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REPORTED INNOVATION INTENSITY IN ELECTRICITY AND GAS DSOS AROUND THE WORLD

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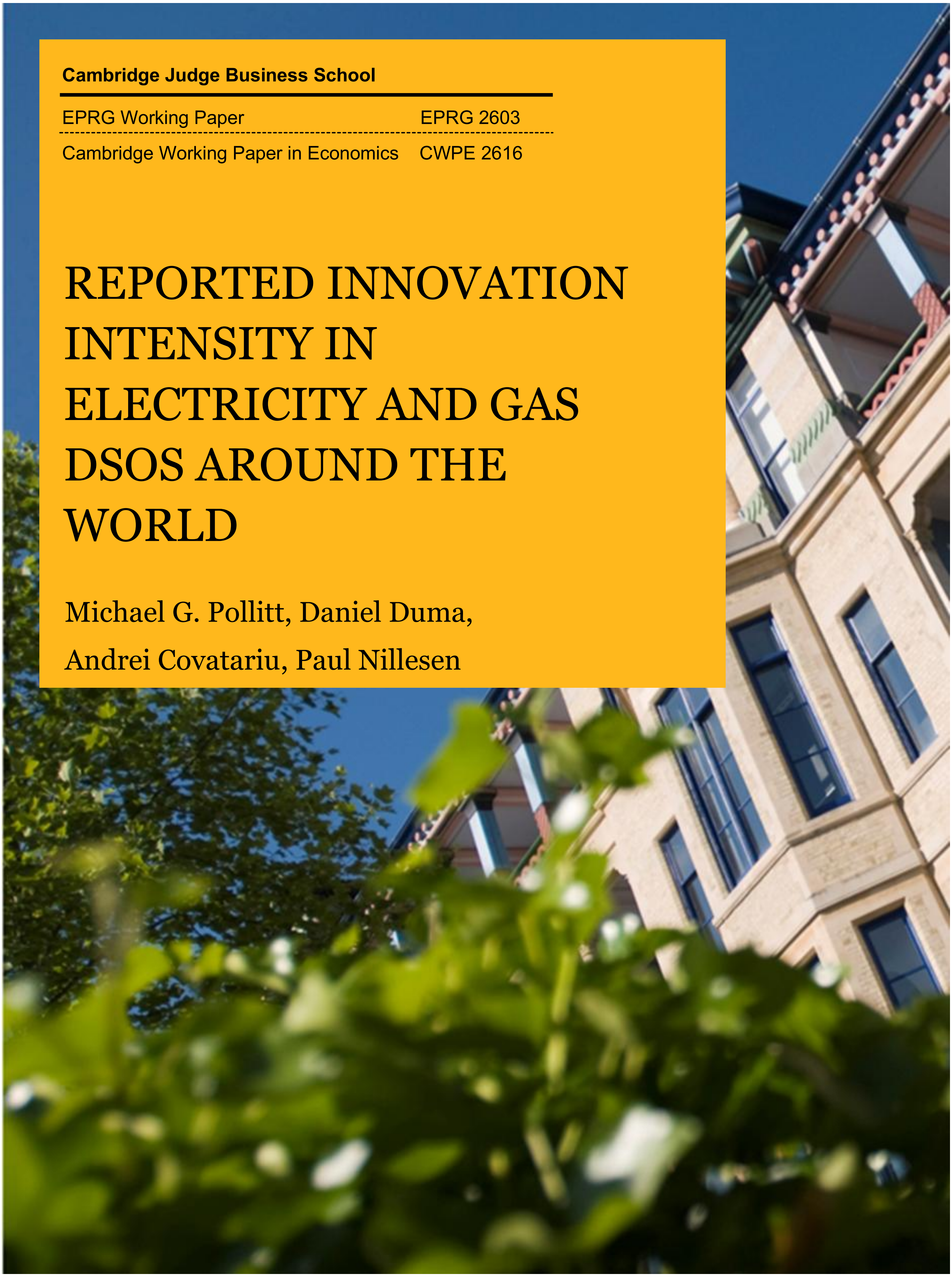

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Abstract: Electricity and gas distribution system operators (DSOs) are expected to play a crucial role in the energy transition. Hence, incentivizing innovation in this sector, which displays natural monopoly features, is becoming increasingly relevant. Measuring innovation is notoriously difficult, as both the inputs (funding innovative activities) and outputs (patents, publications or new adopted technologies and processes) are imprecisely measured and challenging to compare across countries. To address this, we take a text analysis approach to measuring innovation in DSOs, based on occurrences of innovation signaling words. Starting from a sample of 194 electricity DSOs and 73 gas DSOs, this paper measures innovation intensity based on DSO corporate reporting. The results are compared across different DSO characteristics like size, performance, structure, ownership and geographic location.

Keywords : Distribution System Operators, energy transition, innovation

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Reported innovation intensity of electricity and gas DSOs around the world[1]

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1. *Introduction*

Innovation in electricity and gas distribution

Distribution networks represent the segment between long-distance transmission networks and the final customer for both electricity and natural gas.[2] They manage the direct link to consumers and are thus at the forefront of the energy transition to net zero GHG emissions. This transition process poses multiple challenges for DSOs and tackling them requires innovation.

In this paper, innovation is defined in its widest sense. According to the OECD and Eurostat 'Oslo Manual' that establishes methodologies to measuring innovation, an innovation is a 'new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)' (OECD and Eurostat, 2018, p. 20).

In the context of electricity networks, innovation is a 'process through which new methods are created or alternative methods are adopted, with the aim of providing improved outcomes' (Poudineh, Peng and Mirnezami, 2017, p. 4). Following Poudineh, Peng and Mirnezami, for the case of DSOs, innovation can be divided into three categories: technical, process and commercial. Technical innovation involves new or improved technologies introduced for improved reliability and efficiency. Process innovation includes improved management and operations for greater cost efficiency. Commercial innovation refers to new business models for offering core or other services.

The relevance of innovation in power and gas distribution grids has grown recently, given the expected enhanced role of networks in reaching net zero (Meeus and Rossetto, 2025). On the electricity side, consumption is likely to increase significantly, due to the planned electrification of transport, heating and industry. In addition, distributed sources like residential solar PV, batteries as well as integrating VRE result in more "active" distribution grids with bi-directional flows. This requires not only more infrastructure, but also new ways of using this infrastructure more smartly to manage increased volatility, ensure resilience, and improve flexibility. These developments are all contributing to the need for innovation to take a central role. On the gas side, consumption of fossil methane is likely going to decrease, requiring innovation in preparing the network for lower volumes, greater coordination with electricity, and identifying a role for low-carbon gases like biomethane and hydrogen.

At the same time, innovation is also relevant for the conventional challenges of DSOs, such as network expansion, maintenance, metering, reliability, reduced network losses, resilience and others. Some DSOs are incentivized by regulation to push the boundaries of quality of

[2] The operators of such networks bear different names depending on jurisdiction, but for simplicity will be called Distribution System Operators (DSOs) in this paper.

service, as some DSOs reach average customer interruption times as low as 2 minutes per customer per year (Pollitt *et al.*, 2025). Other DSOs struggle to allocate the required capital to refurbish aging assets and face challenges in terms of unmetered connections, lengthy interruptions and high network losses.

Incentivizing innovation is particularly challenging in regulated network businesses. As natural monopolies with regulated revenues and no competition, DSOs are unlikely to allocate resources to innovation at an optimal level without explicit financial incentives (Poudineh, Peng and Mirnezami, 2017; Meeus and Rossetto, 2025). Economic regulation aims to generate better incentives for DSOs, by linking their revenues to certain desirable behaviors, such as adequate investment, operational efficiency and quality of service. Hence, to some extent, innovation is implicitly encouraged in reaching these conventional objectives. However, an adequate level of innovation cannot be stimulated through regulation aimed solely at operational efficiency. Instead, innovation has to be incentivized explicitly, by generating prospective rewards at an acceptable risk for DSOs. This can be accomplished by focusing on either or both innovation costs (input) or outcome (output) (Poudineh, Peng and Mirnezami, 2017, p. 26). Hence, DSOs can be allowed to recover (some of) the costs of the innovative activity or can keep (some of) the benefits that accrue from that activity, or a combination of both. Both approaches pose significant problems for the regulator of correctly assessing either that the costs are justified or that the benefits are indeed realized. One way to reduce (not eliminate) this asymmetry of information is by awarding innovation allowances competitively. Some regulatory regimes, such as GB's RIIO[3] have created mechanisms to reward innovation, such as allowances awarded competitively, sandboxes or funding for pilots. Such mechanisms do not completely solve the incentive problem, as DSOs still incur costs they may never recover and are unsure about the extent to which they can appropriate the eventual benefits, but it does stimulate innovative activity beyond the conventional operation of the grid.(Pollitt, Duma and Covatariu, 2025).

A global perspective on DSO innovation

Looking at DSOs around the world, one can observe a high degree of variation in many features (Pollitt *et al.*, 2025). In a sector with otherwise similar goals and the same 'fundamental physics', operators differ widely in terms of ownership, structure, size, performance but also in the approach to innovation. Given the universal imperative of net zero and the crucial role of networks, the different starting points and challenges that operators face, represent a matter of global relevance. Also, identifying whether some DSOs are constrained by their size, structure, ownership or financial health to innovate and play their role in net zero is also relevant for national and global policy.

[3] RIIO: Revenue = Incentives + Innovation + Outputs.

As Jamasb and Pollitt (2008) show, the reform of electric utilities in the 1990s may have had implications for research, development and innovation in the sector. Introducing competition, private ownership and unbundling have impacted the incentive for innovation spending and has led to a decline in basic R&D. Smaller sized firms with separated activities, facing increased competition and uncertainty have reduced their R&D expenditure (Jamasb and Pollitt, 2008, 2011, 2015). Other research shows an ambiguous relationship between ownership and performance (Alkhuzam, Arlet and Lopez Rocha, 2018) and adoption of renewable technologies (Steffen, Karplus and Schmidt, 2022). The data points toward public ownership being more conducive to innovation, but private ownership being better for service quality and profitability. At the same time, private DSOs are more prevalent in high income economies with income potentially being the true determinant of more innovation or better performance, rather than the ownership or structure of the DSO (Alkhuzam, Arlet and Lopez Rocha, 2018). Examining whether these patterns hold true would be even more relevant, given the important role distribution grids play in delivering the energy transition

In this context, this paper aims to explore DSO innovation around the world, based on text analysis of annual and sustainability reports, linking innovation intensity to other DSO or country characteristics. It uses a global sample of 194 DSOs in electricity and 73 DSOs in gas as the starting point and derives a measure of innovation intensity by looking at words that are typically associated with reporting on innovative activity. This measure of innovation is then examined in conjunction with other DSO characteristics like ownership, unbundling, size, performance (for electricity) or network length or country level characteristics like continent or OECD/EU membership. This global approach is meant to expand the understanding of innovation in energy networks beyond the OECD and the larger emerging markets, to fully capture the diversity of contexts and challenges that DSOs face.

The paper proceeds as follows. The next section looks at the literature on measuring innovation and introduces text-based approaches. The third section discusses the methodology of deriving the innovation intensity from DSO annual and sustainability reports. The fourth section presents the results of the analysis, highest and lowest ranked DSOs, average innovation intensity by continent, country groupings, unbundling status, ownership, size or performance, as well as some correlations between innovation intensity and other DSO characteristics. The fifth section includes 6 case studies for electricity and 6 for gas, for the leading DSO in each continent. The last section draws some conclusions.

2. *The literature on measuring innovation*

The literature on innovation is vast with multiple sub-topics, reflecting its economic and societal relevance as well as the diversity of activities and methods it entails (Fagerberg and

Mowery, 2006). Within this expansive landscape, the focus of this paper is on measuring innovation globally, at the corporate level, in the power and gas distribution sector and exploring how that covaries with other regional, country or company level characteristics.

Measuring innovation is notoriously challenging (Smith, 2006; van der Panne, 2007; Haar, 2018). The intrinsic novelty of the innovative activity, its high rate of failure and the difficulty in comparing across products or services make innovation difficult to measure in a consistent way. According to Smith, 'innovation involves multidimensional novelty in aspects of learning or knowledge organization that are difficult to measure or intrinsically non-measurable' (Smith, 2006, p. 148). To circumvent this issue, certain common characteristics have been isolated for comparison both at the input (activity) and the output (results) levels. These include expenditure or number of staff dedicated to the process, which can be measured and compared when they align with the accounts of the reporting unit (which is not guaranteed). On the output side, changes in sales attributed to adoption of innovation are also measurable, but still highly challenging.

The most used indicators for innovation are R&D expenditure, information on patent applications, and bibliometric data (Smith, 2006). These are complemented by surveys and expert interviews looking at subjects of innovation (the agents that are expected to innovate) or the objects (the outputs of the innovation process).

All methods have their limitations but have been used extensively and generated a significant body of literature as well as data for policy making, especially in the OECD and the EU.

In the case of DSOs, especially when taking a global approach, one major challenge is the unit of analysis. As illustrated in Pollitt *et al.* (2025), DSOs vary in terms of structure and organization. Some are bundled with other functions like generation, transmission or retail while some are completely unbundled. Some are owned by multinational groups while many are part of state-owned integrated utilities. Some benefit from the work of dedicated research and innovation institutes (like China's State Grid Company) and may or may not report innovation outputs at the DSO level.

In this context, measuring innovation for each DSO may be more successful by using another, more recent approach: text analysis. Text-based approaches take corporate reports and use different techniques to count word occurrences and derive innovation measures and themes (Pandey, Pandey and Miller, 2017; Bellstam, Bhagat and Cookson, 2021; Nousiainen *et al.*, 2024). Where both patent and text-based approaches are possible, like S&P 500 firms with large corporate reports, the two methods seem to show a high degree of correlation, suggesting that text-based innovation methods are a viable alternative when patent data is difficult to derive or less relevant (Nousiainen *et al.*, 2024).

Specifically for DSOs, there are not many methodologies for measuring innovation, especially in a global context. On the other hand, the various themes of innovation, including decarbonization and renewables, electric mobility and heating, flexibility and demand management, low carbon gases or digital transformation, are the subject of vast literature (Jamasb and Pollitt, 2011; e.g. Sovacool *et al.*, 2020; Norouzi *et al.*, 2023; Boldrini *et al.*, 2024; Duma *et al.*, 2024). This includes product innovation (e.g. batteries, PV, hydrogen), adoption, business model innovation, social-technical systems and others. At the same time, an extensive comparative approach to power distribution innovation across the globe has not been undertaken, to our knowledge.

One partial exception is the SP Group's Smart Grid index, which also applies to electric utilities. The index is based on 7 dimensions: monitoring and control, data analytics, supply reliability, distributed energy resource (DER) integration, green energy, security and customer empowerment and satisfaction. The method relies on a survey with questions pertaining to the seven dimensions that are answered using public information and proxies, for a group of 92 utilities utilities in 36 countries with good data availability. The geographic scope of the index is limited to North America, Europe and Asia-Pacific. The questions and exact results are not publicly available (SP Group, 2025).

3. Methodology

The starting point is a database of all electricity and gas DSOs active in the capital city of 194 countries (Pollitt *et al.*, 2025). The database contains information about the DSO's ownership, structure (unbundled or not), size (customers, sales or length of network), and performance metrics (interruptions and losses for electricity).

For each DSO, we attempt to access their most recent (after 2019) annual report and/or sustainability report. Most of the reports are from 2024 or 2023. This results in a list of 102 (out of 194 countries) DSOs for electricity and 41 (out of 73 countries with gas networks covering the capital) DSOs (Table 1). For each report, we translate it into English, count the frequency of the occurrence of innovation related words[4], sum them, and report them as Textual Innovation Intensity (TII) and relative Textual Innovation Intensity (TTI_r), that latter being TII as a percentage of total words in each report. More information on the method and the code is available in Annex 1.

The types of reports included are also relevant. An annual report can have different meanings in different jurisdictions. There are DSOs with integrated reports that include sustainability

[4] The list of words (their roots and derivatives) is the following: innovation, pilot, demonstration, patent, trial, prototype, lab, research and development, sandbox, test, pioneer, first-of-kind, launch.

information, others with separated annual reports detailing their activity for the year and the financial results. In other countries, the annual reports are exclusively operational (the Netherlands) or financial (Mexico) with significant space dedicated to the auditor's report. This affects comparability but is also a relevant finding in itself. In some countries the public and regulators have access to much more information about the DSOs' activity and innovation than others.

Table 1. Sample

	# of countries/DSOs Electricity	# of countries/DSOs Gas
Initial sample	194	73
With working website	158	62
Annual report (y>=2019) or Sustainability report (y>=2019)	109	44
Accessible (to download) and usable (OCR compatible) annual and/or sustainability report	102	41

The DSOs without a functioning website include both countries affected by conflict and fragility (DSOs in Syria or Sudan), but also DSOs that may have websites temporarily unavailable.

The methodology is affected by a number of limitations.

Firstly, the extent to which DSO discuss their innovation activities in their annual report and/or sustainability report may not be a perfect proxy for innovation intensity. Some DSOs may overreport or overstate their innovative work for different reasons, including reducing regulatory or political pressure or improving their public reputation.

Secondly, the sample is biased toward reports in English and may lose important nuances when using automated translation of non-English reports.

Third, as discussed, the reports themselves may be of different types according to the jurisdiction and the reporting practice. This means the type of information included is systematically different between countries. This affects comparability, but the analysis includes grouping countries by continent, economic block (e.g. EU) or level of income which may mitigate this shortcoming.

4. Results

4.1. Electricity

Innovation intensity

Based on our sample, the absolute textual innovation intensity (TII) ranges from 0 to 241 occurences with a mean of 30.1, median of 16.5 and standard deviation of 41.8 (Table 2). For example, Indonesia has a TII close to the mean (31), which means the pre-defined innovation signaling words occur 31 times throughout its annual and/or sustainability report.

Table 2. Descriptive statistics

TII		*TII_r*	
Mean	30.1	Mean	0.69
Standard Error	4.1	Standard Error	0.06
Median	16.5	Median	0.46
Mode	1	Mode	0
Standard Deviation	41.8	Standard Deviation	0.69
Minimum	0	Minimum	0
Maximum	241	Maximum	4.43
Observations	102	Observations	102

The relative TII ranges (TII_r) from 0 to 4.43 (per thousand words) with a mean of 0.71, median of 0.46 and standard deviation of 0.08. The DSO in Montenegro has a TII_r value close to the mean (0.76), which equals its TII (9) divided by total words in the report (11417), multiplied by 1000.

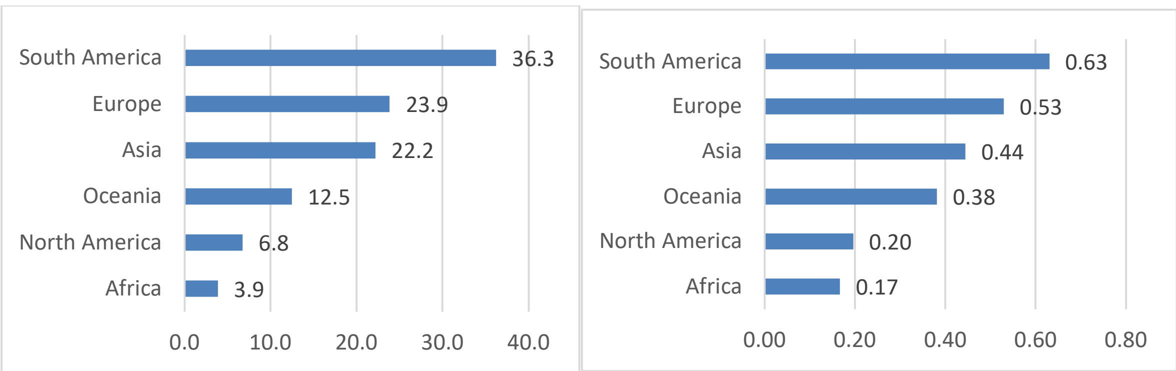
Looking at the ranking of countries by absolute and relative TII, we can notice a significant geographic diversity with Europe, Asia and South America being well represented (Table 3). In addition, there are 3 countries who are ranked in the top 10 for both absolute and relative TII: Saudi Arabia, Colombia and the UK.

Table 3. Highest 10 and lowest 10 ranked countries by TII and TII_r

#	TII	TTI_r (‰)	#	TII	TII_r (‰)
1	Greece	Kosovo	93	Bolivia	Bolivia
2	Saudi Arabia	South Korea	94	Mali	Mali
3	Portugal	Peru	95	Panama	Panama
4	Thailand	United Kingdom	96	Vietnam	Vietnam
5	Colombia	Saudi Arabia	97	Suriname	Suriname
6	Chile	Malaysia	98	Armenia	Armenia
7	Philippines	Luxembourg	99	Netherlands	Netherlands
8	Brazil	Italy	100	Mexico	Nigeria
9	Australia	Colombia	101	Burkina Faso	Mexico
10	United Kingdom	Oman	102	China	Burkina Faso

Looking at various groupings of countries, starting with continents, we notice that South America leads in terms of average TII (36.3), driven mainly by the ample reporting of DSOs in Colombia and Chile. Europe and Asia follow with 23.9 and 22.2 respectively.

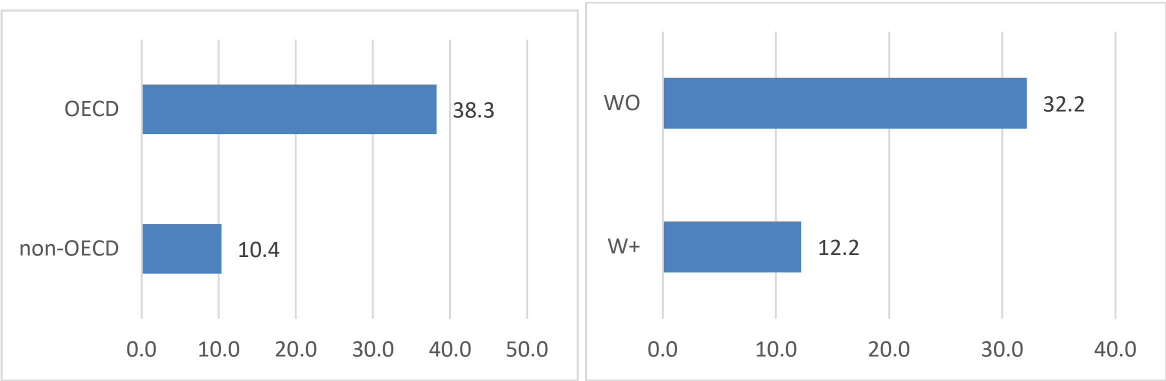
Figure 1. Left: TII by continent. Right: TII_r by continent.



If we change to TII_r, the ranking does not change but the gap between South America and Europe is reduced.

Looking at the level of income, the results confirm the intuition that DSOs in higher income countries can afford to pursue more innovation activity. DSOs in OECD countries have an average TII of 38.3 (0.6 in TII_r) compared to 10.4 (0.2 TII_r) in non-OECD countries.

Figure 2. Left: TII by OECD membership. Right: TII by unbundling status (wires only versus wires plus)



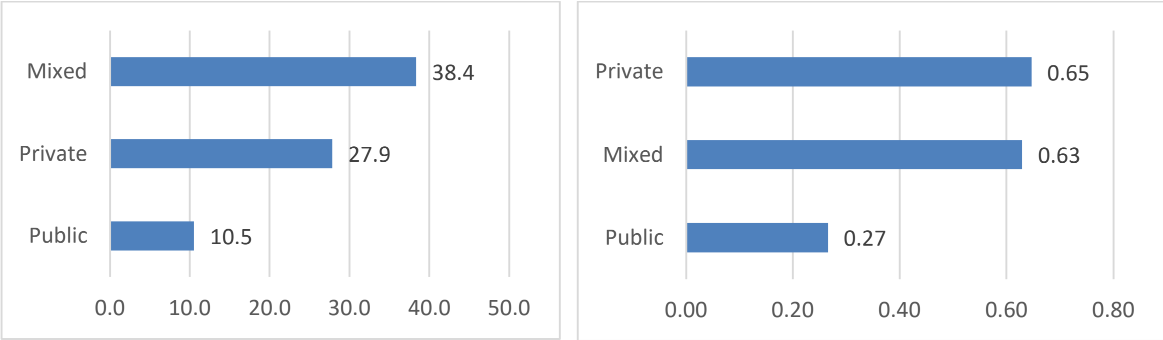
Other country groupings point in a similar direction. ASEAN (32.9 and 0.49 TII_r) and the EU (31.2 and 0.48 TII_r) score higher than MENA (22.2 and 0.4 TII_r), CEE (13.7 and 0.5 TII_r), and SSA (4.1 and 0.16 TII_r).[5]

Unbundled DSOs (wires-only, WO) record much higher levels of TII than bundled ones (wires plus, W+). The difference is both in absolute (32.2 to 12.2) and in relative terms (0.66 to 0.29). This may be a reflection of unbundling being the norm in higher income countries or of incentive regulation being more effective in determinnig unbundled DSOs to innovate in order to reach their performance indicators. Looking at OECD membership as a proxy for income, unbundled DSOs have higher TII (45.7) than bundled ones (26.7) in OECD countries. In non-OECD countries the ranking is reversed, with bundled DSOs having higher TII (10.7) than unbundled ones (6).

In terms of ownership, we defined public DSOs the ones with 50% or more of the shares owned by the state or other public entities, mixed as the ones between 5% and 50%, and private as the remaining DSOs. Our results show that mixed (38.4) and private (27.9) DSOs have higher TII than public ones (10.5). This may again reflect the higher occurance of DSOs with private participation in higher income countries.

[5] Association of Southeast Asian Nations (ASEAN), Central and Eastern Europe (CEE), European Union (EU), Middle East and North Africa (MENA), Sub-Saharan Africa (SSA).

Figure 3. Left: TII by ownership. Right: TII_r by ownership



Looking at TII_r, the picture changes slightly. Private (0.65) and mixed (0.63) DSOs have higher average TII_r than public DSOs (0.27).

Correlating TII and TII_r with other DSO characteristics like size, SAIDI, SAIFI or network losses mostly points in the expected direction.

Table 4. Correlations between TII (TII_r) and other DSO characteristics

	TII	TII_r
Size	-0.03	-0.05
SAIDI	-0.16	-0.11
SAIFI	-0.23	-0.21
Losses	-0.28	-0.23

DSOs with higher levels of TII are not necessarily larger but do have lower levels of interruptions frequency and duration and lower network losses. Only the losses coefficient is statistically significant at the 5% level, while the others are not.

To sum up, looking at electricity DSOs and their reporting innovation intensity, some patterns do emerge. The average TII seems to be highest in South America, Europe and Asia and higher in OECD countries than non-OECD ones. Looking at other DSO characteristics, TII is significantly higher for unbundled DSOs than bundled ones, and for mixed and private DSOs compared to public ones. Finally, correlating TII with DSO size and performance, higher TII is convincingly associated with lower interruptions and losses, and inconclusively with size.

The corporate level of reporting

The analysis relies on corporate reporting of the entity performing the distribution function in a region that includes the capital. This entity can be a municipality owned company (Sibelga in Belgium), a public administration institution (ANDE in Paraguay), an unbundled dedicated distribution company (Enedis in France), a national integrated utility (Eskom in South Africa) or a subsidiary of a multinational group (E.ON Hungary). This diversity affects comparability but also eliminates certain countries from the sample. For example, the distribution company that serves Madrid does not have an annual report at that corporate level, but only at the group level (Iberdrola). At the same time, the DSO serving Santiago de Chile does have an extensive annual report.

Table 5. TII and TII_r for multinational groups and parent companies

Country	**Entity**	**TII**	**TII_r**
Egypt	EEHC	23	0.72
Hungary	E.ON Hungary	47	0.63
Netherlands	Alliander	89	0.54
Norway	Eidsivia	59	0.51
Poland	E.ON Poland	139	0.80
Spain	Iberdrola	70	1.51
United States	Exelon	109	1.59

In addition, DSO functions that are part of integrated utilities may report on innovation that concerns the generation or retail side, which may also be misleading for automated text analysis. To address this issue, we also look at a selection of multinational or integrated groups and their reporting and discuss their approach to reporting at the DSO or country levels.

Table 5 includes this selection and illustrates the issue of the reporting level. For example, the unbundled DSOs in Hungary and Poland do not make an annual report available on the website. However, their parent companies E.ON Hungary and E.ON Poland, part of the E.ON multinational group, do have annual reports and both have levels of TII and TII_r close to or above average. Similar examples come from Egypt, Norway, Spain and the United States. None of these DSOs publish their own reports, but their parent company does, with relatively high levels of TII (all of them above average, except for Egypt).

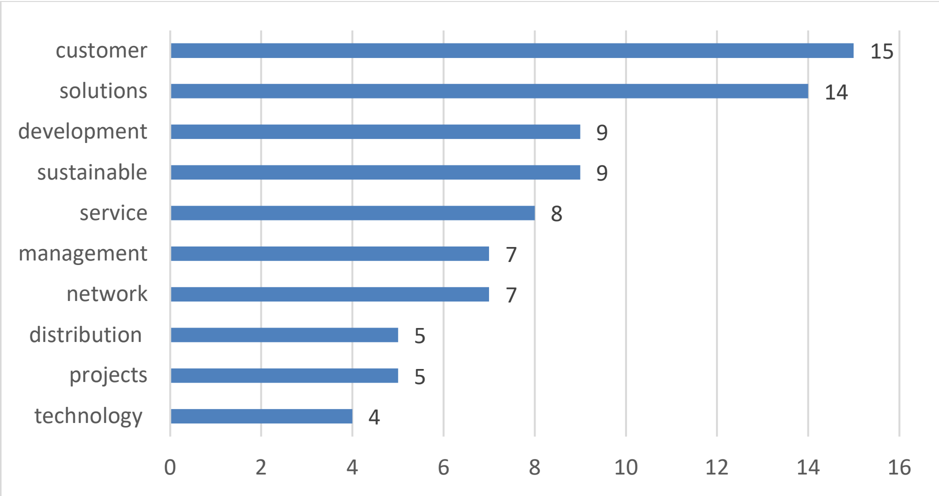
A special case is represented by the Netherlands. The DSO (Liander) does publish an annual report and is thus included in the sample. But the type of reporting is much narrower, focusing mostly on operations. As a result, its TII score is 1, much lower than expected for a DSO in a highly innovative country. Its parent company, on the other hand, Alliander, has a TII of 89 almost three times higher than the sample average, which is closer to expectations. This case illustrates the relevance of the reporting level.

The choice of the corporate level at which to report may also be a matter of regulation. Some countries may require annual and/or sustainability reports as part of the regulatory submissions of the DSO itself. This issue affects the robustness of the results to some extent but is accounted for in the interpretation.

Word associations

Figure 4 presents the top 10 words associated with the root of innovation. This results from taking each occurrence of the root word "innov" and looking at a set of words including 10 words before and 10 words after. This results in a list of innov-proximity words for all reports (See Annex 1 for more details).

Figure 4. Top 10 words associated with 'innov'



Hence, in all analyzed reports, the most commonly associated words with "innovation" are "customer" (including customers) which appears 15 times in the 10 word proximity window of innovation across all reports, followed by solutions and development. The code eliminates irrelevant words (like country names, logical operators and others).

4.2. Natural gas

Innovation intensity

Based on our sample, the absolute textual innovation intensity (TII) for natural gas ranges from 0 to 139 occurrences with a mean of 34.3, median of 19 and standard deviation of 37.8.

Table 6. Descriptive statistics

TII		*TII_r*	
Mean	34.3	Mean	0.78
Standard Error	5.9	Standard Error	0.12
Median	19	Median	0.61
Mode	7	Mode	0
Standard Deviation	37.8	Standard Deviation	0.77
Minimum	0	Minimum	0
Maximum	139	Maximum	4.33
Observations	41	Observations	41

The relative TII ranges (TII_r) from 0 to 4.33 (per thousand words) with a mean of 0.78, median of 0.61 and standard deviation of 0.77.

Peru, Indonesia and Italy lead in terms of TII scores, while for TII_r, it is UK, Peru and Austria that top the rankings.

Table 7. Highest 10 and lowest 10 ranked countries by TII and TII_r

#	TII	TTI_r(‰)	#	TII	TTI_r(‰)
1	Singapore	United Kingdom	32	Chile	USA
2	Peru	Peru	33	Malaysia	Switzerland
3	Indonesia	Austria	34	Switzerland	Denmark
4	Italy	Singapore	35	Romania	Bangladesh
5	Australia	Australia	36	USA	Indonesia
6	Netherlands	Ireland	37	Thailand	Argentina
7	Canada	China	38	Argentina	Lithuania
8	United Kingdom	South Korea	39	Uruguay	Uruguay
9	South Korea	Qatar	40	Germany	Germany
10	Austria	New Zealand	41	Latvia	Latvia

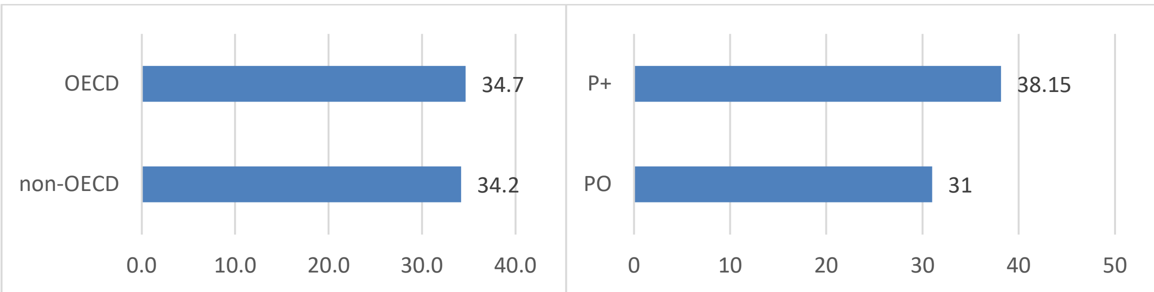
Oceania has the highest average TII as both Australia and New Zealand have high scores and other countries do not have significant gas networks. The other continents have very similar scores, with slightly higher averages for Asia and North America than South America and Europe. Africa has a relatively low score but gas networks are not significant on the continent with the exception of a few countries in North Africa.

Figure 5. Left: TII by continent. Right: TII_r by continent

Looking at TII_r, the differences are slightly more pronounced, with Oceania still leading, but Europe having a higher score than the other continents. Looking at other country groupings, the EU has an average TII score of 30.6 (0.67 TII_r), CEE has 20 (0.53 TII_r) and MENA has 18.7 (0.69 TII_r).

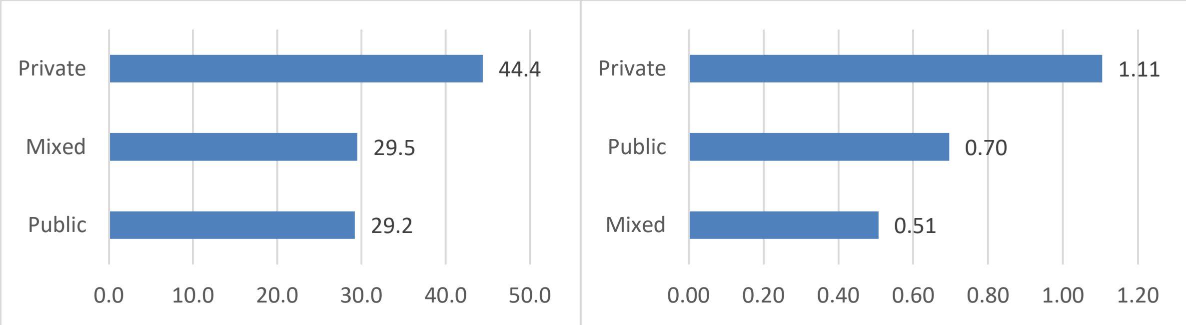
No significant differences appear between average TII scores between OECD and non-OECD countries with 34.7 (0.82 TII_r) and 34.2 (0.74 TII_r) respectively. Unbundled (pipes only, PO) DSOs seem to have lower TII than bundled (Pipes plus, P+) ones but the difference is not high, 38.1 (0.87 TII_r) to 31 (0.71 TII_r).

Figure 6. Left: TII by OECD membership. Right: TII by unbundling status (pipes only versus pipes +)



In terms of ownership private DSOs have significantly higher average TII scores that mixed or publicly owned ones, with the ranking changing slightly between public (0.7) and mixed (0.51) when looking at TII_r.

Figure 7. Left: TII by ownership. Right: TII_r by ownership



The correlation betwee TII and TII_r and other gas DSO characteristics like size (customers), network length or sales (in GWh), is presented in Table 8.

Table 8: Correlations between TII (TII_r) and other DSO characteristics

	TII	TII_r
Size	0.18	0.29
Length	0.06	0.10
Sales	0.26	0.22

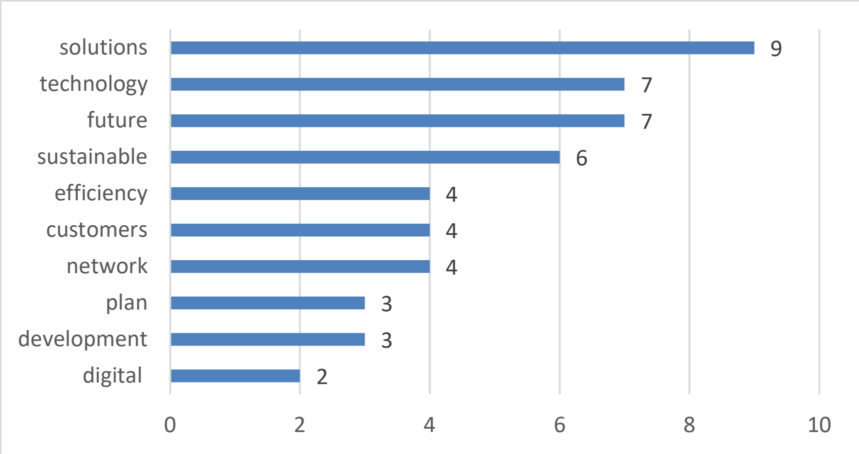
DSOs with higher levels of TII and TII_r have more customers, manage longer grids and have significantly higher sales. The coefficients are not statistically different from zero at conventional significant levels. Only the correlation between TII_r and size is marginally statistically significant at the 10% level.

In summary, average textual innovation intensity (TII) for gas DSOs is higher in Oceania (Australia), Asia and North America than in other continents. OECD DSOs have similar average TII to non-OECD ones, while bundled DSOs and private ones have slightly higher TII than unbundled and public (and mixed) ones respectively. TII seems to correlate positively with size, as TII seems to be higher in DSOs with higher sales, more customers and longer networks.

Word associations

For gas, solutions, technology and future are the most frequently used words associated with innovation in the reports (Figure 9). They associated words are remarkably similar to those for electricity, but it is interesting to note that the word customer is much lower in the ranking than in the case of electricity.

Figure 8. Top 10 words associated with innovation



5. Case studies

To reduce complexity and make measurement and comparison possible, we used corporate reports to determine the intensity of innovation. To complement our approach and examine what is behind the reported innovation intensity, we look at case studies. Although large differences exist based on various characteristics of countries (e.g., OECD versus non-OECD) or companies (e.g., bundled versus unbundled; part of a group or not), an interesting selection approach can be the comparison of DSO innovation projects across continents. The following section will present short case studies for the top ranked DSO in each continent, for both electricity and gas.

5.1. Examples of innovation in electricity DSOs

Based on our methodology, the leading European company reporting on innovation projects (in absolute TII terms) is **PPC Greece**, with TII of 241. The PPC Innovation Hub oversaw 29 research projects in 2023, covering fields such as electromobility, robotics, and energy storage. Pilot programs included "30 Renewable Islands by 2030," which aims to achieve full RES penetration in isolated island systems, and the LIFE CO_2toCH_4 project, which explores the conversion of captured carbon into renewable methane. Innovation has also been pursued through digital transformation. PPC implemented its DEH@Transformation program, establishing a unified digital architecture, cloud infrastructure, and strengthened cybersecurity protocols.

In North America, the leading company reporting on innovation is **Empresa Eléctrica de Guatemala** (TII=64), which has positioned customer management and access to affordable energy as one of the pillars of its innovation strategy. A central innovation driver has been the company's push toward digital solutions. The EEGSA App was expanded with real-time functionalities for electronic payments, service requests, and claims tracking. Complementing this, digital billing grew by 14.5%, reaching nearly a third of all customers, while digital payment transactions rose by 11% to nearly six million operations. These efforts reduced costs, expanded service reach to remote areas, and gave customers more flexibility and transparency in managing their accounts. Additionally, EEGSA also focused on affordability issues. Initiatives like payment agreements, targeted support for vulnerable groups, and credit flexibility allowed customers to maintain service during economic hardship. Coupled with investments in new service points and kiosks to bring services closer to communities, these measures highlight a hybrid approach, at the intersection of digital tools and physical interaction.

In Asia, the **Saudi Electricity Company (SEC)** tops the ranking of DSOs with TII of 241. The company has focused on various projects in sustainable technologies, digital transformation, and customer-centric modernization, aligning with the country's Saudi Vision 2030. To this end, the company has focused its efforts on Cryogenic Carbon Capture (CCC) pilots, which is the first global application of carbon freezing at a power facility. Additionally, the company has looked at Sorption Cooling, a method using waste heat for district cooling. Digitalization has also been a main driver for the Saudi company, with AI-based grid-loss optimization tools, smart platforms for dynamic load management, or IoT-enabled safety devices such as gas-leak smartwatches, smart helmets, and environmental sensors for worker protection and facility monitoring.

In Oceania, **Australia's EvoEnergy** (TII=91) has focused on integrating various Consumer Energy Resources (CER), which include rooftop solar, batteries, and electric vehicles, into network operations, improving data-driven visibility and analytics, and enhancing non-network solutions for demand management. Based on that, their Network Visibility and Analytics Trial enhanced monitoring of low-voltage networks through smart meter data and analytics tools aimed at improving planning, demand management, and customer/prosumer integration. The company has also conducted battery tariff trials (residential and large-scale) to incentivize optimal energy exports, and it continues to explore EV charging tariff trials and neighbourhood-scale batteries as part of its non-network innovation portfolio.

In South America, with TII of 113, **Colombia's Codensa** (part of the Enel Group) focuses on technological and digital transformation, open and collaborative innovation, as well as on social and environmental impact. Its innovation model emphasizes co-creation with startups, universities, and clients under an Open Innovability approach, which led the company to implement 145 innovation projects in 2023, focusing on operational efficiency, digital platforms, circular economy, and virtual assistance/mobile applications. Key initiatives include Energy Market Insight for automated market analysis, SIPROTAP for public lighting fault detection, 2PowerBox for mobile electricity distribution in remote areas, LiFi technology pilots for confined spaces, and cybersecurity and wireless network improvements in generation plants. At the same time, the company focuses on automation, AI, and robotics (e.g., Rhiino robot for confined-space inspection), sustainability-driven engineering (e.g., low-carbon concretes, eco-cables), and social co-innovation (e.g., community training, women entrepreneurship).

In Africa, with a TII of 20, **Mauritius' Central Electricity Board** (CEB) is the leading DSO in the continent. CEB works on renewable energy integration, smart grid modernization, and digital transformation. The company's flagship innovation projects include the installation of Battery Energy Storage Systems (BESS) totalling 38 MW, aimed at frequency regulation and peak shaving. Additionally, the rollout of smart meters, advanced Metering tools, and Automatic Generation Control (AGC) is gradually transforming the company's grid into a smart network capable of managing variable renewables and enhancing demand-side response. To facilitate this process, the company is also upgrading its IT backbone through data centre modernization. The company's innovation mission also focuses on human-capital investment, by establishing a Renewable Energy and Energy Efficiency Laboratory and training centres.

5.2 Examples of Innovation in gas DSOs

On the gas DSO side, while most leading operators share some similar strategies, such as focusing on gas network digitalization to improve operational efficiency and safety, as well as on the transition to green molecules, some particularities in their challenges and starting points can be observed by looking across continents at the leading gas operators.

In Europe, the leading DSOs is **Italy's Italgas** with TII of 106, based on the company's official reporting. The organization's innovation revolves around digital transformation, decarbonization, and infrastructure modernization. Its Bludigit tool helps the company improve its operational efficiency, predictive maintenance, as well as optimization of gas-network management, through AI (including generative AI) technologies. Additionally, DANA (Digital Advanced Network Automation) platform is now the single point of access to the Group's Internet of Things (IoT) ecosystem, enabling 24/7 remote control, data-driven decision-making, and integration of artificial-intelligence features for smart maintenance. Italgas' innovation projects extend beyond natural gas to green-gas readiness. According to its plans all networks are to be hydrogen-ready and fully digitized by 2028, while pilot Power-to-Gas and reverse-flow biomethane projects in Sardinia test the integration of renewable gases.

In North America, **Canada's Enbridge Gas** (TII of 72) is focusing on modernization, emissions reduction technology, and diversification into low-carbon fuels. Through its innovation projects, the company aims to reach a target of 35% GHG-intensity reduction by 2030, based on the projections of their 2023 Sustainability Report. To achieve that, the operator has implemented recompression units, low-bleed pneumatic devices, and advanced data management systems to cut methane and energy losses, while also investing in three new solar self-power projects and upgrades to compressor stations. The company also focuses on hydrogen blending. Its Markham power-to-gas facility, North America's first utility-scale hydrogen project, produces 400 tons of green hydrogen annually, blending 2% into the gas stream for thousands of customers.

In South America, **Peru's Calidda** (TII=119), based in Peru, has focused its innovation agenda on digitalisation, social inclusion, and sustainable infrastructure expansion. Apart from the company's investment in smart process automation and digital customer-experience tools to improve efficiency and service quality, Calidda also addresses financial inclusion through its digital CrediCálidda platform, which offers micro-credit linked to gas-bill payment records. Sustainability-driven innovation plays a central role in the company's innovation agenda, with initiatives like Atrapanieblas fog-harvesting program going beyond natural gas operation, positioning the company as a community partner.

In Oceania, **Australia's EvoEnergy** (TII=97) is innovating for gas network decarbonization (including carbon capture and storage), alternative fuels (hydrogen and renewable gases), and repurposing existing gas infrastructure. The company is performing hydrogen-readiness assessments of its infrastructure, investigating material compatibility, safety protocols, and potential pilot blending zones. Similarly, it looks on biomethane integration and decentralized gas network planning, using digital models to simulate future hybrid energy systems combining gas, electricity, and storage.

In Africa, **Algeria's Sonelgaz** (TII=7) focuses on modernizing its distribution infrastructure, enhancing safety and efficiency, and preparing the network for future green gas integration. The operator has launched programs for the digital transformation of its operations, including the deployment of smart metering systems, remote monitoring, and data-driven maintenance tools to improve leak detection and safety, as well as for optimizing operational indicators. At the same time, the company is investing in pipeline upgrades and control systems to make them available for low-carbon gases such as biomethane and hydrogen blends.

In Asia, the leading DSO with TII of 139 is **Singapore's City Energy (SP Group)**, which dedicates attention to digitalization, decarbonization, and smart urban infrastructure. The gas operator is investing in advanced process optimization and emissions reduction technologies at its Senoko Gasworks facility, integrating AI-based monitoring systems and digital twins to enhance operational efficiency, safety, and carbon performance. At the same time the company focuses on pipeline integrity management systems using drones and IoT sensors to detect leaks and monitor corrosion, thereby reducing methane losses and enhancing safety standards. City Energy also explores various low-carbon hydrogen and biogas blends options, while aiming to maintain compatibility with existing infrastructure.

5.3. Integrated DSOs (electricity and gas)

In our sample, there are a few cases of DSOs that perform both the electricity and the gas distribution service under the same corporate structure. Some of them are directly comparable, such as EvoEnergy in Australia, Sibelga in Belgium and SP Group in Singapore.

Table 9. DSOs with both electricity and gas and their TII scores (and TII_r scores in brackets)

	Electricity	*Gas*
Australia (EvoEnergy)	91 (1.42)	97 (1.39)
Belgium (Sibelga)	15 (1.43)	31 (0.72)
Singapore (SP Group)	33 (0.52)	139 (1.53)

Interestingly, for all three companies, the gas results are higher than the electricity, double in the case of Belgium and more than four times in the case of Singapore. For Australia, there results are similar.

6. Discussion and conclusions

The text-based mapping of reporting innovation intensity confirms the diversity of activities and the vastly different starting points of DSOs in their net zero journey.

Electricity

On electricity, some DSOs dedicate entire sections of their annual and sustainability reports to innovation projects, technologies or business processes, while others barely mention innovation at all.

This may be suggestive of the different reporting requirements and standards imposed by regulators around the world, or different institutional setups (with dedicated research and development entities distinct from the DSO itself).

With that caveat in mind, some patterns are noticeable.

Based on our sample, DSOs in South America, Europe and Asia lead the way in terms of innovation intensity in their reporting. DSOs in OECD countries, mixed/private and unbundled (wires only) have significantly higher scores than non-OECD, public and bundled (wires plus) respectively. This may be suggestive of innovation being an activity that becomes more significant for DSOs in higher income countries, which happen to have more private and unbundled DSOs. However, it may also signify that private ownership and an unbundled DSO may be more conducive to a focus on innovation, most likely resulting from regulatory incentives.

DSOs that record higher levels of quality of service dedicate more space to reporting their innovation activity. This suggests that DSOs who have reached a certain level in terms of service continuity and reduced losses are now focused on innovation activities to reach more demanding KPIs.

Based on the case studies, the leading DSOs in every continent seems to have the same direction of travel – digitalization, decarbonization, integrating renewables and enhancing flexibility. At the same time, innovation does fit with specific challenges, such as connecting islands in Greece, co-creation, entrepreneurship and access in remote areas in Colombia, affordability in Guatemala, floating solar and BESS in Mauritius (as an integrated utility on an island), DERs in Australia or district cooling in Saudi Arabia. In the highest ranked DSOs, reported innovation is specific which suggests that regulation is effective at stimulating innovation in its context.

Natural gas

On natural gas, the differences are smaller between continents or non-existent between OECD and non-OECD countries, for example. This may be a reflection of the fact that the sample is smaller and more homogeneous, with gas networks with a usable report tend to be in relatively similar countries.

Bundled and private DSOs have higher levels of text-based innovation intensity than unbundled and public ones, respectively.

Correlating text-based innovation measures with other DSO features, we notice that DSOs with more reported innovation have more customers, more extensive networks and higher sales.

The gas case studies also presented interesting local specificities. In Peru, there is a clear focus on affordability, in Australia and Canada, hydrogen is a key innovation theme while in Singapore, digitalization seems to be the priority. Italy seems to focus on low-carbon gases including biomethane together with an optimal operation of the grid, while Algeria works primarily on safety and efficiency improvements. What seems to be common to all, despite them being at different starting points, is the challenging process of decarbonization and identifying the role of the gas grid in net zero seems to be a quasi-universal innovation theme among DSO reporting.

References

Alkhuzam, A., Arlet, J. and Lopez Rocha, S. (2018) "Private versus public electricity distribution utilities: Are outcomes different for end-users?" Available at: https://blogs.worldbank.org/en/developmenttalk/private-versus-public-electricity-distribution-utilities-are-outcomes-different-end-users.

Bellstam, G., Bhagat, S. and Cookson, J.A. (2021) "A Text-Based Analysis of Corporate Innovation," *Management Science*, 67(7), pp. 4004–4031.

Boldrini, A. *et al.* (2024) "Flexibility options in a decarbonising iron and steel industry," *Renewable and Sustainable Energy Reviews*, 189, p. 113988. Available at: https://doi.org/10.1016/j.rser.2023.113988.

Duma, D. *et al.* (2024) "Defining and measuring active distribution system operators for the electricity and natural gas sectors," *Utilities Policy*, 87, p. 101708. Available at: https://doi.org/10.1016/j.jup.2024.101708.

Fagerberg, J. and Mowery, D.C. (eds.) (2006) *The Oxford Handbook of Innovation*. Oxford University Press. Available at: https://doi.org/10.1093/oxfordhb/9780199286805.001.0001.

Haar, P. ter (2018) "Measuring innovation: A state of the science review of existing approaches," *Intangible Capital*, 14(3), pp. 409–428. Available at: https://doi.org/10.3926/ic.1254.

Jamasb, T. and Pollitt, M. (2008) "Liberalisation and R&D in network industries: The case of the electricity industry," *Research Policy*, 37(6), pp. 995–1008. Available at: https://doi.org/10.1016/j.respol.2008.04.010.

Jamasb, T. and Pollitt, M.G. (2011) "Electricity sector liberalisation and innovation: An analysis of the UK's patenting activities," *Research Policy*, 40(2), pp. 309–324. Available at: https://doi.org/10.1016/j.respol.2010.10.010.

Jamasb, T. and Pollitt, M.G. (2015) "Why and how to subsidise energy R+D: Lessons from the collapse and recovery of electricity innovation in the UK," *Energy Policy*, 83, pp. 197–205. Available at: https://doi.org/10.1016/j.enpol.2015.01.041.

Meeus, L. and Rossetto, N. (2025) "How can regulated electricity network companies promote innovation? Lessons from the field of practice," *Handbook on Electricity Regulation*. Edward Elgar Publishing, pp. 371–385. Available at: https://doi.org/10.4337/9781035314355.00023.

Norouzi, F. *et al.* (2023) "Diagnosis of the implementation of smart grid innovation in The Netherlands and corrective actions," *Renewable and Sustainable Energy Reviews*, 175, p. 113185. Available at: https://doi.org/10.1016/j.rser.2023.113185.

Nousiainen, E. *et al.* (2024) "Using machine learning and 10-K filings to measure innovation," *Accounting & Finance*, 64(4), pp. 3211–3239. Available at: https://doi.org/10.1111/acfi.13245.

OECD and Eurostat (2018) *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation, 4th Edition*. OECD (The Measurement of Scientific, Technological and Innovation Activities). Available at: https://doi.org/10.1787/9789264304604-en.

Pandey, S., Pandey, S.K. and Miller, L. (2017) "Measuring Innovativeness of Public Organizations: Using Natural Language Processing Techniques in Computer-Aided Textual Analysis," *International*

Public Management Journal, 20(1), pp. 78–107. Available at: https://doi.org/10.1080/10967494.2016.1143424.

van der Panne, G. (2007) "Issues in measuring innovation," *Scientometrics*, 71(3), pp. 495–507. Available at: https://doi.org/10.1007/s11192-007-1691-2.

Pollitt, M., Duma, D. and Covatariu, A. (2025) "Uncertainty, Regulation and the Pathways to Net Zero," *Handbook on Electricity Regulation*. Cheltenham: Edward Elgar Publishing, p. 576. Available at: https://www.e-elgar.com/shop/gbp/handbook-on-electricity-regulation-9781035314348.html?

Pollitt, M.G. *et al.* (2025) "A Global Map of Electricity and Gas Distribution Network Companies." Cambridge (Cambridge Working Paper in Economics, EPRG2519). Available at: https://www.jbs.cam.ac.uk/wp-content/uploads/2025/09/eprg-wp2519.pdf.

Poudineh, R., Peng, D. and Mirnezami, S.R. (2017) *Electricity Networks: Technology, Future Role and Economic Incentives for Innovation*. Oxford Institute for Energy Studies. Available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2017/12/Electricity-Networks-Technology-Future-Role-and-Economic-Incentives-for-Innovation-EL-27.pdf.

Smith, K. (2006) "148 Measuring Innovation," in J. Fagerberg and D.C. Mowery (eds.) *The Oxford Handbook of Innovation*. Oxford University Press, p. 0. Available at: https://doi.org/10.1093/oxfordhb/9780199286805.003.0006.

Sovacool, B.K. *et al.* (2020) "Actors, business models, and innovation activity systems for vehicle-to-grid (V2G) technology: A comprehensive review," *Renewable and Sustainable Energy Reviews*, 131, p. 109963. Available at: https://doi.org/10.1016/j.rser.2020.109963.

SP Group (2025) "Smart Grid Index (SGI) 2024." Available at: https://www.spgroup.com.sg/our-services/network/overview/smart-grid-index.

Steffen, B., Karplus, V. and Schmidt, T.S. (2022) "State ownership and technology adoption: The case of electric utilities and renewable energy," *Research Policy*, 51(6), p. 104534. Available at: https://doi.org/10.1016/j.respol.2022.104534.

Annex I

Full text analysis methodology

This annex describes the text analysis methodology.

Where available, for each of the DSOs included in Annex II, we take the most recent annual report and sustainability report, concatenate them, apply Optical Character Recognition (OCR) software where needed (using Adobe services), translate them to English (using DeepL services), then we run a Python code that performs the following steps:

i. Processes the text and eliminates irrelevant words from the analysis, including company names and countries.

ii. Counts the simple frequency of (the root and derivatives) of innovation related words: innovation, pilot, demonstration, patent, trial, prototype, lab, research and development, sandbox, test, pioneer, first-of-kind, launch.

iii. Calculates the sum of the occurrenc for each of the words in step II and returns it as a proxy for ‘textual innovation intensity’ (TTI) for each DSO. The score is reported both in absolute numbers (TII) and as a percentage of total words (TII_r).

iv. Takes each occurrence of the root word “innov” and looks at a set of words including 10 words before and 10 words after. This results in a list of innov-proximity words.

To test the validity, we build a mock text with pre-determined numbers of keywords in each category and evaluate the code’s ability to accurately count them. The code accurately returns the predicted occurrences for the keywords.

Annex II: List of DSOs included in the analysis

Country	Electricity DSO	Gas DSO
Afghanistan	Da Afghanistan Breshna Sherkat (DABS)	
Albania	Operatori i Shpërndarjes së Energjisë Elektrike (OSHEE)	
Algeria	Société Algérienne de Distribution de l'Électricité et du Gaz (Sonelgaz Distribution)	Société Algérienne de Distribution de l'Électricité et du Gaz (Sonelgaz Distribution)
Andorra	Forces Elèctriques d'Andorra (FEDA)	
Angola	Empresa Nacional de Distribuição de Electricidade (ENDE)	
Antigua and Barbuda	Antigua Public Utilities Authority (APUA)	
Argentina	Edenor	Metrogas SA
Armenia	Electric Networks of Armenia (ENA)	Gazprom Armenia
Australia	EvoEnergy	EvoEnergy
Austria	Wiener Netze Gmbh	Wiener Netze Gmbh
Azerbaijan	Azerishiq OJSC	Azerigas
Bahamas	Bahamas Power and Light	
Bahrain	Electricity and Water Authority (EWA)	
Bangladesh	Dhaka Power Distribution Company (DPDC)	Titas Gas Transmission and Distribution
Barbados	Barbados Light and Power Company	
Belarus	Minskenergo	Beltopgaz
Belgium	Sibelga	Sibelga
Belize	Belize Electricity Limited	
Benin	Société Béninoise d'Énergie Électrique (SBEE)	
Bhutan	Bhutan Power Corporation (BPC)	
Bolivia	Delpaz	
Bosnia and Herzegovina	Elektroprivreda Bosne i Hercegovine (EPBiH)	Sarajevogas
Botswana	Botswana Power Corporation (BPC)	
Brazil	Neoenergia	
Brunei	Department of Electrical Services (DES)	
Bulgaria	Electrodistribution Grid West (EDG West)	Overgas
Burkina Faso	Société Nationale d'Électricité du Burkina (SONABEL)	
Burundi	Régie de Production et de Distribution d'Eau et d'Electricité (REGIDESO)	
Cabo Verde	Empresa de Electricidade e Água de Cabo Verde (Electra)	
Cambodia	Electricité du Cambodge (EDC)	

Cameroon	ENEO	
Canada	Hydro Ottawa Networks Ltd	Enbridge Gas
Central African Republic	Énergie Centrafricaine (ENERCA)	
Chad	Société Nationale d'Électricité (SNE)	
Chile	Enel Distribucion	Metrogas Chile
China	State Grid Corporation of China (SGCC)	Beijing Gas
Colombia	Codensa	Vanti SA
Comoros	SONELEC	
Congo	Energie Electrique du Congo (E^2C)	
Costa Rica	Compañía Nacional de Fuerza y Luz	
Cote d'Ivoire	Compagnie Ivoirienne d'Électricité (CIE)	
Croatia	HEP ODS	Gradska plinara
Cuba	Union Electrica	
Cyprus	Electricity Authority of Cyprus (EAC)	
Czech Republic	PREdistribuce	Pražská plynárenská
Democratic Republic of the Congo	Société Nationale d'Électricité (SNEL)	
Denmark	Radius Elnet	Evida
Djibouti	Electricité de Djibouti (EDD)	
Dominica	Dominica Electricity Services Limited (DOMLEC)	
Dominican Republic	Empresa Distribuidora de Electricidad del Este, S.A	
Ecuador	Empresa Eléctrica Quito	
Egypt	South Cairo Distribution Company	Town Gas
El Salvador	DEL SUR (AES El Salvador)	
Equatorial Guinea	Sociedad de Electricidad de Guinea Ecuatorial (SEGESA)	
Eritrea	Eritrean Electricity Corporation (EEC)	
Estonia	Elektrilevi	AS Gaasivõrk
Eswatini	Eswatini Electricity Company (EEC)	
Ethiopia	Ethiopian Electric Utility (EEU)	
Fiji	Energy Fiji Limited (EFL)	
Finland	Helen Electricity Network	Auris Kaasunjakelu Oy
France	Enedis	GRDF
Gabon	Société d'Énergie et d'Eau du Gabon (SEEG)	
Gambia	National Water and Electricity Company (NAWEC)	
Georgia	Telasi	Tbilisi Energy
Germany	Stromnetz Berlin	NBB Netzgesellschaft
Ghana	Electricity Company of Ghana (ECG)	

Greece	Hellenic Electricity Distribution Network Operator	EDA Attikis
Grenada	Grenada Electricity Services Ltd. (Grenlec)	
Guatemala	Empresa Eléctrica de Guatemala, S.A. (EEGSA)	
Guinea	Electricité de Guinée (EDG)	
Guinea-Bissau	Electricidade e Águas da Guiné-Bissau (EAGB)	
Guyana	Guyana Power and Light (GPL)	
Haiti	Electricité d'Haïti (EDH)	
Honduras	Empresa Nacional de Energía Eléctrica (ENEE)	
Hungary	E.ON Hungária Zrt.	Opus Tigáz Zrt
Iceland	Veitur Utilities	
India	BSES Rajdhani Power Limited (BRPL)	
Indonesia	PLN (Perusahaan Listrik Negara)	PLN (Perusahaan Listrik Negara)
Iran	Tavanir	National Iranian Gas Company (NIGC)
Iraq	Ministry of Electricity	
Ireland	ESB Networks	Gas Networks Ireland
Israel	Israel Electric Corporation (IEC)	
Italy	Areti	Italgas
Jamaica	Jamaica Public Service Company Ltd. (JPS)	
Japan	Tokyo Electric Power Company (TEPCO)	Tokyo Gas Network
Jordan	Electricity Distribution Company (EDCO)	
Kazakhstan	Akmola Electricity Distribution Company (AEDC)	QazaqGaz
Kenya	Kenya Power and Lighting Company (KPLC)	
Kiribati	Public Utilities Board (PUB)	
Kosovo	Electricity Distribution Services Kosovo J.s.c (KEDS)	
Kuwait	Ministry of Electricity and Water (MEW)	
Kyrgyzstan	Severelectro	Gazprom Kyrgyzstan
Laos	Electricité du Laos (EDL)	
Latvia	Sadales tīkls	Gaso
Lebanon	Electricité du Liban (EDL)	
Lesotho	Lesotho Electricity Company (LEC)	
Liberia	Liberia Electricity Corporation (LEC)	
Libya	General Electricity Company of Libya (GECOL)	
Liechtenstein	Liechtensteinische Kraftwerke (LKW)	Liechtensteinische Gasversorgung
Lithuania	Energijos Skirstymo Operatorius (ESO)	Energijos Skirstymo Operatorius

Luxembourg	Creos Luxembourg	Creos Luxembourg
Madagascar	JIRAMA (Jiro sy Rano Malagasy)	
Malawi	Electricity Supply Corporation of Malawi (ESCOM)	
Malaysia	Tenaga Nasional Berhad (TNB)	Gas Malaysia Berhad
Maldives	State Electric Company Limited (STELCO)	
Mali	Énergie du Mali (EDM-SA)	
Malta	Enemalta	
Marshall Islands	Marshalls Energy Company (MEC)	
Mauritania	Société Mauritanienne d'Électricité (SOMELEC)	
Mauritius	Central Electricity Board (CEB)	
Mexico	Comisión Federal de Electricidad (CFE)	Naturgy Mexico
Micronesia	Pohnpei Utilities Corporation (PUC)	
Moldova	Premier Energy Distribution	Chisinau Gaz
Monaco	Société Monégasque de l'Électricité et du Gaz (SMEG)	
Mongolia	Ulaanbaatar Electricity Distribution Network (UBEDN)	
Montenegro	Crnogorski Elektrodistributivni Sistem (CEDIS)	
Morocco	Office National de l'Électricité et de l'Eau Potable (ONEE)	
Mozambique	Electricidade de Moçambique (EDM)	ENH-Kogas Distribution Project
Myanmar	Yangon Electricity Supply Corporation (YESC)	
Namibia	Namibia Power Corporation (NamPower)	
Nauru	Nauru Utilities Corporation (NUC)	
Nepal	Nepal Electricity Authority (NEA)	
Netherlands	Liander	Liander
New Zealand	Wellington Electricity	Powerco
Nicaragua	Disnorte-Dissur	
Niger	Société Nigérienne d'Électricité (NIGELEC)	
Nigeria	Abuja Electricity Distribution Company (AEDC)	
North Korea	Pyongyang Electric Power Bureau	
North Macedonia	Elektrodistribucija DOOEL	
Norway	Elvia	
Oman	Nama Electricity Distribution Company (NEDC)	
Pakistan	Islamabad Electric Supply Company (IESCO)	Sui Northern Gas Pipelines Limited (SNGPL)
Palau	Palau Public Utilities Corporation (PPUC)	
Panama	EDEMET	

Papua New Guinea	PNG Power Limited (PPL)	
Paraguay	Administración Nacional de Electricidad (ANDE)	
Peru	Enel Distribucion	Calidda
Philippines	Manila Electric Company (Meralco)	
Poland	Innogy Stoen Operator	Polska Spółka Gazownictwa (PSG)
Portugal	E-REDES	Lisboagás GDL
Qatar	Qatar General Electricity and Water Corporation (Kahramaa)	
Romania	Retele Electrice Muntenia	Distrigaz Sud Rețele
Russia	Rosseti Moscow Region	Mosgaz
Rwanda	Energy Utility Corporation Limited EUCL	
Saint Kitts and Nevis	St. Kitts Electricity Company Limited (SKELEC)	
Saint Lucia	St. Lucia Electricity Services Ltd. (LUCELEC)	
Saint Vincent and the Grenadines	St. Vincent Electricity Services Limited (VINLEC)	
Samoa	Electric Power Corporation (EPC)	
San Marino	Azienda Autonoma di Stato per i Servizi Pubblici (AASS)	
Sao Tome and Principe	Empresa de Água e Electricidade de São Tomé e Príncipe (EMAE)	
Saudi Arabia	Saudi Electricity Company (SEC)	
Senegal	Société Nationale d'Électricité du Sénégal (SENELEC)	
Serbia	Elektrodistribucija Srbije (EDS)	Srbijagas
Seychelles	Public Utilities Corporation (PUC)	
Sierra Leone	Electricity Distribution and Supply Authority (EDSA)	
Singapore	SP Group	City Gas
Slovakia	Západoslovenská Distribučná (ZSD)	SPP Distribucia
Slovenia	Elektro Ljubljana	EnergetikaLjubljana
Solomon Islands	Solomon Power	
Somalia	BECO (Banadir Electric Company)	
South Africa	Eskom	Egoli Gas
South Korea	Korea Electric Power Corporation (KEPCO)	Seoul City Gas
South Sudan	Juba Electricity Distribution Company (JEDCO)	
Spain	Iberdrola Distribución	Madrileña Red de Gas
Sri Lanka	Ceylon Electricity Board (CEB)	
Sudan	Sudanese Electricity Distribution Company (SEDC)	
Suriname	Energiebedrijven Suriname (EBS)	
Sweden	Ellevio	Gasnätet Stockholm

Switzerland	EWB	EWB
Syria	Public Establishment for Electricity Distribution (PEDEEE)	
Tajikistan	Barki Tojik	
Tanzania	TANESCO	
Thailand	Metropolitan Electricity Authority (MEA)	
Timor-Leste	Electricidade de Timor-Leste (EDTL)	
Togo	Compagnie Energie Electrique du Togo (CEET)	
Tonga	Tonga Power Limited (TPL)	
Trinidad and Tobago	Trinidad & Tobago Electricity Commission (T&TEC)	
Tunisia	Société Tunisienne de l'Électricité et du Gaz (STEG)	Société Tunisienne de l'Électricité et du Gaz (STEG)
Turkey	Başkent Elektrik Dağıtım	Başkentgaz
Turkmenistan	Turkmenenergo	Ashgabatgaz
Tuvalu	Tuvalu Electricity Corporation (TEC)	
Uganda	UMEME	
Ukraine	DTEK Grids	Gazmerezhi
United Arab Emirates	Taqa Distribution	
United Kingdom	UK Power Networks	Cadent Gas
United States	Potomac Electric Power Company (PEPCO)	Washington Gas
Uruguay	Administración Nacional de Usinas y Trasmisiones Eléctricas (UTE)	Montevideo Gas
Uzbekistan	Regional Electric Networks of Uzbekistan (REN)	Hududgaztaminot
Vanuatu	UNELCO Engie	
Venezuela	Corpoelec	
Vietnam	Hanoi Power Corporation (EVN Hanoi)	
Yemen	Public Electricity Corporation (PEC)	
Zambia	Zesco	
Zimbabwe	Zimbabwe Electricity Transmission and Distribution Company (ZETDC)	