



National Audit Office

Report

by the Comptroller
and Auditor General

Ofgem, Department for Business, Energy & Industrial Strategy

Electricity networks

Key facts

£8bn

total regulated revenues of electricity transmission and distribution companies (electricity network companies)

9%

average return on regulatory equity electricity network companies expect to make for their shareholders in the current regulatory period. This compares with historical returns of 5%–6% for UK companies on average (figures in RPI-real terms)

£17bn to £40bn

the cumulative amount of expenditure across the electricity system, including networks, that could be avoided by 2050 by using sources of flexibility such as batteries, according to research for the Department for Business, Energy & Industrial Strategy

29 million number of homes and businesses connected to the electricity networks

£40 billion estimated value of electricity network assets such as cables and substations

£70 billion Ofgem's estimate of the capital investment in electricity networks that has taken place since privatisation in 1990

Around 50% reduction in the frequency of power cuts since Ofgem introduced incentives for companies to improve reliability in 2002

£130 the amount households pay each year, on average, for electricity transmission and distribution networks. A further £10 is spent on the costs of balancing the electricity system. These payments are made via consumer energy bills

£800 million amount we estimate consumers could have saved in the current eight-year regulatory period if Ofgem had used up-to-date evidence to set network companies' returns

Summary

1 Electricity networks take electricity from the power plants where it is generated, to homes and businesses where it is used. The physical assets making up the networks, which have an estimated value of about £40 billion, include more than 800,000 kilometres of overhead and underground cables. Electricity networks comprise transmission networks, which carry electricity nationwide at high voltage, and distribution networks, which carry electricity at lower voltages and distribute it locally. A distinct company, the Electricity System Operator, is responsible for ensuring supply and demand for electricity on the transmission network remain in balance. The costs of running, maintaining and upgrading the networks are passed on to businesses and households through their energy bills. In 2019, transmission and distribution network costs made up around 20% (£130) of the typical household's annual electricity bill. Overall, they amount to £8 billion a year.

2 The electricity networks in Great Britain were privatised in 1990. Each transmission or distribution network company (network company) serves a different region, so most customers do not have the option of using a different company. To prevent network companies from overcharging their customers, and to ensure they provide a good service, their earnings are regulated by Ofgem, a non-ministerial government department sponsored by the Department for Business, Energy & Industrial Strategy (BEIS). Ofgem does this through price controls, which are multi-year regulatory settlements that provide network companies with allowances for their costs, and targets for performance.¹ BEIS has overall responsibility for energy policy and ensuring the UK meets legislated targets for reducing carbon emissions.

3 Network companies have a crucial role to play to support carbon emissions reductions in the energy sector and the wider economy. To date, nearly a million solar panel installations have been fitted, and distribution networks have ensured these can be accommodated in the electricity system. By 2050, the overall amount of electricity flowing through electricity networks may need to double, to displace carbon-emitting fuels for transport and heating buildings. Growth in the overall demand for electricity and displacement of carbon-emitting fuels by renewables means that new investment is needed to upgrade electricity networks. While upgrading networks has traditionally meant reinforcing them with new cabling and substations, new technology such as battery storage may offer lower-cost methods of upgrading them. BEIS commissioned academic research, which estimated that using this technology could ensure that the cumulative cost of reducing carbon emissions by 80% by 2050 is between £17 billion and £40 billion less than it would be if the technology were not used. However, using this technology will require significant changes to the way network companies operate.

¹ Electricity networks in Northern Ireland are part of a distinct electricity system for the island of Ireland, and are regulated by the Utility Regulator for Northern Ireland rather than by Ofgem. This report focuses on Great Britain only.

4 In 2010, Ofgem concluded that price controls must change to incentivise the network companies to support the transition to low-carbon energy. This led to the introduction of a new set of price controls known as RIIO (an acronym for ‘Revenue = Incentives + Innovation + Outputs’, pronounced “Rio”). For transmission networks, the first set of RIIO price controls (RIIO-1) applies from 2013 to 2021, and for distribution networks, the first set of RIIO price controls applies from 2015 to 2023. Ofgem is currently designing the next set of price controls (RIIO-2).

Scope of this report

5 This report examines how effectively Ofgem is using the RIIO electricity transmission and distribution network price controls to protect the interests of consumers and achieve the government’s climate change goals. It also comments on the strategic challenges BEIS and Ofgem will face in the near future in ensuring electricity networks enable the achievement of government’s climate change goals. We have chosen to focus on these price controls because:

- they have a very significant impact on consumers’ energy bills;
- they are an important policy lever for decarbonising the energy sector; and
- they are in the process of being redesigned for the next regulatory period.

Because the electricity network price controls are a large and complex subject area, we did not look in detail at other aspects of network regulation, including the regulation of network user charges, or Ofgem’s approach to incentivising the Electricity System Operator and gas companies (both of which RIIO also applies to). In other recent reports, we have examined government policies for changing non-network parts of the electricity system, and the wider consumer protection work of Ofgem and other regulators.²

Key findings

Network companies’ performance and profits

6 Network companies provide consumers with a good service. Consumers in Great Britain experience fewer power cuts than consumers in most other EU countries, and the reliability of the networks has improved substantially since 1990. Electricity network companies have met almost all the targets Ofgem has set for them in RIIO-1, which cover safety, the environment, reliability and availability, providing timely connections, customer services, and assisting vulnerable consumers. The targets reflect the level of performance Ofgem thought efficient network companies would be able to achieve (paragraphs 2.2 and 2.3, Figure 13 and Appendix Three).

² For example, see: Comptroller and Auditor General, *Nuclear power in the UK*, Session 2016-17, HC 511, National Audit Office, July 2016; Comptroller and Auditor General, *Rolling out smart meters*, Session 2017-2019, HC 1680, National Audit Office, November 2018; Comptroller and Auditor General, *Regulating to protect consumers*, Session 2017-2019, HC 1992, National Audit Office, March 2019.

7 Network companies' returns are high relative to comparable companies and Ofgem's expectations. Ofgem designed RIIO-1 so that networks' returns depended on how well they performed. Its expectations were that networks could make a real-terms return on regulatory equity of between roughly 2.5% and 10.5%, but it expected only the best-performing companies to reach the high end of the range. In practice, based on the latest available information, three of the nine network companies are forecasting returns of around 10%, and the average forecast return is 9.2%. By comparison, Ofgem estimates that FTSE-listed companies on average provide returns of 5.25%–5.75%, based on various sources of evidence including historical market data.³ An Ofgem survey suggests that in recent years investors have come to expect lower returns from the FTSE than this (around 3%–4%), although investors' views are liable to change over time. Investors accept lower returns on lower-risk companies, and regulated utilities such as network companies are seen as lower risk than FTSE-listed companies on average (paragraphs 2.6 to 2.9 and Figures 15 and 16).

8 Ofgem missed opportunities to reduce consumer costs when designing RIIO-1. When setting up price controls, Ofgem provides network companies with a baseline rate of return, which is intended to be in keeping with the amount of risk borne by these companies' shareholders. Estimates of this risk are always highly uncertain, but Ofgem's estimate of this risk for RIIO-1 now looks high. At the time of RIIO-1, other regulators tended to adopt estimates which were on the high side, as this was thought to be necessary to provide additional certainty that companies will not need to be financially rescued by consumers or taxpayers. In addition, it ensures companies are capable of raising enough finance for significant programmes of investment, such as the investment Ofgem was expecting in RIIO-1. Nevertheless, in our assessment, Ofgem erred in placing too much weight on consistency with previous regulatory decisions when it set the baseline rate of return, and not enough weight on the most up-to-date market evidence, which suggested network company risk was lower. We estimate that if Ofgem had placed greater weight on this evidence, consumers could have paid at least £800 million less (paragraphs 2.10 to 2.15 and Figure 18).

9 Consumer costs were further increased because network companies were able to exceed almost all the performance targets that Ofgem set. Of the average 9.2% returns forecast by network companies, 1.2 percentage points come from network companies spending less than their full allowances for costs, and 1.5 percentage points from operational performance other than underspend. For electricity distribution companies, most of the rewards for operational performance come from exceeding targets set under a scheme that rewards companies for preventing power cuts. Targets for this scheme were fixed too far in advance, meaning network companies were already beating their targets before the price control started (paragraphs 2.9 and 2.16 to 2.19, and Figures 16 and 19).

³ All of the returns figures in this paragraph are in real terms, deflated using the retail prices index (RPI).

10 Ofgem’s unusually long price control period has locked consumers into paying higher costs for longer. Price controls usually last for five years. Ofgem set RIIO-1 to last for eight years, expecting this to encourage increased innovation and more long-term thinking from network companies, creating better outcomes for consumers and the environment. Ofgem has now concluded that there is no evidence that longer network price controls create this additional benefit. Instead, the length of the price control period means Ofgem will wait an additional three years before it fully addresses the issues with RIIO-1 that have added to consumer costs (paragraphs 2.20 to 2.22).

11 Ofgem did not change the rules of RIIO-1 to reduce networks’ profits because of the potential for increased costs in the long term. Under RIIO-1, networks automatically pass about half of any underspend against their allowances onto consumers. In addition, during RIIO-1, four of the nine electricity network companies have made “voluntary contributions to consumers” from their high returns. Ofgem has welcomed these contributions and continued to highlight concerns around the legitimacy of existing returns to all network companies. Midway through the regulatory period, Ofgem considered changing some of the rules of RIIO-1 to enable more of those returns to be transferred to consumers. But it decided against doing this because it would mean going back on its previous commitments, which it believed could have reduced investors’ confidence in the regulatory regime, ultimately resulting in additional costs for consumers (paragraphs 2.23 to 2.25 and Figure 20).

Ofgem’s regulation in the future

12 Ofgem currently lacks robust evidence it can use to determine whether making changes during a price control period would save consumers money.

Ofgem says it would only be willing to make retrospective changes during the price control period if there was clear evidence that there would be a net benefit for consumers. The quantitative evidence base for assessing potential impacts on investor confidence is limited, making the overall impact of any retrospective changes uncertain. Ofgem would be able to make decisions during the price control period more confidently if it had an improved evidence base (paragraphs 2.25 and 2.26).

13 Several of Ofgem’s proposals for RIIO-2 aim to ensure networks only earn a fair return. Ofgem has undertaken its own review of RIIO-1 ahead of RIIO-2. For RIIO-2, Ofgem has reduced its estimate of networks’ financing costs by between 2.2 percentage points and 3.2 percentage points, to be more aligned with current market conditions. In addition, it is proposing:

- to adjust the proportion of network company savings that is returned to consumers, from 30%–55% in RIIO-1 to 50%–85% in RIIO-2;
- to adopt a more flexible price control, limited to five years, with the potential for greater use of ‘dynamic’ targets, which it updates as new evidence emerges; and
- to introduce mechanisms to adjust network company returns in the event of extreme deviations from Ofgem’s initial expectations.

These proposals are subject to consultation (paragraphs 2.27 and 2.28).

14 Ofgem recognises the need for greater scrutiny of the financing of network companies to ensure they are acting in the interests of consumers.

The performance of network companies in reducing costs and providing quality of service only provides part of the picture of whether current and future consumers' interests are being protected. Whether regulated companies provide value for money also depends on their financial structures, dividend policies and the way they incentivise their executives. Poor policy in these areas can put the sustainability of companies at undue risk, and ultimately lead to consumers or taxpayers needing to provide these companies with additional financial support. In the water sector, these issues are attracting concern and increased scrutiny from the regulator (Ofwat). Ofgem is also increasing its oversight in these areas, for example by gathering more information on dividends, executive pay and tax, areas which network companies were not previously required to report on (paragraph 2.29).

15 Ofgem needs to do more work to show in clear and simple terms that the overall cost-effectiveness of networks has improved over price control periods.

In privatising the networks, the government aimed to improve their value for money, by reducing costs and providing customers with a better service. In recent years, networks have served more customers and provided a better service, but costs have increased. Ofgem has started to create indicators of networks' overall value for money, which take both costs and quality of service into account, although this research has been hindered by limitations in underlying historical data, which Ofgem would need to work with the Office for National Statistics to address. As we noted in our report on *Regulating to protect consumers*, it is important for regulators to measure and report on what they have accomplished for consumers, not least because of public debate over regulators' effectiveness (paragraphs 1.14 to 1.16, and Figures 11 and 12).

The role of networks in tackling climate change

16 Ofgem has supported innovative efforts to reduce carbon emissions, although more work needs to be done to understand the impact of this support.

Ofgem believes that network companies must become more innovative if they are to support the transition to low-carbon power. It has given network companies dedicated funding for innovation projects since 2004 and expanded this under RIIO-1. An Ofgem-commissioned evaluation of the main innovation funding mechanism over the period 2010–2015 found that innovation projects have delivered significant cost savings for consumers and reductions in CO₂ emissions. However, the extent to which these projects would have taken place without the support of the funding mechanism is unclear. Ofgem has not yet undertaken a detailed independent evaluation of the innovation support mechanisms in RIIO-1, which would help inform the effective use of innovation funding in RIIO-2 (paragraphs 3.2 to 3.4 and Figure 21).

17 Strong pressure from government and Ofgem is needed to ensure network companies transform to support a low-cost, low-carbon energy system.

Ofgem has successfully incentivised network companies to start investing in new technology, but extensive further changes are needed. For networks to support decarbonisation of the economy at least cost, they will need to develop capabilities to contract for flexible solutions such as battery storage for both shorter-term network management and for longer-term network capacity upgrades, something that has not been done before. Ensuring networks undergo this transformation in a timely way will be a challenge for BEIS and Ofgem because it will not necessarily be in the economic interests of the network companies, yet government is dependent on them to do much of the technical planning (paragraphs 3.5 to 3.9).

18 BEIS has yet to introduce the policies for low-carbon heat that are urgently needed to determine future network requirements. To achieve the net zero emissions target, there is broad consensus that the level of low-carbon heating and transport will need to increase significantly during the 2020s, much of which is likely to use electricity. However, BEIS has not set out a fully-fledged strategy for low-carbon heat, contributing to uncertainty around future electricity network requirements. This uncertainty creates a risk of too little network infrastructure being built, endangering achievement of the net zero target, or too much infrastructure being built, at additional cost to consumers (paragraphs 3.10 to 3.12).

19 BEIS and Ofgem will need to improve coordination significantly in the energy system if it is going to reach net zero emissions at least cost. Since privatisation, the government has pursued a strategy of promoting competition and decentralising planning in the energy system. Although this has brought benefits for consumers, the current structure of the energy system may make it difficult to coordinate to meet climate change goals. To reach net zero emissions, greater coordination is needed between transmission and distribution, the electricity and gas systems, and the energy system and the wider economy. Ofgem and BEIS are taking steps to improve coordination within energy markets, including by enabling and encouraging data to be more open. But keeping network costs to a minimum while the wider economy undergoes a mass transition to low-carbon power may necessitate more strategic coordination than current energy system governance allows for. Ofgem and BEIS have said they are reviewing governance of the energy system and will publish a position paper on this in 2020 (paragraphs 3.13 to 3.17).

Conclusion on value for money

20 Under Ofgem's current regulatory framework, electricity network companies have provided a good service, but it has cost consumers more than it should have. It is now clear that targets were set too low, budgets too high, and the impact of these decisions was compounded by Ofgem extending the regulatory period from five years to eight. In some cases, Ofgem did not use the best information available to it at the time: on financing costs, for example, where better use of evidence could have saved consumers at least £800 million. To Ofgem's credit, it has sought to learn lessons from these experiences and design the next regulatory period differently.

21 Electricity networks now have a crucial role to play in helping the UK reach net zero emissions by enabling the system needed for low-carbon heat and transport. An intelligent approach to this transition could spare consumers from significant extra costs: this is illustrated by recent research which estimated that using flexible technology could help to reduce the cumulative electricity system costs, including increasing electricity system capacity, by between £17 billion and £40 billion by 2050. To maximise electricity networks' value for money in future, Ofgem must ensure it sets stretching targets for network companies in the next regulatory period, while building enough flexibility into the price controls to respond to unexpected developments. The government must help to clarify future network requirements by bringing forward further policies for decarbonising heat and transport. And BEIS will need to ensure that the energy market is governed in a way that provides enough strategic coordination of its many actors.

Recommendations

22 To ensure the interests of consumers are protected, Ofgem should:

- a** do more to demonstrate that regulation is working for consumers, by developing and publishing summary indicators of the overall value for money of networks over time and across price control periods, and improving the quality of the underlying official statistics with the Office for National Statistics;
- b** improve the evidence base on the empirical impact of regulatory decisions on investor confidence and cost of capital, and use this evidence to inform major decisions in future;
- c** assess the extent to which cost targets set in RIIO-1 were too generous in the light of likely outturn expenditure, and use this information to inform its approach to assessing individual network company business plans for RIIO-2; and
- d** ensure network companies make it clear to the public how much tax they pay; how executives are rewarded and how this links to quality of service for customers; and how dividend policies ensure companies remain sustainable.

23 BEIS, working with the Department for Transport, should:

- e** work with Ofgem to obtain as much clarity as possible on the implications of heat and transport decarbonisation for future network requirements, in advance of Ofgem making significant decisions on how distribution networks will be regulated in RIIO-2.

24 BEIS should:

- f** as part of its 2020 review on industry governance, investigate the potential benefits of more strategic coordination in the energy system; and
- g** bring forward further heat decarbonisation policies that ensure the achievement of carbon emissions targets in the 2020s.