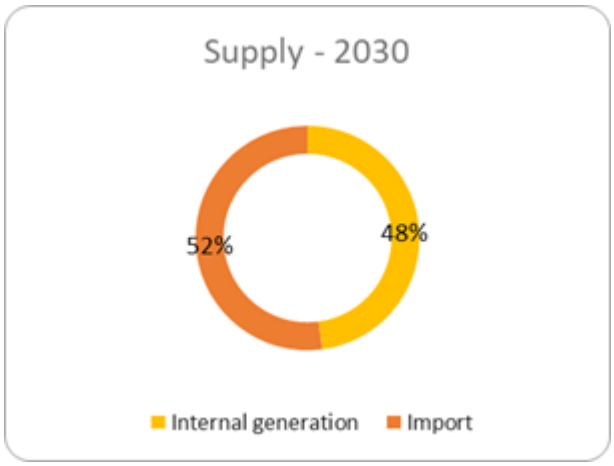
The share of renewables in 2030 will more than double. Considering the share in final energy consumption, the percental will pass from 17% to 41%, thanks to the increase in RES electricity capacity, heat pump uses and the 15% of renewables in the transport sector. The results are in line with the “FIT for 55” objective of 40% of RES in final consumption.





Taking into account the level of dependency of the regional supply, the scenario foresees an internal production of almost 50%, which is more than double than the actual value.





6.2.5 Primary energy in supply and consumption

The 2030 scenario (mid term scenario) highlights a reduction in primary energy consumption of 28% with respect to 2016 data (baseline scenario).
With respect to FIT for 55 strategy objectives the primary energy needs at 2030 amounts to ~9,000 ktoe (104,353,000 MWh) in line with the target value of about 9,000 ktoe

Primary Energy Demand

Short term primary consumption	Solid fossil fuels	Crude oil and petroleum products	Gas	Renewable energies	Non renewable wastes	Electricity	Derived heat & grid bound thermal system	Total
Agriculture, forestry and fishing	-	755,055	364,941	-	-	400,356	-	1,520,352
Industry (without construction), energy, water sewage etc	28,195	-	13,429,896	130,192	91,302	14,201,345	10,476,599	38,357,530
Construction	-	10,969	178,446	-	-	136,520	-	325,935
Transport	-	13,906,062	346,503	5,252,244	-	6,294,021	-	25,798,829
Services	-	-	1,682,864	1,614,061	-	8,435,509	1,090,738	12,823,172
Residential	-	-	5,507,555	10,517,417	-	5,882,198	3,619,930	25,527,100
Total	**28,195**	**14,672,085**	**21,510,205**	**17,513,914**	**91,302**	**35,349,950**	**15,187,267**	**104,352,919**

6.2.6 Final energy consumption and GHG emissions

Concerning Final energy consumption the 2030 scenario shows a reduction of 29% with respect to 2016 data.
With respect to FIT for 55 strategy objectives the final energy needs of 2030 should be ~7,965 ktoe, +12% higher than the target value of ~7,000 ktoe.
With respect to GHG emissions the final value for the mid term scenario at 2030 for the region is ~14.7 Mton CO_2 with a target value of 13.9 Mton, according to a reduction of 55% respect to 1990 data (50% respect to baseline data).

Final Energy Demand

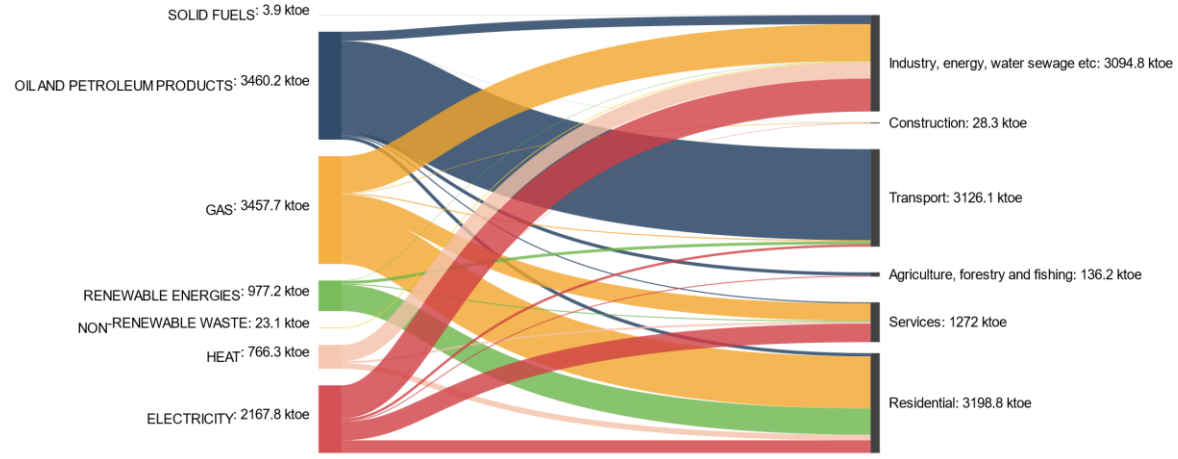
Short term scenario - SHIFT & CHANGE	Solid fossil fuels	Crude oil and petroleum products	Gas	Renewable energies	Non renewable wastes	Electricity	Derived heat & grid bound thermal system	Total
Agriculture, forestry and fishing	-	705,659	347,563	-	-	345,944	-	1,399,166
Industry (without construction), energy, water sewage etc	25,632	-	12,790,377	130,192	228,256	12,271,248	6,984,399	32,430,104
Construction	-	10,251	169,949	-	-	117,966	-	298,166
Transport	-	12,996,319	330,002	5,252,244	-	5,438,604	-	24,017,170
Services	-	-	1,602,728	1,614,061	-	7,289,043	727,159	11,232,990
Residential	-	-	5,245,290	10,517,417	-	5,082,752	2,413,286	23,258,746
Total	**25,632**	**13,712,229**	**20,485,909**	**17,513,914**	**228,256**	**30,545,556**	**10,124,845**	**92,636,342**

GHG Emissions

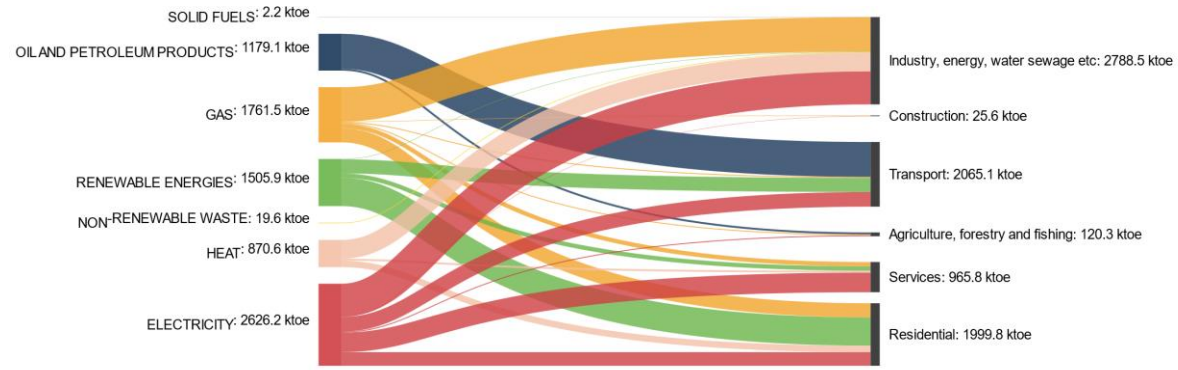
Short term - carbon emissions	Solid fossil fuels	Crude oil and petroleum products	Gas	Renewable energies	Non renewable wastes	Electricity	Derived heat & grid bound thermal system	Total
Agriculture, forestry and fishing	-	188,411	70,208	-	-	36,087	-	294,705
Industry (without construction), energy, water sewage etc	8,459	-	2,583,656	-	76,009	1,280,059	1,763,561	5,711,744
Construction	-	2,737	34,330	-	-	12,305	-	49,372
Transport	-	3,470,017	66,661	1,034,692		567,321		5,138,691
Services	-	-	323,751	-	-	760,347	183,608	1,267,705
Residential	-	-	1,059,549	-	-	530,201	609,355	2,199,104
Total	**8,459**	**3,661,165**	**4,138,154**	**1,034,692**	**76,009**	**3,186,319**	**2,556,523**	**14,661,321**

6.2.7 Sankey diagram

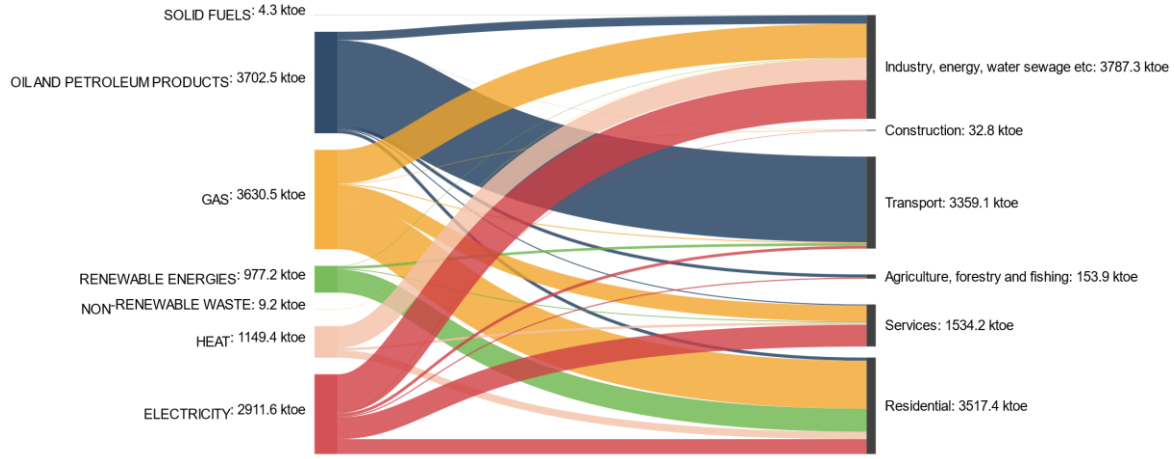
Final Energy Demand | Baseline



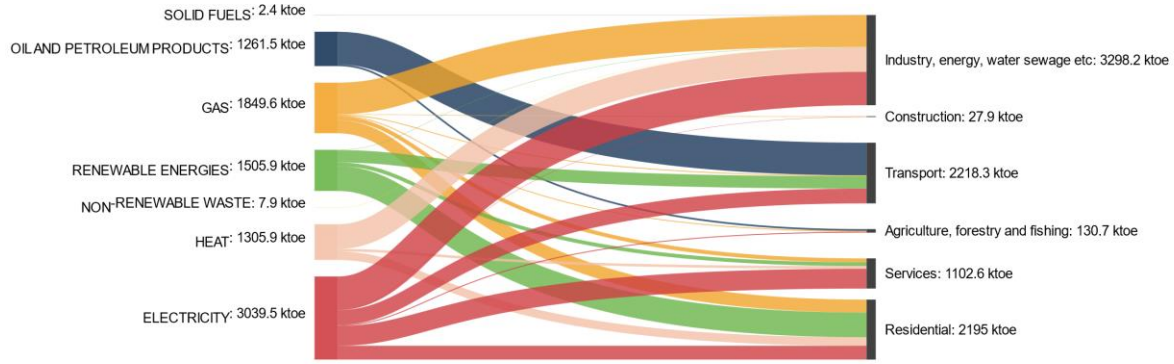
Final Energy Demand | 2030



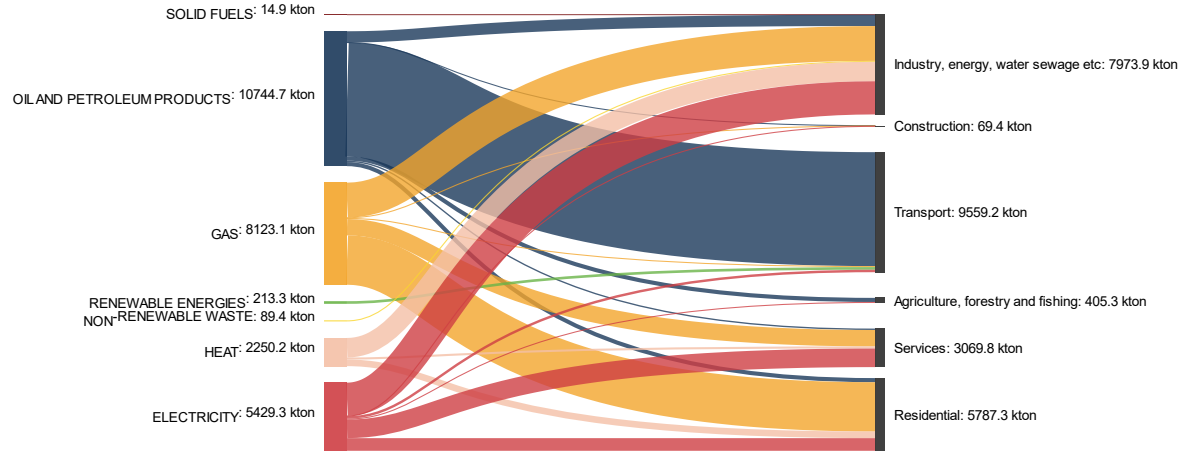
Primary Energy | Baseline



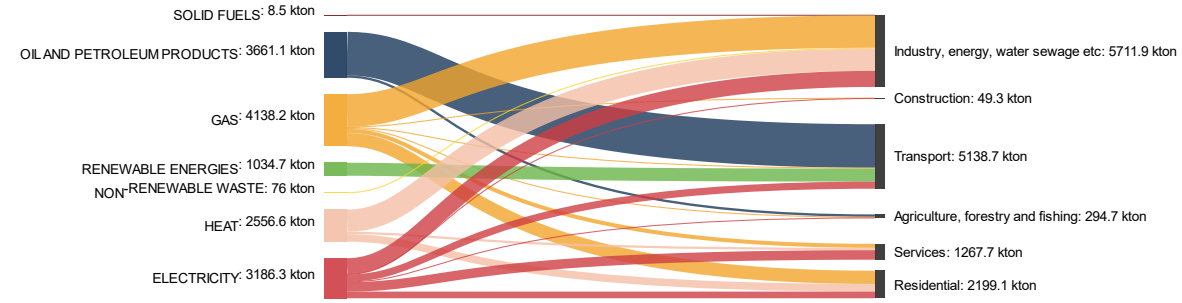
Primary Energy | 2030



CO_2 EMISSIONS | Baseline



CO_2 EMISSIONS | 2030



FOSSIL FUELS SHIFT | 2030

6.3 Scenario 2040

6.3.1 General description: Actions and measures in the scenario

The 2040 scenario sets the main direction for the decarbonisation of the industrial sector, in the completion of some processes already started in the 2022-2030 decade and defines the intermediate step towards the 2050 objectives.

The actions of greatest interest to the industrial sector concern the shift from gas to district heating networks, as regards heat requirements for heating (currently hampered by defiscalisation of the use of natural gas) and the electrification of heat needs for industrial process uses.

The scenario also assumes the completion of the phase-out of liquid fossil fuels from the transport sector. These needs are broken down according to national forecasts (here anticipated to 2040) between electricity and sustainable fuel needs.

Considering electricity generation, the scenario foresees the increase of PV capacity of 800% with respect to current data. It should be noted that the electrification processes of the sectors will lead the region to become a net importer of electricity, with a share of dependence from neighbouring regions by at least 30%. This assumption should be better understood by enlarging the perspective horizon beyond the regional borders. Indeed, it is likely to be expected that other regions in Italy have much more potential for alternative renewables other than photovoltaic and hydropower as Piemonte. For example, a great push to the electric generation at national level should be provided by offshore wind, where, of course, Piemonte Region has no role to play. This scenario foresees, therefore, a regional system based on a share of imports, which reflects the situation that Piemonte faced in the past for several decades.

6.3.2 State of energy efficiency, renewable energy supply, mobility, infrastructure and spatial development

Sectors demand and scenario analysis

- Civil sector

The 2030 to 2040 scenario can be considered as a follow up of what has already been initiated in the period 2022-2030.

It is assumed that the process of upgrading the civil sector building stock will continue with a slower trend, leading to an ~60% reduction in the sector's thermal energy needs compared to the 2016. This reduction is coupled with the shifting from natural gas use to renewable energy (7.5% respect to 2016), heat pump (60%) and district heating system (10%).

The 2030 to 2040 trend, with growth values halved compared to the 2022-2030 decade will lead to the achievement in 2050 of the maximum expected reduction of 80% of requirements compared to 2016.

Considering non thermal electricity needs a reduction of 25% is expected with respect to 2016 values for the residential sector and 10% for the tertiary sector.

- Industrial sector

The modelling of the industrial sector considers three different types of action:

- shifting consumption for thermal purposes to district heating networks
- electrification of the thermal needs of production processes
- energy efficiency and changes in production flows.

Unlike other sectors (such as residential and tertiary), industry does not currently allow for a rapid distinction between different thermal, process and electrical energy needs. In fact, this sector often has internal production of electrical energy from natural gas cogeneration processes or simultaneous production of processed heat and space heating.

The scenario considers how the combined actions of the above measures could lead to an increase in the sector's electricity needs of around 35% compared to 2016 needs, while a shift in natural gas consumption of around 60% can be expected, with a view to proceeding with a steady trend towards a natural gas phase-out by 2050.

- Transport sector

It is assumed that the transition to electric mobility (70%) and the use of sustainable fuels (30%) in the sector will be continued as previously described.

In the case of sustainable fuels, a share of about 60% can be covered internally by the region through the upgrading of biogas to biomethane. The remaining share will have to be imported and may involve different carriers/fuels (e.g. hydrogen).

Generation and fuels scenario analysis

- Photovoltaic systems

The development of photovoltaic systems will continue with the previous trend with a provision of 800% in the increasing of the installed power (respect to 2016) in compensation of a phase-out of natural gas fired systems (-80% respect to 2016).

This installation capacity will have to involve assessments of the use of land currently in agricultural use, with assessments of the potential for integrating this technology while maintaining the agricultural vocation of the land.

· Natural gas

The process of thermoelectric and cogeneration production from natural gas will have to continue its trend in anticipation of phase-out in 2050. The drop to 2040 will be 80% compared to 2016 data.

· Biomasses and DH system

Considering the decarbonization process of DH system (currently mainly fired by natural gas) a study of the potential for forest biomass production, compared to future residential needs (following an 80% reduction in heat demand) shows the capacity of the area to meet the thermal needs of these networks (DHS) through the exclusive use of local renewable sources.

· Biogas to Biomethane

In the 2030 to 2040 scenario it is assumed to complete the conversion of the thermoelectric and cogenerative plant fired by biogas to biomethane upgrading.

6.3.3 Required investments

· Civil sector

Cost estimates were derived for the residential sector based on the assumptions made.

Based on the model data of the regional building stock, orders of magnitude associated with the overall energy efficiency of 25% of the residential buildings in the region have been derived.

This analysis, summarised in the table, carried out on the basis of parametric cost estimates, results in an annual investment for the period 2030-2040 of 1,900 M€/year.

	area 2022-2030 [millions m²]	specific cost [€/m²]	investment [million €]	annual investment [million €/y]
External walls	51	120	6,100	675
Windows	82	650	5,100	550
Roofs	24	150	3,600	400
Basements	22	120	2,600	290

According to the previous scenario with respect to the tertiary sector this sector can be assumed to be 650 M€/y for the period 2030-2040.

- Industrial sector

No estimates are provided for the industrial sector.

- Transport sector

Concerning the private direct investment in the shift to electromobility, considering a reduction in the cost spread between diesel/petroleum cars and EV, the yearly economic value could be estimated at about 400 M€/y considering the need to shift the 70% of the current vehicle, according to the previous scenario hypothesis.

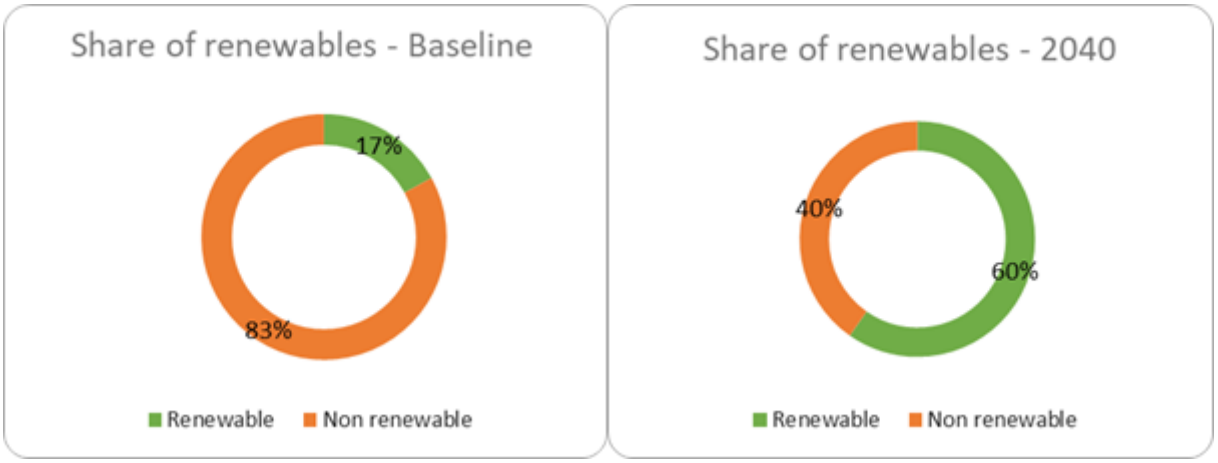
Generation investment analysis

- Photovoltaic systems

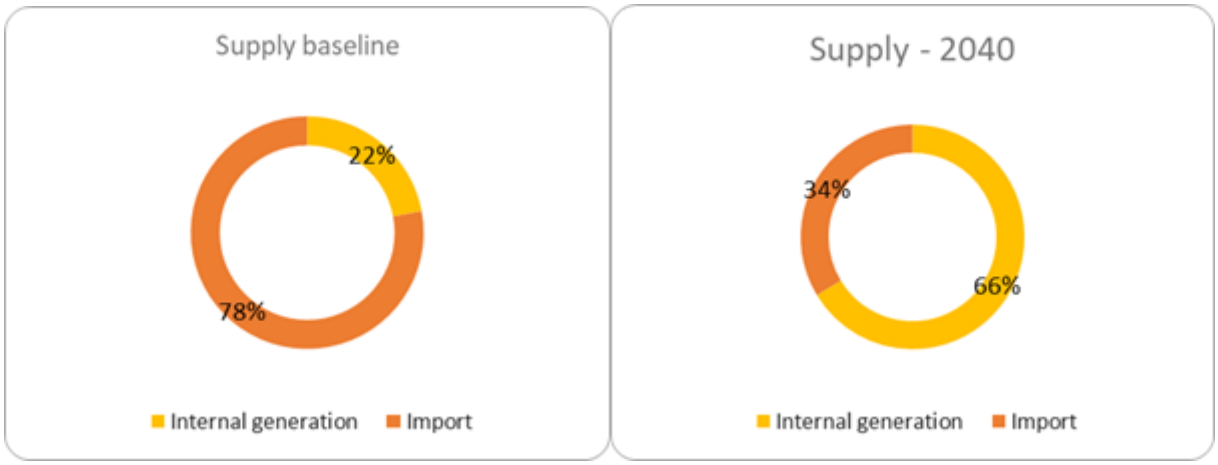
The increase in capacity of 3 GW (+800% if compared to 2016 considering the intermediate +600% results in 2030, +29% if compared to 2030) will involve investments of approximately 3,600-5,400 M€ in the 2030-2040 period (1,200-1,800 M€/y) depending on the type of plants considered (1,200 €/kW in the case of large plants, 1,800 €/kW in the case of distributed residential plants).

6.3.4 Renewable energy in supply and consumption

The share of renewables thanks to the increasing in RES electricity capacity and heat pump uses will quadruple from 2020 (double from 2030 to 2040), considering the RES share in final energy consumption, the percental will pass from 17% to 60%.



Similar result is expected regarding the internal generation. In the long term scenario, focusing only on electricity (data not related to following pictures) the region will be dependent on other regions for about 30% of internal needs.



6.3.5 Primary energy in supply and consumption

The 2040 scenario (long term scenario) highlights a reduction in primary energy consumption of 41% with respect to 2016 data (baseline scenario). With a final value of ~7,300 ktoe (~84,530,000 MWh).

Primary Energy Demand

Mid term primary consumption	Solid fossil fuels	Crude oil and petroleum products	Gas	Renewable energies	Non renewable wastes	Electricity	Derived heat & grid bound thermal system	Total
Agriculture, forestry and fishing	-	288,697	562,374	-	-	485,553	-	1,336,624
Industry (without construction), energy, water sewage etc	10,781	-	6,295,137	99,559	69,820	17,223,417	13,700,069	37,398,782
Construction	-	4,194	140,575	-	-	165,572	-	310,341
Transport	-	-	313,891	8,682,294	-	9,185,171	-	18,181,355
Services	-	-	573,704	1,508,116	-	6,871,044	743,685	9,696,549
Residential	-	-	1,835,852	8,315,996	-	5,039,739	2,413,286	17,604,873
Total	**10,781**	**292,891**	**9,721,531**	**18,605,965**	**69,820**	**38,970,495**	**16,857,041**	**84,528,523**

6.3.6 Final energy consumption and GHG emissions

The 2040 scenario (long term scenario) highlights a reduction in final energy consumption of 39% with respect to 2020 data (baseline scenario).
Considering GHG emissions the final value for the long term scenario at 2040 for the region is ~8.1 Mton CO_2 with a reduction of 70% with respect to baseline data (2016).
The scenario trend, focused on 2050 can lead to a value of ~4.8 Mton CO_2 mainly related to "residual" natural gas consumption and related potential emissions to be avoided through the import of sustainable liquid biofuels.

Final Energy Demand

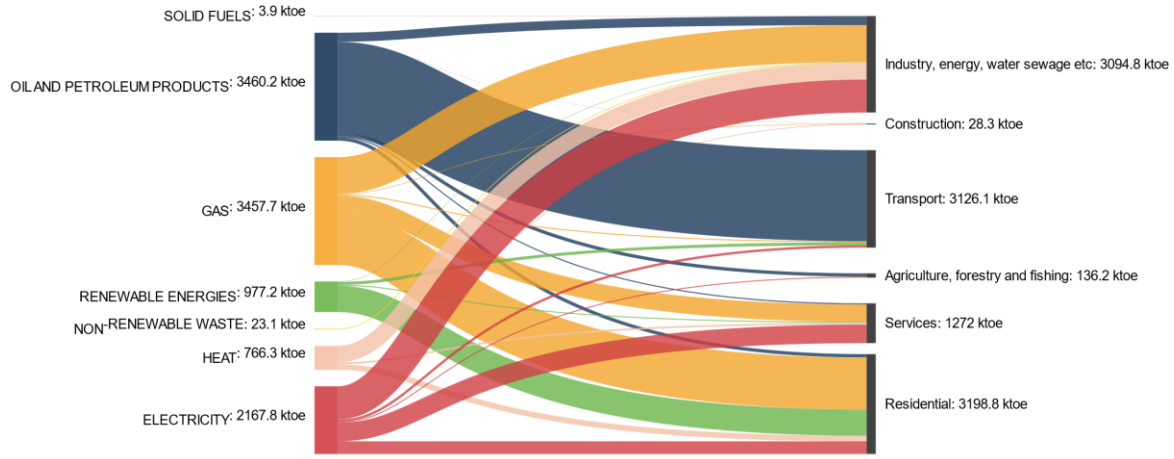
Mid term scenario - SHIFT & CHANGE	Solid fossil fuels	Crude oil and petroleum products	Gas	Renewable energies	Non renewable wastes	Electricity	Derived heat & grid bound thermal system	Total
Agriculture, forestry and fishing	-	269,811	535,594	-	-	467,112	-	1,272,517
Industry (without construction), energy, water sewage etc	9,801	-	5,995,369	99,559	174,549	16,569,302	9,133,380	31,981,958
Construction	-	3,920	133,881	-	-	159,284	-	297,084
Transport	-	-	298,943	8,682,294	-	8,836,334	-	17,817,572
Services	-	-	546,384	1,508,116	-	6,610,094	495,790	9,160,385
Residential	-	-	1,748,430	8,315,996	-	4,848,338	1,608,858	16,521,622
Total	**9,801**	**273,730**	**9,258,601**	**18,605,965**	**174,549**	**37,490,465**	**11,238,027**	**77,051,137**

GHG Emissions

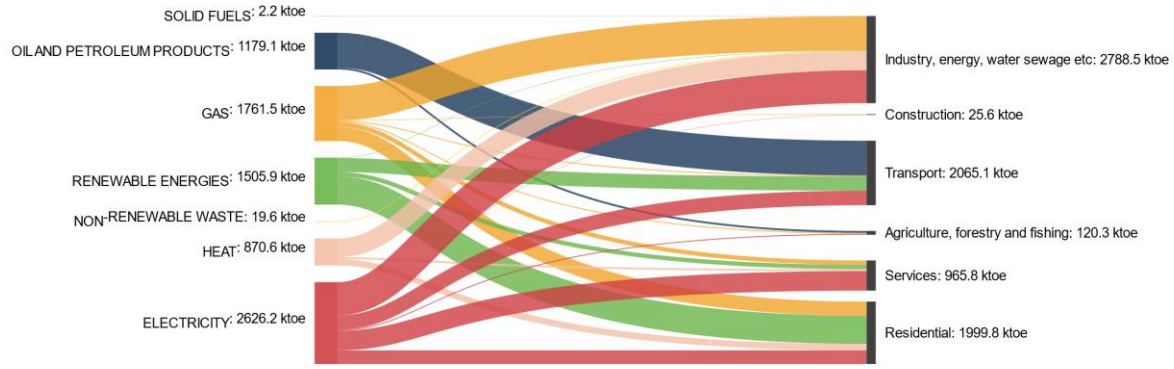
Mid term - carbon emissions	Solid fossil fuels	Crude oil and petroleum products	Gas	Renewable energies	Non renewable wastes	Electricity	Derived heat & grid bound thermal system	Total
Agriculture, forestry and fishing	-	72,039	108,190	-	-	19,189	-	199,418
Industry (without construction), energy, water sewage etc	3,234	-	1,211,064	-	58,125	680,663	2,306,178	4,259,265
Construction	-	1,047	27,044	-	-	6,543	-	34,634
Transport	-	-	60,387	1,710,412		362,995		2,133,793
Services	-	-	110,370	-	-	271,541	125,187	507,098
Residential	-	-	353,183	-	-	199,169	406,237	958,588
Total	**3,234**	**73,086**	**1,870,237**	**1,710,412**	**58,125**	**1,540,100**	**2,837,602**	**8,092,796**

6.3.7 Sankey diagram

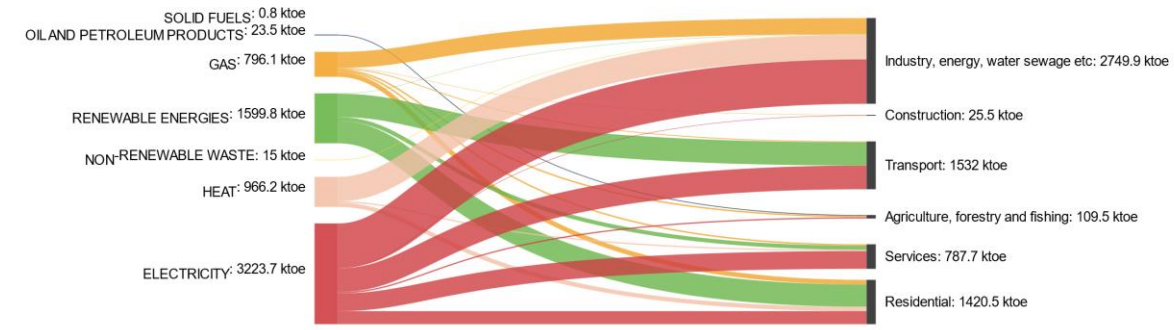
Final Energy Demand | Baseline



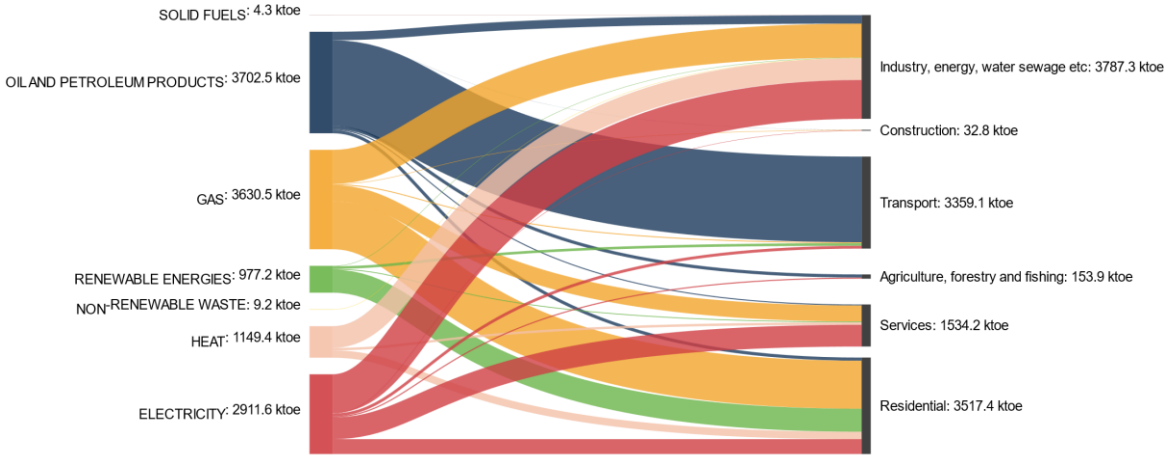
Final Energy Demand | 2030



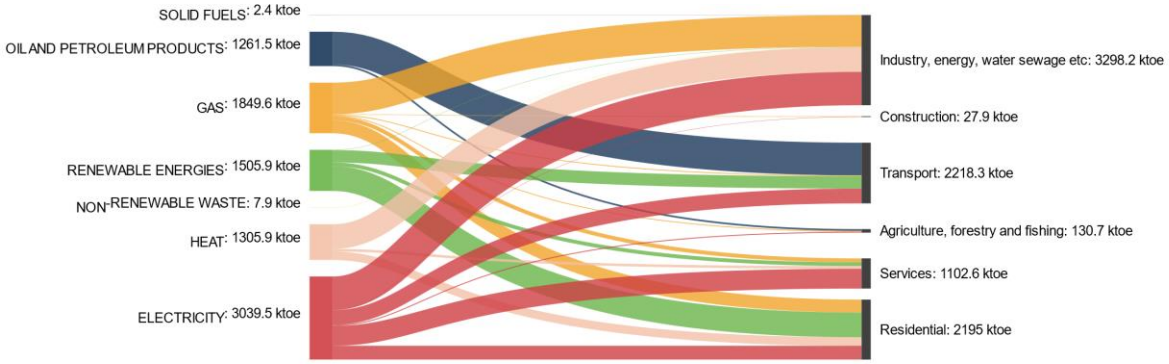
Final Energy Demand | 2040



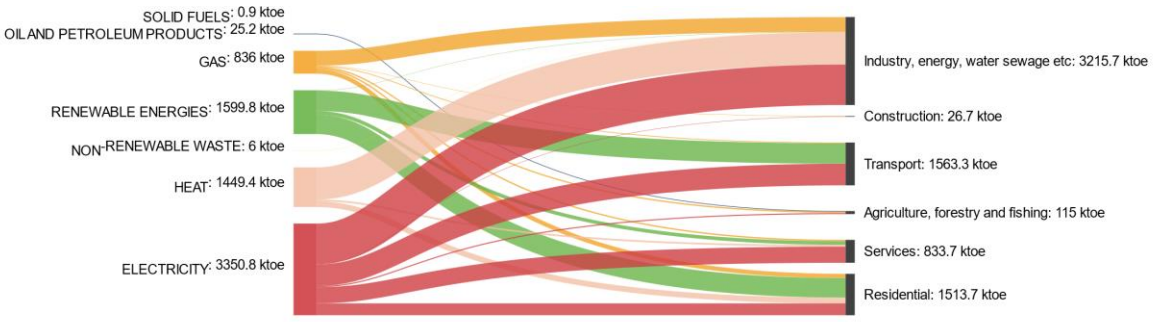
Primary Energy | Baseline



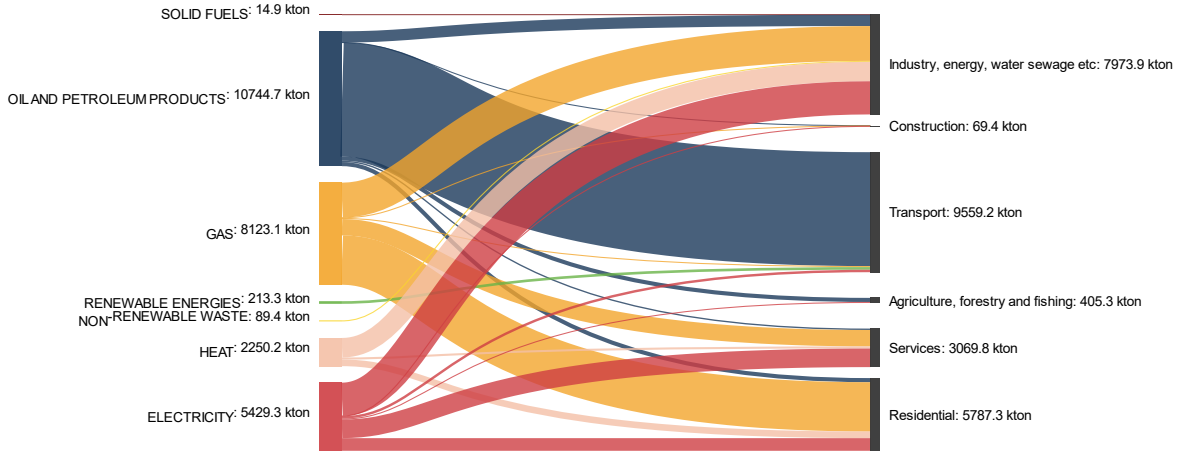
Primary Energy | 2030



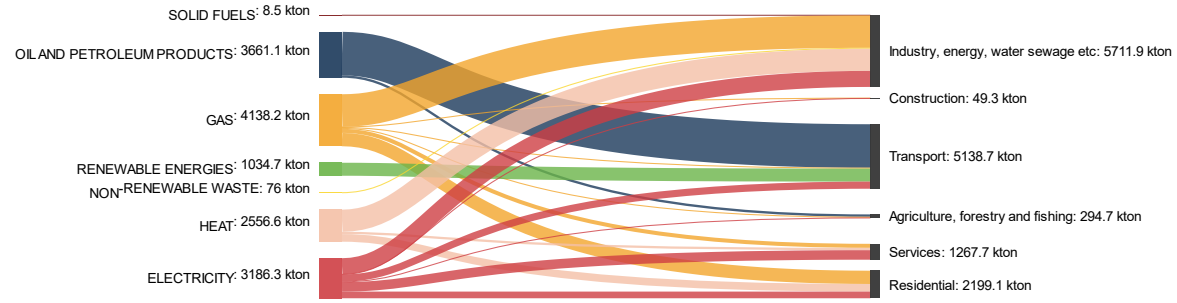
Primary Energy | 2040



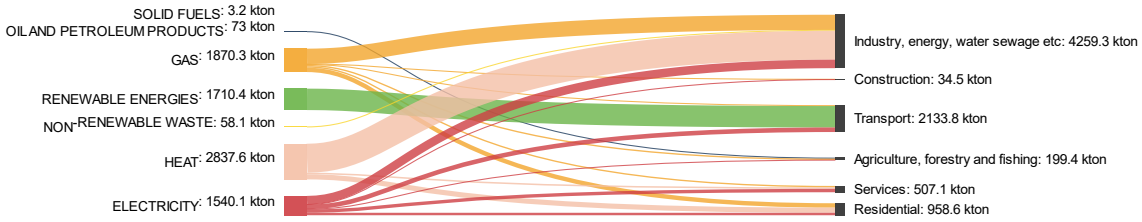
CO_2 EMISSIONS | Baseline



CO_2 EMISSIONS | 2030

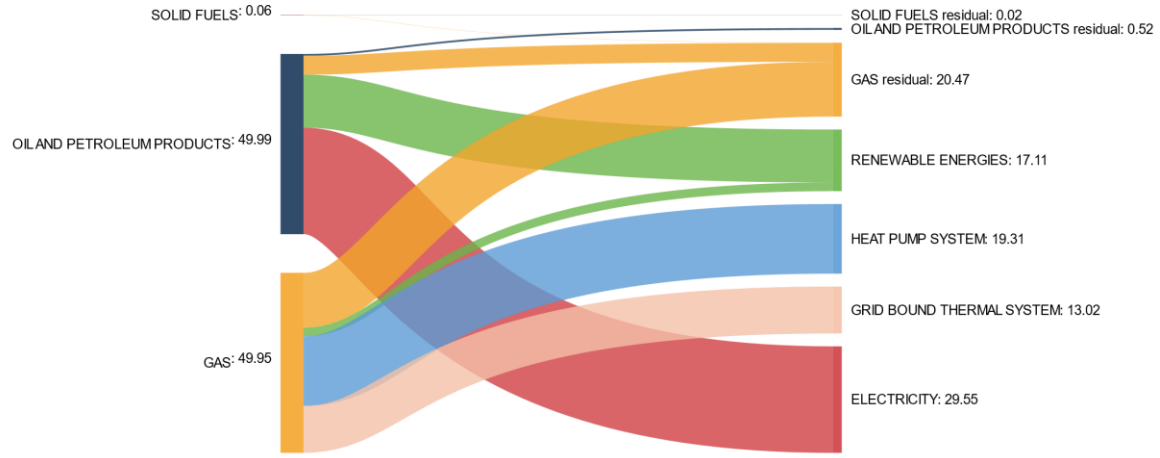


CO_2 EMISSIONS | 2040



FOSSIL FUELS SHIFT | 2030

FOSSIL FUELS SHIFT | 2040



7. IMPLEMENTATION MONITORING AND KPIs

7.1 Evaluating body and evaluation periods

The Sustainable Energy Department of Piemonte Region is entitled and in charge of monitoring the progress in the implementation of the energy transition targets at regional level. This activity is mainly done in the framework of the Regional Observatory activities under implementation and that PROSPECT2030 project helped to reinforce and boost. This is also, as detailed above, one of the Actions of the Regional Energy Action Plan itself.

Main outcomes of such activities are so far:

- the publication of a statistical Energy Report issued every year where main energy data are collected, processed and disseminated;
- the set up of a online publication (as open data format or restricted ones) of main energy consumption data collected at municipal level from DSOs and other regional datasets (such as the Energy Performance Certificates and Boilers cadasters)

In order to upgrade the capacity of data processing, collaborations should be established or kept alive with Universities and Research Institutes.

Given the cross cutting issue of energy, horizontal collaborations are established with other Regional Sectors of the Environmental Department and the Statistics Sector.

7.2 KPIs for impact monitoring

Main KPIs for impact monitoring are the following:

- Renewables in general consumption (primary and final)
- Renewables in electricity supply
- Renewables in final electricity consumption
- Renewables in final thermal consumption
- Final energy consumption broken down per sectors and energy carriers
- Final thermal consumptions per day degree
- Final energy consumptions per GDP
- Carbon emissions and Emission reductions
- Carbon emissions per final energy consumption unit
- Carbon emissions per capita
- Carbon emissions per electricity generation
- Regional generation, import, export
- Number of Municipalities joining the Covenant of Mayors Initiatives for Energy and Climate
- Number of Energy Communities and self consumed generation

8. ASSESSMENT OF SUITING BUSINESS MODELS AND FUNDING SCHEMES

The European Commission's Green Deal sets out the ambition target of carbon neutrality by 2050. This means that we are facing a transition phase toward a complete new energy system. As such, transition planning requires another way of thinking, finding new solutions and innovative approaches that could make feasible and possible what seems to be really hard to achieve, such as carbon neutrality. This requires not only profound changes in technology and infrastructure, but also requires adaptations and even changes in the business sector. Moreover, as it is recognized that public investments will not be enough to reach the national objectives, it is important to use public funds as a leverage to unlock the private investment potential

8.1 Existing business models with regional relevance for low carbon energy supply and development potentials

Nowadays we are facing a period in which huge public money is used to support the growth of economics, after the pandemic outbreak. Budgetary shortage and constraints of the past are no longer existing and therefore an unprecedented flow of public money is available and expected for the future years. Most incentives are given in the form of grants or non-repayable capital contributions on the investments with a limited financial leverage.

The most important existing instrument is the Superbonus. It is activated to rapidly relaunch the construction sector and respond to the important climatic and environmental challenges envisaged for the civil sector by the Integrated National Energy and Climate Plan. The incentive - which encourages energy and seismic upgrading of residential buildings - provides for a 110% deduction rate for energy renovation costs, to be divided into 5 years, within the maximum limit of predefined variable deduction values depending on the size of the building and the type of intervention.

The beneficiary of the deduction has the possibility to:

- directly access the deduction, thus paying the full amount of the work and receiving 110% of the admitted amounts deferred over 5 years;
- receive directly from the person carrying out the interventions a discount on the invoice equal up to 110% of the amount of the works supported. The latter will benefit from the deduction in 5 years;
- transfer the credit to a third party, including a financial or insurance institution, by paying a reduced amount of the work, of an amount equal to the discounting at year zero of the portion sold. The latter will benefit from the deduction in 5 years.

Not only the expenses covered by the Superbonus, but also other tax deductions due (according to other existing mechanisms) on works carried out on the building are admitted to the assignment of the credit or discount on the invoice.

This instrument is working well and is triggering a lot of investments on the market, even though it is also causing speculation procedures and increase in the works prices.

Other active incentive schemes on renewable energy production and energy efficiency (for the public sector) work well to mobilise investments, but can be subject to financial speculations if not well managed.

On sustainable energy investments, interest subsidies have low appeal at present due to the low cost of equity, are scarcely appreciated by investors and are not affected by state aid-compliance. On the other side they generate a good leverage of private equity and have large territorial impact.

The Public-Private Partnership model is a good instrument for energy refurbishment of public assets, the investment risk is very well managed, the fiscal compact limitations are overcome, and there are good pooling competences and operative capacities.

Talking about big infrastructures (HV lines, large plants, etc.), there is no regional strategy regulating these projects and how funds are given. These projects are strongly dependent on financial & lobbying capacity, and driven by national policies.

In any case, for the years to come what is crucial is the launching and management of the National Recovery and Resilience Plan (PNRR), which is part of the Next Generation EU program. It has an overall budget of 750 billion euro, about half of which is made up of grants, agreed by the European Union in response to the pandemic crisis. The Recovery and Resilience Facility (RRF) has a duration of six years, from 2021 to 2026, and a total size of 672.5 billion euros (312,5 of grants, the remaining 360 billion loans at subsidized rates).

8.2 Alternative business models and regional applicability

Alternative business models that should be boosted in the coming years, addressing different target groups, are:

- bundling approach for public buildings
- one stop shop for citizens for the renovation of private buildings
- energy communities

Bundling approach for public buildings

The bundling and pooling approach aims at creating economies of scale in a fragmented market such as the renovation of public buildings belonging to small and medium municipalities. The approach would lead to the launch of joint tender procedures involving several buildings belonging to several Local Authorities. This approach could be connected to the implementation of an EPC Investment Plan, which should follow three main steps:

1. Energy Audit and financial assessment;
2. Tendering process (joint procurement);
3. Operational phase. The latter includes the Investment implementation, the Maintenance services delivery and the Measurement and verification procedure.

For the successful implementation of such a business scheme, a project development assistance (PDA) service should be set up. The PDA consists in:

- coordination and support actions (aggregation of demand, definition of binding agreements between Municipalities)
- technical assistance in the development of the investment plan
- legal assistance in launching the tender procedure
- communication support

Several initiatives promoting Public Private Partnership have been launched by Piedmont Region with the aim at mobilizing private investments by using Energy Performance Contracts (EPC) under the bundling approach. The space for further promotion of similar initiatives is relatively high.

One stop shop (OSS) for citizens for the renovation of private buildings

The renovation of buildings can bring economic and financial benefits while improving the health and wellbeing of owners, tenants and communities, and contributing to the targets and objectives of energy efficiency. In order to achieve a climate-neutral building stock, renovation rate of existing buildings should be increased at a rate of 3-4% per year.

The revised EED calls for further actions that support market development and stimulate the role of market intermediaries such as one-stop-shops (OSS).

They can be the integrated solution helping owners and tenants to overcome difficulties and start a renovation or refurbishment process and act as single suppliers who could be in charge of an entire renovation project and an interface between the beneficiary and the entire supply chain and decision-making process, including financial and legal aspects, monitoring and delivery. In this way the OSS tackle the key barriers that owners face, mainly the lack of technical knowledge, financial resources, skills to arrange a complex renovation or knowledge of the procedures involved.

Thanks to one H2020 project, a pilot project in this direction is under implementation. High potentialities are envisaged in this field also in the future.

Energy communities

Energy communities organise collective and citizen-driven energy actions that will help pave the way for a clean energy transition, increasing the public acceptance of renewable energy projects and making it easier to attract private investments. At the same time, they have the potential to provide direct benefits to citizens by advancing energy efficiency and lowering their electricity bills.

By supporting citizen participation, energy communities can moreover help in providing flexibility to the electricity system through demand-response and storage.

Empowering renewable energy communities to produce, consume, store and sell renewable energy will also help advance energy efficiency in households, support the use of renewable energy and at the same time contribute to fighting poverty through reduced energy consumption and lower supply tariffs.

Energy communities can take any form of legal entity, for instance that of an association, a cooperative, a partnership, a non- profit organisation or a small/medium-sized enterprise. It makes it easier for its citizens, together with other market players, to team up and jointly invest in energy assets. This in turn, helps contribute to a more decarbonised and flexible energy system, as the energy communities can act as one entity and access all suitable energy markets, on a level-playing field with other market actors.

Pilot initiatives are under operation in the Region and as soon as the legislative framework is stabilized, there are huge potentialities to further develop projects in this direction.

8.3 Usable funding schemes: applicability and possible gaps to be filled

One of the most important aspects to implement in the future funding schemes is the stability over the years of the scheme itself. In fact, until now most incentives have been set suddenly with a huge availability of money, only to last a couple years and then removed due to lack of money or too many bad practices. Lower but more stable incentives can avoid distorting the market and create speculative situations for investors, and can let market players adapt and build business plans with a longer time horizon.

It is important that complementarity between regional and national incentives is ensured to generate a positive cumulative effect and gap filling and to avoid creating speculation opportunities in few sectors and leaving others without support. Moreover, a medium and long-term synergy will allow more investors to plan and implement initiatives with lower risk.

A sound governance of the future public available funding is thus needed

9. CONCLUSIONS

9.1 Summary of findings

The action plan highlights the huge challenges we have in front of us, while considering carbon neutrality as the final and ultimate goal. The Region must face unprecedented changes in the energy system, as in twenty years from now it will be completely different in terms of energy production and consumption. First of all a massive shift towards electric energy is foreseen in all sectors. Private households, office buildings, transport vehicles and factories will use much more electricity than now. This change will lead to, on one hand, to the increase of consumptions of this vector and the consequent reduction of other energy carriers with a huge penetration of renewables and, on the other hand, the transformation of the region as a net electrical importer. The development of power generation will be based mainly on photovoltaic, which will be the leading technology in a decade. Nevertheless, the increased challenging PV capacity would not be enough to offset the decommissioning of fossil thermoelectric power and the expected increase of consumptions. A major role in the next twenty years will be played by energy efficiency, whose targets in the building sector are extremely challenging and would require a combination of investments, behaviour change and different mindset that is hard to imagine. District heating infrastructure could still play a role in the future, but with a new concept based on thermal renewables and with an extensive network connecting a lot of low demand buildings and factories. Although close to unrealism, the change is a must and there is no other way in front of us.

9.2 Challenges for the regional authorities and stakeholders

The transition to the new energy system requires a huge workload for the regional and local authorities and stakeholders. The change is not a win-win situation for all stakeholders and market players based on the fossil economy will resist against. So far it seems that the right context is being set in the framework of the National Recovery and Resiliency Plan. This is the opportunity to give credibility to what will be next and to spark the change, upscaling the processes of energy efficiency and decarbonization.

The Region should, thus, reinforce its governance role coordinating the local and regional policies implemented by different stakeholders. Multilevel governance at vertical and horizontal level should be reinforced. In this context, proactive leadership must be played supporting and addressing local policies toward the needs of the renovation wave and the energy transition challenges. In order to achieve this goal, it is urgent and necessary that additional, young and qualified staff would be recruited in the public sector.

The Energy observatory needs to be boosted and kept alive along the years in order to monitor the effectiveness of the implemented policies and readdress them taking into account the targets of carbon neutrality ahead.

Several investments need to be performed in the energy grids system and a clear vision based on carbon neutrality must be shared in order to make sure that this would happen in the right time frames. To promote the development of smart grids coupled with the development of the Energy Communities concept (more efficiency, smart remote management, storage systems, etc.) will be a key.

The huge additional RES capacity will need authorization procedures that would go straight forward taking into account environmental needs and the urgency of it.

Finally the Region needs to act as an accelerator of investments in the private and public sector, managing efficiently and with sound leverage factors the public fundings available. Besides, supporting information and reducing transaction costs for the full roll out of investments of private citizens and SMEs in the decarbonization direction.

9.3 Expected impact on regional economy

Surely, all measures related to energy savings and shift from fossil fuels to renewables will achieve, after the payback time, relevant monetary savings for private citizens and private administrations. This should provide more availability of equity, higher investment opportunities and local added value. In particular, local generation and consumption, also in the form of energy communities, might save a good share of the final cost of purchased electricity, which is related to the infrastructure taxes. Another option might be that local cooperatives buy and manage the local distribution grid, allowing even these taxes to stay on the territory.

One of the main trends of the whole energy transition process is to decentralize every kind of production, as RES are available also in remote areas and do not depend on the existing infrastructures. This is expected to have a very positive impact on rural and peripheral areas, such as alpine valleys. To supply and sell, install, maintain and manage a high number of small RES plants numerous job places are expected to be created, with a positive impact also on the regional GDP.

The opportunities related to large scale projects as well as for industrial pilot projects of new technologies and synergies can be a boost for the entrepreneurial and industrial sectors of the region, attracting investments from inside the region but also from the rest of Italy and abroad. Within these projects there is also the opportunity for Universities and research centres to pursue national and European funds, develop research teams and gain experience on the technologies and on the university-company cooperation.

9.4 Gaps to fill for proper implementation (technical, regulatory, financial)

Back to back with the development of technologies and solutions which are not yet market-ready for their large scale implementation, it is essential that most of the not-technological barriers that hinder the full roll out of sustainable energy projects are removed.

The Region can play a role in removing the transaction costs of the projects implementation, upgrading the level of their feasibility. The Action Plan drafted in this document highlights the urgency of a timely implementation of the changes required. The regulatory framework of the transition must be, thus, set and kept stable or aligned to the long term objectives that we have in front of us. Mitigation to climate change must be the red line that drives any investment project in the coming years.

Several public funds will be invested in this direction, this is a challenge that we cannot lose and all the efforts of public and private stakeholders should converge toward the same goal.