

INFRASTRUCTURE TO SUPPORT HOUSING



NATIONAL
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The Commission

The Commission's remit

The Commission provides the government with impartial, expert advice on major long term infrastructure challenges. Its remit covers all sectors of economic infrastructure: energy, transport, water and wastewater (drainage and sewerage), waste, flood risk management and digital communications. While the Commission considers the potential interactions between its infrastructure recommendations and housing supply, housing itself is not in its remit. Also out of the scope of the Commission are social infrastructure, such as schools, hospitals or prisons, agriculture, and land use

The Commission's objectives are to support sustainable economic growth across all regions of the UK, improve competitiveness, and improve quality of life.

The Commission delivers the following core pieces of work:

- a National Infrastructure Assessment once in every Parliament, setting out the Commission's assessment of long term infrastructure needs with recommendations to the government
- specific studies on pressing infrastructure challenges as set by the government, taking into account the views of the Commission and stakeholders, including recommendations to government
- an Annual Monitoring Report, taking stock of the government's progress in areas where it has committed to taking forward recommendations of the Commission.

The Commission's binding fiscal remit requires it to demonstrate that all its recommendations for economic infrastructure are consistent with, and set out how they can be accommodated within, gross public investment in economic infrastructure of between 1.0 per cent and 1.2 per cent of GDP each year between 2020 and 2050. The Commission's reports must also include a transparent assessment of the impact on costs to businesses, consumers, government, public bodies and other end users of infrastructure that would arise from implementing the recommendations.

When making its recommendations, the Commission is required to take into account both the role of the economic regulators in regulating infrastructure providers, and the government's legal obligations, such as carbon reduction targets or making assessments of environmental impacts. The Commission's remit letter also states that the Commission must ensure its recommendations do not reopen decision making processes where programmes and work have been decided by the government or will be decided in the immediate future.

The Commission's remit extends to economic infrastructure within the UK government's competence and will evolve in line with devolution settlements. This means the Commission has a role in relation to non-devolved UK government infrastructure responsibilities in Scotland, Wales and Northern Ireland (and all sectors in England).

The Infrastructure and Projects Authority (IPA), a separate body, is responsible for ensuring the long term planning carried out by the Commission is translated into successful project delivery, once the plans have been endorsed by government.

The Commission's members

Sir John Armitt CBE (Chair) published an independent review on long term infrastructure planning in the UK in September 2013, which resulted in the National Infrastructure Commission. Sir John is the Chair of National Express Group and the City & Guilds Group. He also sits on the boards of the Berkeley Group and Expo 2020.

Dame Kate Barker sits on the boards of Taylor Wimpey plc and Man Group plc. She also chairs the Jersey Fiscal Policy Panel, is the Chairman of Trustees at the British Coal Staff Superannuation Scheme, and a member of the Geospatial Commission. She was an external member of the Bank of England's Monetary Policy Committee from 2001 to 2010. In April 2020, she will become Chair-elect of the Universities Superannuation Scheme.

Professor Sir Tim Besley CBE is School Professor of Economics and Political Science and W. Arthur Lewis Professor of Development Economics at the LSE. He served as an external member of the Bank of England Monetary Policy Committee from 2006 to 2009.

Professor David Fisk CB is the Director of the Laing O'Rourke Centre for Systems Engineering and Innovation Research at Imperial College London. He has served as Chief Scientist across several government departments including those for environment and transport, and as a member of the Gas and Electricity Markets Authority.

Andy Green CBE holds several Chair, Non-Executive Director and advisory roles, linked by his passion for how technology transforms business and our daily lives. He chairs Lowell, a major European credit management company and has served as Chair of the Digital Catapult, an initiative to help grow the UK's digital economy.

Bridget Rosewell CBE is a director, policy maker and economist. She served as Chief Economic Adviser to the Greater London Authority from 2002 to 2012 and worked extensively on infrastructure business cases. She is a Non-executive Director at Network Rail, Chair of the Atom Bank and Non-executive Chair of the Driver and Vehicle Standards Agency.

Professor Sadie Morgan OBE is a founding director of the Stirling Prize winning architectural practice dRMM. She is also Chair of the Independent Design Panel for High Speed Two and one of the Mayor of London's Design Advocates. She sits on the boards of the Major Projects Association and Homes England.

Julia Prescott is a co-founder and Chief Strategy Officer of Meridiam and sits on the Executive Committee of Meridiam SAS. She has been involved in long term infrastructure development and investment in the UK, Europe, North America and Africa. Since 2019 she has sat on the board of the Port of Tyne.

Executive summary

The government’s current aim is for one million homes to be built in England over the next five years and for the annual build rate to rise toward its 300,000 homes target.¹ This means more homes in existing towns, villages and cities and the creation of new settlements. Each one of these new homes will require essential infrastructure – water, energy, wastewater and broadband connections – to make them habitable.

Effective deployment of economic infrastructure is therefore essential for improving the efficiency of delivering new housing. However, developers, planners and infrastructure providers have all raised concerns about aspects of their legal, regulatory and governance frameworks hampering the effective delivery of the infrastructure needed for new housing.

At the same time existing infrastructure is coming under pressure; with new demands on energy supply from electric vehicles and heating, and water and wastewater infrastructure being impacted by the increasing likelihood of floods and drought. The Commission considers that the issues currently being faced need to be tackled now, given the increased pressures likely to be experienced.

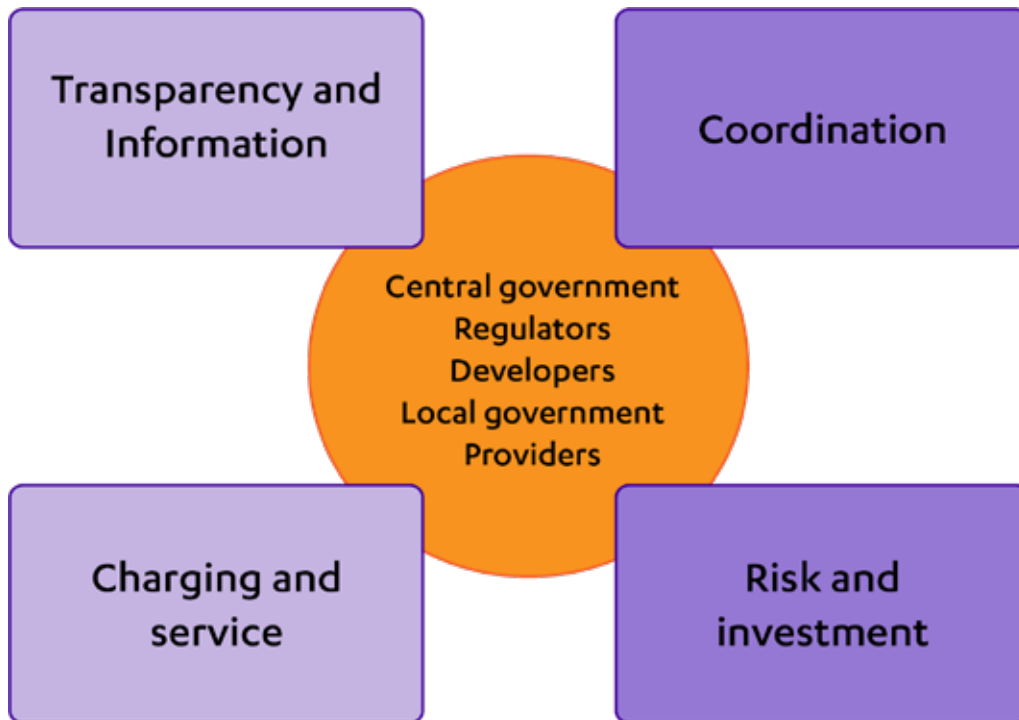
The Commission’s *National Infrastructure Assessment*, published in July 2018, identified three areas where the planning, funding and building of utilities impacts on the efficient delivery of housing. The Commission committed to carrying out further analysis on:

- the diversity of organisations involved in planning, design and delivery of infrastructure
- a lack of mechanisms to improve coordination of the parties involved
- the tension between the requirements on regulators to protect consumers from price rises and to allow investment in additional infrastructure.

Getting the essential infrastructure in place is only part of what is needed to deliver more homes. The wider, complex and multifaceted issues around land availability, housing supply, social infrastructure and affordability sit outside of the Commission’s remit.

This analysis focuses on energy, water and wastewater. Broadband issues are also explored where relevant. In particular, this paper focuses on the regulatory frameworks for charging across the sectors. Other recent reports have explored broader areas of infrastructure, including transport, and the planning framework.²

The problems identified can be grouped into the following interrelated areas:



Transparency and information

Information flows between the main parties (developers, local authorities and infrastructure providers) involved in delivering housing and utilities are often inadequate. Lack of clarity about different roles and responsibilities, as well as identifying where to obtain the information needed, are limiting factors to effective engagement.

In some cases there is insufficient incentive to share relevant information as there is a cost to providing it, and the benefits primarily accrue to other parties. This is particularly the case for infrastructure providers where there is a cost to actively engaging with the number of planning authorities across the regions they supply.

Improving the accessibility of information concerning the location of proposed new developments and utility networks, available capacity and the likely cost of connection is vital to minimise the costs involved in sharing information. This will also help developers to factor in more accurate costs of utility provision when purchasing land for future development.

Infrastructure providers should be actively engaged in the local plan development process and respond to the needs of developers by providing accurate, timely and relevant information. Regulators should ensure their frameworks incentivise this behaviour through continued focus on monitoring performance in this area. Planning authorities also need to have appropriate powers and resources to seek, understand and interpret information in formulating the infrastructure elements of their local plans.

In *Data for the Public Good*, the Commission's 2017 study on the opportunities for improvements in infrastructure productivity from new technologies, the Commission recommended enhanced frameworks for the sharing of data.³ This study also recommended establishing a national digital twin, a virtual model of infrastructure assets. Making progress on delivering these will facilitate information sharing.

Charging and service

The timeliness of information provision and delivery of work by infrastructure providers can be poor. There can also be confusion for developers on what they will be asked to pay for when requesting a connection because the initial information they receive from providers can change.

Where monopoly service providers deliver a connections service, incentives to encourage high performance exist within the regulatory frameworks. Improvements have been noted but these incentives are yet to drive consistently high performance from all providers. A focus from regulators on monitoring and reporting in these areas needs to be maintained to emphasise the importance of meeting the expectations of developers and planning authorities.

Coordination

Engagement and coordination do not always happen at the right stages. For small developments, efficient infrastructure provision can be significantly improved by developers having clear access to information about the work and cost of getting utilities connected. These improvements may not be sufficient for large scale housing developments with multiple developers.

A coordinating body will be critical in bringing together relevant parties ahead of the development starting, when they otherwise lack the incentive to engage. When coupled with the appropriate funding mechanisms, effective coordination at an early stage can better support preparation for housing development sites. The Commission considers that, where feasible to establish, development corporations would be best placed to do this. Elsewhere, planning authorities could be resourced to take on this role, given their central position in coordinating local housing growth. Pooling resources across local authorities may provide the most cost-effective means of delivery. Lessons can be learnt from the experience of the Greater London Authority where the devolved powers and resources necessary to convene relevant parties are in place.

In *Strategic Investment and Public Confidence*, the Commission's regulation study, the Commission called for a duty on regulators to collaborate on cross-sectoral issues and to take account of relevant evidence from the devolved authorities with responsibility for planning.⁴ Improving coordination is one area where this recommendation could be applied as it is an issue across the sectors.

Risk and investment

Infrastructure providers and developers are reluctant to carry the risk of investment in infrastructure until there is certainty that it will be used and that the investment can therefore be recouped. Waiting for this certainty can place infrastructure delivery on a timescale that is too tight to match the timeline for house building completions.

This issue is particularly prevalent in electricity. In part this is down to the nature of investment requirements. New or upgraded substations provide a specified volume of additional capacity. A developer can therefore be required to pay for infrastructure beyond what is needed to meet its own requirements in order to get a connection. The initial developer then carries the risk that no future developers come along who could repay some of its original investment.

The creation of alternative investment approaches to ease these types of issues, such as using additional regulated location based investment funds or central government funds, have softened the impact of the issues. But they may have created a perception amongst developers that, if they wait, another party (even another developer) will invest first.

The risk appetite of infrastructure providers, driven by the regulatory frameworks, creates a barrier to timely, efficient and aligned provision of housing and the infrastructure to support it. Regulators are responsible for setting the frameworks that lead to the situation described above, guided by legislation set by government. When regulators or government make decisions that alter the balance of who carries the risk they should consider the impact on all users of the infrastructure and the wider economy. *Strategic Investment and Public Confidence*, the Commission's regulation study, recommended that government set out a long term strategic vision to empower regulators to approve long term strategic investment in infrastructure.⁵

The Commission welcomes the inclusion of an evaluation of the current approach to charging for electricity connections, which would help to address this, in Ofgem's forward work programme. Features of the approach in the water sector may be useful to apply to the electricity sector.

Taking steps now to avoid escalating issues

With the present rate of home building needing to increase steadily to meet the government's ambition, it is even more important that infrastructure delivery keeps pace.⁶ In addition to this, as the UK economy moves towards net zero greenhouse gas emissions by 2050, increasing demands will be made on the way infrastructure is used, particularly the electricity network.⁷ Infrastructure providers need to be prepared now to ensure that the existing frustrations do not become more significant as the rate of house building increases.

The highest projected growth in the number of households is in London, the South and the East of England.⁸ These areas are already classed as seriously water stressed (household demand for water is a high proportion of the rainfall that is available to meet demand).⁹ Maintaining the quality of services in areas where demand is likely to increase, will only happen with efficiently planned and delivered investment.

Gigabit capable broadband connections are likely to be a requirement for new build properties.¹⁰ The issue of the quality of the connections service from providers could become a more material blocker to efficient provision and therefore needs to be addressed.

Housing and planning are devolved matters across the nations of the United Kingdom. This paper is therefore primarily applicable to arrangements in England, as devolved matters are out of scope of the Commission. However, not all utilities are devolved matters, and the conclusions reached on those are applicable wherever those matters are reserved and therefore within the scope of the Commission.

Next steps

This paper represents follow up analysis to the Commission's *National Infrastructure Assessment*. Recommendations from the Commission, including those in the *National Infrastructure Assessment*, can make a positive contribution to alleviating some of the issues identified in delivering infrastructure to support housing.

How investment is made to increase the capacity of the electricity network, and who pays for it, is one of the biggest frustrations the Commission heard from housing developers in the engagement process for this paper. The same issues are also experienced by other parties, including businesses and electricity generators looking to connect to the distribution network. The expected growth in electricity demand from existing customers as the UK economy moves towards net zero greenhouse gas emissions could further exacerbate the existing issues. Timely and necessary expansion of the electricity distribution network will be needed to support delivery of net zero as well as to support housing growth.

The Commission intends to take forward further work assessing the capacity constraints on the existing network and the actions that may be needed in the future. This will look more widely at the impacts to other groups of customers and feed in to Ofgem's ongoing consideration of how to adapt its regulatory framework to allow for investments that ensure services remain fit for purpose as the UK economy moves towards net zero greenhouse gas emissions by 2050.¹¹ This work will not interfere with the price control review process that Ofgem began in December.¹²

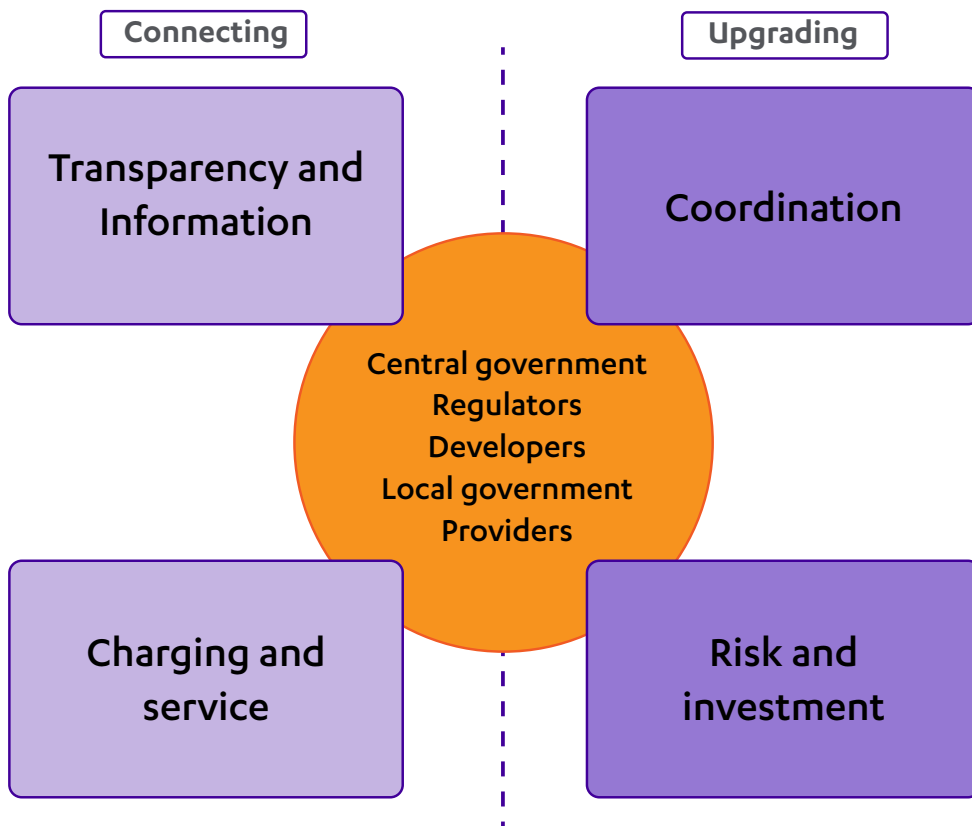
1. Getting connected

Developers are responsible for making sure that housing is connected to economic infrastructure before it is put on the market. They have to engage with infrastructure providers to achieve this. The scale and complexity of the work required varies by location and the size of the development.

Broadly, there are two stages of connecting housing to infrastructure:

1. **Connecting to the existing network** – provision of site-specific infrastructure to connect new homes to the existing network
2. **Upgrading (or reinforcing) the existing network** – to enable the connection of site-specific infrastructure and to maintain service quality to all customers.

In many situations, developers will only have to engage infrastructure providers to deliver the first stage. The Commission has found that the issues most materially arise when the second stage is needed.



Connecting to the network

To make this process work effectively, parties need access to each others' information in a timely manner. Transparent working practices and effective communication of information will help achieve this.

The monopoly utility providers have a duty to connect new housing to their networks, while maintaining services to the wider customer base. They publish information on how to get a connection, what it is likely to cost and advise on what services the developer can choose to have supplied by an alternative provider. Appendix A outlines who can provide connection services in the utilities sectors.

Broadband connections are also open to competition, but a backstop Universal Service Obligation will exist from March 2020 ensuring that everybody has the option to access a 10Mbps broadband connection.¹³

Housing developers need to engage with planning authorities and infrastructure providers to understand and plan for the infrastructure requirements to support new development. The development of local plans should be the start of the engagement process between these parties.¹⁴ Engagement is crucial in ensuring there are sufficient lead-in times for delivery of utilities and broadband connections.

Ensuring charges are transparent and a high quality service is delivered improves trust between parties.

For connection activity, developers have a choice of who they contract with to carry out work and this should allow them to trade-off price against the quality of information provision and service delivery in the choice they make. Monopoly utility providers must meet minimum 'guaranteed' standards for some of the connections activity they carry out. The regulatory frameworks also include incentives designed to encourage improvements in quality. In water and energy, quality of connection services is measured and reported. Regulators use comparative competition to benchmark different providers against each other.

Charges for utility connections provided by monopoly service providers are regulated and follow specified rules. Monopoly providers publish information on how they set charges including some standard prices for work. It can still be difficult for developers to calculate the exact charge to them in advance, as some costs, such as those for necessary streetworks, are site-specific.

Connection to a broadband service is not currently a statutory requirement for new build houses but this may change following the outcome of the present government consultation.¹⁵ Developers can contract a range of providers or even deliver the necessary work themselves. Charges are set in the contractual agreement between the developer and the chosen provider. There are voluntary service standards that providers follow and a requirement on Openreach to publish key performance indicators related to the wholesale access service it provides.

Upgrading the existing network

Coordination models have been used to good effect in the provision of infrastructure to support housing.

Upgrading infrastructure to accommodate new connections is a complicated and time-consuming process. It involves a number of interested parties: utility providers, developers, planners, local authorities (e.g. on granting road closures), landowners and regulators. Large scale housing developments in particular require one party to coordinate, as often there are multiple developers on a site. Different approaches have been used by central and local government to carry out a coordination role with examples provided in chapter 2.

Monopoly network providers' investment plans are regulated as are the rules around who pays for investment.

Regulators set the frameworks that utility providers operate under. The main mechanism regulators use are price controls which are multi-year financial settlements which allow for a certain amount of investment to be made, including investment to meet the needs of new connections while maintaining service to the wider customer base.

Regulators are not involved in the individual investment decisions regarding infrastructure requirements for new settlements. But the strategic investment framework that they define is critical in determining the risk appetite of utility providers and the approach they take to investing in anticipation of growth. Regulatory settlements do allow for investment to address growth, but this may not always be adequate or targeted in the right areas.

Developers are expected to pay a contribution to network reinforcement to account for the impact that additional demand on the network has on the cost of operating it. This contribution could go towards measures such as upsizing a substation or increasing the diameter of a water pipe.

The current arrangements around who pays are outlined in Appendix B. There is some commonality in the approaches:

- Developers will only pay for the impact up to a point on the network, eg in electricity this is determined by voltage. In water only the distribution network investment is charged for and not any investment in treatment capacity or the need to abstract more water
- The costs represent the minimum cost scheme for delivering the necessary increase in capacity.

The proportion of the cost paid varies by sector:

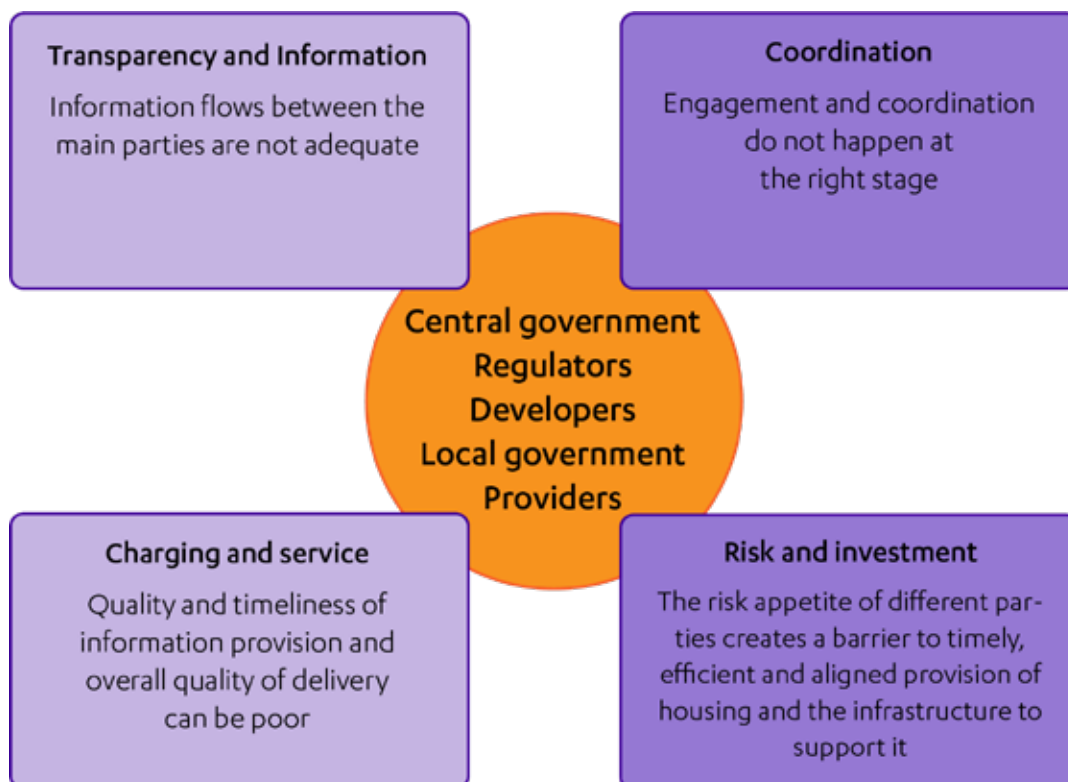
- In gas, under most circumstances there is no cost which reflects both the charging arrangements in place and the reducing need for gas transportation as demand is falling
- In water and wastewater, all connections pay a fixed charge determined by each water company in accordance with the charging rules (which used to be capped at an industry wide level in the licence) irrespective of the impact they have on the wider network¹⁶
- In electricity, the developer pays a contribution towards any reinforcement required based on a site-specific calculation.

These differences, and the consequences, are examined further in chapter 2.

2. Evaluating the issues

Effective deployment of economic infrastructure can make the provision of new housing more efficient. Developers, planners and infrastructure providers raised concerns about aspects of their legal, regulatory and governance frameworks hampering the efficient delivery of housing. Since the publication of the National Infrastructure Assessment there has been increased focus on the obstacles to efficient infrastructure provision to support housing delivery.¹⁷

The problems identified can be grouped into the following interrelated areas with several parties being central to resolution of the issues identified:



In each area parties have sought out and applied solutions that attempt to address the issues. But these solutions have not always been effective, or the most effective approach, and are not widespread. More can be done to alleviate the issues.

2.1 Transparency and information

Explaining the issue

The planning process and the frameworks under which infrastructure providers operate are complex. The incentives on individual parties (developers, local authorities and infrastructure providers) to invest in improving access to information that will primarily benefit others can be weak.

The abolition of regional spatial strategies, which aimed to support the integration of housing and infrastructure at a larger geographic level than local planning authorities, has increased the spatial mismatch between plans for housing and plans for infrastructure. This impacts effective coordination but, on a practical level, it has also significantly increased the number of organisations that infrastructure providers have to engage with, which in turn may have contributed to levels of disengagement from infrastructure providers.

Local plans, a requirement of the National Planning Policy Framework (NPPF), have replaced regional spatial strategies and should have been an important step in providing infrastructure providers with information on development sites to use in their own forward planning of infrastructure delivery.¹⁸ However, as of January 2019, it was reported that 22 per cent of planning authorities had still to submit a local plan under the NPPF (post 2012).¹⁹

The lack of plans in some areas is compounded by the inaccessibility of the information contained within existing plans. Guidance encourages plans to be made digitally accessible and for open data methods to be used. However, difficulty in accessing the information contained in these plans, and the lack of consistency in the information made available, has been raised as an issue by infrastructure providers.

Anglian Water local plan data collection²⁰

Water companies produce five-year plans for investment. These are set in the context of long term Water Resources Management Plans (WRMPs) which set out how water supply will meet demand over at least a 25-year period.²¹ Water companies base their forecasts of demand on population and property forecasts which rely on information on housing growth from local plans.

Anglian Water commissioned a third party to gather evidence from local plans on housing growth from each of around 60 planning authorities that cover the area Anglian Water covers. The first step was taking available information from each authority's website. Planning officers were then contacted to confirm the details, obtain information not in the public domain and to source additional information, particularly digital Geographic Information Systems (GIS) data on planned sites. By following this process Anglian Water was provided with housing growth site data in GIS format for use in its own systems.

A need to engage is hampered both by the resource dedicated to it within planning authorities and the responsiveness of infrastructure providers. Those in planning authorities have raised the difficulty of engaging with utility providers: *"finding a way in is hard – they are big opaque organisations that we don't really understand."*²²

The NPPF states that plans should be shaped by “*early, proportionate and effective engagement*” with infrastructure providers.²³ But utility providers are not required to input into the plan development process (nor are planning authorities required to be consulted about utility providers’ plans) and therefore there is no requirement on either party to actively engage.

In summary, failure to have appropriate access to transparent information can result in delays to the completion of housing. The Commission has heard of situations where developers have reduced their funding contribution (via planning gain tools such as Section 106) for affordable housing and social infrastructure once the costs of utility provision are realised and turn out to be higher than the developer originally anticipated. And developers have estimated that, in some cases, delays of between three and six months can be experienced after construction starts due to getting the utility connection in place.²⁴

How it is being addressed

Steps have been taken to digitise information in local plans. The Infrastructure Projects Authority has been engaging with the Geospatial Commission and Ministry of Housing Communities and Local Government (MCHLG) to explore options.

Digital mapping of infrastructure

Greater Manchester mapped data²⁵

The map is designed to provide developers and planners with infrastructure and housing related information across Greater Manchester on a single, easily accessible map. Since its launch in 2014/15 the map has been expanded with further datasets on planning, housing, environmental, social, economic and demographic data issues such as heritage, flooding, property prices and river quality.

Greater London Authority (GLA) London Infrastructure Mapping Application (IMA)²⁶

The IMA provides visibility of London’s future growth and development as well as its planned infrastructure investment. The data within the IMA supports the GLA’s Infrastructure and Development Coordination Team, infrastructure providers and local authorities in planning effectively for growth and delivering coordinated capital works that minimise cost and disruption to Londoners. A range of data underpins the application, including information on future investments provided by infrastructure providers and details of where development is planned to occur provided by London’s local authorities via the London Development Database.

Leadership from planning authorities has also created improved relationships and data sharing.

Local Energy East strategy²⁷

Government funding was made available to Local Enterprise Partnerships (LEP) to create local energy strategies. Local Energy East includes the three LEPs, local authorities, the electricity network provider, universities, third sector organisations and energy sector business.

Several housing projects were identified as being at risk of not delivering to the original specifications and timescales as a result of energy infrastructure challenges. One part of the solution has been to work with the electricity network provider to improve collection and dissemination of information. Local Energy East also plans to create a data mapping portal.

Energy and water network providers produce long term statements on how they will continue to meet demand on their networks. The usefulness of these to developers and planning authorities is currently limited due to the granularity of information they contain and the lack of a standard format. Ofgem is currently consulting on reforms including enhancing the availability of network forecasting and planning data.²⁸

The sector regulators have increased their focus on ensuring that infrastructure providers deliver a high quality service including in the way they engage and provide information. Active engagement with developer customers and planning authorities has included developer days and surgeries, and some have taken on a broader role of bringing together regional stakeholders. Electricity providers now produce heat maps which indicate the constraints on different parts of the network. These can be beneficial to developers in assessing the economic feasibility of developing sites.

There is more that can be done, as highlighted in Ofgem's most recent assessment.²⁹ The Energy Networks Association's (ENA) Open Networks project includes information on good practice information sharing.³⁰ The ENA has also advised the Commission that it is taking forward a project to provide a digital mapping tool which will provide an open access database on available capacity across networks. In addition, electricity providers are due to make more information available on how options are considered, and decisions made on where investment on the network is targeted.³¹

Conclusions

Failure to have appropriate access to transparent information, and to seek it out, can result in delays to the completion of housing. Improving the accessibility of information is vital to allow for information to pass between parties with minimal cost. Better access to information would also support developers in reducing the level of uncertainty in the cost of utility provision in their initial appraisals and therefore make appropriate allowances when purchasing land for development.

More could be done by all parties to produce consistently formatted information that is open access. *Data for the Public Good*, the Commission's 2017 study on the opportunities for improvements in infrastructure productivity from new technologies, recommended enhanced frameworks for the sharing of data.³² This study also recommended establishing a national digital twin – a virtual model of infrastructure assets. The Centre for Digital Built Britain was tasked with developing this and making progress on delivery will benefit information sharing.

Planning authorities also need to have appropriate powers and resources to seek out, understand and interpret information in formulating the infrastructure elements of their local plans. In some cases, the infrastructure delivery plans, used to form the evidence base of a local plan, lack sufficient detail and more comprehensive analysis is required for specific sites. However, local authorities may not have resource available to undertake such analysis. In the *National Infrastructure Assessment*, the Commission called for cities to have appropriate powers and funding to pursue ambitious, integrated strategies for housing and infrastructure.³³ The recommendation was targeted at transport provision but could be applied more broadly to have a positive impact on the development of capability within authorities to consider broader economic infrastructure that supports housing.

Infrastructure providers need to engage actively in the local plan development process and respond to the information requirements of developers and planners. Regulatory pressure has been important in driving openness and engagement from infrastructure providers. Regulators should consider whether more direct action should be taken to require infrastructure providers to play an active role in local plan development as sought in the National Planning Policy Framework.

2.2 Charging and service

Explaining the issue

Quality of information provision and service delivery has been raised as an issue by those receiving connection services. While some providers are noted for their responsiveness, others are flagged as lagging behind. This inconsistency is experienced within and across sectors.

The infrastructure provider's calculation of the cost of getting the necessary infrastructure to a site can be opaque. It is very difficult for a developer to establish if the works proposed by an infrastructure provider are necessary (and not over engineered) without taking professional advice. This can lead to confusion from developers on what they are being asked to pay for and a perception that monopoly networks can use these charges to recover the cost of resolving existing issues on their networks. This issue has been most notably raised in water where the perception of double charging was one of the drivers for recent changes Ofwat made to the charging framework.³⁴

How it is being addressed

Incentives to encourage high performance from infrastructure providers exist. These have been introduced over time because, particularly prior to there being competition for connection services, there was a lack of natural incentive on providers to invest in better performance for this relatively small sector of their work. The quality of the connection service is measured and reported on by individual providers and regulators. There are minimum 'guaranteed' standards that must be met in some sectors. Regulators for these sectors report on company performance each year. For water, voluntary standards exist and Water UK publish statistics on connection services each quarter.³⁵

Conclusions

Service improvements over the last few years, particularly from electricity providers, have been noted in the Commission's engagement with developers and planning authorities.

Water providers are seen as lagging behind but recent interventions by Ofwat, such as the introduction of a customer service measure for this group of customers, are intended to improve this and the Commission welcomes this development. The quality of service from broadband providers is mixed, although progress has been made with agreements put in place between some providers and developers.³⁶

There should be a clear statement by network providers on what they will deliver, the level of service they will meet and what it will cost. A focus from regulators on monitoring and reporting will emphasise the importance of meeting the expectations of developer and planning authority customers. Reporting provides a reputational incentive to encourage providers to enhance their performance. In *Strategic Investment and Public Confidence*, the Commission's study into the regulation of utilities, the Commission included a recommendation on a strengthened role for the UK Regulators Network which could then support regulators on ensuring consistent regulation, including on how performance is reported.³⁷

2.3 Coordination

Explaining the issue

All parties plan on different timescales and the systems they operate under are disconnected. Planning authorities outline medium to long term plans through the local plan development framework whereas regulated infrastructure providers outline plans on a five year cycle. For large scale developments, with multiple developers, the impact of a lack of coordination ahead of the development starting can be significant. It causes delays to the delivery of housing and may result in costly reconfiguration of sites to allow for the installation of the necessary infrastructure.

The Commission has heard that cuts to local government budgets have further negatively impacted on the skills and capacity available to planning authorities to allow them to play a coordination role. The need for planning authorities to prioritise coordination to create a better link between plans and infrastructure provision is not new and has been recommended in previous work in this area.³⁸ There are examples of other parties, such as utility providers, attempting to fill this gap but without the appropriate governance, accountability and authority there is only so far these alternative arrangements can go to effect change.

How it is being addressed

Coordination has been successful in delivering improvements to the alignment of housing and infrastructure provision on larger development sites. Previous reviews have found that more effective coordination would improve and speed up the delivery of infrastructure on large brownfield sites.³⁹ Coordination can bring relevant parties together and identify:

- Ways of physically delivering housing and infrastructure most efficiently; and
- The fairest way of sharing the cost and risk associated with delivery of supporting infrastructure.

The examples the Commission has sourced have generally involved one party taking ownership and sometimes that party is supported in doing this through obtaining additional resource.

Royal Docks and Beckton Waterfront coordination

This area was identified as an opportunity area for new housing in the London Plan.⁴⁰ The Royal Docks Team (a joint initiative between the Mayor of London and the Mayor of Newham) undertook an electrical network assessment with the electricity network provider. It was identified that long term growth could not be accommodated by the current electricity network and that it needed reinforcing to provide sufficient capacity to meet demand for the proposed level of development. Other utility constraints were also evaluated. Due to the forecast cost and the need to source funding for such significant reinforcement the Royal Docks Team has taken an active role in brokering coordination. This includes convening expertise across providers and regulators; phasing and mapping of demand in the local area; liaising with the range of developers at the site to gather data and seeking out options for funding and recouping upfront investment.

The Royal Docks Team notes an additional benefit of a coordinated approach is that it allows utility providers and regulators to have more confidence in making allowances for strategic investment.

East of Kettering urban extension⁴¹

An urban extension of 5,500 homes is due to be fully complete in the mid-2030s. Anglian water worked directly with the land and housing developers to gain intelligence around when the site would need water and wastewater services rather than waiting for the planning permission process to complete. This meant that the majority of offsite network upgrade work necessary to service the whole site was delivered before the first house was completed in 2017. If the water company had waited for the developer to be on site, the two year timescale to complete the work would have resulted in the work not being ready when the first house was otherwise ready to be occupied. Early direct engagement therefore increased the alignment between housing completions and infrastructure delivery.

Plymouth and South West Devon Infrastructure and Investment Forum⁴²

In constructing its joint local plan Plymouth and South West Devon engaged with infrastructure providers, authorities and other stakeholders. To keep this coordinated effort going it has established an Infrastructure and Investment Forum. This will be used for forward planning and coordination with the aim of ensuring services are delivered on time and that economies of scale, from working together, are achieved.

Conclusions

When coupled with the appropriate funding mechanisms, effective coordination at an early stage can better support preparation for large scale housing development sites. The Commission considers that, where feasible to establish, development corporations would be best placed to do this. Elsewhere, planning authorities could be resourced to take on this role, given their central position in coordinating local housing growth. There is not one 'model' approach to coordination and the examples provided show a range of ways that coordination can support effective delivery. What is important in all approaches is having the capability and capacity to deliver a coordination role.

The Commission's previous recommendations in *Partnering for prosperity: a new deal for the Cambridge – Milton Keynes – Oxford arc* called for a coordinated delivery programme to unlock sites for housing.⁴³ While this recommendation was focused on transport investment, a similar approach could be applied for other economic infrastructure. It also called for broader consultation and collaboration with infrastructure providers across the region and establishment of development corporations that can act as coordinators and be accountable to local stakeholders.

Pooling resources across local authorities may provide the most cost effective means of delivery. Lessons can be learnt from the experience of the Greater London Authority which has more of the devolved powers, relationships and resources necessary to convene stakeholders in the utilities sectors.

Learning from the London approach

The Greater London Authority is currently trialing an approach to alleviate the significant coordination challenge of planning and delivery being faced in London. It has set up the Mayor's London Infrastructure Group (comprised of London's utilities, regulators, government, developer and contractor representatives) to engage with stakeholders and highlight that the present mechanisms for infrastructure coordination are likely to be insufficient to deal with the intensity of future construction.

The Group endorsed a business case from the Greater London Authority to use funds from the Lane Rental Scheme to establish an Infrastructure Coordination Team⁴⁴ which is now delivering a mixture of pan-London and area specific coordination services which aim to improve the planning and delivery of infrastructure and construction.

In its recent examination of utility regulation the Commission called for a duty on regulators to collaborate on cross sectoral issues and to take account of relevant evidence from devolved authorities who have responsibility for planning.⁴⁵ The planning cycles of infrastructure providers do not align with those of planning authorities but a coordinated approach can strengthen the needs case and cost benefit analysis that regulators seek in assessing infrastructure providers' plans for strategic investment, and help ensure sufficient capacity is allowed for.

2.4 Risk and investment

Explaining the issue

A particular problem arises with utility connections requiring upgrades to the existing network to accommodate demand from new housing. For these connections the regulatory charging frameworks seek to balance risk and determine who pays for upgrades. The charging frameworks vary by sector. In all sectors a proportion of expected costs is recovered from the wider customer base through household utility bills. The regulators for each sector determine how much can be recovered from utility bill payers through the price control review process. Remaining costs are recovered directly from the housing developer when a connection is requested and made. Appendix B provides a summary of these arrangements.

Where developers are required to pay for upgrades, this can lead to a timing mismatch between the date a housing developer needs the infrastructure to be in place and the length of time it takes for the infrastructure to be built.

There are also difficulties in reserving capacity for a specific development. At the extreme, sites that are otherwise ideal for housing can lie undeveloped because no party is able to take on the financial responsibility of getting all utilities in place. These issues could be fixed under the existing regulatory charging frameworks if one party was willing to take on additional risk to bring infrastructure development forward in time. But often they are not.

The scale of the issue defined in this section is different across the sectors, in part, due to the different regulatory charging frameworks and the impact they have on risk and investment approaches. It may also, in part, be down to the nature of the investment required.

For water and wastewater all developments pay a contribution towards upgrading the existing network (through an infrastructure charge). This means that network providers can use these funds to make strategic investment in their networks ahead of need, assuming they have access to relevant information on where new housing is most likely to be and what the constraints are on the existing network. Ofwat monitors the providers to ensure that receipts from infrastructure charges are spent on network upgrades.

In electricity, all contributions to upgrading the network are calculated on a site specific basis. This can result in piecemeal network improvements as investment is reactive rather than strategically planned. It also means some developments pay nothing towards network costs where upgrade work is not required, while others must pay the full cost of the works needed. On a large scale development site, the first developer to trigger the need for a new substation required for the entire development could end up taking on all the initial investment risk. A new or upgraded substation provides a specified volume of additional capacity. A developer can therefore be required to pay for infrastructure beyond what is needed to meet its own requirements in order to get a connection.

The ‘second-comer’ rule⁴⁶ was introduced to overcome the incentive on developers to wait for others to invest first by allowing a payment from followers (connecting within ten years) to first movers. This rule does not appear to have been as effective as intended. It does not apply to enabling works or upgrades to the network (without a specific connection) which means that strategic upgrades to the network in advance of anticipated development cannot be recovered by this mechanism. It also leaves developers carrying the risk and managing the cash flow implications and there is confusion on how future payments are returned. Furthermore, major developments, such as Garden Cities, can take more than ten years to build and so the requirement for subsequent developers to connect within ten years in order to recover upfront investment can be a limiting factor of this mechanism.

Under the regulatory charging framework for electricity network upgrades, the risk of underutilisation of the network could fall across three parties – the developer, the infrastructure provider and the wider customer base:

- If the developer pays for the capacity it needs upfront, the risk sits with them. If their own development does not go ahead, they should manage this risk. It can be the case that a developer has to pay for infrastructure beyond what is needed to serve its own site. When this is the case and additional development does not proceed, the developer is then unable to recoup the investment through the second-comer rule. Developers are reluctant to take on this additional risk.
- If the regulator provides an allowance for investment upfront, the cost is recovered from utility bill payers, who take on the risk of underutilisation. Regulators seek to avoid utility bill payers covering this risk.

- If the infrastructure provider carries out the work before there is certainty the development will go ahead, it risks not being able to recover the expenditure from any customer if the regulator determines the investment was inefficient. Infrastructure providers therefore try to avoid taking this risk as it would amount to a cost to their shareholders.

Developers are finding that there is an increasing likelihood of reinforcement costs arising when requesting electricity connections. Inadequate capacity, which means upgrades are needed before new connections can be made, can be a very localised issue but with electricity demand set to rise this situation could be experienced more frequently.⁴⁷ Five out of six electricity network owners reported significant capacity constraints on their networks in 2017.⁴⁸ While the proportion of the total cost paid by developers may be small,⁴⁹ the overall cost can be high for individual sites and it is not possible to accurately predict without requesting a formal quotation of works from the electricity network provider.⁵⁰

For gas connections, the Commission has not found material evidence of issues impacting the efficiency of development. This may be a symptom of reducing consumption over time which has meant capacity constraints are not a material issue.⁵¹

How it is being addressed

Approaches have been applied, primarily in the electricity sector, to limit the potential for delays to connecting new housing because of the upgrade work needed. These approaches have not been needed for other utilities because the scale of the issue, to date, has been more limited, in part driven by the different approaches to charging for upgrades to the network.

Strategic investment regulatory allowances

Regulatory allowances for energy, water and wastewater provide a level of investment regulators calculate as appropriate to address growth in the demand on networks. Network providers make investments in their networks within the envelope of these allowances. The regulatory frameworks do however allow providers to choose where this investment is targeted. This allows them to respond to the changing pattern of demand which cannot be accurately foreseen years in advance when decisions on regulatory allowances are made. This therefore creates a degree of flexibility for infrastructure providers to accommodate expected growth before connection requests are received. However, where upgrade work is required to be charged directly to the developer, network providers wait until a connection request is received because there is no incentive for them to take on the risk of underutilisation.

In addition to the standard regulatory allowances, Ofgem has also allowed area specific investment where the electricity provider has made the benefits case for an upfront investment approach. This had limited application in the initial process as part of the last price control review.

Strategic investment in electricity networks in London⁵²

In its business plan for 2015 to 2023 UK Power Networks, the electricity network provider for London, proposed £100m of strategic investment projects in London. These projects sought to strengthen the existing network in anticipation of increased demand from housing growth. UK Power Networks made a successful argument to the regulator that the wider customer base would benefit (through lower overall cost and less disruption) from a planned approach rather than piecemeal infrastructure upgrades made in response to connection requests. The regulator decided that the additional risk (of underutilisation) placed on the wider customer base was outweighed by these benefits.

Central government funding streams

The Housing Infrastructure Fund provides upfront investment for various forms of infrastructure including transport, utilities, digital communications, schools, land assembly and site remediation.⁵³ Direct use of public funds in this way, some of which will be used to fund utilities, was designed to get sites ready for development where the cost of providing the infrastructure is hampering the private delivery of benefits from developing sites. Funding is directed from central government to planning authorities, who contract with infrastructure providers to deliver the necessary work. Planning authorities may in turn be able to recoup the cost from developers for broader use in the region. The ability to recoup investment is so far untested on those sites provided with funding for utilities infrastructure as the relevant works have yet to be completed.

Developer consortium or development corporation

As well as improving relationships and forward planning, coordination can help allocate risk between parties. A consortia approach or establishing a development corporation can create the right governance framework to allow for the sharing of risk and cost between parties. This can help overcome the issue of one developer being required to make the initial investment and take on all risk of underutilisation at a site.

Ebbsfleet Development Corporation⁵⁴

A development corporation was established to support a new settlement at Ebbsfleet. Prior to it being established in 2015 the project to deliver a new settlement had stalled, partly due to the difficulties in attracting housing developers without the right utilities infrastructure in place. Electricity capacity constraints existed and the cost of providing the connection and reinforcement of the existing network was preventing developers from starting works as the cost to be borne by the first developer made it an unattractive prospect.

The development corporation wanted to provide a site that had the infrastructure ready and could deliver housing at pace and scale. Government funding was available but they needed to find a mechanism which would allow forward funding of the electricity infrastructure and create a legal mechanism to recover the investment.

Following negotiations between the network operator, the Infrastructure and Projects Authority, the development corporation and Ofgem, a contractual approach was negotiated to mirror the second-comer recovery mechanism under legislation (Electricity (Connection Charges) Regulations 2017). This created a route that the development corporation could use to recoup its upfront investment.

Conclusions

The Commission considers that the regulatory framework should remain the primary route for allocating costs and risks between parties. The creation of alternative investment approaches to ease the problems faced in the electricity sector have reduced delays and improved the efficiency of the process at particular sites. They do not however represent equitable long term solutions as they result in differences in risk and cost allocation simply due to the funding approach applied at a particular site and time. They may also have created a perception amongst developers that the cost of reinforcement, that they would otherwise be required to bear, will be passed on to another party. Developers are therefore further incentivised to wait for another party (even another developer) to invest first which delays the development of sites otherwise suitable for housing, such as the Ebbsfleet area.

The issues resulting from the current arrangements are faced most acutely in the provision of electricity. These issues will persist unless parties are incentivised to manage existing risks differently or there is a change in the balance of where risk lies, and therefore how investment in network upgrades is recovered from different parties. Recovering all investment costs from the wider customer base through utility bills (as opposed to sharing some costs with developers), through adding to the categories of costs recovered through regulatory allowances, may be a pragmatic answer but could create potentially adverse consequences.

There are valid reasons for requiring developers to contribute to the cost of delivering network reinforcement:

- It shares the risk inherent in the need for additional investment between housing developers (and in some cases landowners), infrastructure providers and the wider customer base.
- It sends a location based pricing signal to developers to encourage them to:
 - locate where new housing can make best use of the existing assets; or
 - reduce their capacity requirements by installing onsite renewable generation assets and energy efficiency measures or water saving devices and innovative water recycling schemes.

Regulators and government are responsible for making decisions that alter the balance of who carries the risk of investment in utilities networks. Decisions require consideration of the impact on all users of the infrastructure and the wider economic consequences of this balance, including the efficient delivery of housing. The Commission's study of regulation – *Strategic Investment and Public Confidence* – recommended that government set out a long term strategic vision to empower regulators to approve strategic investment in infrastructure.⁵⁵ An evaluation of the current approach to charging for electricity connections is most pressing and the Commission welcomes the inclusion of this in Ofgem's forward work programme as part of its current review of charging for electricity distribution connections.⁵⁶

This should consider whether a different balance of risk may reduce the current issues faced without creating undue negative consequences, such as the loss of the benefits that location based price signaling can deliver. Features of the approach to charging for enabling infrastructure works in the water sector may be useful to apply to the electricity sector. Ofgem should consider whether the differences between the sector approaches to charging for infrastructure are warranted for engineering or design reasons or a result of incremental decision making. The key differences are that in the water sector:

- A fixed 'infrastructure' charge is added to all connections to pay for network reinforcement. Water companies are required to balance their network reinforcement costs with revenue recovered from infrastructure charges over a rolling five-year cumulative period.⁵⁷ While limiting the location based signal sent, this approach does allow for more strategic planning of investment.
- Many water network providers offer a discount to the charge for network reinforcement where the developer reduces the demands that will be placed on the network through use of, for example, water efficient devices beyond the minimum required. This helps counteract the loss of the location based signal highlighted above in order to maintain an incentive on developers to limit the impact housing has on the networks.
- In calculating the cost to the developer, the future revenue stream that will be available from adding an additional connection to the network is accounted for.

Appendix A: Who provides connection services

Sector	Network providers	Connection providers
Electricity	<p>14 regional distribution networks (DNOs) across England, Wales and Scotland</p> <p>Independent DNOs (IDNOs) own and manage site-specific networks</p> <p>Three transmission operators</p>	DNOs, IDNOs and utility infrastructure providers (UIPs) compete for contestable connections activity
Gas	<p>Eight regional distribution networks (GDNs) across England, Wales and Scotland</p> <p>Independent gas transporters (IGTs) own and manage site-specific networks</p> <p>One transmission operator</p>	GDNs, IGTs and UIPs compete for contestable connections activity
Water	<p>17 regional undertakers across England and Wales</p> <p>New Appointments and Variations (NAVs) own and manage site-specific networks</p>	Regional undertakers, NAVs and UIPs (also known as self-lay providers) compete for contestable connections activity
Wastewater	<p>11 regional undertakers across England and Wales</p> <p>New Appointments and Variations (NAVs) own and manage site-specific networks</p>	Regional undertakers, NAVs and UIPs (also known as self-lay providers) compete for contestable connections activity. Often the developer builds the onsite wastewater assets itself.

Appendix B: Who pays for network reinforcement

Some connections to the existing utility networks may not require reinforcement. When it is required the proportion of the costs that fall to the connecting customer vary by sector.

Sector	Developer pays...	Wider customer base pays...
Electricity	<ul style="list-style-type: none"> ● A share of the cost of reinforcement that provides additional capacity up to one voltage level above point of connection ● A rebate to the DNO/previous connecting customer if the connection makes use of previously made reinforcement under the second-comer rule (Electricity (Connection Charges) Regulations 2017 (ECCRs)) <p>Potential for reimbursement of own reinforcement costs if additional connections over a 10-year period use the assets/capacity installed (where these were paid for in full) under the ECCRs</p>	<ul style="list-style-type: none"> ● Reinforcement costs where the case has been made through the price control review for strategic investment ● A share of the cost of reinforcement that provides additional capacity up to one voltage level above point of connection ● Reinforcement at greater than one voltage level above point of connection <p>Potential for reimbursement of reinforcement costs if additional connections over a 10-year period use the assets/capacity installed</p>
Gas	<ul style="list-style-type: none"> ● If reinforcement costs exceed expected future revenue (the 'economic test') then connecting customer pays an amount equal to the gap between reinforcement costs and revenue 	<ul style="list-style-type: none"> ● Reinforcement upstream of the closest economically feasible connection point to the existing main, in whole or in part (if economic test not met) ● Cost of delivering the fuel poor connection scheme
Water	<ul style="list-style-type: none"> ● Network reinforcement through payment of a fixed 'infrastructure charge' determined by water companies in accordance with the charging rules ● From April 2020 the infrastructure charge will be discounted to reflect the future revenue from the new connection so that the balance between contributions to costs of new connection services by developers and bill payers is broadly maintained over time* 	<ul style="list-style-type: none"> ● New water main capacity beyond what is needed for the connection ● Network reinforcement beyond the distribution network (treatment and abstraction)

* Currently this discount is applied to the charge to 'requisition' any new water mains that are needed to supply the site. This means that currently the new main is paid for by both the connecting customer and the wider customer base.

Sector	Developer pays...	Wider customer base pays...
Wastewater	<ul style="list-style-type: none">● New 'requisitioned' sewers (up to the capacity needed for the site), with the cost currently discounted to reflect the future revenue from the new connection (not all companies apply discount) so that the balance between contributions to costs of new connection services by developers and bill payers is broadly maintained over time● Network reinforcement through payment of a fixed 'infrastructure charge' determined by water companies in accordance with the charging rules	<ul style="list-style-type: none">● Where applicable new sewer costs not currently recovered from customer● New sewer capacity beyond what is needed for the connection● Network reinforcement beyond the distribution network (treatment and disposal)

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