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Terna: Financing Italy's grid modernisation

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Key findings

Terna's planned investment programme marks a structural shift to sustained high-intensity grid expansion, driven by renewable integration needs and the resolution of chronic transmission bottlenecks.

Persistent north–south and island congestion continues to limit renewable exports and increase system costs, making major domestic and interconnections grid reinforcements urgent.

Successful delivery of grid investments depends on a supportive regulatory framework and a resilient financing strategy; Terna shows strong access to funding via the European Green Bond Standard.

Despite significant investment needs, electricity bill impacts should remain manageable, with Terna's transmission charges estimated to stay close to its recent 4% of customer costs through 2028.

Executive summary

Italy's long-term competitiveness and energy transition will depend on the strength of its transmission grid. Renewable generation is expanding rapidly, but without sufficient network capacity, electricity cannot consistently flow from where it is produced to where it is consumed. Congestion, curtailment and regional price differences are no longer marginal issues; they are structural constraints. In this context, grid investment is not discretionary. It is an initial requirement.

As Italy's transmission system operator, Terna S.p.A. sits at the centre of this challenge. Operating under a regulated framework and supported by a stable ownership structure, the company benefits from strong revenue and cash flow visibility, which supports its capacity to invest. Its role has evolved beyond maintaining infrastructure. It is now responsible for enabling renewable integration, strengthening energy security and supporting market integration at both national and European levels.

Grid bottlenecks persist. Renewable production is concentrated in southern regions and on the islands, while demand remains anchored in the industrial north. The resulting congestion limits exports of clean power, increases system costs and widens zonal price spreads. The case for reinforcement, particularly through new high-capacity links and modern transmission technologies, is necessary. Without timely delivery, renewable integration will slow, curtailment will increase and system inefficiencies will persist.

Over the past decade, Terna has steadily increased investment to modernise the network. The investment cycle ahead is substantial, reflecting physical system needs. The focus is clear: strengthen north–south corridors, reinforce island connections and expand cross-border interconnections.

With €16.6 billion of planned grid investments over 2024-28, the company will need to scale capital expenditure (capex) well above historical levels while maintaining its investment-grade credit profile. While the shortfall between internally generated cash flow and total investment requirements is significant, Terna has a diversified funding strategy to bridge this gap. The company has demonstrated strong market access through the successful issuance of €1.6 billion of senior and subordinated debt under the European Green Bond Standard (EUGBS), supported by robust investor demand.

The success of its investments will depend on sustainable funding through regulated cash flow generation without placing undue pressure on network tariffs or energy affordability. Despite the scale of required investments and the resulting increase in transmission charges, the impact on electricity bills is likely to remain manageable. IEEFA estimates that Terna's transmission charges could stay close to its recent 4% of total customer electricity costs throughout the current investment cycle to 2028. To ensure long-term energy affordability while enabling the necessary expansion and modernisation of grid infrastructure, regulators should implement complementary measures such as decoupling of gas costs from electricity prices and adjustments to system charges and taxes.

Terna should deliver its investment programme in a timely and efficient manner while maintaining sound operational efficiency and disciplined financial management. The deployment of innovative and sustainable financing tools, including the exclusive use of EUGBS, together with targeted public funding to limit additional debt needed particularly for high-value projects, will be critical.

Introduction

Italy's energy transition and grid modernisation will require a substantial increase in capital expenditure (capex), placing Terna, the owner and operator of Italy's high-voltage transmission network, at the centre of a major operational, investment and financial challenge. As the national transmission system operator responsible for system reliability and cross-regional power flows, Terna is pivotal to resolving persistent congestion bottlenecks that are constraining renewable integration and market efficiency. Delivering the required grid expansion will require balancing accelerated infrastructure development with financial resilience and regulatory stability.

This paper examines how Terna can deliver infrastructure aligned with the country's needs, ensuring that necessary investments could bring broad long-term socioeconomic benefits without materially impacting affecting near-term energy affordability. In this paper, IEEFA reviews Terna's investment track record and analyses structural grid bottlenecks across domestic and cross-border corridors. Adopting a systems thinking approach,[1] the report evaluates Terna's ability to finance its investment programme by considering the interrelated factors of the company's operational performance, debt leverage, and ability to generate internal cash flow generation under the regulatory framework, while containing impacts on transmission charges or network tariffs, as well as effectively mobilising both public and private capital.

Company description

History and institutional evolution

Terna was established in 1999 as part of the liberalisation of the Italian electricity sector following European Union directives aimed at unbundling generation, transmission, and distribution activities. Initially a subsidiary of ENEL, Terna became an independent company in 2004 when ENEL sold a majority stake through a stock market listing on the Borsa Italiana. This marked a major shift toward full ownership unbundling, designed to position Terna as a neutral system operator aligned with EU competition and market integration objectives.

In 2005, Terna acquired ownership of the high-voltage grid from ENEL, consolidating its role as both transmission system operator and transmission asset owner. Subsequent regulatory reforms reinforced Terna's monopoly over the national transmission network, while governance arrangements ensured the EU-required independence from generation and retail activities.

Over time, Terna's mandate expanded beyond pure grid operation to include system planning, market facilitation, security of supply coordination, and integration of distributed and renewable generation. The company has also taken on a growing role in international infrastructure

[1] Arnold, R. D. & Wade, J. P. (2015) A Definition of Systems Thinking: A Systems Approach. Procedia computer science. [Online] 44669–678.

development, particularly in cross-border interconnections and technical cooperation with neighbouring Transmission System Operators (TSOs), tasks that are much needed for a country dependent on power imports.

Ownership structure and governance

Terna is a publicly listed company, but its ownership structure reflects its strategic national importance. As of 2024, approximately 29.85% of Terna's shares were held by CDP Reti S.p.A., a vehicle controlled by Cassa Depositi e Prestiti, the Italian state-owned development bank. The remainder of the share capital is traded on the market.

This mixed ownership model is designed to combine market discipline with public interest alignment. Governance follows Italian corporate law and international best practices for listed infrastructure companies, with a board of directors appointed by shareholders and subject to regulatory fit.

Business units and core activities

Terna's activities are structured around regulated and non-regulated business segments, although most revenues originate from regulated transmission activities.

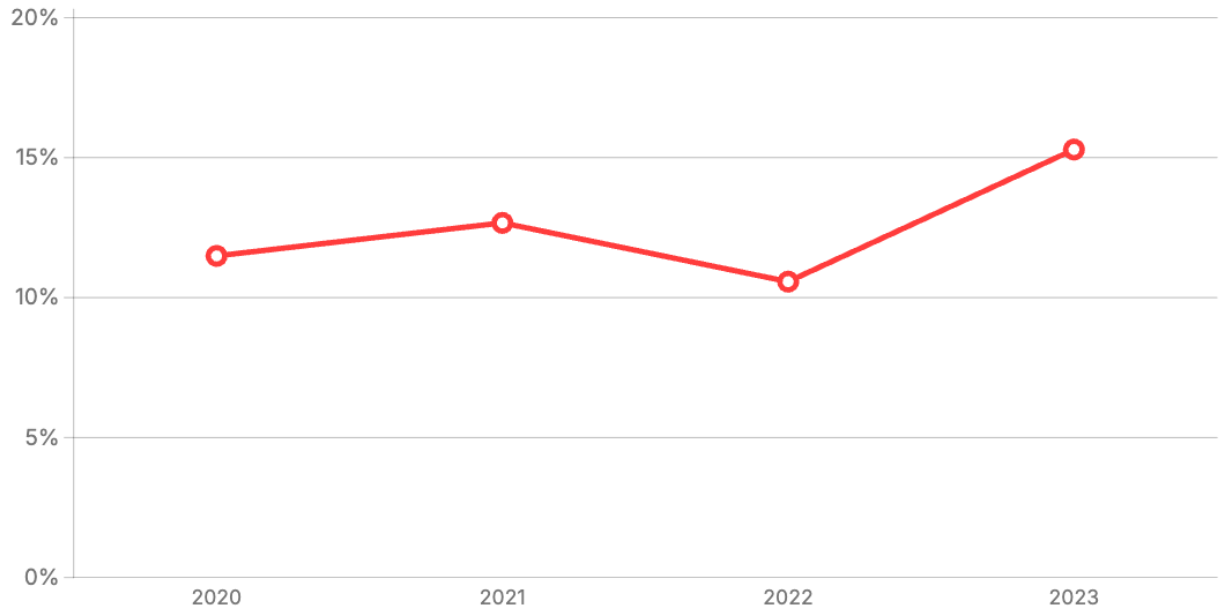
The core regulated business includes electricity transmission, grid operation, dispatching, maintenance, and system development, under the control of Italy's Regulatory Authority for Energy, Networks and the Environment (ARERA or Autorità di Regolazione per Energia Reti e Ambiente). Terna owns and operates approximately 75,000 kilometres of high-voltage and extra-high-voltage transmission lines, more than 900 substations, and multiple international interconnectors. It is responsible for real-time balancing of the Italian power system, ensuring frequency stability and managing congestion.

Non-regulated activities include international consultancy, engineering services, and technological innovation, primarily through Terna Plus and other subsidiaries. These activities remain marginal in revenue terms but serve strategic objectives related to know-how export and technological leadership.

In addition to domestic transmission, **Terna operates and manages cross-border interconnections** with France, Switzerland, Austria, Slovenia, Greece, Montenegro either directly or through joint ventures. The key interconnections to balance the Italian power grid trough imports are French and Swiss

Italy is the most import power-dependent country in. Western Europe, receiving 14.2% of its electricity in 2024 from outside its borders. The trade imbalance is increasing, highlighting the lack of domestic power capacities. This is not a viable long-term option for system demand of over 300 terawatt-hours (TWh)/year.

Figure 1: Italy's dependency on power imports (%)



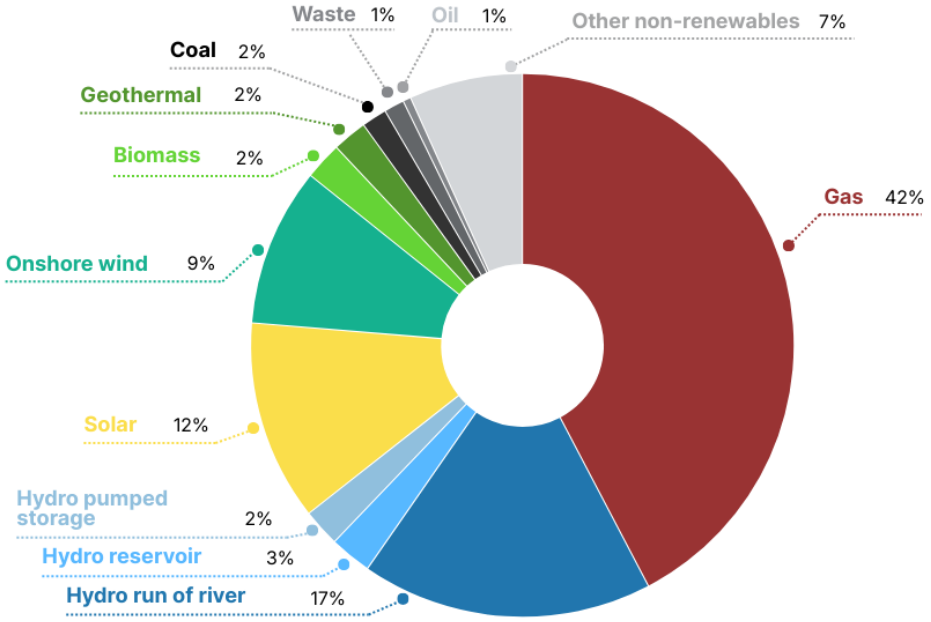
Source: Terna annual energy balances.

Table 1: Italy power imports/demand ratios

Data	Value	Unit	Source
Italy consumption 2024	308.5	TWh	Terna
Italy power imports 2024	43.8	TWh	Terna
Ratio imports/consumption	**14.2%**		

Source: Terna.

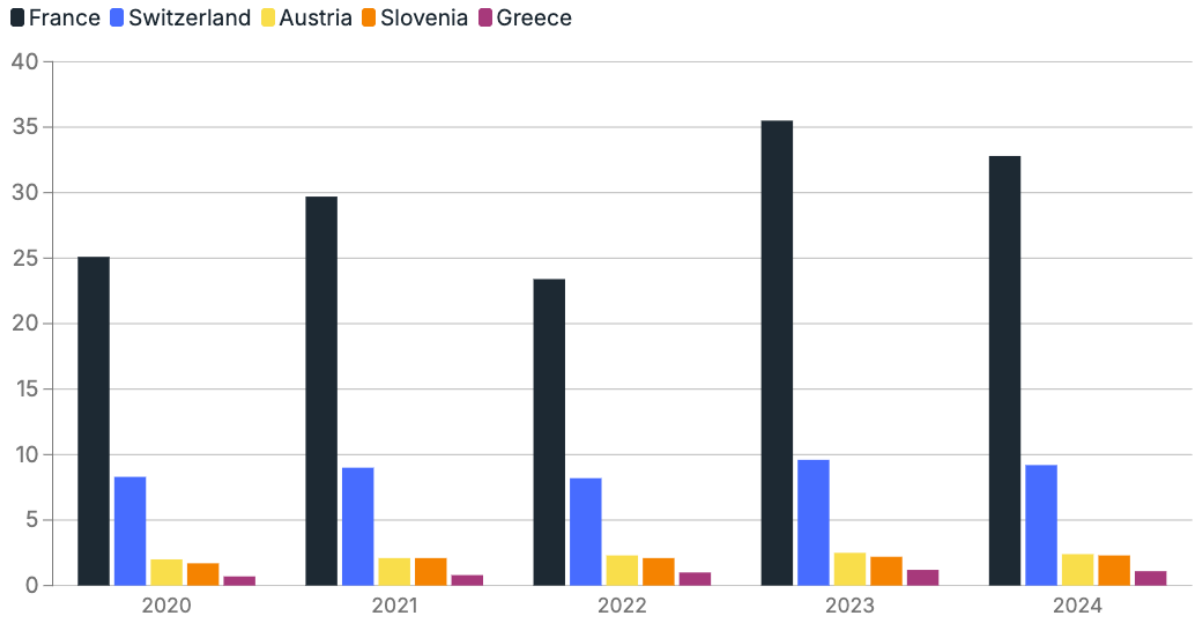
Figure 2: Italy 2024 power generation mix (%)



Source: ENTSOE power statistics.

Italy is a net power importer from all its neighbours. France and Switzerland are its main electricity suppliers, with a trade deficit of 43 TWh in 2024 from the two neighbouring countries.

Figure 3: Italy net import power flows per country (TWh)



Source: Terna annual statistical data.

Geographical presence

Terna's physical infrastructure spans the entire Italian territory, including mainland Italy and the islands of Sicily and Sardinia. The grid reflects Italy's geography, with dense tied networks in the north and more radial configurations in the south and islands.

Internationally, Terna has interests in several cross-border projects and subsidiaries, particularly in the Balkans and Mediterranean region. The Italy–Montenegro subsea interconnector, operational since 2019, represents one of its most significant international assets, boosting Italy's role as a Mediterranean electricity hub.

Financial indicators

Terna's financial profile is characteristic of regulated utilities, with stable revenues, predictable cash flows, and high capital intensity. In 2024, Terna reported revenues of €3.7 billion and EBITDA of €2.6 billion. Regulated activities account for 84% of 2024 revenues and 96% of EBITDA. Terna's net capital invested had reached €19.5 billion at the end of 2025.

Capital expenditure: Historical performance and future plans

Historical capex and execution track record

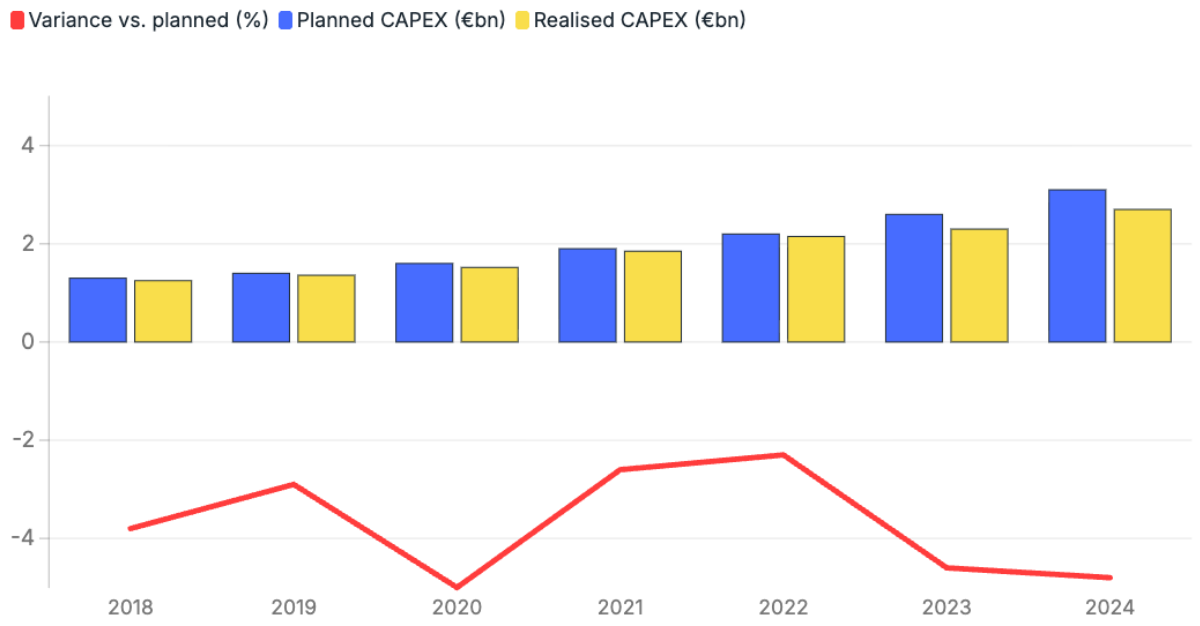
Terna has consistently increased its capital expenditures over the past decade, reflecting the need to modernize aging infrastructure, integrate renewable energy sources, and address chronic congestion issues. Between 2015 and 2024, cumulative capex exceeded €12 billion, making Terna one of the largest infrastructure investors in Italy.

Actual versus realized capex performance has generally been consistent, with realisation rates usually above 90% of planned investments. Deviations have primarily been driven by permitting delays, local opposition, and complex environmental authorisation processes, particularly for new overhead lines and substations.

The 10-year national development plan published in 2021 envisioned approximately €18.1 billion of investments by 2030.[2]

[2] 2021-2025 Industrial Plan Update Presentation (page 12).

Figure 4: Historical planned vs. realised investments



Source: Terna Annual Reports (2015–2024), Terna Industrial Plans 2019–2023, 2021–2025, and 2024–2028.

The chart highlights Terna's execution against planned and the evolution of its investment scale over time. It shows a steady increase in annual capex from approximately €1.1 billion in 2015 to more than €2.3 billion in 2023, with a further acceleration in 2024. The variance between planned and realised capex is generally limited, typically within a range of minus 3% to minus 7%, reflecting permitting delays rather than funding or operational constraints. The table also illustrates the structural change that occurred after 2020, when investments were scaled up to support renewable integration and grid resilience.

Capex breakdown by business unit

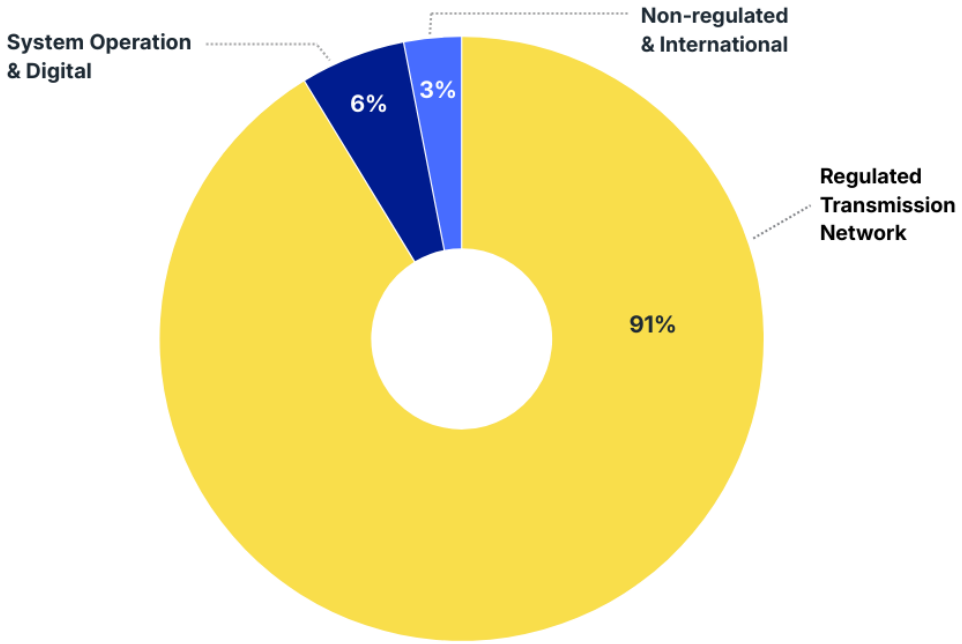
Most of the capex is allocated to the regulated transmission business. Investments are concentrated in network development, grid reinforcement, and digitalisation. Maintenance capex, while substantial, represents a smaller share relative to expansion and modernisation projects.

System operation investments focus on advanced control systems, real-time monitoring, and cyber-security enhancements. Digital substations, wide-area monitoring systems, and artificial intelligence-based dispatching tools have become increasingly prominent.

Non-regulated investments remain limited and are primarily focused on international consultancy and innovation activities. Technologically, Terna's investments span overhead lines, underground cables, subsea interconnections, substations, and digital infrastructure. A notable trend is the increasing share of underground and subsea cables, driven by environmental constraints, public acceptance, and the need to connect islands and offshore renewable resources.

High-voltage direct current (HVDC) technology plays a central role in Terna's strategy, particularly for long-distance and subsea connections. Projects such as the Tyrrhenian Link, Adriatic Link, and the Italy–Tunisia interconnector rely on HVDC to enhance capacity and controllability. Substation investments increasingly incorporate digital protection systems, gas-insulated switchgear, and automation technologies aimed at improving reliability and reducing footprint.

Figure 5: CAPEX 2021–25 (€bn)



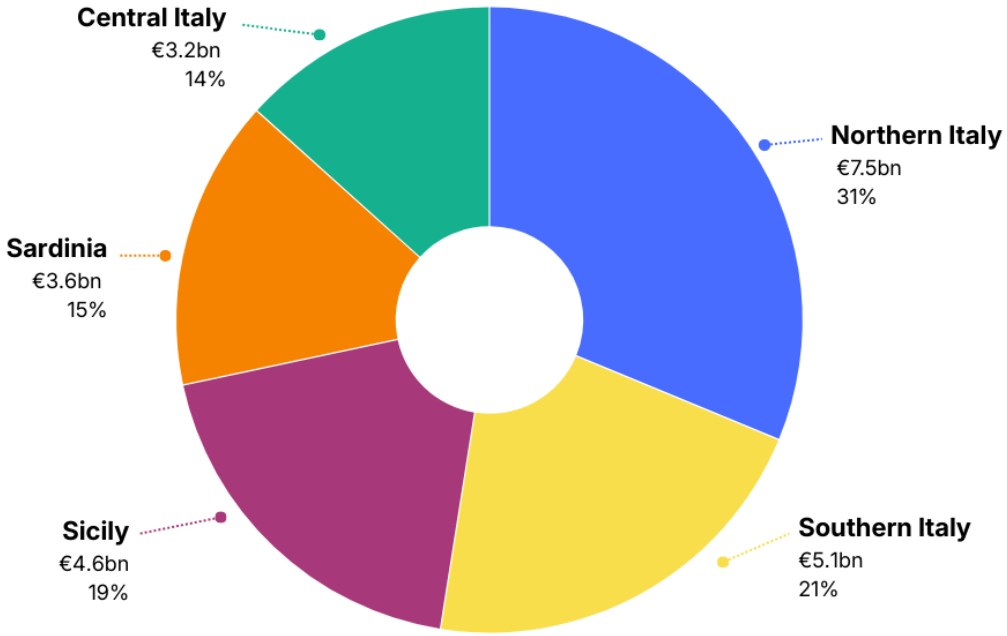
Source: Terna 2021-2025 Industrial Plan Update; Terna Capital Markets Day presentations.

The chart above confirms that regulated transmission consistently represents more than 90% of total capital expenditure. The increase in overall capex is almost entirely attributable to network development projects, including new lines, substations, and interconnections. Investments in system operation, while smaller in absolute terms, show a rising trend linked to digital control and smart dispatching systems.

Capex by geography

Geographically, capex allocation reflects Italy's structural imbalances due to its geographical variances. A significant share is directed toward southern Italy, Sicily, and Sardinia, where renewable generation potential exceeds local demand and grid constraints are most acute. Northern Italy continues to receive investments aimed at congestion relief, interconnection enhancement, and industrial demand support.

Figure 6: CAPEX 2021–28 (€bn) by Italian geographical areas



Source: Terna Development Plan[3] (Piano di Sviluppo della Rete); Italian Ministry of Environment and Energy Security documentation.

The data above show that Southern Italy, Sicily, and Sardinia together account for more than 45% of total planned capex, despite representing a smaller share of electricity demand. This reflects the concentration of renewable generation in these regions and the need to reinforce export capacity toward the north. Northern Italy remains a major recipient of investment due to congestion relief needs and cross-border interconnection projects. The chart visualises the investment intensity by region, directly linking capex allocation to renewable penetration levels and congestion indicators.

International investments focus on strengthening cross-border capacity with neighbouring countries, particularly France, Switzerland, Austria, and Balkan states.

[3] Terna Piano di sviluppo della rete.

Table 2: Italy major interconnections projects

Project	Country	Technology	capex (€bn)	Status
Italy–France (Piossasco)	France	HVDC	1.9	Permitting
Italy–Austria	Austria	HVDC	1.3	Planning
Italy–Greece	Greece	HVDC	1	Advanced planning
Italy–Tunisia (ELMED)	Tunisia	HVDC	0.9	Approved
Italy–Montenegro	Montenegro	HVDC	1.1	Operational

Sources: ENTSO-E TYNDP 2022 and 2024; European Commission TEN-E project database; Terna project disclosures.

The table shows that cross-border projects account for approximately 10%–15% of Terna's total planned capex over the 2024–28 period, but much more significant strategic leverage in terms of market integration and security of supply. It illustrates Italy's interconnection capacity before and after the completion of planned projects, highlighting the expected increase in net transfer capacity and the reduction of structural import bottlenecks at the northern borders.

Planned capex from 2026 onwards

Terna's 2025 Development Plan outlines investments of more than €23 billion,[4] with a long-term view of planned capex into the early 2030s.

Planned investments prioritise renewable integration, electrification readiness, resilience against climate risks, and European market integration. Strategic projects include the completion of the Tyrrhenian Link, the Adriatic Link, reinforcement of north–south corridors, and new interconnections with Greece, Tunisia, and Austria.

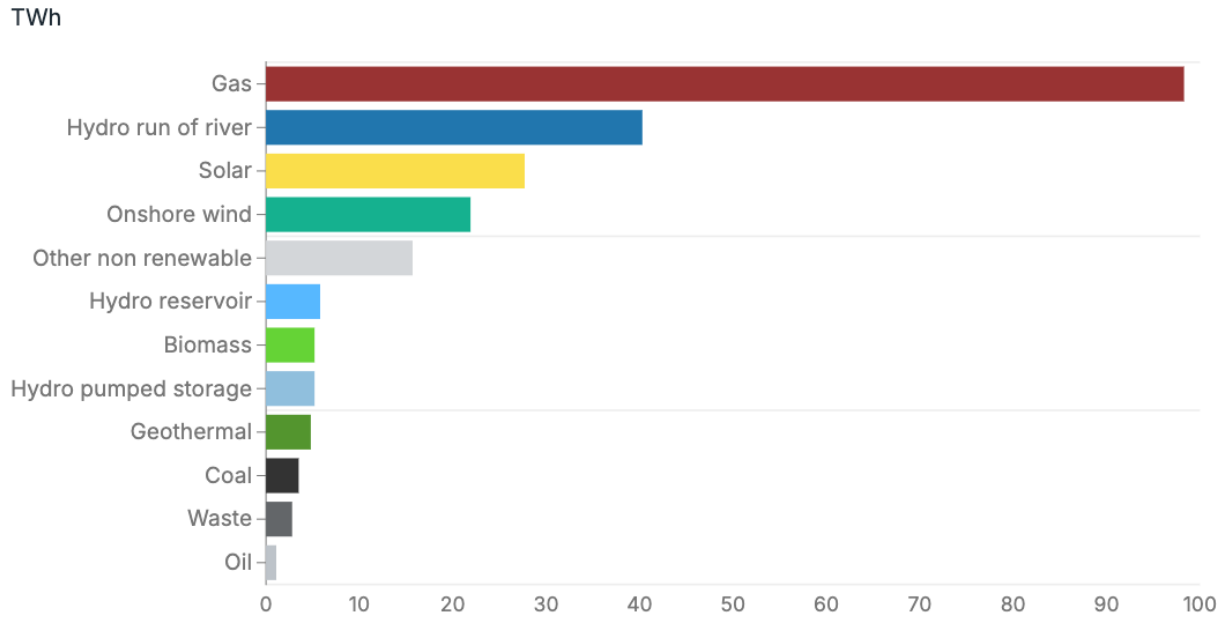
[4] Terna 2025-2034 Development Plan.

Grid bottlenecks and congestion analysis

Domestic congestion and structural imbalances

Italy's electricity system is characterised by persistent north–south congestion. These constraints lead to renewable curtailment, price differentials between zones, and increased system balancing costs.

Figure 7: Italy 2024 power generation mix



Source: ENTSOE Statistical Factsheet 2024.

Overall, in 2024 Italy generated 52.5% of fossil fuel and waste power versus 47.5% of renewable power.

Northern Italy has a high concentration of industrial demand and historically hosted most of the thermal and reservoir hydro generation, while southern regions and islands now host a disproportionate share of renewable capacity, particularly solar and wind.

Key congestion nodes include the Calabria–Sicily interface, the Campania–Apulia corridor, and internal bottlenecks within Sicily and Sardinia. The Tyrrhenian Link, connecting Campania, Sicily, and Sardinia via HVDC subsea cables, is designed to address some of these constraints by creating a backbone grid connection capable of transferring renewable energy northward and enhancing island security of supply.

Island systems: Sicily and Sardinia

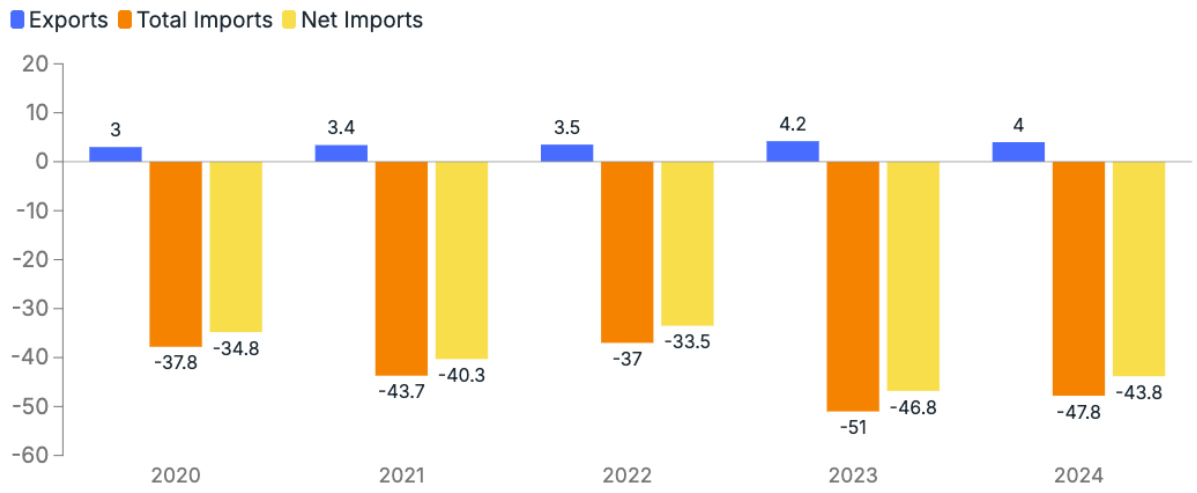
Sicily and Sardinia represent unique challenges due to their insular nature and high renewable penetration. Despite existing connections to the mainland, both islands experience frequent congestion and limited export capacity.

In Sicily, internal bottlenecks between western wind-rich areas and eastern load centres further complicate system operation. In Sardinia, the transition from coal-fired generation increases reliance on interconnections and storage solutions.

Cross-border congestion and import dependency

Italy's annual net imports of electricity, primarily from France and Switzerland, cause congestion in the system, limiting Italy's ability to access lower-cost generation and balance its system efficiently.

Figure 8: Italy power flow balances (TWh)



Source: Terna annual energy balances.

Existing interconnections are often saturated during peak hours, leading to price convergence issues and constrained market coupling. Terna's strategy includes upgrading existing interconnectors, building new HVDC links, and participating in regional capacity allocation initiatives under ENTSO-E frameworks.

The Italy–France Piossasco–Grand'Ile project, the Italy–Austria interconnector, and the planned Italy–Greece and Italy–Tunisia links are critical to addressing these constraints and diversifying import sources.

Strategic importance of Mediterranean interconnections

Mediterranean interconnections are increasingly viewed as strategic assets, enabling access to future renewable generation in North Africa and enhancing system flexibility. The Italy–Tunisia interconnector, supported by EU funding, exemplifies this approach and positions Italy as a potential electricity transit hub between Europe and the southern Mediterranean.[5]

Financing grid investment needs at scale

Like other leading European TSOs, Terna is supported by solid investment-grade credit ratings that reflect its relative financial stability. The company demonstrates a relatively balanced capital structure and robust access to funding, including senior and subordinated bond issuance and bank borrowings.

As capex requirements increase significantly in the coming years, three interconnected questions shape the challenge ahead.

First, Terna should deliver its investment programme in a timely and efficient manner while maintaining sound operational efficiency.

Second, success delivery will depend on how these investments can be funded sustainably through regulated cash flow generation without placing undue pressure on network tariffs or energy affordability.

Third, mobilisation of a diversified set of funding sources—combining public and private capital—will be key to maintaining a resilient financial and credit profile.

This analysis examines these interrelated factors and shows that a significant increase in investment is achievable if it is supported by disciplined financial and operational management, the government's strategic equity stakes, and public support. Additional investment also would require a consistent and transparent regulatory framework that reinforces Italy's long-term system-wide benefits, including energy security and industrial competitiveness.

[5] ENTSO-E Ten-Year Network Development Plan (TYNDP); Terna Network Development Plans and European Commission TEN-E documents.

Established regulatory framework supports investments and efficiency gains

As a utility with monopoly control over electricity transmission assets, Terna's core business activities in Italy are regulated by the ARERA, which sets out a regulatory framework that underpins the company's cash flow visibility and stability. In IEEFA's view, the ARERA's process of setting allowed revenues and returns have been broadly transparent and supportive, which in turn supports Terna's credit profile and capex programme.

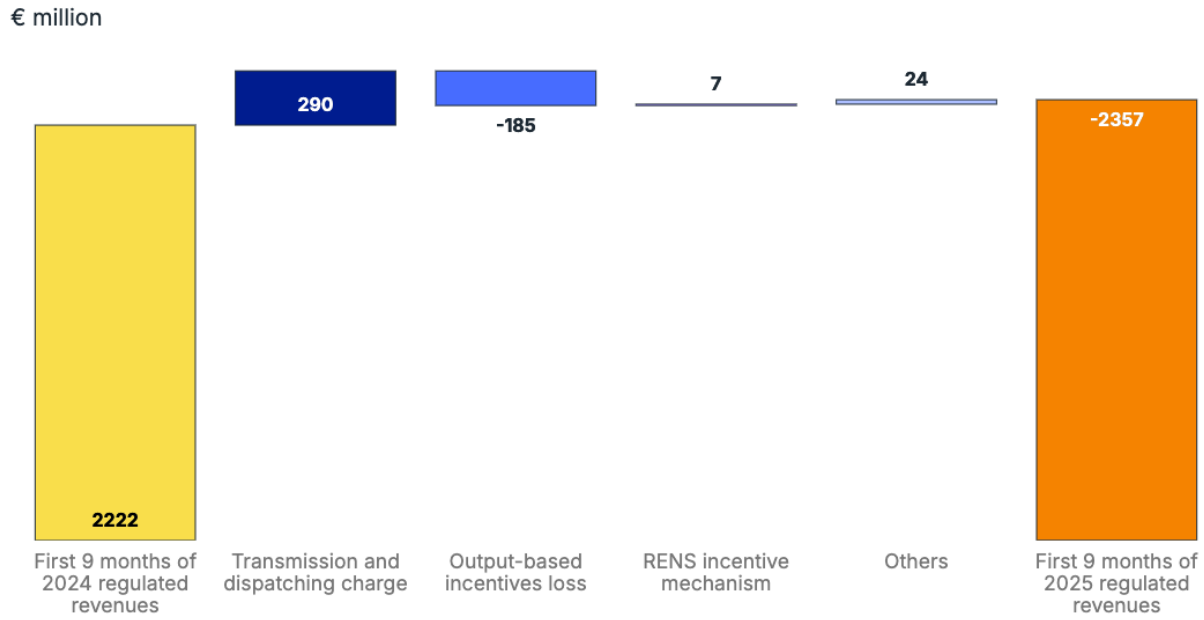
Starting from January 2024, ARERA has implemented the Regolazione per Obiettivi di Spesa e Servizio (ROSS) framework, shifting from separate capex and operating expenditure (opex) treatment to an integrated TOTEX (total expenditure) approach.[6] This aims to balance investment enablement with efficiency incentives. Terna's allowed revenues are composed of: (1) "slow money" —a return on the regulated asset base (RAB) calculated as RAB times the current 5.5% weighted average cost of capital (WACC) plus regulatory depreciation of the RAB over prescribed asset lives; and (2) "fast money"—allowed operating expenditures based on efficient cost benchmarks. The split between slow and fast money is determined using a capitalisation rate set ex-ante by ARERA. Consequently, the portion of TOTEX allocated to slow money may not match the actual capex/TOTEX ratio.

The framework also includes output-based incentives which aim to align investment with system value. For example, resolutions 597/2021 and 132/2022 aimed at increasing the efficiency of dispatching activities through lowering demand side management costs and shortfall in wind production. The company gained €350 million incentives for dispatching activities in 2024. With resolution 326/2024/R/eel, ARERA extended a similar incentive mechanism to the 2025–27 and 2028–30 periods.

In the first nine months of 2025, Terna's revenue from regulated activities increased by 6% to €2.4 billion, primarily driven by an increase in transmission and dispatching charge, which more than offset the decrease output-based incentives (Figure 9). The increase in the transmission and dispatching charge reflects: (1) earlier tariff recognition of depreciation; (2) the fast money component calculated based on the conventional capitalisation rate under ROSS; (3) higher RAB, partially offsetting a decrease in WACC to 5.5% from 5.8% a year prior. While limited output-based incentives were achieved in the first nine months of 2025, compared with 2022–24, Terna continues to guide €900 million in revenues in incentives over 2024-28.[7]

[6] Bovera, F. et al. Combining Forward-Looking Expenditure Targets and Fixed OPEX-capex Shares for a Future-Proof Infrastructure Regulation: the ROSS Approach in Italy. Current sustainable/renewable energy reports. [Online] 11 (4), 105–115. 23 August 2024.
[7] Terna. Q3 earnings call. 13 November 2025.

Figure 9: Revenue analysis for first nine months of 2025



Source: Company reports, IEEFA.

The framework largely supports Terna's credit profile and can help channel resources towards projects with better values. It should be noted that Italy's monopoly gas TSO Snam operates under a similar ARERA regime for gas transmission. In line with Italy's energy transition and competitiveness objectives, it is important to ensure that the regulatory priorities reflect the urgent need for electricity grid modernisation and upgrades. By contrast, given the risks of falling gas demand through continued electrification efforts,[8] the frameworks should avoid inadvertently favouring investment in gas transmission infrastructure.

Necessary transmission investments have relatively small impacts on consumer bills

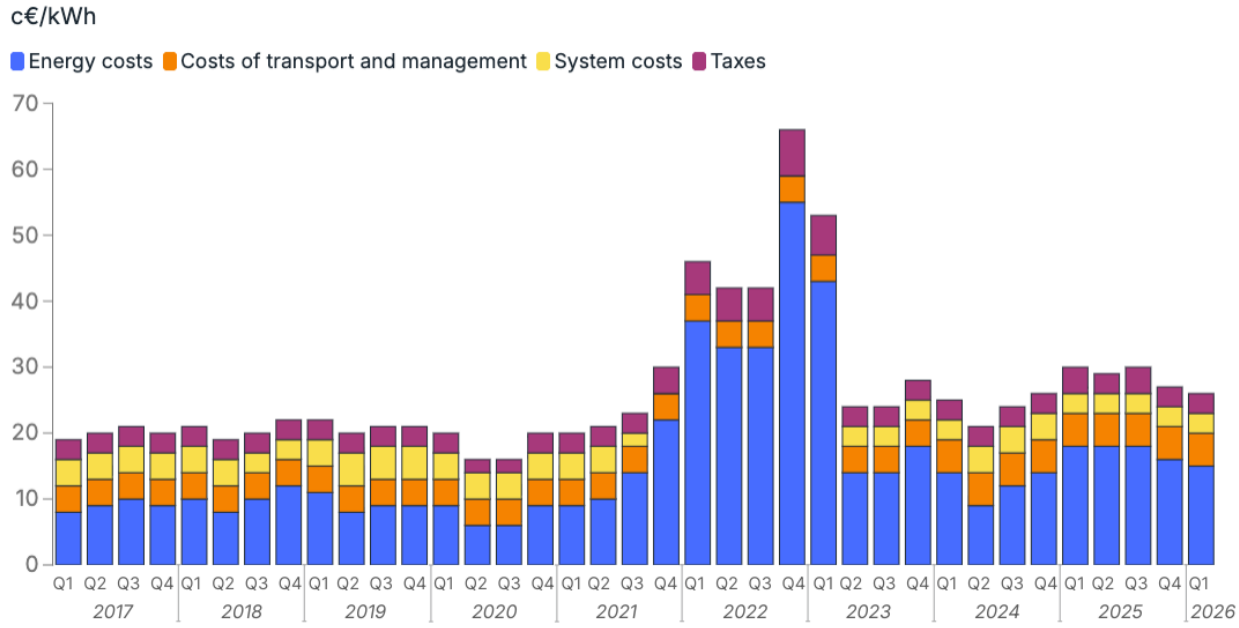
Terna has demonstrated relative transparency in outlining how its regulated transmission business generates revenues. It reported that transmission charges account for around 4% of Italian electricity bills.[9]

Italian electricity bills comprise several components, including energy costs, transmission, distribution and meter management charges, system charges, and taxes (Figure 10). Energy costs account for more than half of the total bills, primarily due to supply costs. Terna's transmission

[8] IEEFA. Italy's soaring gas investments ignore falling demand. 27 January 2025.
[9] Terna. How the electricity system works. [Accessed on 4 February 2026].

charge accounts for a portion of the transmission and distribution charges—around one-fifth of that component, translating into around c€1/kWh.

Figure 10: Components of Italy's electricity bills



Source: ARERA.
Note: Average electricity price with annual consumption of 2,700 kWh; Terna's transmission charge accounts for only a portion of the costs of transport and management.

Considering planned regulated capex of €16.6 billion over 2024–28, annual allowed revenues could increase by around €1.3 billion by 2028 (assuming a 5.5% remuneration rate, a 2.5% depreciation rate and no grants). If passed through to the transmission component of electricity bills, Terna's charges would still stay close to the recent level of around 4% of total customer bills following the increase.

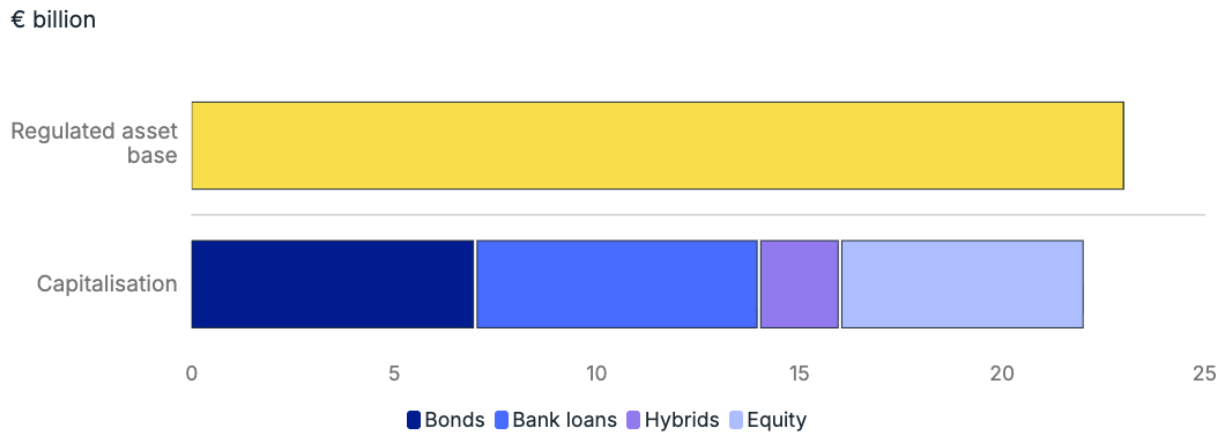
Regulators have several tools to mitigate affordability impacts while enabling the necessary expansion and modernisation of grid infrastructure. These include tariff-setting adjustments to system charges and taxes. Potential measures include electricity market reforms that decouple gas costs from electricity bills and narrow the price gap between electricity and gas, as well as the implementation of carbon pricing and environmental tax reforms that better reflect the long-term socioeconomic benefits of clean power.

Capital structure is intact but capex will drive debt increase

Terna's 2024-28 industrial plan outlines a total capex of €17.7 billion including €16.6 billion in Italy's regulated investments,[10] which contributes to the expected RAB growth of €32 billion a significant increase from the €23 billion for 2024. Terna has a balanced capital structure with funding sourced from bonds, bank loans, hybrid instruments and equities (Figure11) – this is key to support the continued growth in RAB.

Terna's reported net debt—excluding hybrids—had increased slightly by €500 million to €11.7 billion by September 2025 (Figure 12), since investments were not sufficiently covered by internal cash flow generation (Figure 13). Negative free cash flow will likely continue, placing pressure on net debt to rise materially faster than earnings growth through the end of the current industrial plan in 2028. Over the longer term, however, leverage could decrease since the added RAB has a long economic life that can support sustainable, long-term regulated cash flows.

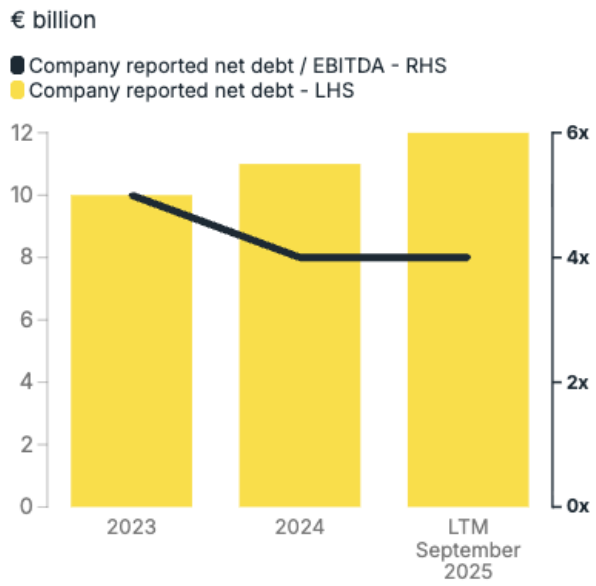
Figure 11: Terna's capital structure is well-balanced



Sources: Company reports, IEEFA.

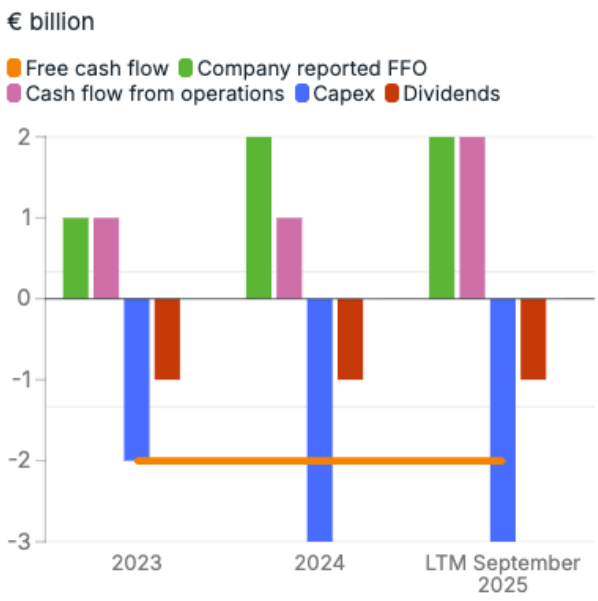
[10] Terna. Targets and Achievements. [Accessed on 4 February 2026].

Figure 12: Terna's debt leverage



Sources: Company reports, IEEFA.
Notes: Company reported net debt excludes hybrid instruments. LTM = last 12 months.

Figure 13: Terna's negative free cash flow



Sources: Company reports, IEEFA.
Notes: Free cash flow = cash flow from operations minus capex and dividends. FFO, or funds from operations, refers to cash flow from operations before changes in working capital. LTM = last 12 months.

Recent issuances under European Green Bond Standard have attracted strong investor demand

Terna has been an established green bond issuer, raising more than €7.45 billion under the green label since its inaugural green bonds in 2018, including subordinated debt. Its recent issuances have adopted the European Green Bond Standard that has been in effect for just over a year.[11] This reflects the company's leadership in using the landmark European Green Bond (EuGB) label to promote transparency and credibility—in turn, providing investors with better confidence in bonds' environmental impact.

Terna's July 2025 €750 million EuGB issuance attracted five times oversubscription, with significant participation from ESG funds.[12] In January 2026, an €850 million hybrid green bond achieved nine times oversubscription, with maximum demand exceeding €7 billion.[13] This enabled bond spreads to tighten and recorded the lowest-ever subordination premium for a euro-denominated corporate

[11] IEEFA. EU Green Bond Standard: A strong first year, but more to be done. 9 February 2026.
[12] Terna. Terna: successful launch of the first 6-year European Green Bond issue for €750 million. 15 July 2025.
[13] Terna. Terna: successful launch of a European Green hybrid perpetual Bond issue for € 850 million. 26 January 2026.

hybrid bond in Europe—less than 60 basis points above a senior issuance of equivalent duration. The hybrid structure, with 50:50 equity credit, provides additional debt raising capacity and helps maintain debt leverage headroom.

Looking ahead, Terna has the potential to exclusively use the EuGB label to fund future investments, continuing to build a track record and access a strong investor base in sustainable debt markets. Terna could also consider combining the use of EuGB with sustainability-linked structures to improve accountability.[14]

Public grants provide additional source of funding

In its 2024-28 plan, Terna expects €1.1 billion to be funded by public grants, accounting for 7% of the initial €15.5 billion five-year investment plan in regulated projects,[15] which was later revised upward to €16.6 billion. These grants could service as a key source of funding, complementing the regulatory model and potentially reducing the extent of an allowed revenues increase

In 2023, Terna and Steg, the Tunisian TSO, secured a total grant of €307 million under the EU Connecting Europe Facility to support the Italy-Tunisia interconnection project with a total investment of €850 million. ARERA's allocation of investment costs showed that EU grants covering up to 50% of the project could reduce the investment costs passed through on Terna's revenues and to transmission tariffs by nearly half.[16] Such grants are particularly important for large-scale cross-border projects of this kind.

Access to a policy bank is also key to ensure affordable, long-dated debt funding channel is intact. As of 2024, Terna had €4.1 billion outstanding loans from the European Investment Bank (EIB), accounting for around 30% of total debt excluding hybrids. For example, Terna used €1.9 billion in financing from the EIB for the Tyrrhenian Link project; in October 2024, Terna secured a €400 million loan agreement from the policy bank to boost the efficiency and reliability of the transmission grid.

Summary: System mapping illustrates way to deliver future-proof energy assets

Figure 14 maps the intertwined relationships among the key factors influencing Terna's transmission business and funding landscape, illustrating how the company can address its grid investment gap and deliver the necessary, future-proof grid infrastructure that provides long-term socioeconomic benefits.

[14] Please refer to the IEEFA proposed sustainability-linked financing target catalogue. Source: IEEFA. Red Eléctrica's opportunity to close Spain's grid investment gap. 18 November 2025.
[15] Terna. Terna: 2024-2028 Industrial Plan approved. 19 March 2024.
[16] ARERA. 176/2020/R/eel. 21 May 2020.

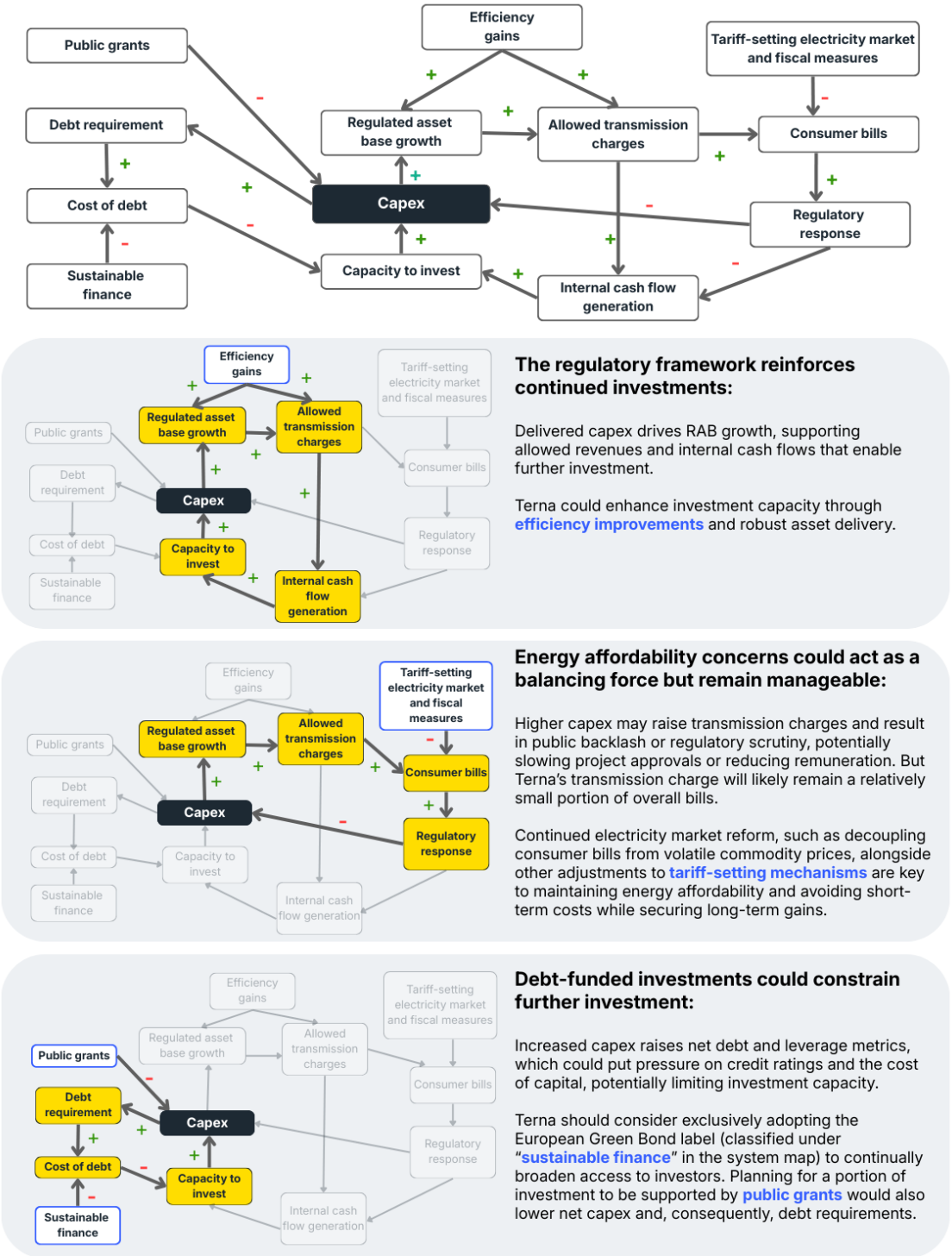
First, the regulatory framework plays a central role by creating a reinforcing loop: Capex investment drives RAB growth when projects deliver, which supports allowed revenues and internal cash flows, increasing potential investment. Features of the regulatory framework ensure that returns are linked to investments that generate higher value. Terna should leverage the reinforcing loop and enhance its investment capacity through efficiency improvements and robust asset delivery.

Nevertheless, electricity costs and concerns over energy affordability could result in public backlash or regulatory scrutiny against capex that leads to increased transmission charges, potentially slowing project approvals or reducing remuneration. This loop is manageable given that expected increase in transmission charge from Terna remains a relatively small portion of overall bills. That said, the allowed revenues and tariff-setting mechanism should follow a fair and transparent process with clear regulatory objectives in line with Italy's energy transition and competitiveness policies. As electrification advances, electricity transmission investments are essential for reducing grid congestion and accelerating renewable integration, potentially bringing broad benefits, which are often long term and not immediately visible. Continued electricity market reform, such as decoupling consumer bills from volatile commodity prices, is key to maintaining energy affordability and avoiding short-term costs while securing long-term gains.

Creditworthiness constraint could represent another outcome. Increased capex raises net debt and leverage metrics, which could put pressure on credit ratings and the cost of capital, potentially limiting investment capacity. Terna has used multiple approaches to maintain a robust capital structure, including hybrid debt issuance and the use of the EuGB label. Terna should consider structuring innovative financing tools while exclusively adopting the EuGB label to broaden access to investors. Planning for a portion of investment to be supported by public grants would also lower net capex and hence debt requirements. Collectively, these measures would help sustain investment capacity within tolerable credit parameters.

Figure 14: System mapping and feedback loops of Terna's business and finances

Explore the interactive version of this figure online.



Source: IEEFA.

Note: The "+" notation indicates potential positive relationships – an increase in one variable may result in an increase in the other; the "-" notation indicates potential negative relationships

Conclusion

Italy's electricity transition is no longer constrained by generation ambition but by transmission capacity. Renewable deployment, electrification trends and import dependence are reshaping power flows across the country, exposing structural bottlenecks that have developed over decades. In this context, grid reinforcement is not a supporting measure; it is a prerequisite for system reliability, price stability and decarbonisation.

Terna stands at the centre of this transformation. The company combines a stable regulated business model with a proven execution track record and expanding technical capabilities, particularly in high voltage grid and complex interconnections. The planned acceleration in capital expenditure reflects the physical realities of Italy's geography and generation mix rather than discretionary growth. North–south congestion, island constraints and saturated cross-border interfaces require structural solutions.

The financing challenge is material but manageable. The regulatory framework provides revenue visibility, capital markets remain accessible, and European Green Bond instruments have broadened funding access. While debt leverage will rise during the investment cycle, the long economic life of regulated assets underpins long-term cash flow stability and prospects of deleveraging. Transmission charges, although set to increase, remain a relatively small component of overall electricity bills.

Ultimately, the effectiveness of this investment cycle will depend on regulatory consistency, permitting efficiency and disciplined execution. If delivered as planned, Terna's programme can reduce congestion, lower curtailment, enhance market integration and strengthen security of supply, positioning Italy more competitively within the European energy system.

The strategic question is not whether to invest, but whether investment can be delivered at the required pace. The cost of delays will exceed the cost of execution.

Appendix

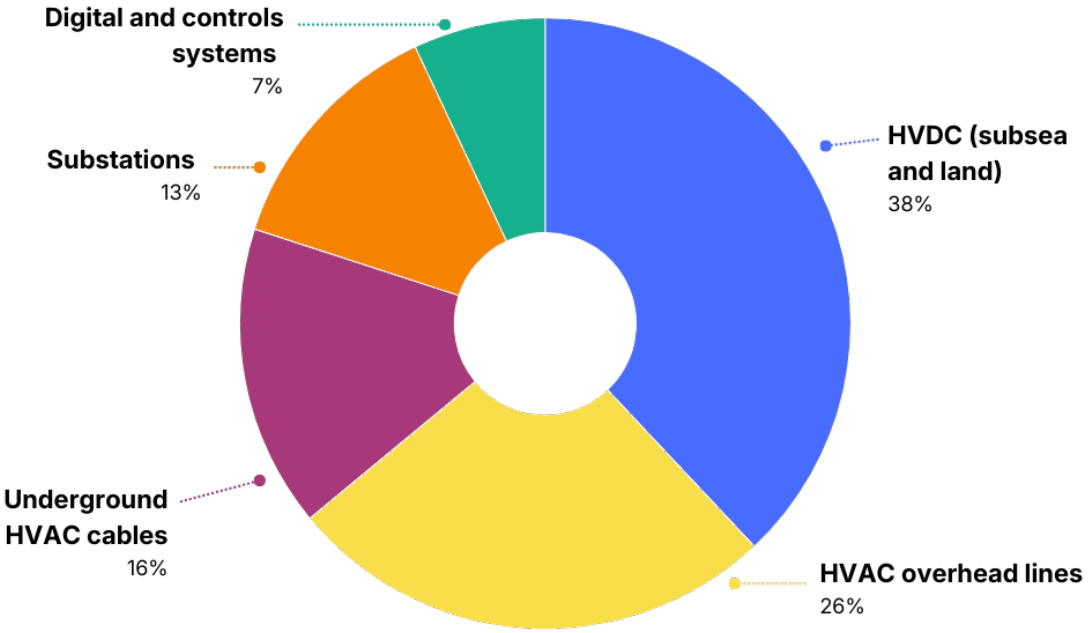
Capex by technology

Technologically, Terna's investments span overhead lines, underground cables, subsea interconnections, substations, and digital infrastructure. A notable trend is the increasing share of underground and subsea cables, driven by environmental constraints, public acceptance, and the need to connect islands and offshore renewable resources.

High-voltage direct current (HVDC) technology plays a central role in Terna's strategy, particularly for long-distance and subsea connections. Projects such as the Tyrrhenian Link, Adriatic Link, and the Italy–Tunisia interconnector rely on HVDC to enhance capacity and controllability.

Substation investments increasingly incorporate digital protection systems, gas-insulated switchgear, and automation technologies aimed at improving reliability and reducing footprint.

Figure A 1: CAPEX 2021–28 (€bn)



Sources: Terna Network Development Plans; Terna Industrial Plan 2024–2028; ENTSO-E TYNDP project fiches.

About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

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