The European House Ambrosetti

Enel Foundation

Net Zero E-conomy 2050

Decarbonization roadmaps for Europe: focus on Italy and Spain

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1 Why it is important to talk about decarbonization and where we are going

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Global CO_2 emissions in 2021 reached an all-time negative record of 36.3 bln tons. To respond to this challenge, the European Union has set itself the goal of becoming **"climate neutral" by 2050**

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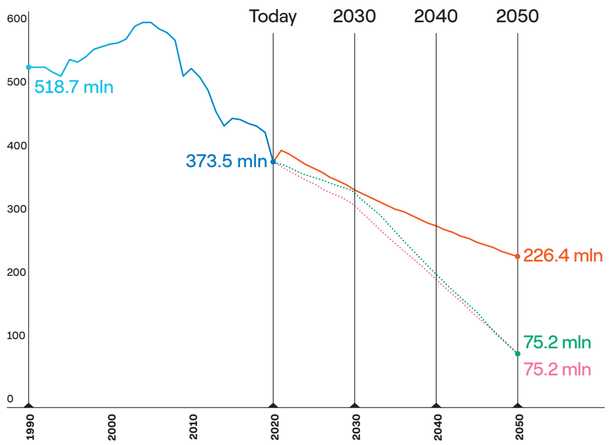
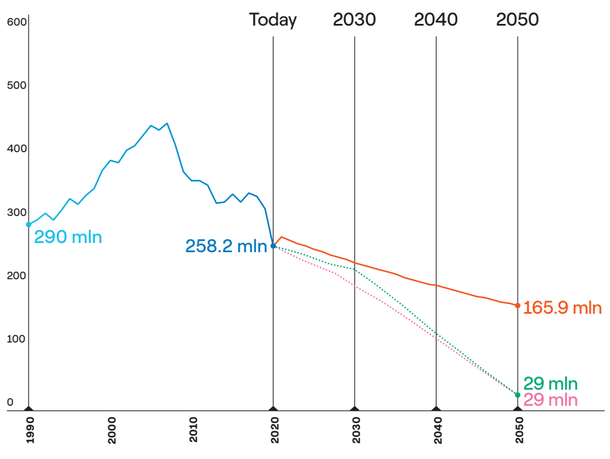
Both Italy and Spain register **some criticalities with regards to the main energy transition levers**. In particular, looking at GHG emissions, they are underperforming in both the short and the long term: in 2050 the gap between the inertial trend and the target set in the national long-term strategy is equal to around **151.2 mln tons CO_2-eq. in Italy and 136.9 mln tons CO_2-eq. in Spain**

Figure 1 → GHG gross emissions in Italy and in Spain, 1990-2050[E] (% values)

↓ Italy



↓ Spain



Source → The European House – Ambrosetti and Enel Foundation on European Environment Agency, NECP and long-term strategy, 2022.

1 Inertial trends have been calculated by projecting CAGR (Compound Annual Growth Rate) from 2009 to 2019.
2 The policy targets are the ones reported in the 2030 Integrated Energy and Climate Plan and the 2050 Long-Term strategies.
3 The "Fit for 55" targets in 2030 were estimated by projecting the same percentage increase estimated at European level.

2 The decarbonization process is closely linked to achieving energy independence

Figure 2 → Energy dependence index[4] in EU27 countries, 2020 (% values)

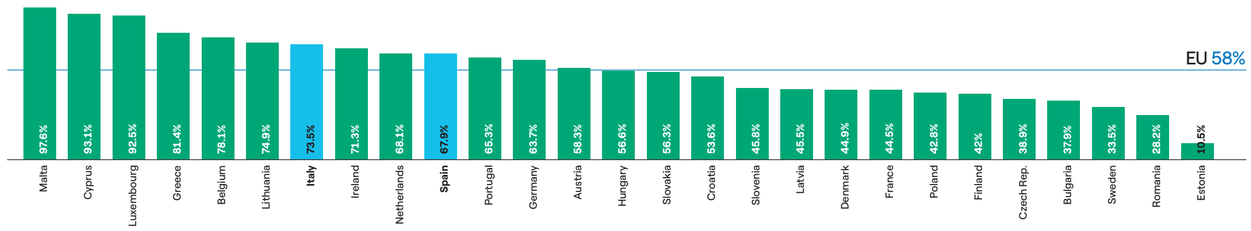
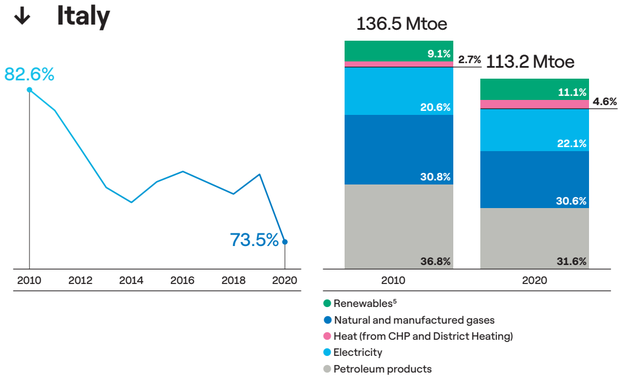
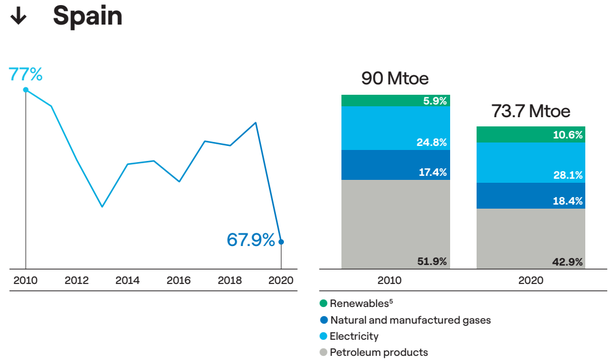


Figure 3 → Trend in energy dependence index (left, %) and final energy consumption by fuel type (right, Mtoe) in Italy and Spain, 2010-2020

↓ Italy



↓ Spain



Source: The European House – Ambrosetti and Enel Foundation on Eurostat data, 2022.

4 The indicator is calculated as net imports over gross available energy.
5 Renewables include biomass and waste, geothermal,solar heat and ambient heat.

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Italy ranks **2nd** in Europe for **imported gas in the gross available energy mix (41.2%)**, while Spain's gas imports account for 26.1%

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Italy is **5th** in Europe in the **gas intensity of GDP index[6], consuming more gas per million Euros GDP** with a value of **34.9 toe per million Euros GDP** (23.3 toe per million Euros GDP in Spain)

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However, between 2010 and 2020, Italy and Spain were both able to reduce their energy dependence by about **9.1 percentage points** (from 82.6% in 2010 to 73.5% in 2020 in Italy and from 77% in 2010 to 67.9% in 2020 in Spain), thanks to a combination of **energy efficiency gains** and **a switch to renewable energy sources in the primary production mix**

6 The gas intensity of GDP index has been calculated dividing the quantity of gas consumed in each country by the GDP. Therefore, the index evaluates the amount of gas consumption necessary in the countries to produce a million Euros GDP.

3 A more robust acceleration of decarbonization would require less resources than a weaker one

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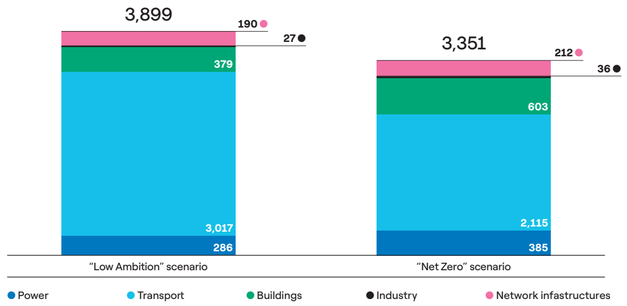
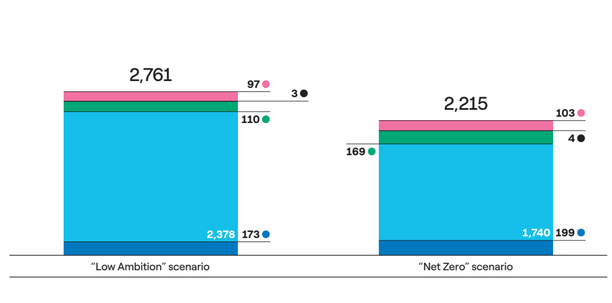
The "Net Zero" scenarios defined for Italy and Spain envisage investments equal to **3,351 bln Euros** and **2,215 bln Euros** (vs. 3,899 bln Euros in Italy and 2,761 bln Euros in Spain in the "Low Ambition" scenarios) respectively in the 2021-2050 period, less than the investments needed by the "Low Ambition" scenarios

Figure 4 → Investments per sector in the "Low Ambition" and "Net Zero" scenarios in Italy and Spain, 2021-2050 (absolute values in bln Euros)

↓ Italy



↓ Spain



Source → The European House – Ambrosetti and Enel Foundation on European Environment Agency, NECP and long-term strategy, 2022.

4 The expected benefits of "Net Zero" scenarios in Italy and Spain

→ Italy

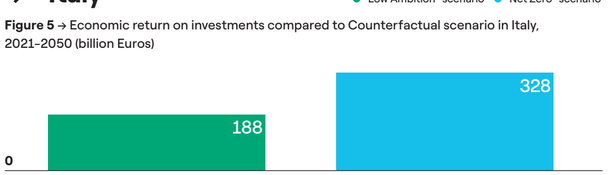


Figure 5 → Economic return on investments compared to Counterfactual scenario in Italy, 2021-2050 (billion Euros)

→ Spain

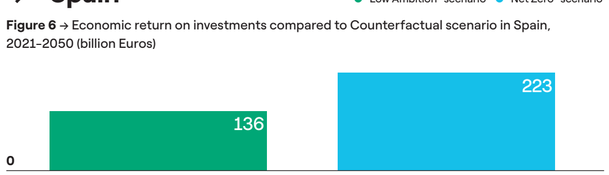


Figure 6 → Economic return on investments compared to Counterfactual scenario in Spain, 2021-2050 (billion Euros)

Economic and social impacts

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The "Net Zero" scenario generates a **better economic effect** than the "Low Ambition" scenario: considering the estimated investment, this translates, for Italy and Spain respectively, into **328 billion Euros** and **223 billion Euros** of higher economic returns compared to a Counterfactual scenario[7]

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The "Net Zero" scenario also creates **more jobs (full-time equivalent)** than the "Low Ambition" scenario: **2.6 million jobs** vs 2.1 in the "Low Ambition" in Italy, and **1.8 million jobs** vs. 1.7 jobs in the "Low Ambition" in Spain

Reduction of pollution

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The reduction of pollution – such as Particulate Matter (PM) and Nitrogen Oxides (NO_x) – generates a **positive effect on public health**: in the 2021-2050 period, the savings connected to the **reduction of diseases, the improvement of productivity and the avoidance of premature deaths** made possible by the reduction of pollution in the "Net Zero" scenario come to around **614 billion Euros** in Italy and **317 billion Euros** in Spain compared to a Counterfactual scenario (vs. 495 and 205 savings in the "Low Ambition" scenarios rispectively)

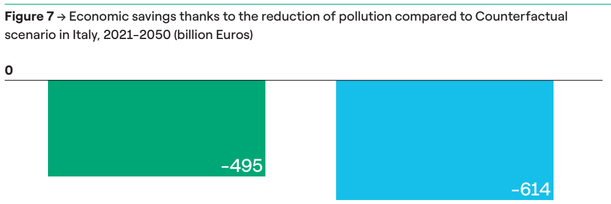

Figure 7 → Economic savings thanks to the reduction of pollution compared to Counterfactual scenario in Italy, 2021-2050 (billion Euros)

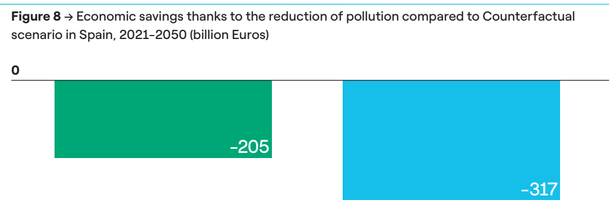

Figure 8 → Economic savings thanks to the reduction of pollution compared to Counterfactual scenario in Spain, 2021-2050 (billion Euros)

Savings in fossil fuel expenditures

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Italy would benefit from **1,914 billion Euros of fossil fuel expenditures savings** in the "Net Zero" scenario compared to a Counterfactual scenario in the 2021-2050 period (vs. 851 billion Euros in the "Low Ambition" Scenario)

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In Spain, economic fossil fuel savings would be equal to **1,279 billion Euros** in the "Net Zero" scenario compared to a Counterfactual scenario in the 2021-2050 period (vs. 702 billion of Euros in the "Low Ambition" scenario)

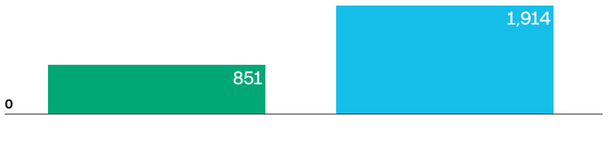

Figure 9 → Savings in fossil fuel expenditures compared to Counterfactual scenario in Italy, 2021-2050 (billion Euros)

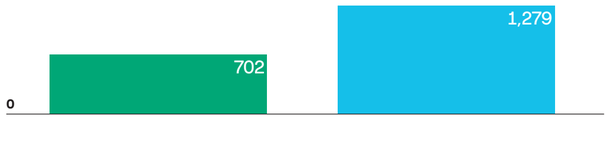

Figure 10 → Savings in fossil fuel expenditures compared to Counterfactual scenario in Spain, 2021-2050 (billion Euros)

Energy security

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The "Net Zero" scenario would allow a significant **reduction in gas intensity of GDP**. In this scenario, in Italy it is expected to be equal to **1.9 toe per million Euros GDP** in 2050 (vs. 34.9 in 2020 and 8.3 in the "Low Ambition" scenario), leading to a **94% reduction** compared to current values (vs. -76% in the "Low Ambition" scenario)

↘

In Spain, gas intensity of GDP is expected to reach **1.9 toe per million Euros GDP** in 2050 (vs. 23.3 in 2020 and 10.2 in the "Low Ambition" scenario), leading to a **92% reduction** compared to current data (vs. 56% in the "Low Ambition" scenario)

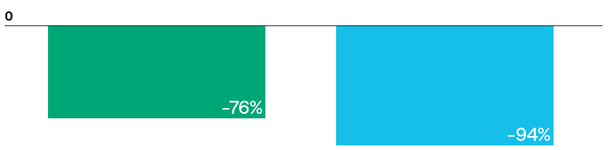

Figure 11 → Variation of gas intensity of GDP index compared to 2020 values in Italy, 2020 and 2050 (% values)

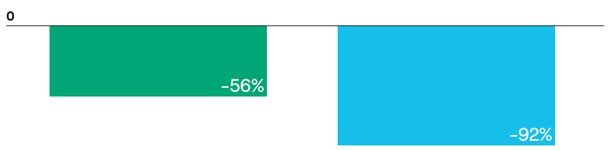

Figure 12 → Variation of gas intensity of GDP index compared to 2020 values in Spain, 2020 and 2050 (% values)

Energy independence

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In Italy, the "Net Zero" scenario would allow a further **decrease in the energy dependence index** compared to the projections of national plans, from 73.5% in 2020 to **zero** in 2050 in the "Net Zero" scenario (31.3% in the "Low Ambition" scenario)

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For Spain, the energy dependence index is expected to decrease from 67.9% in 2020 to **13% in 2050** in the "Net Zero" scenario (52% in the "Low Ambition" scenario)

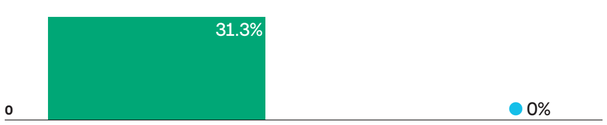

Figure 13 → Energy dependence index at 2050 in Italy, 2050 (% values)

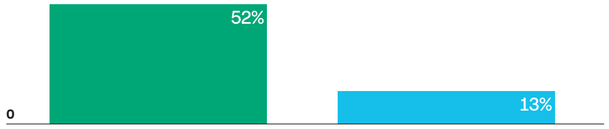

Figure 14 → Energy dependence index at 2050 in Spain, 2050 (% values)

Source → The European House – Ambrosetti and Enel Foundation, 2022.

7 For economic and social impacts the Counterfactual scenario indicates a scenario in which the same level of investment considered in the Scenarios ("Net Zero" and "Low Ambition") was used for another project or for other production purposes, in this case the historical investment trend over the past 10 years. Instead, for reduction of pollution and savings the Counterfactual scenario corresponds to the 2035 values of the "Low Ambition" scenario.

Source → The European House – Ambrosetti and Enel Foundation, 2022.

2 prerequisites and 5 policy proposals to accelerate the pathway towards a "Net Zero" economy

→ Prerequisites

I Ensuring **stability**, **transparency** and **consistency** in European, national and local energy policies and measures

II Supporting **industrial production** in scaling up existing green technologies, developing new ones, and stopping fossil fuel subsidies

→ Cross-sectoral policy proposal

1 Guaranteeing a **stronger form of cooperation** and a **greater degree of harmonization** in the governance of the energy transition at the European level

→ Sectoral policy proposals

2 Power — Simplifying **authorization procedures** for RES plants, facilitating intervention on energy infrastructures, and promoting **demand side** management as well as deployment of **storage** facilities and **flexibility** solutions

3 Transport — Simplifying charging infrastructure installation **procedures**, strengthening **collaboration** between all e-mobility actors, enabling **interoperability**, optimizing **grid connections time-to-market**, and promoting electric **public urban mobility**

4 Industry — Leveraging on legal frameworks to support the technological shift of industry towards greener technologies, creating **Tech Transfer Labs** for direct and indirect electrification solutions, and favoring **demand-response**

5 Buildings — Defining the **phase out** of fossil fuel boilers – through a just, stable and transparent framework with regards to heat pumps – and creating a **one-stop shop** to support the renovation of buildings