



# DBFO Payment Mechanisms in the United Kingdom

*By Nigel C. Lewis*

In 1992, the government of the United Kingdom launched the Private Finance Initiative (PFI) to facilitate closer cooperation between the public and private sectors in various industries. The initiative, initially targeted to the transportation industry, was also meant to introduce private-sector skills into the delivery and management of projects and services traditionally undertaken by the public sector. The government was already committed to these principles through its ongoing Public Private Partnerships initiative in several other sectors.

In the roads sector, the Highways Agency (HA) in 1994 used the PFI to establish a road service on parts of the country's motorway and highway network under a design, build, finance, and operate (DBFO) format. The objectives for each DBFO road-service project were to:

- Ensure that the project is designed, maintained, and operated safely and so as to maximize its benefits to road users;
- Transfer the appropriate level of risk to the private sector;
- Promote innovation, not only in technical and operational matters, but also in financial and commercial arrangements;
- Foster the development of a private-sector road-operating industry; and
- Minimize the financial contributions required from the public sector.

In a relatively short time, the DBFO method has encouraged a more commercially minded operating industry and delivered economic benefits earlier than would have been possible under conventional procurement arrangements.

A dozen DBFO highway contracts have been signed to date with private-sector companies, with construction completed on the first eight projects.

To pay the DBFO companies, the HA uses various mechanisms. The first contracts used the shadow-toll payment mechanism, which is based on the number of vehicles using the road. Subsequent contracts have used the active management payment mechanism and the availability payment mechanism, the evolution of which is described in more detail below.

In a relatively short time, the DBFO method has fostered a productive partnership between the UK's public and private sectors and provided incentives for efficient management of the UK's roads. The arrangement has also encouraged a more commercially minded operating industry and delivered economic benefits earlier than would have been possible under conventional procurement arrangements.

### **Policy and Philosophy**

The DBFO concept started as a precursor and transition to highway

tolling and was designed to create a private-sector road-operating industry that might manage tolled highways in the future. Under this scheme, the emphasis is on the provision of an operating "service," rather than an asset, over the life of a contract, with the private sector assuming responsibility for the operation and maintenance of a length of road.

The principal benefit of DBFO lies in the increased value for money to the taxpayer of procuring a road service in this way, through a combination of transfer of risk and private-sector innovations. Indeed, the UK DBFO projects so far have delivered an overall value-for-money savings averaging around 15 to 20 percent, as calculated by the UK National Audit Office. (This figure has varied depending on the actual discount rate being used.)

Transfer of risk and value for money are two of the main principles of public-private partnerships (PPPs) inherent in DBFO contracts, along with payment for service and partnership.

**Transfer of risk.** Under DBFO arrangements, the allocation of risk and reward between the contracting

parties should be clearly defined, with private-sector returns genuinely subject to risk. The DBFO company is expected to assume the majority of the risks associated with the design, construction, maintenance, operation, and financing of the project.

**Value for money.** DBFO projects are evaluated to determine whether the proposed levels of payment for the service provided are justified by the project's benefits; that is, whether the project constitutes value for money. Part of this assessment involves using a public-sector comparator (PSC) that makes allowance for the risk transferred. The PSC is calculated by determining what the public sector would have had to pay to procure the construction, operation, and maintenance by traditional means.

**Payment for service.** Payments are to be made in relation to the receipt of a service. These payments are adjusted according to the satisfaction of selected performance criteria, such as lane availability.

**Partnership.** The DBFO concept encourages a productive partnership between the public and private sectors, harnessing private capital and

commercial expertise to fund both the initial construction and long-term maintenance of roads. A commitment to an effective partnership between the HA and the DBFO company ensures cooperative and nonadversarial working practices, well-aligned objectives, and constructive arrangements for resolving differences.

As alluded to earlier, transferring many of the risks to the private sector has resulted in increased innovation and efficiency in matching design and construction with long-term service needs. This in turn has led to significant savings compared with traditional procurement methods, not just in terms of construction cost but also regarding recurrent life-cycle maintenance costs.

### The Procurement Process

To ensure that each contractor selected for a project possesses the appropriate qualifications and resources to undertake the tasks required, candidates are preselected in accordance with a negotiated procedure. During this process, candidates are typically required to supply information regarding their financial standing; technical capability and approach;

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and ability to secure appropriate technical, financial, and legal advice for negotiating and finalizing the contract.

The government includes a draft of the DBFO contract in its invitations to candidates. These invitations, or tender documents, set out the government's position regarding the contractor's obligations and the allocation of risk. Candidates are required to submit a tender on this basis but may also submit "variant bids" subject to compliance with the specified requirements.

A substantial amount of information is made available to the tenderers, including existing design information. Tenderers are required to propose their own designs for the project and are encouraged to incorporate innovative ideas that deliver value for money. Candidates are required to stipulate

the amount of DBFO payments they propose, based on their obligations and allocation of risk as set out in the cash-flow projections.

Negotiations are held with the tenderers to refine and finalize their obligations, the allocation of risk, and the payments to be included in the DBFO contract. The Highway Agency then selects the most economically advantageous tender from the best-qualified candidate, based on the principle that value for money is best achieved by minimizing cost while allocating risk to the party *best able to manage it*. This is a key factor in the HA's evaluation of tenders.

The DBFO contract period spans 30 years because finance for this type of project generally has a maximum repayment period of 15 to 20 years and the payment mechanisms have to be structured to allow repayment of debt over a similar time scale. Because 30 years is currently beyond the range of conventional debt, the choice of period encourages financial innovation and use of alternative sources of funding. It is also important that the period be sufficiently long to allow the DBFO company to apply whole-life costing to the project.

**The Importance of Value for Money**  
Under each DBFO contract, the private sector assumes substantial risks, including those relating to the design,

building, and operation of the road. The private sector, relative to its area of expertise, is expected to be able to manage these risks better than the public sector would under traditional methods of procurement. The placing of risk in this way is likely to provide better value for money. The fact that the procurement process for each scheme is highly competitive assures that the terms obtained are the best available from the market.

As noted above, each DBFO project is evaluated to determine

whether the proposed contract offers value for money compared with conventional procurement. To assist in this evaluation, a PSC is prepared, calculated by estimating what the public sector would have had to pay to procure the construction of the relevant scheme and the operation and maintenance of the project road over 30 years by traditional means. This calculation includes an assessment of the risk the government would assume under conventional procurement. An assessment of the net present value

## THE A13 THAMES GATEWAY

The A13 Highway is a strategic East London/Thameside radial route. At its western end, the road connects with London, while its eastern end includes the new A13 Bypass. The route is of major importance to industry located along the A13 and provides commercial vehicle links from East London and Docklands to the East Coast of the UK. These schemes are key to improving east–west access to Docklands and other parts of East London and the site of the 2012 Olympics, maintaining north–south local access, and supporting urban renewal and new land uses in a major part of the Thames Gateway.

An alternative payment mechanism to the shadow toll was devised for the A13 DBFO contract, designed to motivate the private sector to deliver a service in tune with the government’s approach to integrated transport. This payment mechanism, the availability payment mechanism, moves away from the all-vehicle shadow-toll payments used on previous DBFO contracts, replacing them with a combination of the following:

- Availability payments. Payments linked to road availability account for approximately 70 percent of the A13 DBFO company’s income. This gives the company an incentive to maximize the time the road is available to road users, particularly during peak hours.
- HGV/bus shadow tolls. Long-vehicle volume-based payments encourage the DBFO company to efficiently manage public transport and commercial-goods vehicle traffic while precluding incentives to increase car usage.
- Safety payments. Safety payments were designed to encourage the DBFO company to seek to reduce the number of accidents on the A13.

In addition, the core requirements for the A13 contract were amended to include the provision of monitoring equipment to improve accident response times and the use of variable-message signs to inform road users of congestion, delays, and public-transport alternatives.

(NPV) of the PSC is also prepared and, using an appropriate discount rate, compared with the NPV of future, projected payments under the DBFO contract.

### Shadow Tolls

As noted above, the first DBFO contracts used the shadow-toll payment mechanism. Under this arrangement, the Highways Agency pays each DBFO company based on the number and type of vehicles using the road, with adjustments made for lane closures and safety performance. These payments are known as “shadow” tolls as opposed to “real” tolls because payment for usage is made by the Highways Agency rather than by the road user.

**Road usage.** Shadow tolls are calculated based on two factors: (1) vehicle length and (2) traffic bands that are delineated by the number of kilometers traveled per year. Bidders are asked to bid the parameters of traffic levels for a maximum of four bands and a minimum of two bands, with the proviso that the top band, in terms of vehicle kilometers per year, must have toll levels set at zero so as to ensure that the maximum liability under the DBFO contract is capped.

Within each traffic band, bidders specify a toll for two categories of vehicle: long vehicles (over 5.2 meters, which includes heavy-goods vehicles, or HGVs) and short vehicles (less than

5.2 meters). (Length measurement is used as a proxy for weight.)

Bidders set the bands and tolls based on their own assessment of traffic levels. Most opt for four bands, with the lowest band (at, say, US\$0.20 per vehicle) representing a cautious view of traffic, and tolls within that band set at a level that covers debt-service requirements. Figure 1 shows a typical banding structure.

**Availability of service.** Where a project consists of an existing stretch of road with one or more construction schemes along its length, prior to the completion of any scheme shadow-toll payments are made at a reduced level representing the cost of operation and maintenance for the existing road. Generally, once the permit for use is issued for a construction scheme and the road is open to traffic, the DBFO company receives 80 percent of the payment. When the construction works are completed and the completion certificate issued, the company receives the final 20 percent.

In most cases, the toll payments step down in the future once the third-party debt has been fully repaid. This reflects the fact that revenue in excess of operating and maintenance costs at that stage is solely return on equity. Figure 2 shows a typical payment profile, assuming no variance in traffic or adjustments for lane closure or safety performance.

Figure 1: Sample Traffic Bands under the Shadow-Toll Payment Mechanism

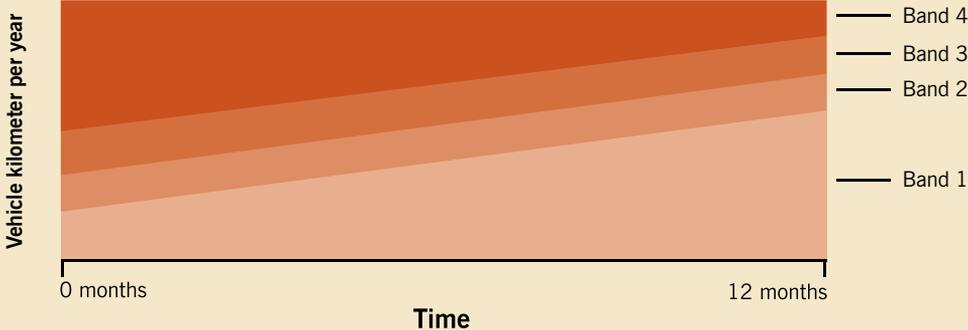
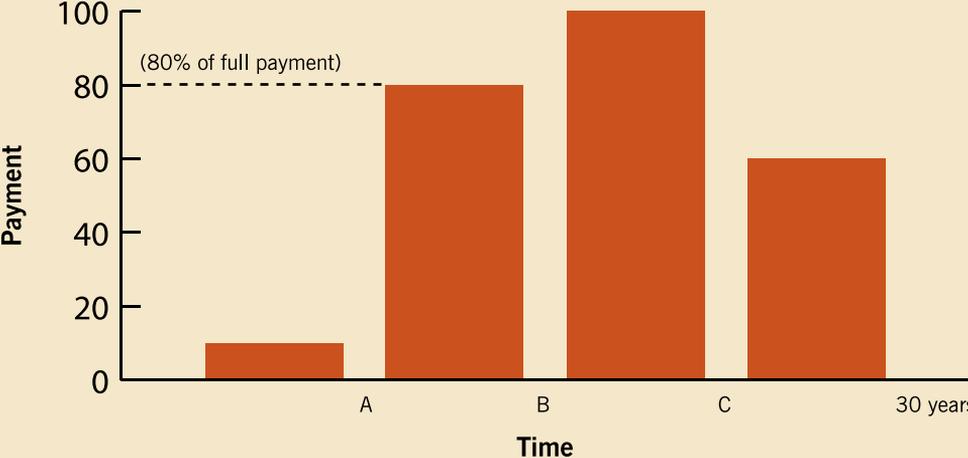


Figure 2: Sample Shadow-Toll Payment Profile over the Life of a Road Project





**Payment adjustments for safety performance and lane closures.** The DBFO company is encouraged to suggest safety-improvement schemes on the project, for which it can receive bonus payments. If its ideas are approved, the company constructs and pays for the scheme and is compensated by receiving 25 percent of the economic cost of each personal injury accident avoided in the following five-year period.

The company can also incur deductions from the planned toll payment, specifically when lanes are closed. The size of the deduction depends on the number of lanes closed, the duration of the closure, and the expected traffic at the time of the closure. Lane-closure charges are assessed only for closures within the company's control.

### **Availability Payments**

Among the alternatives to the shadow-toll payment mechanism in the UK, the availability payment mechanism has been used specifically for the A13 Thames Gateway London Project, due to the project's essentially urban characteristics (see the sidebar accompanying this article). Under this mechanism, payments are based on:

- Lane availability,
- HGV/bus shadow tolls,
- Safety payments, and
- Bus-journey time reliability.

**Lane availability.** Payments to the DBFO company take into account the number of available carriageway lanes. Payments depend on the time of day, with higher payments for keeping the road available during peak hours than during off-peak hours. This method of making payments is an incentive for

the DBFO company to manage its maintenance program so as to avoid disruption to road users at busy times.

**HGV/bus shadow tolls.** These tolls for heavy-goods vehicles and public transport give priority to managing HGVs and public transportation effectively while preventing incentives to increase car commuting.

**Safety payments.** These payments provide incentives for the company to continuously reduce the accident rates on its road.

**Bus-journey time reliability.** The company is encouraged to keep bus lanes available during bus transit times, to assist in the reliability of bus-journey times.

**Penalty points.** One of the main operational issues with the DBFO method is ensuring that the company complies with the terms of the DBFO contract. Toward this end, the contract contains a penalty point provision that attributes points for failure to perform under the terms of the contract. The allocation of penalty points involves specific threshold triggers and monitoring requirements. If a specified number of points has been exceeded, the HA has the right to step in, temporarily assuming operation of the road, suspending payments, or ultimately terminating the contract.

## Active Management Payments

The active management payment

mechanism, a second alternative to shadow tolls, comprises two elements: congestion management and safety performance. This mechanism encourages the DBFO company to actively manage the project to reduce congestion and increase the reliability of road-user journey times. It also retains the benefits of whole-life costing and proper maintenance planning to minimize the loss of road availability at peak periods. It is achieved by reducing payments for any time that congestion is experienced on the project road, and is used in more urban environments where the company can influence the occurrence and levels of congestion by managing its causes effectively.

A safety-performance adjustment is made to active management payments based on the number of personal injury accidents that occur on the project compared with a benchmark, determined from the accident records of a comparative set of roads.



The DBFO company is required to accept the risk of predictable congestion resulting from roadwork, special events, or slow-moving vehicles as well as unpredictable congestion caused by varying conditions such as accidents and weather problems. Some of the ways the company can manage such incidents include planning roadwork during off-peak times, liaising with local authorities and police, keeping breakdown vehicles available on standby for motorist assistance, and providing additional signage. The payment mechanism makes allowance for the fact that DBFO companies have limited control over recurrent congestion caused by the sheer volume of traffic demand.

Under the active management mechanism, tenderers bid a single annual sum that is indexed over the contract duration. The amount is divided into carriageway sections for each hour of the day, with the allocated amount for each section and each hour directly proportional to the level of traffic. Payments are made as follows:

- Full payments are made if speeds are above the target speed, but if speeds

fall below the target speed, payment is reduced.

- Full payment is made if traffic exceeds the deemed capacity of the road, even if the speed falls below the target speed.
- A graduated level of payment reduction applies for speeds between the minimum and target speeds and between 80 and 100 percent of capacity.
- A bonus is paid if flow exceeds 110 percent and speeds exceed the minimum speed.
- The maximum bonus that can be earned is 20 percent of the payment for the hour and road section if flow exceeds 120 percent of capacity and speed exceeds the target speed.

### **Linking Objectives to Payment**

When considering a particular payment structure for a DBFO project, the objectives for the service being provided should be carefully determined, with the payment mechanism designed to motivate the private-sector company to achieve the stated objectives, such as congestion reduction, safety performance, lane availability, and

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journey-time reliability. Whichever the payment mechanism chosen, the use of a model contract as the basis of negotiation for each DBFO contract saves bidders time in preparation and provides significant efficiencies, in both the negotiation and the operation of the contract.

One of the reasons for using shadow tolls is that they offer a workable method of acclimating the private sector to the concept of payment per vehicle as a precursor to the introduction of user-paid toll roads. This is not inconsistent with aims to reduce the need to travel and to optimize the use of the existing network. The way DBFO companies generally structure their toll levels results in a reduced payment per vehicle in the higher traffic bands.

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accelerated the introduction of cost efficiencies, innovative techniques, and whole-life cost analyses to the design and construction of road schemes and their operation.

The risk allocation on these contracts has been encouraging. As noted earlier, where transfer of risk to the private sector has occurred, good value for money has been obtained.

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