1. Evaluation Context

1.1. Object of the evaluation: overview of LIOP Energy

15. The three energy axes of LIOP (6, 7, 8) cover four categories of interventions, each with reference to one or more Specific Objectives (SOs):

    a. **Energy efficiency** through smart metering of energy consumption at the industrial level (SO 6.2), smart metering in households (SO 6.3), and small industrial co-generation systems (6.4);
    b. **Lower emissions** through less-exploited renewable sources (SO 6.1), which covers production of RES (geothermal) and investments in distribution grids;
    c. **Energy efficiency** at the level of district heating systems of selected cities (SOs 7.1 and 7.2); and
    d. **Smart and sustainable transmission grids** for electricity (SO 8.1) and natural gas (SO 8.2).

16. Table 1.1 summarizes the implementation status as of January 31, 2021.

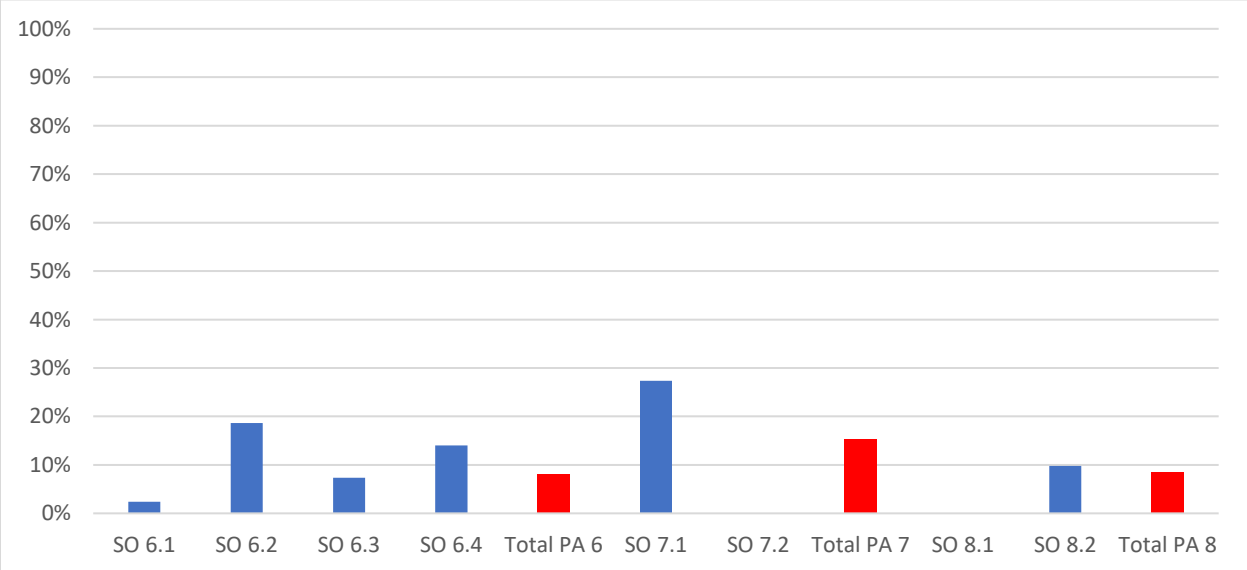
Table 1.1. LIOP implementation status as of January 31, 2021

Specific Objective	*Latest allocation (€ mn)*	*Implementation details (cutoff date January 31, 2021)*					
		Projects submitted	*Rejected*	*Under evaluation*	*Approved*	*Contracted*	*Implementation status*
• Priority Axis 6: Clean energy and energy efficiency in order to support a low-carbon economy • 88.3% contracting rate (1); 4.42% finalization rate (2)							
SO 6.1: Increasing production of energy from renewable and less-exploited (biomass, biogas, geothermal)	27.6 (EU 23.5)	Projects for renewable energy sources (RES) capacities: 45 (high competition, over 7.7 times the allocated amount)	11	28	6	4	4 under implementation, 93% contracting rate
	18.4 (EU 15.6)	Projects for distribution to integrate RES capacities: 17 (2.2 times the total allocation)	2	11	4	4	4 under implementation; 62% contracting rate
SO 6.2: Reducing energy consumption at industrial consumers	11.8 (EU 10)	66 (equals total allocation)	10	36	20	15	12 finalized, 3 under implementation; 23% contracting rate; 79% finalization rate
SO 6.3: Reducing the average power consumption of households	38.1 (EU 32.4)	16 (competitive, 3.9 times allocated amount)	1	13	2	2	1 finalized, 1 under implementation; 25% contracting rate
SO 6.4: Increasing savings of the consumption of primary energy produced by high efficiency co-generation systems	28.2 (EU 24)	15 (1.6 times total allocation)	0	12	3	2	2 under implementation; 21% contracting rate

• Priority Axis 7: Energy efficiency at system level centralized heating in selected cities • 43% contracting rate (1); 0% finalization rate (2)							
SO 7.1: Increasing energy efficiency for DH systems in selected cities	151.3 (EU 128.6)	11 (not competitive, 7 cities defined at programming stage; one city submitted 2 projects); equals total allocation	2	3	6	6	1 finalized; 5 in implementation. 18% finalization rate; 76% contracting rate
SO 7.2. Increasing energy efficiency of district heating system in Bucharest	117.6 (EU 100)	1 (not competitive); 189% of total allocation	0	0	1	1	231% contracting rate
Priority Axis 8: Intelligent and sustainable transmission systems for electricity and natural gas 39.25% contracting rate (1); 0% finalization rate (2)							
SO 8.1: Increasing the capacity of the national energy system to use energy produced from renewable resources	23.5 (EU 20)	1 (not competitive); 123% of total allocation	0	0	1	1	1 in implementation; 133% contracting rate
SO 8.2. Increasing interconnection capacity of National Transmission System of natural gas with other neighboring countries	169.3 (EU 143.9)	250, o/w 1 non-competitive and 249 competitive, extension of distribution networks; 2x total allocation	14	10	1	1	1 in implementation; 26% contracting rate

Note: (1) *contracting rate*: value of contracts signed / total allocation; (2) *finalization rate*: value of contracts completed / value of contracts signed.

Figure 1. Effective absorption rate, February 2021 (reimbursements / allocation)



Source: MA internal reporting

17. The energy-related LIOP projects covered by this evaluation are presented in Table 1.2.

Table 1.2. Energy-related LIOP projects

	Project title	*Beneficiary*	*SMIS*
SO 6.1 – Increasing production of energy from renewable and less-exploited sources (biomass, biogas, geothermal)			
1.	Upgrading of the 20 kV overhead line (OHL) Mofleşti – Melineşti and the 20 kV branch axis Fratostita and Pojaru, Dolj County to increase the distribution capacity for taking over the power delivered by the photovoltaic power plants	Distribuție Energie Oltenia S.A.	122825
2.	Upgrading of the 20kV OHL Axes Parangu – Sadu and 2B – Novaci and of the 20kV OHL Axis Carbunesti – Novaci, in order to increase the distribution capacity for taking over the power delivered by the Low Power Hydroelectric Power Plants in the N-E area of Gorj County	Distribuție Energie Oltenia S.A.	127410
3.	Upgrading of transformer stations under the management of Delgaz Grid in order to take over the electricity produced from renewable sources in safe conditions of operation at SEN – Huși, Stănilești, Vetrișoaia, Fălciu, Murgeni stations	Delgaz Grid	127686
4.	Upgrading of transformer stations of E.ON Distributie Romania S.A. – building additional capacity into the electrical network upstream of the connection point so it can handle the electricity produced from renewable resources in safe conditions of S.E.N. – Unit 110 / 20kV Hirlau, Unit 110 / 20kV Pascani, Unit 110 / 20kV Gorban	Delgaz Grid	105731
5.	Combining geothermal energy with heating pumps to produce thermal agent for heating and hot water for Nufarul I Area, Oradea	Oradea Municipality	115839
6.	Increasing the production of thermal energy based on geothermal water in Beiuș	Beius Municipality	127641
7.	Construction of the biomass thermal energy production unit and the thermal energy distribution network in Maieru	Maieru Village	119846
8.	Increasing the production of energy from less exploited renewable resources obtained in the Salonta geothermal perimeter	Salonta Municipality	125691
SO 6.2 – Reducing energy consumption at industrial consumers			
9.	Implementation of a system for monitoring energy consumption (electricity, heat, compressed air) at the level of SC Sortilemn SA	SORTILEMN SA	105740
10.	Intelligent energy consumption monitoring system within Yazaki Component Technology Romania	Yazaki Component Technology S.R.L.	106581
11.	Smart metering application for utility consumption and production	Vel Pitar S.A.	106965
12.	Intelligent energy consumption monitoring system within Antibiotice SA	Antibiotice S.A.	109717
13.	Reducing energy consumption at the level of SC Zoppas SRL by implementing a high-performance monitoring system	Zoppas S.R.L.	111829
14.	Implementation of an energy consumption monitoring system at AZUR S.A.	AZUR S.A.	116222
15.	Smart metering utility consumption application	COMELF S.A.	117803
16.	Intelligent energy consumption monitoring system within CIECH Soda Romania S.A.	CIECH Soda Romania S.A.	117977
17.	Development of the energy consumption monitoring system at Hammerer Aluminum Industries Santana S.R.L.	Hammerer Aluminum Industries Santana S.R.L.	118591
18.	Technical solution study – energy consumption monitoring system	Infopress	118973
19.	Implementation of advanced metering system with on-line monitoring to reduce energy consumption at Takata Romania SRL	Takata Romania SRL	120195
20.	Intelligent energy consumption monitoring system within CEMACON SA	CEMACON SA	127985
21.	Advanced metering system for reducing energy consumption at CELCO SA – Lime Factory	CELCO S.A.	128259
22.	Implementation of energy consumption monitoring systems for industrial consumers	Heineken S.A.	128334

23.	Energy consumption monitoring system within S.C. Meat Industrialization KOSAROM S.A.	KOSAROM S.A.	130415
SO 6.3 – Reducing average power consumption of households			
24.	Implementation of intelligent measurement system in Craiova, central area (partially) and Sărari (approx. 10,000 consumers from Craiova)	Distribuție Oltenia	114790
25.	Implementation of an intelligent distribution monitoring system in a homogeneous area of predominantly household electricity consumers	DELGAZ	117855
SO 6.4 – Increasing savings of the consumption of primary energy produced by high-efficiency co-generation systems			
26.	Increasing the operational energy efficiency at SC AMBRO S.A. Suceava by implementing a high efficiency cogeneration installation	AMBRO S.A.	115900
27.	Optimization of primary energy consumption within CEMACON S.A. by installing a high efficiency cogeneration plant	CEMACON S.A.	119391
SO 7.1 – Increasing energy efficiency for DH systems in selected cities			
28.	Rehabilitation of the district heating system in Oradea for the period 2009-2028, to comply with environmental legislation and increase energy efficiency – Stage II	Oradea Municipality	108460
29.	Rehabilitation of the district heating system in Focșani Municipality for the period 2009–28 to comply with environmental legislation and increase energy efficiency – Stage II	Focșani Municipality	114845
30.	Rehabilitation of the district heating system in Iași Municipality to comply with environmental standards regarding the emissions in the atmosphere and to increase the energy efficiency in the urban heat supply – Stage II	Iași Municipality	115253
31.	Rehabilitation of the district heating system at the level of Râmnicu Vâlcea Municipality for the period 2009-28 to comply with environmental legislation and increase energy efficiency – Stage II	Râmnicu Vâlcea Municipality	118892
32.	Rehabilitation of the district heating system in Oradea for the period 2009–28 to comply with environmental legislation and increase energy efficiency – Stage III	Oradea Municipality	123600
33.	Re-engineering of the centralized district heating system in the Municipality of Timișoara to comply with environmental protection regulations on air pollutant emissions and to increase efficiency in urban heat supply – Stage II	Timișoara Municipality	127006
SO 7.2 – Increasing energy efficiency of district heating system in Bucharest			
34.	Rehabilitation of the heating system of Bucharest Municipality	Bucharest Municipality	138142
SO 8.1 – Increasing the capacity of the national energy system to use energy produced from renewable resources			
35.	LEA 400 KV d.c. Gutinas-Smardan	Transelectrica	129245
SO 8.2 – Increasing interconnection capacity of National Transmission System of natural gas (NTS) with other neighboring countries			
36.	Developments of NTS in the North-East area of Romania to improve the natural gas supply of the area as well as to ensure the transmission capacities to the Republic of Moldova	Transgaz	122972

1.2. Context: background to the LIOP energy interventions

18. Romania's energy policy has in recent years lacked a clear direction, with numerous ad hoc changes and frequent legal and regulatory amendments. The latest approved strategy is from 2007, though there were numerous attempts to formulate a new strategy, in particular from 2016 onwards. Changes in government and in institutional setup (such as ministries' structure and responsibilities), as

well as the absence of a political majority in the electoral year 2020 (overlapping with the pandemic), have led to substantial amendments to the draft strategy.

19. This has contributed to uncertainties for investments in the energy sector, affecting both private and public companies. There have been virtually no finalized investments in electricity generation capacities since late 2016, when new investments became ineligible for support schemes adopted previously (RES green certificates scheme of 2009–12; cogeneration bonus of 2009–11). At the same time, large coal-fired plants (CE Oltenia, CE Hunedoara) committed to an accelerated phase-out of significant capacities by 2026–30 (at least 2500 MW) and replacement with cleaner generation (renewables and gas as a transition fuel). If these plans – which have been submitted to the European Commission (EC) – are not implemented and new investments fail to compensate for the closure of obsolete, environmentally damaging capacities, Romania may soon face an electricity generation shortfall.

20. Profitable state-owned companies have been required to contribute 90 percent of their profits as dividends – which were much needed to cover fiscal deficits, but also limited the profits that could have been reinvested. Major investment projects in the 10-year network development plans of Transelectrica and Transgaz were delayed, as well as investments in state-owned generation (Romgaz' new 430 MW gas-fired capacity at Iernut). However, the finalization in late 2020 of new gas and electricity cross-border interconnection capacities may signal a recent improvement in the capacity to operationalize large investments and a new sense of urgency.

21. There is insufficient ownership of district heating aspects within the Government, where responsibilities are unclearly split between the MoE, the Ministry of Development, Public Works and Administration (MDPWA), the energy regulator (ANRE), and local authorities. Major constraints affecting development of energy capacities exist in the areas of project planning, preparation of technical documentation, expropriations, permitting (central and local), procurement, and execution of works or availability of supplies. The legal framework in the energy sector (electricity, gas, heating) needs alignment with the latest European Union (EU) energy directives and regulations to ensure maximization of benefits from liberalization; to facilitate trading of gas, electricity and heating, and to create a sound regulatory environment for market-driven energy-efficiency measures (including services such as industrial and residential energy service companies or ESCOs).

22. Access to energy for vulnerable consumers remains a challenge. The legal framework supporting identification of types, location and number of vulnerable consumers, as well as the operationalization for targeted financial and non-financial assistance, is not yet in place.

23. These shortcomings and challenges in the Romanian energy sector feature prominently in European Union policy documents and recommendations; as well as in Romania's commitments and strategic documents prepared in response to the EU's concerns.

- The EC's latest (2020) Council Recommendation for Romania[1] highlights several priorities including basic household access to energy; the urgent need to relaunch public infrastructure works, including energy; and clean production and use of energy. These need to be addressed in Romania's National Energy and Climate Plan (NECP), though the latest draft (January 2021) still does not address some of the EC recommendations. Also, investments in clean and efficient production and use of energy and environmental infrastructure, including in the coal regions, are highlighted as priorities for 2020 and 2021. These are in line with previous Council Recommendations.
- The 2020 National Reform Program[2] contains extensive recommendations to (i) improve the functioning of energy markets (including by full adoption of EU rules); (ii) reform state-owned energy companies (corporate governance); (iii) restructure district heating through a government-financed program that complements existing funding (including EU); and (iv) support energy-storage projects with research. The Program also summarizes existing initiatives that are funded from the central budget (e.g. the Environment Fund and state budget).
- The draft NECP proposes more-ambitious 2030 targets than previously envisaged for renewables, energy efficiency (industrial and households), and energy access. In the absence of an approved energy strategy and given the new Commission's focus on the European Green Deal[3], the NECP will be the overarching strategic document to guide energy sector priorities for 2020–30.
- Romania has also recently prepared a National Recovery and Resilience Plan (NRRP) in the context of the EU's NextGenerationEU plan to emerge stronger and greener after the pandemic. The preliminary version will be negotiated in May 2021 in Brussels. The draft energy chapter includes reforms concerning the finalization and adoption of the NECP, the legal transposition of EU Directive 944 and Regulation 943 (electricity market), and the consolidation of the legal framework to facilitate investments and (partial) coal phase-out. Investments include electricity storage (batteries), hydrogen, renewables (particularly decentralized capacities for underserved regions), digitalization, and greening investments in the coal regions. The revised energy chapter does not, however, address some of the criticisms from national stakeholders, such as a clear target for coal phase-out or support for modernized heating/cooling systems integrating renewables. Some of the projects proposed for investments might well exceed the 2026 deadline since they are not mature enough (e.g. smart grids), while others would face significant challenges to meet EU's legal criteria for state aid.

24. In this context, Romania's energy policy is de facto driven mainly by EU commitments; and OPs in 2007–13 and 2014–20 contributed to steering some interventions towards more ambitious decarbonization and modernization, ahead of the national policies and strategies. OPs also "stabilized"

[1] European Commission, *Council Recommendation on the 2020 National Reform Program of Romania, with a Council opinion on the 2020 Convergence Program of Romania*, May 20, 2020: https://ec.europa.eu/info/sites/info/files/2020-european-semester-csr-comm-recommendation-romania_en.pdf.

[2] Government of Romania, *National Reform Program 2020*, https://sgg.gov.ro/new/wp-content/uploads/2020/05/ANEXA-5.pdf.

[3] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

certain measures as part of the EU's 7-year cycles despite the frequent changes in legal and regulatory framework. SOP Competitiveness 2007–2013[4] covered interventions in renewable capacities and energy efficiency and SOP Environment supported investment prioritization in DH, while the Large Infrastructure Operational Program (LIOP) 2014–20 enhanced the interventions supported in the previous cycle with increased technical standards for interventions. Thus, SOP Competitiveness supported investments in renewable energy sources (RES); cross-border interconnections of electricity and gas grids; support for energy efficiency equipment for industry; modernization of transport and distribution grids; and desulphuration of energy generation. SOP Environment 2007–13 supported the DH sector in 7 cities. The correspondence between the interventions in the previous programming period and LIOP interventions is summarized in the table below. Several lessons learned from the previous cycle informed the programming of LIOP; whereas other issues causing delays in implementation persist:

- During the programming of the two OPs for 2007–13 and 2014-20, the SOs were more broadly defined to include more possible areas of support, e.g. investments in any part of the grid infrastructure provided it contributed to energy efficiency, increased RES capacity, or interconnectivity. This allowed for more flexibility and identification of areas which lag behind for support in the current cycle under LIOP. For example, if the energy efficiency in industry intervention in Operational Program (OP) Competitiveness highlighted companies' lack of interest in projects with energy efficiency as the primary benefit (preferring productive investments), LIOP concentrates on the need to raise awareness and interest among beneficiaries for the optimization of their energy consumption (supporting smart metering). Some areas supported in OP Competitiveness indicated the beneficiaries' reluctance to invest in projects that face more administrative constraints (e.g. permitting and expropriation); in response, LIOP Axes 7 and 8 focus on a set of predetermined projects, with a view to allowing them time to prepare and plan better to overcome such difficulties over the program period (though the success is only partial, e.g. the same delays are observed in SO 8.1)
- The implementation of Sectoral Operational Programs (SOPs) Competitiveness and Environment also incurred delays and was concentrated in the latter part of the programming period – with some projects "phased", other not finished, and even some cancellations. Most delays happened because of difficulties in interpreting state aid; procurement problems; and changes in the legal framework that affected the viability of some of the projects or the motivation of the beneficiaries (e.g. changes to the support for renewables in the green certificates scheme caused projects to arbitrate between the forms of state aid, seeking the more advantageous option). These constraints have not been resolved and will continue to affect LIOP, where the implementation is again concentrated in the last three years of the program, 2021–23.
- Interventions supported in 2007–13 continued to be relevant in the current programming period; however, the standards were increased, focusing on targeted and rather ambitious measures –

[4] Available in Romanian at https://www.fonduri-ue.ro/images/files/programe/COMPETITIVITATE/POSCCE/2018/Raport_Final_de_Implementare_POS_CCE_2007-2013-revizuit_1.pdf.

with substantial benefits expected in terms of contributions to energy efficiency, RES, and interconnectivity that could then be scaled up.

Table 1.4. Comparison between OP 2007-13 and OP 2014-20

2007–13 OP	*2007–13 measures*	*Results*	*LIOP 2014–20 SO*	*Lessons learned in previous OP*
Competitive-ness	4.1.1. EE in industry	Good progress, 83% finalization, 67 projects	6.2, 6.4 - continued investments, narrowed to smart metering and small cogeneration	Little interest for EE, preference for productive investments; needed measures to raise awareness of EE benefits
	4.1.2. Modernization of energy grids	Relatively broad coverage (transport, distribution, gas, electricity), 92.5% finalization, 37 projects	6.1, 6.3, 8.1, 8.2 - narrowed down interventions on more specific areas	Beneficiary preference for stations (because of land expropriation issues), both for distribution and transport; SCADA for gas transport; extension of gas distribution networks. State aid interpretations
	4.1.3. Desulphuration energy capacities	One project, 100% finalized (12 projects submitted)	No longer supported	Desulphuration interventions completed; no need for further support (other generation support is difficult for state aid reasons)
	4.2.1. RES capacity	472 projects submitted, 89 contracted, 53 finalized (59% finalization rate)	6.1 - generation limited to geothermal; distribution	Many contracts cancelled because of changes in green certificates scheme; delays in procurement, difficulties in cofinancing
	4.3.1. Interconnections electricity & gas	Competitive projects for Transelectrica and Transgaz. One project contracted and then cancelled.	8.1, 8.2 - predetermined projects	Delays caused by change of state aid rules; the approach in 2014–20 with preselected projects focused preparation on mature projects
Environment	Axis 3. Support for DH in 7 cities	Good progress - preparation of TORs and technical specifications, investments to reduce emissions (generation, transport)	7.1 - investments based on DH technical documentation prepared in SOP Environment; 7.2 extended to Bucharest	Work contracts signed only in 2014 (prior to 2014, only consultancies and TA). Delays in absorption caused by procurement, approval of tariff increases, and insolvent contractors. A major finding is that losses in networks are substantial and need investments.

1.3. LIOP Theory of Change

25. The Large Infrastructure Operational Program (LIOP) theory of change (ToC), illustrated in Annex A, was reconstructed based on the analysis carried out for evaluation. Table 1.3 summarizes the three main elements of the ToC as identified in the Inception Report: challenges, needs, and strategy.

Table 1.3. The LIOP Theory of Change

Challenges The main features of the national context and the main challenges concerning LIOP interventions in energy	The following challenges were identified in the LIOP programming phase: • Absence of an up-to-date energy strategy, which constrains the capacity to prioritize actions to reach EU 2020 targets on energy and climate (the target most at risk is on energy efficiency). • Limited appetite for the development of renewable capacities or energy-efficient generation in certain technologies (e.g., biomass and industrial co-generation), based on existing support mechanisms. • Limited capacity of the electricity transmission and distribution networks to integrate renewable sources and allow for adjustments in demand (such as may occur through smart distribution); limited rollout of smart metering for household electricity. • Delays in implementing well-functioning energy markets and interconnectivity of the gas system. • Poor performance of DH systems (high network losses). Most of these challenges remain relevant to date. Additional challenges that are increasingly prominent in recent energy policy debates include: • Vulnerable consumers (poor and/or substantially affected by energy-supply unavailability) and access to energy supply (e.g., household access to gas in rural areas); • Prosumers (households that can produce and deliver renewable electricity to the grid)—requiring the acceleration of smart metering and smart grids and accelerated modernization of electricity distribution; • Electromobility—requiring modernization of electricity distribution in cities. Furthermore, the EU Energy Package and the more ambitious new European Green Deal will require accelerated efforts for decarbonization in Romania – for example, conversion from coal to gas; new renewable energy sources (RES) such as offshore wind; hydrogen development; and faster integration of RES in electricity grids.
Needs The main structural reform needs highlighted in the context of the LIOP in relation with the energy interventions	The following key structural reform needs were identified; they appear to remain relevant to varying degrees: • Strengthened corporate governance of energy SOEs (the National Reform Programs of 2014–2020 indicate weaknesses in implementing the relevant legislation, including for energy SOEs) and increased independence and capacity of the energy regulator ANRE. While some advancements were made in this sense (especially for some SOEs and ANRE), corporate governance reforms remain necessary for certain SOEs (e.g. Oltenia, DH companies) to ensure adequate performances to meet the country's envisaged objectives. • Continued energy market liberalization, particularly for gas and electricity, as highlighted in the LIOP ex-ante evaluation. This remains relevant to date, despite progress: delays in implementation of successive EU Energy Packages (Third and Clean Energy packages) limit the appetite for market-driven investments in RES, co-generation, etc. It also hampers development of energy-efficiency measures at the consumer level. Prioritization of investments in infrastructure

	(transmission and distribution networks for electricity, gas, and heating) is needed to ensure adequate access to the energy markets to producers and consumers. • Adoption of an energy strategy correlated with a climate strategy. When the LIOP was being prepared, the two strategies needed only to be consistent. But in 2020, new EU rules introduced a more stringent condition to prepare an integrated National Energy and Climate Plan (NECP). Romania submitted the final version of the NECP to the European Commission in January 2021 and it is currently under review.
Strategy The strategic approach proposed by LIOP for energy interventions in terms of SOs, eligible activities, eligible beneficiaries, target groups, and target areas	The energy interventions in LIOP focused on areas where support mechanisms and energy markets existing at the program design stage proved insufficient to foster investments (for example, less-developed RES, energy efficiency, industrial co-generation, smart metering, and so on). Although a strategy to develop these areas was not well defined, their inclusion in the LIOP compensated to a certain extent by providing a strategic framework for intervention. But the effect instead has been LIOP financing spread too thin—small amounts distributed across multiple intervention areas, mainly for pilots and demonstration projects for OS 6.1-6.4; projects which cover only portions of total investment plans of DH networks in SO 7.1-7.2.
Factors which influenced the LIOP energy interventions	• *Economic*: Economic growth after 2013 has increased demands for energy, both for households and industry, making energy a priority sector. Since the market and business environments were not yet sufficiently developed to stimulate investments in the energy sector, targeted state interventions were still required. • *Demographic and geographic*: Changes in energy-demand patterns (heating for households; electricity and gas consumption in industry) were not matched by current supply patterns (and to a certain extent, they are still not today). The electricity, gas, and heating networks are obsolete, while fossil-fueled generation has not kept pace with regional shifts in demand or with changes in electricity consumption for new uses (e.g., electromobility; increased electricity demand for households for new appliances, etc.). • *Legislative framework*: Frequent amendments to the Energy Law (covering gas and electricity) and uncertainties concerning the Heating Law, as well as secondary legislation and regulations, are likely to have reduced the interest of beneficiaries in accessing LIOP available funds. • *Availability of complementary resources*: Electricity generation is a competitive sector, while energy efficiency is also market-driven; both can and should draw resources from the private sector, focusing public support for accelerating trends and adopting innovative technologies. Investments in infrastructure (transmission and distribution networks for gas, electricity, and heating), as well as maintenance, should be covered by regulated tariffs collected from end-consumers. The availability of private funding sources, however, depends on the functioning of the market and regulatory environment, while public-sector support requires compliance with state aid principles.
Assumptions behind the LIOP interventions	The assumptions used during the programming stage linked the challenges, needs, and the existing strategy and policy measures in place at the time (2013) • SO 6.1: Certain renewable technologies (biomass, geothermal, etc.) have potential, but existing market conditions and support schemes are insufficient to attract investments. • SO 6.2: While energy market prices were liberalized for industrial consumers before 2014, additional efforts are needed to increase awareness (metering) and support acceleration of energy efficiency efforts.

	• SO 6.3: Smart metering rollout (initially targeted at 80 percent by 2020), introduced in the Energy Law 123/2012, requires additional support to take off, in the form of pilot/demonstration projects to indicate the costs and benefits. • SO 6.4: Industrial co-generation that is not covered by support schemes (such as the co-generation bonus) requires initial support, at least for demonstration purposes. • SOs 7.1 and 7.2: DH networks in eight cities where environmental benefit is demonstrated (in SOP Environment, 2007–2013) incur large losses and need financial support to boost efficiency and avoid consumer disconnections for poor quality. • SO 8.1: The electricity transmission grid requires additional investments to integrate rapidly developing RES (avoiding a potential bottleneck for RES development). • SO 8.2: Interconnections with Moldova (part of EU's internal energy market) enhance regional energy security but require public funding.
Outputs, outcomes, results	The target values for both outputs and outcomes are rather limited for SOs 6.1–6.4, and their contribution to Romania's Europe 2020 targets is marginal. Certain proposed measures (under SOs 6.1-6.4) involved seed funding for pilot and demonstration projects to provide information (real costs and benefits) for later scale-ups, along with other sources of funding. Output and outcome indicators for PAs 6, 7, and 8 required an assessment of the capacity of relevant entities to effectively monitor the achievements.