Mind the (Investment) gap

Funding and delivering capital projects amidst fiscal constraints

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EY Parthenon

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Summary

- Governments across the West are facing increasing demands on social, economic (rail, road), green, technological and defence infrastructure.
- This is creating a growing investment gap, as decades-high inflation, rising cost of capital and expanding government balance sheets, following COVID-19, have made capital projects more expensive while leaving many governments with less money to spend.
- In the UK, for example, there are £1.6tn worth of unfunded programmes and projects up to 2040. Only around £900bn of which we estimate will be covered by government funding under the current fiscal outlook, leaving at least a £700bn shortfall.
- Another £1tn could be added to this shortfall if the infrastructure project cost overruns of the last decade are replicated, which is a plausible scenario without action.
- A whole series of solutions are required to close this gap, from the planning system to the workforce.
- In this report, we identify three categories of solutions at the project-level, which we estimate could help to close the investment gap in the UK and in other markets, while boosting productivity. They are:
  - Significantly increasing alternative and private funding into infrastructure by deploying and adapting various tested revenue and delivery models to a broader range of assets.
  - Delivering more for less including a more integrated approach to design, which on average could cut 20%-25% of a project's total cost.
  - Unleashing new technologies, in particular, AI across more accurate spend classification, cost and risk management, which we estimate could achieve another 10% in productivity savings across an average capital project.

The century-defining investment challenge

The major investment decisions taken by Western governments over the remainder of this and next decade will be critical in determining economic, social and environmental wellbeing for the rest of this century. There are at least five categories of capital spending often associated with significant government investment:

1. **Green**
   The energy transition including decarbonising and upgrading power grids.
2. **Social**
   Managing changing demographics including more health and social care investment.
3. **Economic**
   Maintaining and upgrading economic infrastructure including rail and roads.
4. **Strategic**
   Boosting defence capabilities and strategic autonomy via supply chains less reliant on critical goods and services from other countries.
5. **Technology**
   Enhancing digital connectivity and accelerating emerging technologies including Gen AI.

The challenges of funding different projects are nothing new – every government must make tough decisions on what to prioritise. However, what makes the next 15 years so different – and the decisions so important – is the sheer number of structural changes happening at the same time, and the very significant capital investment required to fund them. Take the pressing challenge to achieve net zero globally. According to EY and Fédération Internationale Des Ingénieurs-Conseils (FIDIC) research, world governments and the private sector will need to invest close to $140tn between now and 2050. Currently, $64tn is unfunded.[1]

[1] Closing $64 trillion infrastructure gap crucial to achieving net zero, FIDIC/EY report, Sep 2023.

Inflation, higher cost of borrowing and expanded government balance sheets are creating new pressures

To add further pressure, the combination of decades-high inflation, rising cost of capital and expanding government balance sheets following COVID-19 have made virtually all capital projects more expensive while leaving many governments with higher borrowing costs and less money to spend.

Producer Price Index (PPI) inflation, a better indicator of manufacturer and infrastructure costs than Consumer Price Index (CPI), peaked at 24.4% in the UK and 45.8% in Germany in 2022. That means the costs of a capital project undertaken either in the UK and Germany back in 2016 would have increased by 46% and 50% respectively (in nominal terms) in 2022[2] due to inflation.

At the same time, for governments, Debt-to-GDP in Organisation for Economic Co-operation and Development (OECD) member Countries stood at 83% at the end of 2023,[3] an increase of 30 percentage points compared to 2008 levels. UK debt interest payments have increased by threefold from £38bn in 2019-20 to £105bn in 2023-24. US debt interest payments reached $1tn a year in late 2023, almost double 2019 levels. In France, the figure was €50bn in 2023, a 29% increase from 2019 levels. The International Monetary Fund (IMF) argued in its recent Fiscal Monitor report that the UK "critically need to take policy action to address fundamental imbalances between spending and revenues'.[4]

2. Office of National Statistics, Producer Price Index.

3. Governments and firms need to address the key risks from a sharp increase in global bond borrowing, OECD, Mar 2024.

4. IMF, Fiscal Monitor: fiscal policy in the great election year, April 2024.

Case study

Why balancing fiscal constraints and capital priorities means an inevitable funding gap

Many governments have designed fiscal rules with clear limits on both borrowing and debt. The new UK Government, for example, allows borrowing for capital investment but requires debt to fall as a share of GDP at the end of a rolling five-year period.

At the same time, the UK also has a pipeline of significant capital needs across the five categories identified above. This includes new energy infrastructure, such as nuclear, wind and grid upgrades for the UK to meet its target of a carbon free grid by 2030.

The UK also must plan for an older population, with the next decade adding another 3mn people aged 60 or above[5], as well as meeting existing infrastructure and defence commitments.

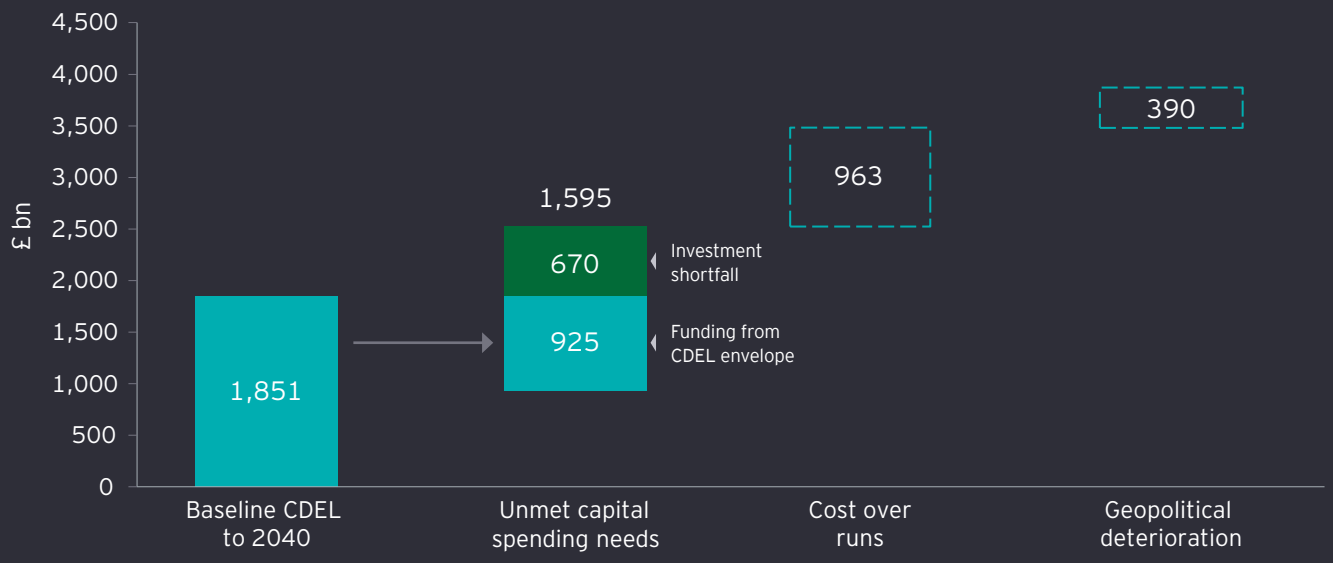
As a proxy for the spending pressures across the West, we quantified the public investment gap that is opening up in the UK. To do so, we assessed the entire pipeline of projects and capital funding needs across the five categories discussed above. We only considered capital investment that on current trajectory is expected to come from public money, in the UK usually expressed as the funding contained within Capital Departmental Expenditure Limit (CDEL).[6]

Looking at forecasts from the Office for Budget Responsibility (OBR), historical averages and assuming broadly the current fiscal rules, we estimate that UK governments would commit around £1.8tn in cumulative capital expenditure over 17 years (2024-2040), or about £109bn per year on average.

We then identified and isolated capital projects and commitments across the five categories that are currently unfunded, i.e. those that show up in the infrastructure pipeline or in policy commitments but have not yet been allocated money. To quantify total unmet needs we have combined top-down assumptions about how public capital investment needs to grow to keep up with, for example, demographic trends and rising defence commitments; with a bottom-up approach looking at individual projects in the pipeline that are currently unfunded.[7]

5. Principal projection – England population in age groups, ONS, Jan 2024.
6. Our estimates on CDEL project £1.8tn of baseline spend to 2040. This projection takes the OBR's CDEL forecast to 28-29. For the remainder period we have used CDEL spend as a proportion of GDP based on historic proportions from 2010. Government commitments to long term climate and environmental goals, digital, defence and future demographic needs places additional pressures on HMG capital spending. The other major government spending category is resource spending, or Resource Departmental Expenditure Limit (RDEL).
7. To reach a cumulative figure of currently unfunded projects we have assessed all individual projects contained in National Infrastructure Commission (NIC)'s Second National Infrastructure Assessment report, October 2023. We have covered the time period 2024-2040, meaning a 17 year period. We have categorised the projects into funded and unfunded projects on basis of the projects having commenced or having a clear commencement date, meaning a number of large-scale rail, road, nuclear and energy transition programmes are not categorised as unfunded in this exercise. There are a number of projects and programmes that are likely to need government funding currently not included in the £1.6tn figure, including decarbonising the energy grid and investment in strategic manufacturing projects. In addition, some projects that we consider funded may in fact not yet have been fully "scored" by the government i.e. are not currently fully covered by spending plans and not accounted for by the Office for Budget Responsibility in their fiscal outlook. In combination, this means that the total value of unfunded projects across energy and economic infrastructure could be an underestimate. For health and defence we have compared current CDEL projections with CDEL levels required to keep pace with demographic trends and, for defence, a scenario in which the UK commits to spending 2.5% of GDP on defence. We have also considered individual programmes currently unfunded including hospitals and large-scale defence contracts. It is possible this is over-estimating the CDEL vs. RDEL requirements for health and defence, but considering the possibility of our analysis under-estimating other capital spending categories, we don't consider this changing the total cumulative value of unfunded projects.

Capital Departmental Expenditure Limits (CDEL) projection: potential unmet need (2024-2040)



This gives us a cumulative £1.6tn in currently unfunded projects and programmes between now and 2040. However, while we currently don't have long-term fiscal plans, it's reasonable to assume that some of future CDEL will go towards currently unmet needs. Looking at the historic ratio between new projects and exiting projects in the UK pipeline, and new versus maintenance (depreciating) capital, we assess that 46% to 58% of CDEL in any given year can go towards funding new projects, with a central estimate of around 50%.[8] This would give us cumulative investment shortfall of £670bn, or £39bn a year, leading up to 2040. (see graph).

We have also considered two 'shock scenarios'. The first is where analogous cost overruns for publicly funded capital projects in the UK are repeated across the period to 2040. This would add another £963bn to the investment gap by 2040, bringing it to £96bn a year. By some estimates, 67% of UK projects go over budget with average overruns of 57%[9] so such a scenario is far from inconceivable.

The second shock scenario considers the impact of significant geopolitical deterioration relating to the Middle East, Russia-Ukraine and China. Combined with slower GDP growth, higher inflation and additional spending requirements to decouple supply chains further (and so reduce reliance on other nations), this scenario could add another potential £390bn to the spending gap – a projection that is similar to that of the Office for Budget Responsibility in its 2024 Spring Budget assessment.[10]

8. To estimate the CDEL budget available for new projects, we analysed the historic proportion of spending on new projects relative to the total value of ongoing projects, as reported in the Infrastructure and Projects Authority (IPA)'s Annual Reports for 2021-22 and 2022-23. We then adjusted these expenditures for project lifespans, resulting in an estimated average annual CDEL budget allocation to new investments ranging from 46% to 58%.
9. Average cost over-runs is drawn from Global data construction intelligence center database, BCG centre for growth and research, 2024, and cross-checked against EY data on cost-overruns. In estimating cost cover-runs of £963bn, we have applied 57% average cost over runs on 67% of all the on-going projects.
10. Slower GDP growth and incremental spend required to decouple would result in a £280bn impact, and the inflationary cost pressure would result in a £110bn impact.

Project-level solutions

The entire value chain needs to work together to optimise how we fund and deliver projects

It's very clear that the entire capital projects universe – policymakers, private investors, developers, suppliers – urgently need to identify and execute a combination of solutions to deliver on the priorities across the capital agenda.

Here, we highlight three categories of solutions that individual projects can pursue, often but not always, irrespective of the wider macro and policy environment.

Based on evidence and our work with capital projects across the globe, we assess that these three types of solutions shall have a disproportionately positive effect on both closing the investment gap and improving capital projects productivity. The latter is particularly important as productivity in capital projects has in the UK, for example, not grown in the last 20 years and lags behind the industry average.[11,12]

Opportunities to close UK's capital investment gap

1 More alternative funding

There are both privately and government-held infrastructure assets that are commercially viable for private investors and could be unlocked by alternative investment. These include projects where different sources of revenue can be used to make them commercially attractive for private investment, while maintaining strong consumer protection. This can include both regulated and fully market-based models.

Funds and investors sit on at least £264bn in 'dry powder' waiting to be deployed into infrastructure assets. These can provide an avenue to start plugging the investment gap.

Here are some of the models that could be deployed to unlock and 'crowd in' private investment.

Public-Private Partnership (PPP) models:

- Concessions where governments fund the construction and thereafter grant the private sector a concession (usually for a fixed period) to operate and maintain an asset. Alternatively the concession agreement can include construction (including financing) by the private sector. In return, the private sector receives the right to charge users of the infrastructure e.g., through tolls or fees. France uses this model to fund, operate and manage a significant proportion of its road transportation portfolio.
- Build, operate and transfer models which are similar to concessions but have a larger private sector build component. These are typically used for individual assets rather than networks, with charges commonly applied to governments.
- Design, build, finance, operate and maintain (DBFOM) models which transfer the widest remit to the private sector, typically via a Special Purpose Vehicle (SPV). DBFOMs require upfront financing by the private sector, alleviating the need for capital investment by Government. The DBFOM is a fixed price contract, with the SPV typically receiving payment from the Government once the asset is operational, generally for a period of 25–30 years. At the end of this period, the asset is returned to the Government.

11. Office for National Statistics – Productivity in the Construction Industry, UK.
12. Oxford Economics – Construction Industry leaders tackle stagnant productivity.

Regulated models:

- Regulated Asset Base (RAB) models are often used to help fund very large infrastructure projects such as Sizewell C, Thames Tideway and Heathrow in the UK, where the cost is frontloaded while the revenue is spread out. They use the government balance sheet to 'bring forward' revenues from customers and users to fund the build and operation of a project, thereby de-risking financing.

Government backed

- Value capture models are frequently used to support the financing of Japanese rail infrastructure – where the government will cover a minority proportion of capital costs, with the private sector funding the rest and the operational costs of the projects, in exchange for receiving revenue from the rail network.
- In Austria, ASFINAG, the entity that builds, operates and maintains the motorway and expressway road network operates as a public limited company with the Austrian government being the sole shareholder. ASFINAG collects tolls to fund its operations and can issue bonds guaranteed by the Austrian government, providing cost-efficient financing.

Market-based models

- Tax increment financing (TIF) is an approach used to capture uplift in local tax revenue generated by an increase in value of, for example, property. This is frequently used in the USA for economic infrastructure and housing. It was also used for the Northern Line extension to Battersea Power Station in London, which enabled Transport for London (TfL) to borrow the funds to build the new line without recourse to taxpayer funding.
- Community Infrastructure Levy (CIL) is a charge that local governments, particularly in the UK, levy on new developments to fund the infrastructure required to support new developments. This was used in the UK, for example, to pay for a portion of Crossrail 1.

2 Delivering more for less

The holy grail of any capital delivery programme is to deliver more effectively and at a lower cost. A number of 'best practice' guidelines to achieve this already exist – including principles for project success published by the Global Infrastructure Hub, UK Infrastructure and Projects Authority and the European Bank for Reconstruction and Development. Key actions tend to focus on driving efficiency through planning and sourcing, contracting incentives, technology, labour and construction (including modern methods of construction), supply chain, as well as operations and maintenance through the project lifecycle.

However, failures in design factors[13] is one of the leading causes of cost overrun in capital projects. Evidence[14] suggests that projects that focus on design can reduce costs by 20%-25% and execute 10-15% faster than average projects. This is because design alteration when a project is already underway tends to be very expensive, reducing the cost-benefit ratio of the project.

13. MDPI journals – Cost overrun causative factors in road infrastructure projects.
14. Infrastructure ports authority – Setting up for success: The importance of front-end loading.

To leverage better design principles to deliver more for less, there are some vital steps that individual projects should take:

- Focus on the outcomes to be achieved and quantify the associated benefits. From the outset, projects should establish the metrics that would be used to measure success with focus on benefits delivery and achieving outcomes throughout the whole lifecycle of the project.
- Use reliable data for evidence-based cost estimation. Projects should award contracts based on realistic cost range developed using evidence-based cost estimation and reference class forecasting, which, for example, could be achieved by using 'should-cost' estimates as reference when accessing estimates from bidders.
- Improve accuracy of data with strong benchmarking. Project owners and their vendors and supply chain can use shared, centralised data-driven frameworks, and foster collaborative working with third-party experts and technology to generate accurate estimates.
- Define and adhere to the project scope from inception. Most capital projects are likely to evolve over time, and so it is important to set out precise scopes for distinct stages in the project lifecycle in alignment with the project's overarching parameters. Strict change control is essential, and any alterations to the scope or design should be thoroughly tested for effects on costs, outcomes and benefits prior to decisions being taken.
- Design to minimise complexity and risks and set a comprehensive risk management plan. Where possible, design to reduce dependencies, otherwise identify and continually manage dependencies throughout the project lifecycle. Ensure different aspects of the projects are aligned and integrated, and test their ability to work together at every phase to ensure their compatibility and outcomes are user focussed.

Resources should be strategically allocated to maintain an ongoing focus on improving outcomes and benefits, as well as to enhance productivity and optimization, thereby ensuring effective project execution and preventing cost overruns.

3 Unleashing new technologies

Advances in AI and other technologies offer huge potential for efficiency and cost-savings. Infrastructure projects are too often slow adopters of new technologies. Even in areas like Building Information Modelling where it is widely accepted as best practice, the latest available technology only has a 4% adoption rate.[15]

Evidence including from EY's analysis of cost savings using its AI Value Accelerator tool, suggest that deploying the latest AI advances across the lifetime of the asset can reduce the overall cost by 10%.[16]

Key areas where AI can be deployed now include:

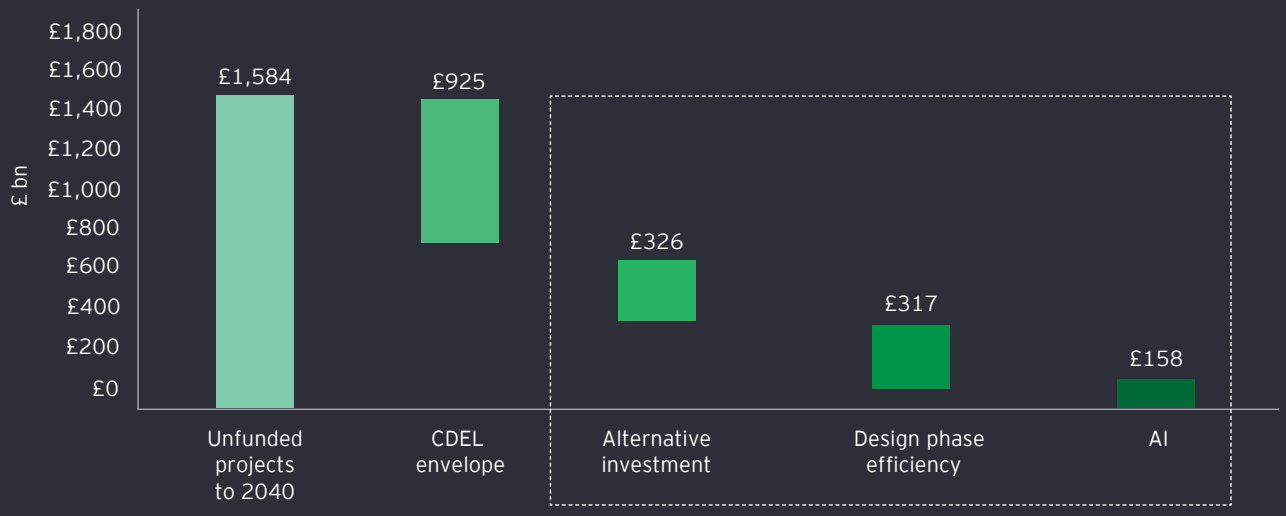
- Spend classification insight: AI could present savings opportunities through fast and accurate spend classification (leveraging enhanced classification algorithms, high-certainty classification and taxonomy accuracy), using vast amounts of procurement and spend data. Infrastructure programmes can leverage AI to process and group spend data into structured and standardised spend taxonomy. One example is the United Nations Standard Products and Service Code (UNSPSC), against which procurement spending can be mapped and processed.

15. BIM in the UK: its history and impact on industry- PlanRadar.
16. Drawn from estimates using EY's AI Value Accelerator on use cases in infrastructure and construction.

- Cost-management: Improved cost management can be achieved by deploying machine learning and AI to analyse and crunch complex data faster to develop better Should Cost Models (SCM). This can include analysing historical data from similar asset class to set a benchmark and progressively iterate estimates as new or revised data and requirements becomes available. Evidence suggests cost estimate accuracy can improve by 50% compared to traditional methods.[17]
- Model complex variables: AI can help account for complex variables and external factors such as geopolitical events, which may influence the accuracy of predictive and forecasting models used in cost estimation. Doing so allows projects to enhance the modelling, refine risk allocation, and anticipate probable scenarios.
- Project management: In a complex programme environment, where tracking and managing work packages, deliverables and dependencies can be resource heavy, there is the opportunity to leverage AI for better analytics and communication to organise, manage and deliver change, where necessary, rapidly. One example is using machine learning and natural language processing solutions to automate and streamline project management functions and tasks including scheduling, resource allocation, document management and progress monitoring. Doing so boosts control, insights and productivity, producing higher quality, real-time project and portfolio performance information. These enhanced capabilities also allow project managers to identify early signs of project failure and make actionable recommendations.

As a proxy, if these solutions were to be deployed at the project-level in the UK, assuming that the UK could achieve the same level of private investment as international peers) we estimate that the UK's investment gap could be closed (see graph).[18]

Opportunities to close UK's capital investment gap



17. Improving Infrastructure Cost Estimate Accuracy – The future of Infrastructure.

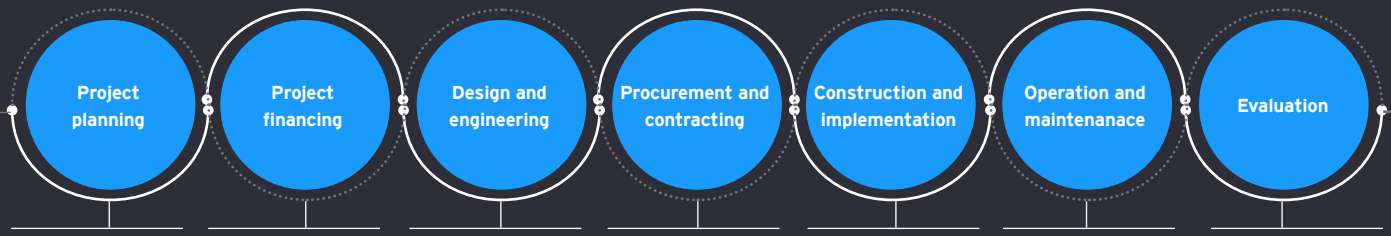
18. Analysis of alternative funding opportunity in Transport is based on the average private investment in Transport for Canada, Australia and US (2022). 'Other' sectors considered include Waste, Flood Risk Management and Digital Communications. Waste and Flood risk Management estimated based on World Bank assessment of PPI in developing countries. Digital Communications estimated based on rural deployment of infrastructure in Canada and World Bank analysis. As per notes 14 and 16 we have assumed 20% for design phase efficiency and 10% for AI-originated efficiency.

How EY can help?

The team at EY can support capital projects across its entire lifecycle form the strategic case to implementation, in an uncertain and constrained environment. Our broad range of services include:

EY teams offer a broad range of services that cover key steps of infrastructure projects lifecycle

EY teams offering infrastructure projects lifecycle:



Project planning	Project financing	Design and engineering	Procurement and contracting	Construction and implementation	Operation and maintenanace	Evaluation
Identify infrastructure needs. Conduct feasibility studies and formulate project plans.	Secure funding from various sources, including public and private, to support the project.	Develop detailed engineering and design plans based on project requirements.	Procure materials, equipments and services through tendering and contracting process.	Physically build and implement the infrastructure asset.	Operate and maintain the asset throughout its lifecycle to help ensure optimal performance and longitivity.	Evaluate project performance and alignment with objectives.
▸ Project planning and governance ▸ Regulatory and economic advice ▸ Infrastructure strategy ▸ Market research and feasibility studies ▸ Environmental impact assessment ▸ Demand analysis	▸ Economic and financial analysis ▸ Commercial advice ▸ Business case planning ▸ Risk assessment and risk management ▸ Investment appraisal ▸ Transaction management ▸ Asset valuation ▸ Decision support modeling ▸ Transaction tax and accounting	▸ Economic modeling ▸ Project management	▸ Procurement strategy ▸ Commercial and financial advice ▸ Transaction management ▸ Tax and legal advice ▸ Supply chain and operations support ▸ E2E Data and AI strategy to build and monitor a sustainable and compliant supply chain	▸ Project and construction management	▸ Asset management through managed services (tax, finance, risk, legal and others) ▸ Regulatory compliance	▸ Project performance assessment

EY services

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