B Creating sustainable commercial arrangements

Government policy is to set up NBN Co as a commercial entity, operating with commercial incentives and funded, to the extent possible, with private capital. This policy can be implemented over the life of the NBN. However, in the initial years NBN Co should be funded with Government equity to preserve policy flexibility and to avoid diluting the returns Government could earn over time.

Based on detailed cost modelling by the Implementation Study, even at the higher end of the plausible range of cost estimates, the coverage solution recommended in Part A can be realised within Government's original $43 billion capital expenditure estimate.

The projected internal rate of return (IRR) on the investment in NBN Co exceeds the assumed Government bond rate of 6 percent under most reasonable assumptions for cost and revenue, and where returns are lower, Government and NBN Co have a number of options to improve returns over time.

Government should fund NBN Co solely with equity investments until NBN Co can raise its own investment-grade debt and pay interest from its own earnings. Private equity should not be introduced at least until the network roll-out is complete. To do so any earlier will be too expensive and constrain Government's ability to establish the right policy and regulatory settings. It will also lead to substantial distraction for management around the equity transactions concerned. This applies to both cash injections and any proposals to vend in assets in return for equity.

When fully established, NBN Co could be attractive to a wide range of potential investors, but will be a large and complicated business to privatise. Government should preserve flexibility in both the timing and nature of privatisation to avoid diluting its return and to stay true to its coverage and competition policy objectives. Overall returns to Government are sensitive to the size of the exit multiple and the timing of privatisation. Alternatives to a traditional privatisation may also emerge such as taking on high levels of commercial debt to reduce Government's equity investment through dividends and/or capital returns.

NBN Co needs to have certainty of funding to engage confidently with suppliers and customers. Government can provide this certainty with a formal funding agreement. As an additional source of funding certainty, Government could also use or replicate the Building Australia Fund arrangements, which would suit the context of the NBN in several ways. It would enable Government to match funding to NBN Co's needs and performance and adapt it over time. Longer-term it would be positive for funding transparency and certainty.

Part B consists of two chapters:

- Chapter 7 integrates cost and revenue estimates from Part A and examines the overall returns for the NBN project under different scenarios
- Chapter 8 presents recommendations on the funding model over time, given the nature of the NBN project and the returns under different scenarios.

7 Presenting an integrated business case

SUMMARY

- Detailed cost modelling by the Implementation Study indicates the NBN can be built for approximately $43 billion in capital costs under conservative estimates. Infrastructure sharing agreements with existing service providers could reduce this amount.
- Post-construction, NBN Co will have strong free cash flows and margins, with a very high EBITDA margin estimated at 75 percent.
- Under most plausible scenarios, NBN Co will generate returns in excess of Government's cost of borrowing. If a lower-return scenario starts to emerge, NBN Co can use the repetitive nature of the project to drive efficiencies, or Government can be more flexible on policy settings to improve the expected return.
- Government can reduce risk around the cost of the network build by creating powers and immunities for NBN Co to access facilities, deploy infrastructure and obtain information about infrastructure that could potentially be shared.

Government has stated an objective to build the NBN on a commercial basis, attract private sector funding during construction and to privatise it eventually. This chapter integrates the analysis of build costs and revenues from Chapters 4–6, and presents the business case for NBN Co, in 3 sections:

7.1 Confirming the feasibility of building the NBN for $43 billion in capital costs

7.2 Integrating build costs with ongoing revenues and expenditure

7.3 Managing the business case under different scenarios.

7.1 Confirming the feasibility of building the NBN for $43 billion in capital costs

The Implementation Study's detailed cost modelling estimates that the NBN can be built for $42.8 billion in capital costs. Exhibit 7–1 compares the initial Government estimate (in nominal dollars in the year of expenditure) of $43 billion with the Implementation Study's estimate. The right hand side reflects the Implementation Study's recommended solution —that is:

- Fibre to 93 percent of premises;
- A next-generation fixed-wireless service for premises in the 94th to 97th percentiles;
- A next-generation satellite service for those in remote areas who cannot or choose not to take a fixed-wireless or commercially-available mobile broadband product.

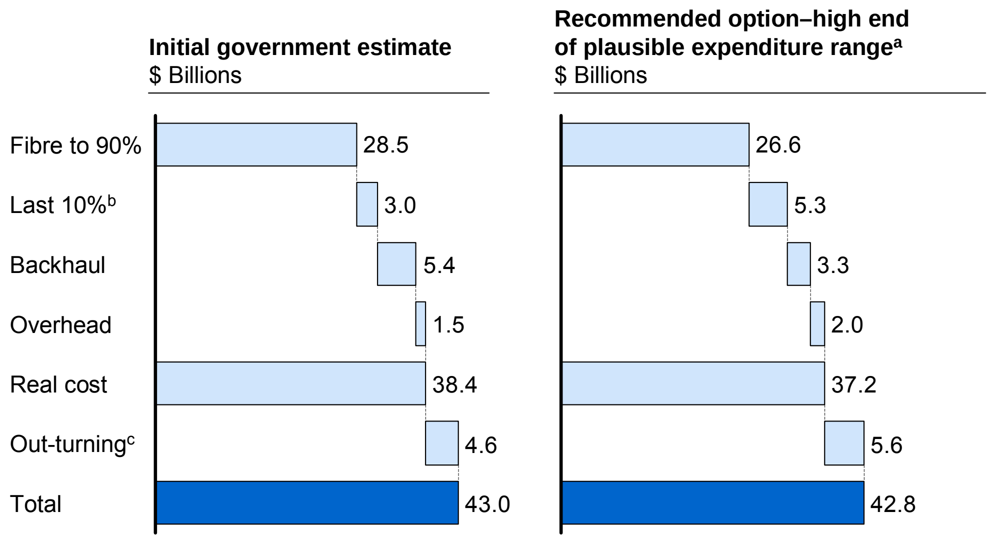
The Implementation Study takes a conservative approach to estimating costs and revenue, which will be detailed throughout this chapter. The costs in Exhibit 7–1 are at the higher end of the plausible capital expenditure range, and assume minimal use of existing telecommunications infrastructure.

This section contains a synthesis of our cost modelling as follows:

7.1.1 Estimating the cost of the NBN

7.1.2 Understanding major cost sensitivities.

Exhibit 7–1. Estimated cost to build the NBN



a. Cost assumptions are for the 'High-end of the plausible range' scenario.
Technology assumptions: 50% of the Fibre Access Network uses a Home Run topology; 50% uses a shared feeder with distributed splitter cabinets; Wireless network uses 2.3GHz spectrum and LTE technology; Satellite transitions to Ka Band.
b. Fibre from 90 to 93% is included in last 10%.
c. Conversion from real to nominal expenditure, using a nominal inflation rate of 2.5%
SOURCE: Implementation Study

7.1.1 ESTIMATING THE COST OF THE NBN

The Implementation Study models a range of cost scenarios because there is necessarily some uncertainty about the final cost to build the NBN. A point estimate, or a point estimate plus a flat percentage for contingency, can be misleading. This chapter shows the impact of 4 scenarios:

- The higher end of the plausible range (illustrated in Exhibit 7–1 above);
- The lower end of the plausible range;
- A blowout in fibre deployment costs;
- A reasonable sharing of infrastructure.

The first three scenarios assume minimal sharing of existing telecommunications infrastructure. Specifically, all backhaul links without two competitors are overbuilt, all exchanges are built rather than leased, and the deployment is a combination of aerial and new trenching—only a minimal portion of ducts are leased at current market prices. Reasonable sharing of telecommunications infrastructure could reduce the headline build cost by $5 billion or more, although the impact on NBN Co’s net present value will be less than this because the reduction in capital cost to build would be partially offset by an annual lease cost or a capitalised payment upfront. An agreement to share infrastructure would only be struck on terms which increase the net present value of NBN Co and would therefore increase the expected rate of return.

This chapter uses the higher end of our plausible range as a reference point, and shows the impact of various scenarios relative to this reference point. The next chapter, on funding, also uses these costs, combined with a mid-case revenue scenario, as the Funding Reference Scenario for ease of exposition, not because we consider that particular scenario to be the most likely.

Connecting 90 percent of premises with FTTP

The primary drivers of the cost of the fibre network are distance and the density of premises. These drive the civil works which are around 70 percent of the total build cost. Section 4.3 explains our modelling of the fibre access network in detail. The key points to recap are:

- The Implementation Study has modelled a mixed topology, with 50 percent of premises served by exchanges using a home-run topology, and 50 percent served by a shared topology where a single feeder is split into multiple distribution fibres in a street cabinet located in the field. In the latter case, this includes provisioning some home-run fibres to schools, hospitals, and other government or enterprise premises. The Implementation Study estimates deploying a pure home-run topology across the entire network would add up to $3 billion to deploying a mostly shared topology across the entire network. The premium to serve an exchange area with a home-run topology will vary by exchange. Modelling suggests 50 percent of exchanges could be served for around one-third of the nation-wide premium, and this is included in all the cost estimates presented. These cost estimates should be confirmed by NBN Co's in-field deployments to refine the actual cost premium and mix of topologies to be deployed.

- The coverage objective is measured against the number of premises in existence at the end of roll-out. New premises that are built during the roll-out are included, increasing the number of premises NBN Co needs to serve. Greenfield estates are assumed to be served by fibre, and brownfields are assumed to be distributed uniformly and hence served by the same mix of technologies as existing premises.[163]
- The Implementation Study used detailed geospatial modelling to calculate distances and densities covering the entire country. It modelled every address and street in Australia, down to the level of counting the number of fibres that would pass through each street (rather than using a sampling approach).
- Unit cost estimates are based on analysing local and international deployment experience where available, and calibrating for Australia via extensive consultation with industry vendors, network operators, and technical consultants. Field surveys were undertaken to ascertain the likely costs of civil works across regions with different geographical characteristics. A leading industry contractor was retained specifically to advise on cost assumptions.

Assuming a unilateral build, the Implementation Study estimates the higher end of the plausible range at $26.6 billion to build the fibre access network to pass 90 percent of premises, before out-turning. This includes the installation of the drop cable and ONT to all activated premises.

Covering the last 10 percent with a combination of fibre, wireless and satellite

The recommended solution for the last 10 percent comprises a mix of three different technologies. Sections 5.2, 5.3 and 5.4 explain the Implementation Study's modelling of the cost of each of these technologies in detail. The key points to recap are:

- Fibre can be extended to 93 percent of premises before the cost begins to accelerate significantly such that the cost relative to wireless or satellite becomes very high.

[163] Greenfield and brownfield sites are defined in Subsection 2.1.4. Greenfields are parcels of land where urban development is occurring for the first time. Brownfield sites are already covered by telecommunications distribution—although this may currently serve the block rather than every subdivision

- Satellite and wireless are both shared media, with relatively low throughput compared to what is achievable on fibre. Nevertheless, Government's objective of providing at least 12 Mbps is a step-change in performance relative to today. This speed objective is the biggest driver of the cost of non-fibre technologies as it translates directly into infrastructure expenditure.
- The other major drivers of the cost of satellite are the number of satellites required and the number of subscribers taking a satellite service. Two satellites are required, given the possibility that one could fail and a 3–4 year lead time for replacement. Each satellite subscriber requires around $2,000 in customer premises equipment including installation.
- The major drivers of the cost of a fixed-wireless network are the number of towers required to provide the required service level (which depends on the spectrum available), the number of existing towers which can be leased, the length and type of backhaul provided, and the number of subscribers.

In total, the Implementation Study estimates the cost of the recommended solution for the final 10 percent of premises (comprising fibre from the 90th to the 93rd percentiles, a fixed-wireless service from the 94th to the 97th percentiles and a next-generation satellite service) to be $5.3 billion.[164] This includes installation of drop cables and ONTs, fixed-wireless antennas and modems, and satellite dishes and modems.

Estimating the cost of transit backhaul

Transit backhaul is required between fibre exchanges and Points of Interconnect (POIs) where the exchange is not served by competitive backhaul. Subsection 6.2.1 summarises the modelling of the transit backhaul network. The key points to recap are:

- The Implementation Study calculates a unilateral build, with upside potential if an agreement to use Telstra's passive backhaul infrastructure can be reached on reasonable terms. The commercial logic for both NBN Co and for Telstra to share dark fibre on reasonable terms is compelling. An agreement would reduce NBN Co's capital expenditure significantly.
- Distance is the primary driver of passive infrastructure costs. Geospatial modelling was used to calculate that NBN Co would need to overbuild around 70,000 km of backhaul fibre if infrastructure sharing does not occur (this includes the 6,000 km Regional Backbone Blackspots Program).
- Expected traffic and provisioning is the biggest driver of active equipment costs.

164 The costs of each technology used in the final 10 percent are reported in aggregate (rather than as three separate components) due to commercial sensitivities.

The Implementation Study estimates the cost of transit backhaul to serve the fibre access network at $3.3 billion.

Adding the cost of overhead

NBN Co will incur significant overhead costs to deploy the NBN, including network designers, project managers, procurement specialists and contract managers. There are a range of operating models NBN Co could adopt, from a fully outsourced model to developing the capability to perform all this work in-house. An operating model that has a mix of outsourcing and in-house capability is assumed, but this should not be interpreted as a recommendation to NBN Co.

The Implementation Study estimates around 1,000 NBN Co employees will be employed during the roll-out phase to perform tasks like those described above. In addition, a fee of approximately 3 percent of civil engineering costs is paid to third parties to manage part of the construction process. In aggregate, this sums to $2.0 billion in capital costs during the roll-out phase. This reflects figures cited in industry consultations.

Incorporating real and nominal price movements

Real price movements are increases or decreases in the cost of labour and equipment above or below the general level of inflation. For example, construction labour costs have grown ahead of the consumer price index since 1997,[165] while the cost of active electronics has declined.[166] Nine different real price inflators or deflators are modelled, including construction labour; information, media and telecommunications labour; active equipment; fibre; and power (electricity).

Government typically reports planned expenditure as the nominal value in the year it will be incurred. This is known as out-turning. All costs are converted from real to nominal costs, using a general inflation rate of 2.5 percent per annum. This is in the middle of the Reserve Bank of Australia's target inflation range of 2–3 percent, and aligns with Government forecasts.[167]

The out-turning adjustment in the Implementation Study's analysis is $5.6 billion. This is higher than Government's initial estimate due to differences in the timing of costs being incurred, based on the Implementation Study's granular analysis of expected network roll-out and take-up.

165 ABS 2009, *Labour Price Index*, *Australia, December 2009,* cat. no. 6345.0, Canberra

166 iSuppli data, 1998–2007

167 The 2009–10 Mid-Year Economic and Fiscal Outlook (MYEFO) forecasts headline inflation of 2¼ percent for 2010–11 to 2012–13 and then 2½ percent thereafter. We have used a headline inflation rate of 2½ percent throughout

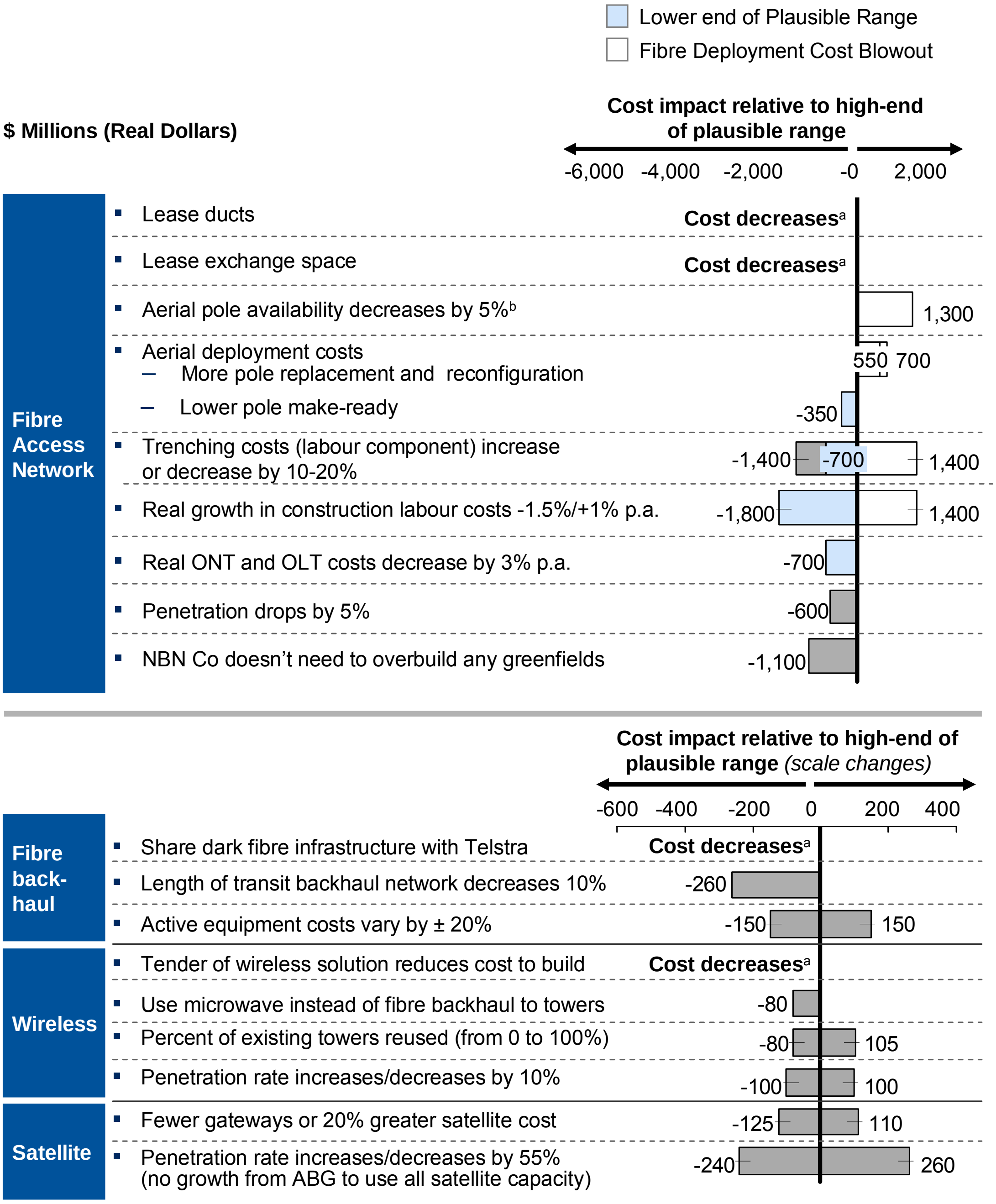
7.1.2 UNDERSTANDING MAJOR COST SENSITIVITIES

A cost to build of $42.8 billion is at the higher end of the plausible range of cost estimates, but is a reasonable reference point for Government to plan for funding and understand likely cash flows given the scale and unprecedented nature of the NBN initiative. It is a conservative number, for five reasons:

- **It calculates a minimal reuse of existing telecommunications infrastructure**, especially ducts, pits, exchange space and backhaul. As stated above, reasonable infrastructure sharing could reduce the build cost by $5 billion or more (although some of this reduction would be offset in value terms by higher ongoing operating costs or a capitalised upfront payment to use the infrastructure). Similarly in estimating the costs of a fixed-wireless network, conservative existing tower reuse assumptions were made.
- **It applies deflators and inflators conservatively.** It assumes NBN Co will incur real growth in construction labour costs in line with historical wage data, and not drive productivity improvements to keep real labour costs constant. The real cost of active electronics has decreased steadily over time, but is assumed to remain constant. There will be upgrades of active equipment which improve network performance over time, and we have assumed this fully offsets any real cost declines;
- **It assumes no scale benefits in procurement** of either active electronics or the civil works to deploy the fibre network. The magnitude of the NBN roll-out means substantial savings could be feasible.
- **It applies network parameters conservatively** in geospatial modelling, especially the rule that a fibre exchange serves a maximum of 30,000 premises. This translates to 2,000 fibre exchanges to serve 93 percent of premises, and this could be reduced by at least one-third and possibly much more.
- **The network modelling does not optimise for the cost of backhaul** when drawing the fibre footprint. Combined with the large number of premises on the fringe of the fibre network, there are some degrees of freedom for NBN Co to choose an alternative, lower cost footprint.

Exhibit 7–2 shows the major construction cost sensitivities for the NBN, shown as cost increases or decreases relative to the higher end of the plausible range. The blue-shaded bars represent the ‘lower end of the plausible range’ scenario. The cost increases in white are part of a ‘fibre deployment cost blowout’ scenario. The grey-shaded bars are not part of any specific cost scenario, although a drop in penetration does reduce build costs as well as revenue. A ‘reasonable sharing of infrastructure’ could have the most significant impact on construction costs, but this is commercially sensitive. These scenarios are integrated with different revenue scenarios in Section 7.3 to estimate the project rate of return.

Exhibit 7–2. Build cost sensitivities



a Commercially sensitive: subject to negotiation with infrastructure owners or tender
b Impact on capital expenditure to build network; not NPV impact including changes in lease costs
SOURCE: Implementation Study

The potential variation in costs differs between cost components. Fibre for access networks is essentially a commodity, as are many of the active electronics, such as OLTs and ONTs. By contrast, there is some uncertainty about the mix and cost of different trenching techniques, so a sizeable range is shown.

There is likely to be some correlation between different sensitivities: for example, an increase in aerial deployment costs due to real wage growth is likely to coincide with a similar increase in trenching costs. Some sensitivities can have a compounding effect—for example, if aerial availability decreases (forcing more of the deployment underground) and per-metre trenching costs rise, then fibre deployment costs could blowout. The figures in Exhibit 7–2 show a unilateral variation. These sensitivities are combined into coherent scenarios, and compounding effects are taken into account in the scenarios described below, which are then combined with revenue sensitivities in Section 7.3.

Impact of different cost scenarios

Fibre deployment cost blowout

Four sensitivities are combined to model a blowout in deployment costs. First, aerial pole availability is reduced by assuming 5 percent of poles are unavailable due to impeding infrastructure (in addition to the 5 percent estimated at the higher end of the plausible range). This decreases the percentage of distribution deployed aerially by 10 percent (because the loss of one pole requires an underground deployment covering twice the span). Second, aerial deployment costs for the poles that can be deployed are assumed to increase substantially (well above the range cited in industry consultations). Third, trenching costs are assumed to increase by 20 percent, which could only occur if the proportion of rock and the impact on the mix of trenching techniques of existing underground infrastructure was substantially higher than industry experts estimate. Fourth, we have compounded these increases by overlaying an ongoing real increase in construction labour costs. The largest single-year real increase in the construction labour cost series since 1997 was 3 percent (with a 12-year average of 1.5 percent). The blowout scenario assumes a 2.5 percent real increase every year, and applies this to wireless and satellite construction labour costs as well.

These effects compound into a larger overhead cost and an increase in the out-turning effect. In sum, this is a very pessimistic scenario, and would increase construction costs by around $6 billion.

Lower end of the plausible range

A more realistic scenario is a reduction in build costs. Four sensitivities are combined. First, the cost of pole make-ready is reduced. Second, trenching costs are reduced by 10 percent. In both cases, the lower estimates align with many industry estimates of a large-scale roll-out. Third, real growth in construction labour costs is held flat, assuming ongoing productivity gains offset real wage cost pressures. In the US, Verizon and other, smaller roll-outs have realised substantial productivity gains over time.[168] Finally, a real decrease of 3 percent per annum in the cost of active electronics is modelled, which is a conservative assumption relative to historic price declines to date.[169] Combined, these effects reduce the build costs by over $4 billion.

Reasonable infrastructure sharing

This scenario assumes a reasonable degree of infrastructure sharing—on ducts and backhaul—on terms that are favourable to NBN Co, but not markedly so. These assumptions are commercial-in-confidence.

168 Bernstein Research 2008 *Verizon (VZ): Project FiOS;* CMSG 2009, *FTTH Deployment Assessment.*

169 Decrease of 9 percent per annum from 1997-2008, iSuppli

7.2 Integrating build costs with ongoing revenues and expenditure

Like any telecommunications network build, upfront capital expenditure is substantial, but EBITDA margins and operating free cash flow to the company are high. By 2022–23, EBITDA margins are expected to be 75 percent or more, and free cash flow between $2.0–2.4 billion in today's dollars.[170]

The next two subsections synthesise the Implementation Study's perspectives on revenue operating costs and recurring capital expenditure:

7.2.1 Integrating sources of revenue

7.2.2 Estimating ongoing expenditure.

7.2.1 INTEGRATING SOURCES OF REVENUE

Exhibit 7–3 summarises the sources of revenue for NBN Co under different scenarios. It excludes any migration incentives, as the impact of these is negligible by 2022–23.

Exhibit 7–3. NBN Co sources of revenue

Revenue scenario	Revenue 2022–23, $billion real
FIBRE REVENUE SCENARIOS	**3.9–4.8**
1. Higher demand	4.8
2. Mid-case demand, higher price	4.4
3. Mid-case demand, lower price	4.2
4. Lower demand	3.9
OTHER SOURCES OF REVENUE[a]	**0.2**
TOTAL	**4.1–5.0**

a. Transit Backhaul, Wireless, Satellite

Source: Implementation Study

170 Free cash flow to the firm defined as EBITDA less Tax, less Replacement Capital less changes in working capital. These figures are based on the middle four boxes in Exhibit 7–4, which illustrates the impact of different cost scenarios

Incorporating fibre revenue

The fibre access network is expected to deliver 95 percent of NBN Co's revenue. The modelling of fibre revenue is explained in Section 3.4. The key points to recap are:

- NBN Co offers service providers a clear value proposition—the ability to deliver superior services at current prices. The indifference point for a service provider to use fibre over copper informs pricing, take-up and penetration assumptions.
- The revenue scenarios have three levels of demand for total fixed-line broadband (70, 80 and 90 percent penetration) and two reference prices, a $30 entry-level wholesale price from NBN Co and a $35 entry-level wholesale price.
- While benefits will accrue to the broader economy as broadband-based innovations emerge, the Implementation Study takes a conservative view of NBN Co's ability to capture a share of these benefits in revenue terms, and has not incorporated any additional revenue from new services or applications.
- A one percent real increase in price over time, which is a combination of a mix shift to premium service offerings and a real increase in the price of the basic service offering, is modelled. The latter would be subject to approval by the regulator and would remain within an overall cap on NBN Co's returns.
- A $300 per premises migration payment included. This has been treated as negative revenue.
- Unbundling is assumed to occur after 2022 across around one half of the network, with new providers at the active layer gaining national market share of approximately 20 percent.
- No provision has been included for any revenue from provision of an RF overlay service.

Incorporating non-fibre revenue

The other sources of revenue are small relative to fibre, and are addressed in Chapters 5 (wireless and satellite) and 6 (backhaul). To recap:

- Penetration for fixed-wireless and satellite is modelled for each percentile beyond the fibre footprint. In the lower percentiles, competition from mobile broadband products is expected to be strong, resulting in lower market share than in the last percentiles where satellite is expected to offer a clearly differentiated service
- The wholesale ARPU for both satellite and fixed-wireless is around $25, both of which are a weighted average across basic and premium products
- Backhaul revenue assumes that 20 percent of premises activated with FTTP use NBN Co transit backhaul, and NBN Co earns $4 per month from these premises.

7.2.2 ESTIMATING ONGOING EXPENDITURE

Estimating Operating expenditure

Operating expenditure is expected to reach around $1 billion per annum by 2022–23, in real terms. Depending on the trade-off made between capex and opex, around 35 percent is for lease costs, and 65 percent is for network maintenance, personnel and other expenditure.

Lease costs

The major lease costs are the land on which exchanges are built and ducts—the 'higher end of the plausible range' scenario assumes 20 percent of feeder is deployed in existing ducts, and NBN Co pays current commercial rates of $7 per metre per annum.

Leasing land for new wireless towers and space on existing towers costs around $25 million per annum.

Network maintenance, personnel and other expenditure

Network operations and maintenance costs are significantly lower for an FTTP network than a copper or FTTN network. These costs have been estimated using publicly available data from BT Openreach and Verizon. BT Openreach data is used to estimate the network operations and maintenance cost per line for a wholesale-only operator on copper and then adjusted for Verizon's experience in shifting from copper to fibre. Verizon has estimated the network operations and maintenance costs of its FTTP network are almost 70 percent lower than its copper network. These reductions are driven primarily by the ability to respond to requests to add, drop or change a service remotely and often through retailer 'self service' via a service portal. In a copper network, this is labour intensive and often requires a technician to be dispatched to the exchange or the premises. Other drivers include the reduction in faults and service outages from passive infrastructure (e.g. line shorts from water penetration), and the ability to monitor and repair the network remotely.[171] After scaling this saving back by 10 percent to be conservative, a 60 percent saving in cost per line is applied to the BT Openreach network operations and maintenance cost per line.

Industry estimates and public company data were used for the network operations and maintenance costs for wireless and satellite networks.

[171] Bernstein Research 2008, *Verizon (VZ): Project FiOS;* Analysys Mason 2008, *Final Report for the Broadband Stakeholder Group—The costs of deploying fibre-based next-generation broadband infrastructure;* Telcordia

The Implementation Study used a proprietary database that contains detailed overhead cost information for more than 850 organisations, to estimate the size of NBN Co's corporate centre. Benchmarks for functions including finance, IT, legal and compliance, human resources, and general support were used. In validating these overhead cost estimates, they were compared with utilities sector benchmark data showing overhead costs as a proportion of revenue per user.

Given the importance of the operational support system (OSS) and business support system (BSS) to telecommunications companies, a separate estimate for these systems has been included in the cost modelling. Vendor consultation and our own experience suggest that NBN Co, as a new organization, is most likely to outsource the development and maintenance of its OSS/BSS rather than build the capability to do this in-house. As such, most of the cost is an ongoing operating cost, although some upfront expenditure has been included as a capital item.

Finally, the cost of electricity to power the fibre exchanges and wireless towers has been included.

Estimating replacement capex

Active equipment like the radio antennas for the wireless network, or the ONTs and OLTs in the fibre network, have relatively short economic lives of 5–10 years. Passive infrastructure like ducts, fibre and wireless towers have relatively long economic lives, and in many cases are expected to last 40 years or more.

Ongoing capital expenditure to replace infrastructure and equipment is costed at today's prices multiplied by the relevant cost deflator(s), and included in both cash flow modelling and terminal value calculations.

7.3 Managing the business case under different scenarios

This section discusses how Government should manage the business case under different scenarios. It contains two sections:

7.3.1 Expecting an internal rate of return of 6–7 percent

7.3.2 Adapting plans to manage returns under different scenarios.

7.3.1 EXPECTING AN INTERNAL RATE OF RETURN OF 6–7 PERCENT

Exhibit 7–4 integrates the cost scenarios from Section 7.1 with the key revenue scenarios from Section 7.2. It shows the Internal Rate of Return (IRR) for the NBN project (see Exhibit 7–5 for an explanation of IRR).

The middle four boxes in Exhibit 7–4 show the expected IRR under the more conservative scenarios most appropriate for planning. These show a reasonable estimate for the project IRR is 6 to 7 percent. The next chapter compares this IRR to the costs of capital required by various investors and explores the implications for funding over time.

The scenarios at the top right and bottom left are theoretical corner cases. In both instances, the Implementation Study would expect Government and NBN Co to change plans if it seemed like either of these scenarios was unfolding.

Exhibit 7–4. Effect of cost and revenue sensitivities on project rates of return

Project IRR above Government borrowing rate
Project IRR below Government borrowing rate
Theoretical corner case without changing plans

Revenue Scenarios[a]	Fibre deployment cost blowout	Build cost at higher end of plausible range	Reasonable infrastructure sharing	Build cost at lower end of plausible range
Higher demand ▪ **$35 basic service**	5.0%	6.7%	7.5%	8.3%
Mid-case demand ▪ **$35 basic service**	4.5%	6.3%	7.0%	7.9%
Mid-case demand ▪ **$30 basic service**	4.2%	6.1%	6.8%	7.7%
Lower demand ▪ **$30 basic service**	3.6%	5.6%	6.3%	7.2%

Build cost scenarios

a. Fixed-line broadband penetration (ie the total of fibre, copper and HFC) ranges from 70% (Lower demand) to 80% (Mid-case demand) to 90% (Higher demand). Prices are entry-level prices at the start of roll-out. Real growth (including a glide path for the $30 entry price scenario) is applied thereafter

SOURCE: Implementation Study

Exhibit 7–5. Explanation of Internal Rate of Return (IRR)

Internal Rate of Return (IRR)
The Internal Rate of Return (IRR) is the discount rate which results in a Net Present Value of zero for all future cash flows. It assumes all net positive cash flows are invested at this IRR. We have used the Modified Internal Rate of Return (MIRR) which assumes all future positive net cash flows are reinvested at the entity's opportunity cost of capital. Because Government has stated its intention to reduce net public debt over time, the opportunity cost is Government's cost of debt, as any net positive cash flows would be used to pay down Government debt. The figures in this chapter are a project IRR. In the next chapter, the concept of equity IRR is introduced to examine the impact of funding choices on the actual returns Government can expect for the money it invests in NBN Co as equity. The IRR is in no way a proxy or a precedent for the Weighted Average Cost of Capital (WACC) that should be used by NBN Co in evaluating infrastructure-sharing deals or tradeoffs between spending capital upfront versus accepting higher ongoing operating costs. Nor is it a proxy or precedent for the WACC that the ACCC is expected to use for NBN Co's access undertaking. We would expect both the ACCC and the NBN Co Board to independently evaluate the nature of the commercial risks and reach their own conclusions.
Source: Implementation Study

If demand exceeds expectations and costs are lower, the returns could be above 8 percent, and Government could require NBN Co to expand the fibre footprint it deploys to. If costs are exceeding expectations and demand is lower translating into a low IRR, then Government and NBN Co would likely adapt their plans—the potential actions are described in the next subsection.

7.3.2 ADAPTING PLANS TO MANAGE RETURNS UNDER DIFFERENT SCENARIOS

A project with the scale and complexity of the NBN will inevitably face challenges during roll-out. A number of uncertainties, including the extent of infrastructure sharing, the response of service providers and end users, and the cost and pace of deployment will only be resolved once construction is underway and services are being delivered. As such, Government needs to give NBN Co discretion, and be prepared to intervene itself, to manage the returns of the company over time. There are some actions the Government can take now to remove regulatory barriers and improve the ability for NBN Co to gain commercial access to facilities that could be useful to NBN Co's roll-out.

Recognising the ability to manage the risk of the NBN over time

Deploying a large-scale fibre network is different to other large capital projects such as new mines, ports or plants. Mines, ports and plants tend to be one-off projects with complex interdependencies and can be challenging to stage. In contrast, the NBN roll-out is a highly repetitive project, albeit with local tailoring. The work required to deploy fibre to each premises, or to build a wireless tower, is very similar as the roll-out progresses street by street and town by town. This repetition has real benefits for managing project costs, in comparison with one-off projects. There are significant opportunities to trial and improve deployment techniques to improve performance over time. In addition, a large number of civil works contractors and equipment vendors will want to be part of a project of this scale. This helps create competitive tension between suppliers to drive productivity improvements and bring costs down. Furthermore, the repetitive nature of the work is conducive to benchmarking of contractor performance to improve price and performance over time and encourage innovative techniques such as 'pre-connectorising'.

Thus NBN Co has the ability to manage the risk of cost over-runs during roll-out. If costs blow out in early deployments, steps can be taken to find more efficient ways to deploy for the majority of the roll-out. If technical problems emerge, they can be addressed early on for the remainder of the roll-out. Of course, deploying a satellite is completely different, with the impact of a failure at launch very hard to mitigate.

NBN Co and the Government can also take more fundamental steps to improve the returns over time if costs are higher or take-up lower. While each of these steps relax some element of Government's objectives or aspirations, they are consistent with the overall objective of dramatically improving the speed and affordability of broadband. We focus on 3:

- **Tailor the roll-out schedule.** The scenarios above apply a uniform roll-out, where fibre is deployed uniformly to higher and lower density areas, and areas with different competitive environments (HFC, multiple DSLAMs, one or no DSLAMs). NBN Co could adapt this roll-out to focus first on areas where the rate of take-up will be greatest or where the cost of deployment is lowest.
- **Slow down the roll-out.** If applications are not evolving rapidly enough to stimulate demand for fixed-line products, the rapid rate of roll-out over 8 years could be slowed down. The number of FTTP trials and deployments being announced in other nations mean that a host of innovative content and applications will become common and the demand for high-speed broadband will increase each year.
- **Allow HFC and VDSL to meet the coverage objective.** If deployment were significantly delayed or over budget, then there is scope to alter some of the Government's policy settings to speed up roll-out or improve NBN Co's economics. These include using VDSL in apartment blocks, and reusing HFC infrastructure—at least as an interim solution beyond the 8-year roll-out timeline.

If returns exceed expectations then NBN Co and Government could consider extending the fibre footprint to cover additional premises.

Removing regulatory barriers to network roll-out

The details of the nature, number and location of facilities which NBN Co will need to deploy cannot be determined until NBN Co has settled its technology and network topology choices. However, the Implementation Study can broadly state that:

- It is desirable to utilise existing underground facilities where there is sufficient availability and the terms are commercially attractive;
- There are likely to be substantial areas where aerial deployment is the only feasible or affordable option;
- Aerial deployment will likely include deployment of aerial subscriber cables to individual premises;
- We envisage roll-out of ONTs would be conducted on a demand-driven basis as premises are cut-over by the relevant retail service provider, which will obtain the consent of the owner of the premises.

Where possible, it is desirable that NBN Co carries out its network roll-out on a co-operative basis with state and local government. However, given the large range of local authorities within the fibre footprint, it would not be surprising if disputes arose in some areas. In the absence of voluntary agreement, NBN Co would need to rely upon the regime contained in Schedule 3 of the *Telecommunications Act 1997*.

The cost implications of delay or prevention of network roll-out in various areas could be substantial. Enhancing the powers and immunities regime in Schedule 3 could be achieved without the delays and uncertainty implicit in the legislative process by amending of the *Telecommunications (Low-impact Facilities) Determination 1997* (the *Determination*) to add additional Low Impact Facilities, being facilities that NBN Co could more easily roll-out without obtaining state and local government approval. Adding the following items would facilitate NBN Co's roll-out:

- All forms of overhead or aerial fibre optic cabling and any ancillary facilities, including aerial lead-ins to individual premises. We note the legislative constraint that prevents this from being extended to cables of a diameter greater than 13 mm. Ideally this would be removed; nonetheless, inclusion of fibre optic cabling up to that diameter is a worthwhile step;
- ONTs and housings;
- Pole infrastructure;
- Pole-mounted housings;
- All facilities ancillary to these facilities.

Ultimately, NBN Co will be best placed to advise Government on the precise nature of the equipment it intends to deploy.

> **Recommendation 55**. That Government, in consultation with NBN Co, expand the definition of Low Impact Facility in the *Telecommunications (Low-impact Facilities) Determination 1997* to include facilities likely to be included in NBN Co's roll-out; that Government consult NBN Co to determine the appropriate items for inclusion in the revised definition.

Access to facilities

Part 5 of Schedule 1 of the *Telecommunications Act* creates a right of access to carriers' existing duct and tower infrastructure for the purpose of rolling out additional telecommunications network infrastructure. The mechanism governing the access regime in Part 5 of Schedule 1 of the *Telecommunications Act* is similar to the 'negotiate-arbitrate' model in Part XIC of the *Trade Practices Act* that the Government is currently endeavouring to reform. Similar reforms would be appropriate to enhance the utility of the *Telecommunications Act* scheme.

NBN Co's roll-out would be further facilitated if this regime were extended to the infrastructure of non-telecommunications utilities.

Such an expansion may have significant cost implications for NBN Co. We note that:

- Access to electricity poles would be vital for efficient aerial deployment;
- Deployment through sewers has been adopted in international roll-outs;
- Gas pipes have been used for fibre deployment in international roll-outs.

Access to utilities' infrastructure is therefore critical for developing a credible alternative to ducts owned by telecommunications carriers.

Consideration should be given to the interaction between any expanded scheme and the operation of Clause 11 of Schedule 3, which sets out carriers' obligations to seek agreement with public utilities in relation to network deployment and maintenance activities.

In addition, relevant infrastructure constructed in greenfields, such as ducts, may be owned by property developers or local authorities. At present, the access regime contained in Part 5 of Schedule 1 does not extend to such facilities. To facilitate potential deployment of NBN network infrastructure in these areas, which under our recommendations will occur where premises are not deemed 'adequately served' by the ACCC, it is important that this be remedied.

Recommendation 56. That Government reform the process of seeking access to infrastructure of telecommunications carriers under Part 5 of Schedule 1 of the *Telecommunications Act 1997* such that:

1. The 'negotiate-arbitrate' model is replaced with a model consistent with the changes to the access regime in Part XIC of the *Trade Practices Act 1974* proposed in the *Telecommunications Legislation Amendment (Competition and Consumer Safeguards) Bill 2009*;
2. This reformed right of access is extended to grant NBN Co access to infrastructure potentially relevant to its network deployment, including ducts, poles and pipes belonging to non-telecommunications utilities and other parties, such as owners of ducts in greenfields.

To use the expanded access regime proposed above to utilise relevant infrastructure, NBN Co will need information about the extent and nature of such infrastructure. The Implementation Study notes that legislation to effect this is presently before the parliament to enable NBN Co to procure such information.

Recommendation 57. That Government require telecommunications carriers, non-telecommunications utilities and other owners of relevant infrastructure, such as owners of ducts in greenfields estates, to provide to Government such information on their networks, infrastructure and operations as Government requests from time to time for purposes directly related to the deployment of the NBN; that Government provide such information to NBN Co on a confidential basis for purposes directly related to the deployment of the NBN, subject to appropriate safeguards around commercially confidential information.