

Multi-stakeholder Energy Compact:

SARDINIA ELECTRIFICATION

Entities: Enel; Rossi-Doria Centre of Economic and Social Research – Roma Tre University

Introduction¹:

This Energy Compact aims to support the relevant project, just in progress, of decarbonizing the energy mix and increasing the electrification of final energy uses in Sardinia/Italy.

Given the marginal penetration of methane and the local relevance of services (commerce, tourism, agriculture and public administration make up 60% of the added value), Sardinia offers a unique context for electrification. Due to the very low presence of natural gas infrastructure, electricity is mostly produced today leveraging coal and residues from oil refining processes. In 2020, 75% of the gross electricity produced (13.6 TWh) was generated from fossil sources; the main renewable sources -wind and photovoltaic-, respectively amounted to 15% and 7% of the electricity generation mix.

Sardinia is a net exporter of electricity: 3.1 TWh are delivered to other Italian regions². Furthermore, net energy consumption amounts to approximately 8.5 TWh; it has the highest value in Italy of electricity consumed per capita in the domestic sector, ca. 1.38 MWh each year. Self-production represents less than 1% and is almost exclusively from fossil sources.

By 2030, the electrification initiative aims to phase out the energy production from coal, increase the share of renewable energy from PV and Wind in the energy mix offered, and support the electrification of final uses (SDG 7 targets 7.1 and 7.2). Due to the demographic characteristics of the island (Sardinia has one of the lowest population densities in Italy, around 68 inhabitants per km²) it will be fruitful to invest in distributed generation.

The efforts toward electrification are in line with the Italian National Strategy for Sustainable Development that, within the Decarbonization pillar, includes the actions aimed to increase energy efficiency and strengthen sustainable mobility. The Sardinian regional strategy for sustainable development is currently being defined in coherence with the National Strategy.

It is a promising endeavor. We are aware that the challenges, solutions and opportunities of this process will provide useful insights for the energy transition of other areas; in particular they will help disseminating concrete solutions of distributed green energy generation in developing and vulnerable countries. To this end, information on the Sardinia electrification will be systematized and followed by the University of Roma³ – Rossi - Doria Centre.

Dialogue with local institutions and Non-Governmental Organizations is underway to directly involve them in the projects, create synergies and amplify the Energy Compact impact.

¹ Unless otherwise stated, data refer to 2019.

² Sardinia also exports ca. 0.4 TWh abroad.

ENERGY COMPACT TEMPLATE (applicable to all parties)

SECTION 1: AMBITION

1.1. Ambitions to achieve SDG7 by 2030. [Please select all that apply]

(Member States targets could be based on their NDCs, energy policies, national five-year plans etc. targets for companies/organizations could be based on their corporate strategy)

<input checked="" type="checkbox"/> 7.1. universal access	<p>Target 1: Increase electrification of final energy uses in Sardinia. Time frame: 2021-2030</p> <p>Context for the ambition(s): Sardinia is an Italian island where, due to the very low presence of natural gas infrastructure, electricity is mostly produced leveraging coal and residues from oil refining processes. Sardinia offers a unique context for electrification; indeed, given the low incidence of sectors hard-to-abate and the marginal penetration of methane, electrification results to be more attractive even from an economic point of view than other regions in Italy. The Sardinian industry is highly electrified (44%); indeed, electrical technologies in the food, manufacturing and machinery sectors (~ 1TWh) are already economically competitive. At the same time, there are opportunities to electrify ports, rental and transfer fleets to promote sustainable tourism, currently almost entirely fueled by oil products. Surveys conducted on the Sardinian population show the need to reduce energy costs and a good propensity for electrification of final consumption. Sardinians are also very interested in distributed generation and willing to take advantage of self-production. The efforts toward electrification are in line with the National Strategy for Sustainable Development that, within the Decarbonization pillar, includes the actions aimed to increase energy efficiency and strengthen sustainable mobility. The regional strategy for sustainable development is currently being defined in coherence with the National Strategy. Moreover, local stakeholders (institutions, citizens, communities) were involved in the project definition to ensure engagement and overall alignment with their expectations.</p>
<input checked="" type="checkbox"/> 7.2. Renewables	<p>Target 2: Transform electricity supply, with a direct transition from fossil fuel production to renewable production with storage systems. Time frame: 2021 – 2030</p> <p>Context for the ambition(s): The industry and residential sectors of Sardinia already show a high rate of electrification. However, they need to decarbonise the energy mix. Currently, Sardinia relies on fossil fuels for >70% of its electricity production. Today, due to the weight of coal and the limited use of renewable sources, Sardinia has an emissions / GDP ratio ~ 30% higher than Italy. The direct transition to renewables and the increase of the storage system will reduce emission intensity by 80% by 2030. In fact, the high potential for renewables is related to high irradiation and windiness that foster the growth of electricity generation from renewable sources. At the same time, the low population density favors the distributed generation of electricity. The aim is to make the entire tourism sector green. From the arrival on the island through green ports to accommodations with zero environmental impact and electric mobility, the aim is to make the whole experience of tourists on the island completely sustainable. At the same time, we want to promote the spread of flexibility systems and renewable energy communities and support the integration of photovoltaic systems in the agricultural sector to increase the yield of crops. This target is aligned with the Italian National Strategy for Sustainable Development since the Decarbonization pillars specifically concern the increase of energy production from renewable sources and the reduction of GHG emissions. The regional strategy for sustainable development is currently being defined in coherence with the National Strategy. Moreover, local stakeholders (institutions, citizens, communities) were involved in the project definition to ensure engagement and overall alignment with their expectations. In this context, in order to guarantee an inclusive, just energy transition, training initiatives as upskilling and reskilling programs will support the project deployment.</p>
<input type="checkbox"/> 7.3. Energy Efficiency	<p>Target: Time frame: Context for the ambition(s):</p>
<input checked="" type="checkbox"/> 7.a. International Cooperation	<p>Target: Time frame: Context for the ambition(s):</p>

7.b. Infrastructure and Technology

Target:
Time frame:
Context for the ambition(s):

1.2. Other ambitions in support of SDG7 by 2030 and net-zero emissions by 2050. *[Please describe below e.g., coal phase out or reforming fossil fuel subsidies etc.]*

Target 3: Enhance the dialogue and collaboration among different stakeholders involved in the energy transition of Sardinia.

Time frame: 2021

Context for the ambition(s):

The preliminary document of the Sardinian Regional Strategy for Sustainable Development identified the necessity of finding shared local strategies for sustainable development to define solutions that are closer to citizens' needs. In Sardinia, different actors (public authorities, private companies, NGOs) are taking action to promote renewable energy generation. In this context, the Rossi-Doria Centre will encourage and support the dialogue and cooperation among regional authorities, private entities, and civil society organizations to create synergies in the pursuit of SDG7.

Target 4: Share knowledge regarding the electrification processes of Sardinia that can be useful for planning the energy transition in other areas, especially in vulnerable and developing countries, contributing to international cooperation in the context of SDG7.

Time frame: 2021

Context for the ambition(s):

The electrification of Sardinia is a promising endeavor. Lessons learned from this process could inform the energy transition of other countries. The Rossi-Doria Centre will study the characteristics of the Sardinian context, e.g., challenges and opportunities of the electrification process, systematize data and information from different sources and actors and explore to which extent the experience of the island can be disseminated and scaled up in other contexts, including developing countries.

SECTION 2: ACTIONS TO ACHIEVE THE AMBITION

2.1. Please add at least one key action for each of the elaborated ambition(s) from section 1. *[Please add rows as needed].*

<p>(Ambition 7.1 - Target 1: Increase electrification of final energy uses in Sardinia.) Action 1.1: Offer to consumers (both families and industries) new products and services that allow to electrify consumption and increase energy efficiency</p> <ul style="list-style-type: none"> a. Short-term: bundled offer of electricity supply in combination with high efficiency appliances b. Medium-term: offering of comprehensive solutions in an 'as a service' model <p>Both steps will be supported by communication campaigns to stimulate the shift to electricity as an energy source with key focus on HVAC technology, induction cooking, electric mobility (individual and public transport, micro-mobility and green ports)</p>	<p><i>Start and end date</i> 2021- 2030</p>
<p>(Ambition 7.2 – Target 2: Transform electricity supply)</p> <p>Action 2.1: Coal phase-out</p> <p>Action 2.2: Renewable generation deployment and low carbon solutions development:</p> <ul style="list-style-type: none"> a) Deployment of PV and wind plants b) Development of low carbon solutions, as storage <p>We plan to focus on renewable distributed generation rather than on utility scale plants and that storage and digital technologies ensure a high level of integration with the electricity grid for higher efficiency and quality.</p>	<p><i>Start and end date</i></p> <p>2.1) 2021-2025</p> <p>2.2) 2021-2030</p>
<p>(Target 3: Enhance the dialogue and collaboration among different stakeholders involved...) Action 3.1: Facilitate stakeholders' engagement and create room for discussions on each stakeholder's actions and how to connect them.</p>	<p><i>Start and end date</i> 2021</p>
<p>(Target 4: Share knowledge regarding the electrification processes of Sardinia that can be useful for planning the energy transition in other areas...) Action 4.1: Undertake a study on the characteristics, e.g., challenges and opportunities of the Sardinian electrification.</p>	<p><i>Start and end date</i></p>

SECTION 3: OUTCOMES

3.1. Please add at least one measurable and time-based outcome for **each** of the actions from section 2. *[Please add rows as needed].*

<p><i>Outcomes for target 1 (increase electrification of final uses) , action 1.1 (Offer to consumers (both families and industries) new products and services that allow to electrify consumption...):</i></p> <p>a) Increase electrification of final demand by at least 1.8 TWh in 2030 (2019 baseline: 8.5 TWh), +1.1 TWh in the cities, +0.5 TWh in agriculture and industry and +0.2 TWh in tourism sector. Electricity will reach 37% in the energy mix by 2030 (vs 28% in 2018) and reducing energy expenses by 50% for families and 20% for industries in order to increase access to affordable, reliable and modern energy services. Specifically, between 2021 and 2030 it is expected the additional introduction of:</p> <ul style="list-style-type: none"> ○ >200k heat pumps ~ 40% homes ○ ~ 200k induction hobs ~ 30% homes ○ >10k electrified businesses ~ 10% ○ >1.0k electric buses ○ 7 completely green ports out of the main 9 harbors ○ ~1,1k EV charging points 	<p><i>Date</i></p> <ul style="list-style-type: none"> ● ~1,1k EV charging points approximately by 2023. ● All other outcomes by 2030
<p><i>Target 2 (Transform electricity supply...), Outcome for action 2.1 (Coal phase- out)</i></p> <ul style="list-style-type: none"> ○ Fossil fuel production from 9.6 TWh in 2019, or c.71%, to 1.2 TWh by 2030, or 10% <p><i>Outcome for action 2.2 (Renewable generation deployment and low carbon solutions development)</i></p> <ol style="list-style-type: none"> a) Renewables production from 4.0 TWh in 2019 to 10.9 TWh by 2030 b) Storage development equal to 0.7 GW by 2030. <p>Combined outcome for action 2.1 and 2.2:</p> <ul style="list-style-type: none"> ○ Decrease carbon intensity of electricity production from 0.5 t CO₂e/MWh in 2019 to 0.1 t CO₂e/MWh in 2030, reducing emissions by 5.5 Mt CO₂e, i.e. ~80% reduction vs 2019 emissions. 	<p><i>Date</i></p> <p>2.1) 2021-2025</p> <p>2.2) 2021-2030</p>
<p><i>Outcome for Target 3: Enhance the dialogue and collaboration among different stakeholders involved...), action 3.1 (Facilitate stakeholders' engagement and create room for discussions on each stakeholder's actions and how to connect them.)</i></p> <p>a) Publication of a document containing a broad vision of Sardinia's energy transition scenario coming out of the commitments made by the multistakeholder compact and promoted by the Sardinian Energy Compact.</p>	<p><i>Date</i></p> <p>2021-2022</p>
<p><i>Outcome for target 4 (Share knowledge regarding the electrification processes of Sardinia that can be useful for planning the energy transition in other areas...) Action 4.1 (Undertake a study on the characteristics, challenges and opportunities of the Sardinian electrification).</i></p>	

a) Publication and dissemination of the report containing the study results.

SECTION 4: REQUIRED RESOURCES AND SUPPORT

4.1. Please specify required finance and investments for each of the actions in section 2.

Target 1 (Transform electricity supply...), action 1.1:

The consumers shift to electric appliances, electric mobility and the electrification of industrial process will represent an investment of approximately 10B€, of which:

- c. 80% for electric mobility;
- c. 19% for building electrification;
- c. 1% for industrial processes.

Target 2 (Transform electricity supply...), action 2.2:

The shift of the production mix to renewable sources will represent an investment of approximately 5B€

4.2. [For countries only] In case support is required for the actions in section 2, please select from below and describe the required support and specify for which action.

[Examples of support for Member States could include: Access to low-cost affordable debt through strategic de-risking instruments, capacity building in data collection; development of integrated energy plans and energy transition pathways; technical assistance, etc.]

<input type="checkbox"/> Financing	<i>Description</i>
<input type="checkbox"/> In-Kind contribution	<i>Description</i>
<input type="checkbox"/> Technical Support	<i>Description</i>
<input type="checkbox"/> Other/Please specify	<i>Description</i>

SECTION 5: IMPACT

5.1. Countries planned for implementation including number of people potentially impacted.

Target 1: Increase electrification of final uses

Countries: Italy, Sardinia region

Beneficiaries: The estimate of people potentially impacted is 1.6 million of Sardinia inhabitants or people having second homes in the region.

Target 2: Transform electricity supply, with a direct transition from fossil fuel production to renewable production with storage system

Countries: Italy, Sardinia region

Beneficiaries: 1.6 million of Sardinia inhabitants will benefit from this transition.

5.2. Alignment with the 2030 Agenda for Sustainable Development – Please describe how **each** of the actions from section 2 impact advancing the SDGs by 2030.

[up to 500 words, please upload supporting strategy documents as needed]

Target 1 (Increase electrification of final uses), action 1.1:

- SDG 11 – Sustainable cities and communities. For example, Polluting emissions (SO_x, NO_x, CO, PM₁₀) would decrease by 40% (target 11.6);
- SDG 9 – Industry, innovation and infrastructure). For example, with respect to target 9.2, local socio-economic benefits are expected: up to 30B€ of additional induced investments and 10-15,000 employees; moreover, by 2030, around 12k of commercial activities (~10%) and approximately 3k of industrial processes (~40%) would be electrified (target 9.4).

Target 2 (Transform electricity supply...), actions 2.1 and 2.2:

- SDG 13 – Climate Action

Target 3 (Enhance the dialogue and collaboration among different stakeholders involved...), action 3.1:

- We aim that the effort undertaken will support the actions planned by the stakeholders that contribute to the achievement of SDGs 7 and 13 and will encourage jointed actions.

Target 4 (Share knowledge regarding the electrification processes of Sardinia that can be useful for planning the energy transition in other areas...) Action 4.1

- The study undertaken will build knowledge about the energy transition and electrification processes, indirectly contributing to SDGs 7 and 13.

5.3. Alignment with Paris Agreement and net-zero by 2050 - Please describe how **each** of the actions from section 2 align with the Paris Agreement and national NDCs (if applicable) and support the net-zero emissions by 2050.

[up to 500 words, please upload supporting strategy documents as needed]

Target 1 (Increase electrification of final uses), action 1.1

- Paris and net-zero: Electrification of consumption is a key lever for energy efficiency and flexibility of the electrical system. Alongside, the upgrading of infrastructures it plays an important role in the energy transition, pursuing the objectives of Paris Agreement.

Target 2: (Transform electricity supply...), action 2.1 and 2.2

- Paris and net-zero: the energy transition towards renewable energies, next to an increase in the storage capacity, positively contributes to reduce CO₂ emissions (thus contributing to the EU NDC's target of reducing domestic greenhouse gas emissions of at least 55% by 2030 compared to 1990). In such a scenario, a reduction in CO₂e emissions of 5.5 Mt CO₂eq/year is expected.

Target 3 (Enhance the dialogue and collaboration among different stakeholders involved...), action 3.1:

- We aim that the effort undertaken will support the actions planned by the stakeholders that contribute to the achievement of the Paris Agreement.

SECTION 6: MONITORING AND REPORTING

6.1. Please describe how you intend to track the progress of the proposed targets in section 3. Please also describe if you intend to use other existing reporting frameworks to track progress on the proposed targets.

Target 1 (increase electrification of final uses)

KPI 1.1 Electricity consumption of final energy uses.

Unit: TWh. 2030 Goal: at least + 1.8TWh. Baseline: 8.5 TWh

KPI 1.2 Share of electricity in the energy mix

Unit: %. 2030 Goal: 37%.

KPI 1.3 Carbon emission of final energy uses.

Unit: Mt CO₂e/year. Goal: reduce emissions by 1.5 Mt CO₂e/year

Target 2 (Transform electricity supply...)

2.1 Share of renewables in the primary energy mix

Unit: %

2.2 Share of electricity production from coal in the energy mix

Unit: %.

2.3 Carbon intensity of energy production.

Unit: t CO₂e/MWh. 2030 Goal: 0.1 t CO₂/MWh

Target 3: (Enhance the dialogue and collaboration among different stakeholders involved...)

3.1 Engage at least one stakeholder from the regional institutions and at least one civil society organizations in the Compact.

Target 4: Share knowledge regarding the electrification processes of Sardinia that can be useful for planning the energy transition in other areas...)

About the indicators: Media and events through which the report will be disseminated are yet to be defined.

SECTION 7: GUIDING PRINCIPLES CHECK LIST

Please use the checklist below to validate that the proposed Energy Compact is aligned with the guiding principles.

I. Stepping up ambition and accelerating action - Increase contribution of and accelerate the implementation of the SDG7 targets in support of the 2030 Agenda for Sustainable Development for Paris Agreement

I. 1. Does the Energy Compact strengthen and/or add a target, commitment, policy, action related to SDG7 and its linkages to the other SDGs that results in a higher cumulative impact compared to existing frameworks?

Yes No

I.2. Does the Energy Compact increase the geographical and/or sectoral coverage of SDG7 related efforts? Yes No

I.3. Does the Energy Compact consider inclusion of key priority issues towards achieving SDG7 by 2030 and the net-zero emission goal of the Paris Agreement by 2050 - as defined by latest global analysis and data including the outcome of the Technical Working Groups? Yes No

II. Alignment with the 2030 agenda on Sustainable Development Goals – Ensure coherence and alignment with SDG implementation plans and strategies by 2030 as well as national development plans and priorities.

II.1. Has the Energy Compact considered enabling actions of SDG7 to reach the other sustainable development goals by 2030? Yes No

II.2. Does the Energy Compact align with national, sectoral, and/or sub-national sustainable development strategies/plans, including SDG implementation plans/roadmaps? Yes No

II.3. Has the Energy Compact considered a timeframe in line with the Decade of Action? Yes No

III. Alignment with Paris Agreement and net-zero by 2050 - Ensure coherence and alignment with the Nationally Determined Contributions, long term net zero emission strategies.

III.1. Has the Energy Compact considered a timeframe in line with the net-zero goal of the Paris Agreement by 2050? Yes No

III.2. Has the Energy Compact considered energy-related targets and information in the updated/enhanced NDCs? Yes No

III.3. Has the Energy Compact considered alignment with reaching the net-zero emissions goal set by many countries by 2050? Yes No

IV. Leaving no one behind, strengthening inclusion, interlinkages, and synergies - Enabling the achievement of SDGs and just transition by reflecting interlinkages with other SDGs.

IV.1. Does the Energy Compact include socio-economic impacts of measures being considered? Yes No

IV.2. Does the Energy Compact identify steps towards an inclusive, just energy transition? Yes No

IV.3. Does the Energy Compact consider measures that address the needs of the most vulnerable groups (e.g. those impacted the most by energy transitions, lack of energy access)? Yes No

V. Feasibility and Robustness - Commitments and measures are technically sound, feasible, and verifiable based a set of objectives with specific performance indicators, baselines, targets and data sources as needed.

V.1. Is the information included in the Energy Compact based on updated quality data and sectoral assessments, with clear and transparent methodologies related to the proposed measures? Yes No

V.2. Has the Energy Compact considered inclusion of a set of SMART (specific, measurable, achievable, resource-based and time based) objectives? Yes No

V.3. Has the Energy Compact considered issues related to means of implementation to ensure feasibility of measures proposed (e.g. cost and financing strategy, technical assistance needs and partnerships, policy and regulatory gaps, data and technology)? Yes No

SECTION 8: ENERGY COMPACT GENERAL INFORMATION

8.1. Title/name of the Energy Compact

Electrification of Sardinia

8.2. Lead entity name (for joint Energy Compacts please list all parties and include, in parenthesis, its entity type, using entity type from below)

Enel (Private sector); Rossi Doria Centre of Excellence – Roma Tre university (Academic Institution); other potential partners are being contacted to join the compact (local entities, Non-Governmental Organization).

8.3. Lead entity type

Government

Local/Regional Government

Multilateral body /Intergovernmental Organization

Non-Governmental Organization (NGO)

Civil Society organization

Academic Institution /Scientific Community

Private Sector

Philanthropic Organization

Other relevant actor

8.4. Contact Information

valeria.termini@uniroma3.it; chiara.dallachiesa@enel.com.

8.5. Please select the geographical coverage of the Energy Compact

Africa Asia and Pacific Europe Latin America and Caribbean North America West Asia Global

8.6. Please select the Energy Compact thematic focus area(s)

Energy Access Energy Transition Enabling SDGs through inclusive just Energy Transitions Innovation, Technology and Data Finance and Investment.

SECTION 9: ADDITIONAL INFORMATION (IF REQUIRED)

Please provide additional website link(s) on your Energy Compact, which may contain relevant key documents, photos, short video clips etc.