

Lower Churchill Project Financial Close Requirements: Procurement Issues

DRAFT FOR DISCUSSION



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Summary

Terms of Reference

- 1 Following a review by Westney, PwC were tasked on 22 January with assessing the LCP procurement plan against the likely preconditions to achieving Financial Close.

Approach

- 2 The author spent 2½ days between 28 and 30 January 2008 with senior LCP staff including: Gilbert Bennett, Paul Harrington, Lance Clarke, and Pat Hussey.
- 3 The author was given access to the following documents:
 - 1 Level 1 project network
 - 2 Latest cost estimates for Gull island
 - 3 Proforma contractor application
 - 4 Contract procurement philosophy
- 4 In addition, the author was given overviews on:
 - 1 The revised design and layout of the dam, the diversion tunnels, spillway excavation and dam rockfill
 - 2 The marine survey data and route planning for the Strait of Belle Isle HVDC subsea link
- 5 The author conveyed preliminary findings and recommendations at a meeting on 30 January attended by, inter alia, Gilbert Bennett, Paul Harrington, Lance Clarke, and Pat Hussey.

Introduction

- 6 Lenders will naturally seek to limit downside risks at the expense of upside risks forgone or increases in expected costs. Lenders will take a holistic view of the risks they are being asked to accept. This view will depend on the specifics of the project in question, the extent of its underlying risks, and the credibility of the approach taken to mitigating them.
- 7 A large number of factors, many of them outwith LCP, will affect lenders' attitudes. It is therefore impossible to be definitive at this stage regarding the degree of construction risk that lenders would accept in order to achieve Financial Close – indeed, it would be positively misleading.
- 8 In the absence of such certainty, in order to be sure to be able to satisfy lenders' requirements, it would be tempting to seek to let a series of fixed-price contracts for the entire project scope together with a contract for project integration. However, such an approach is likely to lead to an uneconomic project, due to the fact that such fixed price contracts would include costs to cover the contractor's risk management.

- 9 In which case, the only way that the Owner can proceed is to seek to reduce risk as much as possible (geological surveys and completing procurement), to manage risk by designing contract packages to marry project requirements with the contractor market, and to control risk through an overall framework.

Main Findings

- 10 The Level 1 network has been drawn up to meet a target date for First Power, and procurement activities have been scheduled to meet that requirement, rather than linked to Project Sanction or Financial Close.
- 11 Total project costs for Full Power are of the order of C\$ 6.0 bn, of which HVDC transmission is approximately C\$ 3.0 bn and Gull Island is C\$ 3.0 bn. The dam excavation and rockfill is approximately C\$ 0.5 bn.
- 12 The Strait of Belle Isle is subject to iceberg scour and so the HVDC subsea cables will need to be laid in deep natural trenches in the middle of the Strait, and protected closer to shore.

Main Recommendations

Procurement phasing and objectives

- 13 A major change in the project phasing philosophy needs to take place relative to the preconditions for Project Sanction envisaged in Gate 3: much of the front-end engineering (not necessarily detailed engineering) and virtually all of the procurement needs to be treated as a Phase 3A and therefore part of project formation, rather than, as currently, Phase 4A and part of project execution. Procurement therefore needs to be elevated into a workstream in the project formation phase alongside the existing commercial, financing, and permitting workstreams. These workstreams are necessarily highly inter-related, with the requirements and objectives in one dependent on what can be achieved in another. Furthermore, procurement must no longer be viewed as separate precursor activities to individual construction packages and scheduled to fit in a time-ordered manner with construction activities themselves scheduled to achieve a First Power date, but as a set of integrated activities designed to achieve an acceptable risk envelope prior to Project Sanction and Financial Close.

Project scope

- 14 At the time of Project Sanction and Financial Close, the scope of the construction project designed and procured must align with the commercial offtake portfolio available at that time to underpin the project's economics. Since that offtake portfolio cannot be predicted with any certainty at this stage, the design and procurement of all transmission routes associated with all the offtake commitments being pursued must be initiated now, recognising that as negotiations progress, a preferred transmission route (or combination of routes) will be determined.

Construction phasing

- 15 With the bulk of procurement activities being complete by the time of Project Sanction and Financial Close, the timing of construction commencement for the various packages is then a matter for risk and cost optimisation. For example, construction could be commenced immediately, thereby minimising the risks associated with deferred commencement (indexation, contractor credit, contractor capacity) and maximising the available float associated with that activity. On the other hand, such an approach would maximise the amount of "unnecessary" IDC and costs associated with remobilisation for the purposes of commissioning.

Construction manager and integrator

- 16 Where lenders accept that a whole-scope fixed-price turnkey EPC contract is not appropriate for a particular project, they are likely to insist on the re-creation of that single-point responsibility by means of the appointment of a construction manager or integrator. They would be remunerated under a construction management contract form that would involve incentives that would be closely aligned to the interests of the Owner and the lenders. We believe that such an appointment represents good practice.

Shadow independent engineer

- 17 With so much potentially riding on the opinions and judgment of the independent engineer eventually selected by the lead arrangers, the Owner should immediately commence the appointment of a shadow independent engineer. They should be a senior director or partner of an engineering consulting firm, personally experienced in acting as the banks' engineer on power projects.

Risk management framework and procurement plan

- 18 In order to manage the construction risk from now until Project Sanction and Financial Close, and thereafter during execution, but, most importantly, to provide a vehicle for persuading the banks' independent engineer that a reasonably low contingency amount should be adequate, the Owner needs to establish a risk management framework. This should work principally at the macro, or package level. Ideally, it should be an industry-standard system or methodology, but if one doesn't exist then it will have to be developed. It should be separate from, but broadly coherent with, the micro-level risk register.

Risk envelope objective

- 19 Other things being equal, the Owner and shareholder have a strong interest in preferring lower base costs and higher contingency amounts. Identified contingency may not be fully required, whilst fixed prices are fixed prices. This preference is even reinforced to the extent that the lenders are prepared to fund part of the contingency. However, if the Owner attempted to pursue its preferred trade-off extensively then the approach would quickly lose credibility with the independent engineer.
- 20 The Owner must convince the independent engineer that they are adopting a prudent approach to procurement. Within the bounds of prudence, however, the Owner may choose to adopt a lower base cost than might otherwise have been selected and allow the independent engineer to impose a higher contingency. Whilst the approach to procurement needs to be carefully planned within the overall risk management framework, this on no account means "fixed price at any cost"; it means "fixed price, where appropriate". The more rigorous the approach taken to procurement planning, the more likely will the Owner be able to persuade the independent engineer to approve an approach that does not always adopt a fixed price solution.

Project formation network

- 21 The commercial and financial workstreams are working toward greater detail regarding their methodology and approach. This will need to be co-ordinated with the revised design and procurement effort, and co-ordinated critical path progress plans will need to be developed. This will need to be captured in much more detailed Level 2 and Level 3 networks for Phases 3 and 3A leading to Project Sanction and Financial Close.

Variegated project risk

- 22 The nature of the underlying risks associated with the activities making up the project is highly variegated, ranging from low-risk commodity supply (HVAC transmission) to the following high-risk activities:
- 23 The **Strait of Belle Isle HVDC subsea link** (submarine cable) involves such very high underlying risk combined with shallow depth of market and high market activity, and is of such a strategic nature, that its procurement should be prioritised and advanced and every effort made to secure factory and installation slots. The possibility of letting this package as a fixed-price turnkey contract should be investigated.
- 24 It is possible that the risk associated with the **dam excavation and fill** can neither be reduced nor mitigated. It is also possible that any attempt to reduce or mitigate the risk would be viewed with scepticism by the independent engineer. However, it might be possible to retain this as a high-risk activity with a high contingency amount, so long as the risk over the rest of the project scope was moderate. This might mean that more fixed-price contracts would have to be let over the rest of the project scope than would otherwise be preferable. To put this in perspective, the estimated cost of the dam excavation and fill is approximately C\$ 0.5 bn, compared with a Full Power scope cost of about C\$ 6.0 bn. A 100% contingency on dam excavation and fill would be equivalent to 8% on the full project scope base cost.

Project management resources

- 25 The bringing forward of design and procurement activities clearly has implications for staffing requirements, both in-house and contracted. Activities to recruit and procure these should be accelerated. There are sound engineering and procurement reasons to procure by way of functional specifications, but a further advantage is the reduced resource requirement and lead time to tender.

Interface with rating agency methodology

- 26 Both Standard & Poor's and Moody's have recently published methodologies designed to categorise construction risk. It would be useful exercise to apply these methodologies to LCP in a rapid manner to help to identify possible fatal flaws and areas to concentrate upon. Depending on the results of this rapid study, it would probably be worthwhile developing an interface with the risk management framework that would score LCP's construction risk according to the rating agencies' methodologies. This would help to monitor the likely perception of construction risk as project formation proceeded towards Project Sanction and Financial Close, and would obviously facilitate discussion with the rating agencies if and when they began a rating assessment.

Contractor credit risk

- 27 We would strongly recommend that a rigorous approach is taken to the prequalification of the bulk of contractors and suppliers seeking to join LCP's accredited list. This might result in their being graded according to the size and nature of the contract that they could reasonably be expected to take on. However, for the say 10-12 largest contractors or suppliers for the big-ticket specialist construction or equipment packages, it would not be sensible to exclude any qualified company from a tender list. Accordingly, we would recommend that LCP should draw up a list of such contractors and task us with assessing their creditworthiness with a view to informing the approach to be adopted towards risk transfer and the bonding structure demanded of each contractor.

Introduction

Lenders' attitudes to construction risk

- 28 Lenders are frequently characterised as being risk-averse. However, this attitude is a logical consequence of their interest in the economics of the project, rather than a product of a gloomy outlook. Lenders, and particularly project finance lenders, are exposed to the risk of project failure whilst their rewards for project success are limited to the full repayment of their loans and the earning of a modest margin. This difference between pay-offs for the lenders and the owners accounts quite reasonably for much of the tension between the parties regarding the allocation and mitigation of risk. Lenders naturally seek to limit downside risks at the expense of upside risks forgone or increases in expected costs.
- 29 This is not the place to outline the principles of project finance; suffice to say that lenders' need to manage their risk limits the application of project finance to a number of sectors or business models where underlying risks can be verified and controlled.
- 30 Lenders will take a holistic view of the risks they are being asked to accept. This view will depend on the specifics of the project in question, the extent of its underlying risks, and the credibility of the approach taken to mitigating them.
- 31 Factors that will influence lenders' attitudes include:
- 1 The sector in which the lenders regard the project as falling. Different sectors have different commercial and business models to which lenders are accustomed. Where a project, such as Lower Churchill, straddles sectors (in this case, power and natural resources) lenders may be reluctant to accept perfectly rational risk management approaches because they are not prevalent in the sector to which the project has been assigned.
 - 2 The size of the financing required. The larger the facility required the more that the lenders will need to involve lenders more experienced in other sectors and lenders much less experienced in project finance. The need to involve a wide spectrum of lenders in a broader syndication process means that the lead arrangers will tend to follow a lowest-common-denominator approach to risk management (i.e. more conservative).
 - 3 The underlying economics of the project. The better the economics (ie the higher the project's expected rate of return) the greater the scope for the project to absorb risks of all kinds. Conversely, the more marginal the economics, the ability to accept risks is inevitably highly constrained. This feeds into the analysis of whether the project is "thick" or "thin" under the different scenarios.
 - 4 The overall range of risks facing the project that lenders are being asked to accept. Lenders take a relatively simplistic approach to risk analysis and therefore tend to add risks together rather than adopting a more rigorous Monte Carlo technique. Accordingly, risks that have to be taken on the commercial or offtake side of the project may limit the project's ability to take risk on the technical or construction side.
 - 5 The timing of the project's financing relative to other projects seeking finance at the same time. Project finance is still a relatively specialist area in most banks and so there are limited human resources available to analyse projects and also limits on allocated capital or gross lending. If project finance lending officers can achieve their budgets and bonuses with easier projects to take forward,

then they will. Lenders' willingness to analyse project risks and take them to their credit committees will depend on the overall state of the project finance market and the risk profile of other projects competing for financing.

- 6 The **judgment** of the independent engineer. Experienced lead arrangers should give the independent engineer strong direction regarding their approach to due diligence. If the lead arrangers have been broadly persuaded by the project's approach to risk management, then they will expect the engineer to report on an exception basis. Conversely, less experienced lead arrangers or a more dominant engineer will lead to a report that starts from a more sceptical viewpoint that requires the engineer to support the risk management approach and is therefore more susceptible to the engineer's judgment.
- 7 **Anecdotal** evidence of problems regarding similar projects. Lenders, and particularly credit committees, are strongly influenced by such evidence, which can often appear late on in the financing process. Such problems can be very difficult to deal with, particularly when the lenders will have much greater direct knowledge regarding them than is available in the public domain. An example would be the recent experience on **Kárahjúkar**, where, upon excavation of the river bed, a fault was discovered that had not been detected by the borehole surveys and which entailed considerable delay and redesign in order to move the dam location further upstream.
- 8 The extent to which **rating agencies** are involved. This will principally be a function of size. Very large projects may well need to tap the bond markets since there would simply be insufficient capacity in the bank project finance market. A bond issue will usually require a rating. Even if the project could be funded entirely by banks, the lead arrangers might well seek to mitigate syndication risk by commissioning a rating of the bank loan facilities. The bond market and rating agencies are more cautious about construction risk than banks, and frequently require more extensive performance bonding than banks.

32 It is therefore impossible to be definitive at this stage regarding the degree of construction risk that lenders would accept in order to achieve Financial Close – indeed, it would be positively misleading. The likely range of risks that might be accepted provides an indication as to the approach to contracting that NLH should adopt, and the areas where review and re-assessment is required.

Owner's approach to construction risk

- 33 This might indicate the adoption of a highly conservative, lowest-common-denominator approach, namely the use of a single fixed-price turnkey lump sum EPC contract. However, we can be reasonably sure that such an approach, even if feasible, would render the project uneconomic. The number of companies willing to bid for such a project is clearly limited, and the number who would be credible in such a role even lower.
- 34 If there is no safe harbour available, how should the Owner address construction risk in the project establishment phase leading up to Financial Close and Project Sanction?
- 35 Firstly, the Owner should reduce risk as much as possible. That will necessarily include thorough geological and marine surveys. It should also include thorough market testing of the intended contract packages, and that effectively means full procurement for the most of the project scope, ie going out to tender, receiving firm priced bids for whatever contract forms are selected, and completing bid evaluation, if not issuing letters of intent.
- 36 Secondly, the Owner should design packages for tender to achieve appropriate risk transfer within a sensible scope that minimises interfaces. The package scope and risk transfer should aim to be attractive to the relevant contracting market, bearing in mind its depth, capacity, and activity. Full provision should be included to enable contractor performance to be managed. In some cases, this might well mean fixed-price turnkey contracts, Interfaces must be actively managed through an integrator
- 37 Thirdly, the Owner should establish a rigorous risk/cost optimisation framework. This is essential in order to be able to demonstrate (both to the shareholder as much as the lenders) that the approach is as robust as can be achieved given the nature of the project and the state of relevant construction markets.

Findings

Level 1 network philosophy

- 38 This has been drawn up on the basis of meeting a target date for First Power. Long lead items associated with the turbine-generator sets form the critical path and determine the timing of the commencement of their procurement and the letting of site preparation activities that are also on the critical path.
- 39 Procurement activities associated with other project elements are commenced at the appropriate time to facilitate construction commencement of those elements to meet the target date for First Power. Some of those procurement activities, particularly for the HVDC subsea link under the Strait of Belle Isle, are shown to commence after Project Sanction and Financial Close.

Recent QS cost estimates for Gull Island

- 40 These may be summarised as follows:

Area	Cost C\$ M
Site preparation and enabling works, including engineering and diversion	400
Owner's costs during construction, including project management and camp running costs	400
Dam excavation and rockfill	475
Dam concrete and structural works including powerhouse structure	475
Turbine-generator sets and associated electrical equipment	525
Switchyard	150
Transmission lines to Churchill Falls	425
Total – Gull Island	2,850

Changed tunnel and dam design

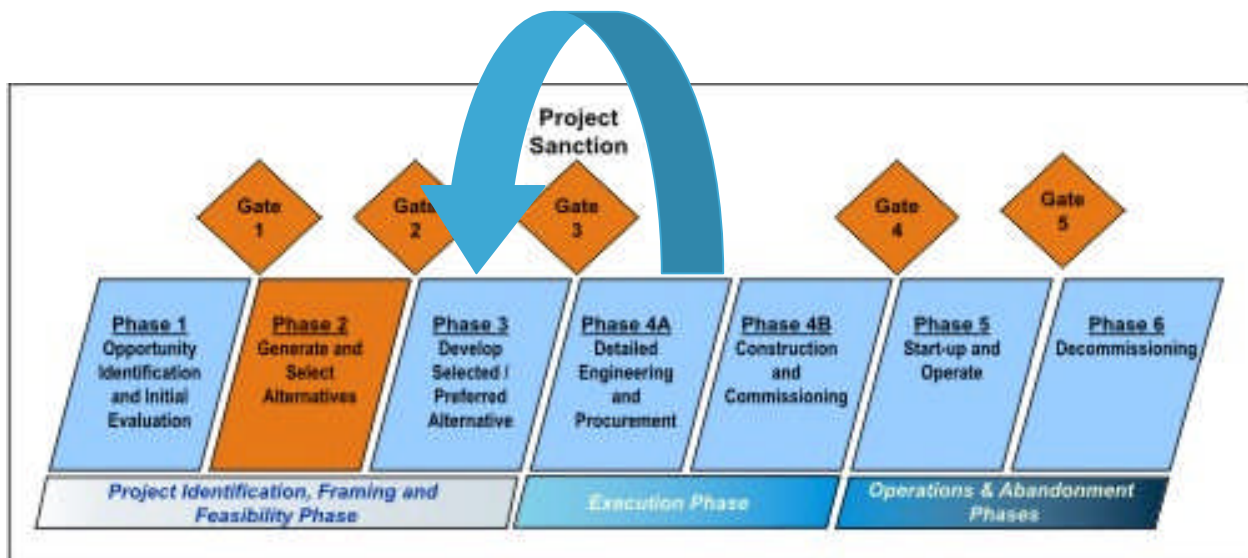
- 41 The design and layout of the dam has been changed. The diversion tunnels have been moved to the south side of the river, underneath the spillway and powerhouse. The rockfill for the dam will be sourced from the excavation of the spillway and powerhouse. This neat environmental solution may cause programming problems.

Strait of Belle Isle surveys – iceberg scour

- 42 The sea-bottom below the Strait of Belle Isle is subject to scouring as a result of the grounding of large icebergs drifting south through the Strait on the local current. As they melt they float off and then get swept north again. Fortunately, there are a number of deep trenches crossing the Strait that should enable the HVDC cable to be located well out of the way of any scouring action, and these trenches have been mapped using detailed marine surveys.

Recommendations

Procurement phasing and objectives



- 43 A major change in the project phasing philosophy needs to take place relative to the preconditions for Project Sanction envisaged in Gate 3: much of the front-end engineering (not necessarily detailed engineering) and virtually all of the procurement needs to be treated as a Phase 3A and therefore part of project formation, rather than, as currently, Phase 4A and part of project execution.
- 44 Procurement therefore needs to be elevated into a workstream in the project formation phase alongside the existing commercial, financing, and permitting workstreams. These workstreams are necessarily highly inter-related, with the requirements and objectives in one dependent on what can be achieved in another.
- 45 Furthermore, procurement must no longer be viewed as separate precursor activities to individual construction packages and scheduled to fit in a time-ordered manner with construction activities themselves scheduled to achieve a First Power date, but as a set of integrated activities designed to achieve an acceptable risk envelope prior to Project Sanction and Financial Close.

Project scope

- 46 An obvious example of the inter-related nature of the workstreams is that the definition of construction scope clearly alters depending on the results of the commercial workstream. Differing portfolios of offtake commitments will need differing transmission routes to be completed. At the risk of stating the obvious, at the time of Project Sanction and Financial Close, the scope of the construction project designed and procured must align with the commercial offtake portfolio available at that time to underpin the project's economics.

47 Since that offtake portfolio cannot be predicted with any certainty at this stage, the design and procurement of all transmission routes associated with all the offtake commitments being pursued must be initiated now.

48 Simply because a particular part of the project is not on the path to achieving First Power that does not mean that its initiation can be deferred. Whilst First Power is clearly an important milestone, it is only a milestone on the way to achieving Full Power, ie delivery to all committed customers and markets.

Construction phasing

49 With the bulk of procurement activities being complete by the time of Project Sanction and Financial Close, the timing of construction commencement for the various packages is then a matter for risk and cost optimisation.

50 Construction could be commenced immediately, thereby minimising the risks associated with deferred commencement (indexation, contractor credit, contractor capacity) and maximising the available float associated with that activity. On the other hand, such an approach would maximise the amount of “unnecessary” IDC and costs associated with remobilisation for the purposes of commissioning.

51 There should be some cost advantage in being able to offer contractors a flexible window within which to carry out their construction.

Construction manager and integrator

52 Where lenders accept that a whole-scope fixed-price turnkey EPC contract is not appropriate for a particular project, they are likely to insist on the re-creation of that single-point responsibility by means of the appointment of a construction manager or integrator. They would be remunerated under a construction management contract form that would involve incentives that would be closely aligned to the interests of the Owner and the lenders. We believe that such an appointment represents good practice.

Shadow independent engineer

53 With so much potentially riding on the opinions and judgment of the independent engineer eventually selected by the lead arrangers, the Owner should immediately commence the appointment of a shadow independent engineer. They should be a senior director or partner of an engineering consulting firm, personally experienced in acting as the banks’ engineer on power projects. Given the relatively few hydro projects that have involved commercial bank project financing, it may well be that no single individual engineer would have both hydro and banks’ engineer experience and that a dual appointment would be required.

54 The shadow independent engineer would act as a sounding board during the project formation phase to ensure that the approach being taken to design, procurement, and risk management will prove to be acceptable to the independent engineer and the lead arrangers during due diligence and enable Financial Close to occur.

55 In due course, it is possible that the lead arrangers might accept the novation of the shadow independent engineer to act as the banks’ independent engineer (there are precedents for this). If not, the shadow independent engineer could provide a valuable liaison with the actual independent engineer.

Risk management framework and procurement plan

56 In order to manage the construction risk from now until Project Sanction and Financial Close, and thereafter during execution, but, most importantly, to provide a vehicle for persuading the banks’ independent engineer that a reasonably low contingency amount should be adequate, the Owner needs to finalise a risk management framework. This should work principally at the macro, or package level.

57 Ideally, it should be an industry-standard system or methodology, but if one doesn’t exist then it will have to be developed.

58 It should be separate from, but broadly coherent with, the micro-level risk register.

- 59 It should address the top 3 or 5 principal risks in each activity or package and set out the contractual mitigants and actions that would be taken if the risk were to eventuate. It should also address key strategic risks that threaten the project (eg the Strait of Belle Isle) or could affect a number of packages.
- 60 The framework should include all the generic risks such as:
- 1 Estimation
 - 2 Contract price
 - 3 Contractor performance
 - 4 Contractor dispute
 - 5 Contractor creditworthiness
 - 6 Interface
 - 7 Delay
- 61 For each activity/package these generic risks should be quantified in terms of a contingency amount in C\$. At the outset the contingency would be set to include all the above risks on the basis that all packages would be let on a cost-plus basis. Clearly, different activities have very different underlying risks, so might be set at, say, 20% for HVAC transmission but at 100% for dam construction.
- 62 Contract price risk will be a function of the scope of the package, the underlying risk in the activity, the risk that the Owner seeks to transfer, and the depth of - and the current activity in - the relevant contractor market. Risk can be traded off for a higher firm price.
- 63 For each activity or package there will be a range of contract forms and risk transfers that could be appropriate, from collaborative, cost-plus, target price, through to fixed price turnkey. For target cost contracts there will be choices as to the most appropriate gainshare mechanisms and limits of liability. For fixed price turnkey contracts there will be decisions to be made (and supported by evidence) regarding the appropriate rates of liquidated damages and liability caps.
- 64 The procurement plan therefore needs to be drawn up within the risk management framework in order to be able to demonstrate that the approach to procurement is designed to achieve the minimum overall construction cost budget (ie base plus contingency) given the underlying risks and the nature of the contractor market. The purpose is to create an "open book" for the independent engineer to review.
- 65 As procurement proceeded, one would expect to see the overall level of contingency reduce as the base figure rose to reflect actual tender prices and greater risk transfer. Ideally, the total figure should fall.
- 66 The risk contingency should be held by a senior manager within the Owner, with a formal procedure required for the release of contingency within the budget. It should be made clear to all those involved in the project that risk is to be held at this level and not reserved at functional or package level. Double reserving for risk itself carries the considerable risk of creating an apparently uneconomic project prior to Project Sanction.
- 67 The treatment of delay within the risk management framework should be considered carefully. The value of time in terms of First Power and Full Power needs to be analysed and communicated at all times within the Owner. If offtake contracts have been negotiated on a non-firm basis, or to start at a backstop date, then the value of time will be limited to IDC costs. On the other hand, an aluminium smelter offtake contract would be exposed to high rates of liquidated damages.
- 68 Managing projects to time represents a powerful discipline that should not be forgone lightly. However, time is ultimately about money, and it is the outturn project cost that matters. Time has a finite value.

Risk envelope objective

69 As discussed in the Introduction, lenders will have an approach to the way that the project is being managed and risk addressed in its own right. This is sound practice, especially in the light of the sub-prime fiasco. However, their ultimate view of construction risk will be affected by the extent to which it has been mitigated in a way that preserves the economics of the project from their perspective.

Funding sufficient

70 Firstly, this means that they will need to be assured that construction costs can be funded to achieve completion. Clearly, if the project fails to achieve completion then the lenders stand to lose all the money they will have lent.

71 They will therefore expect the construction budget to include an appropriate level of identified contingency (which will have been reviewed by the independent engineer) and the funding plan (project finance debt and committed shareholder funding) established.

72 In addition, they will plan for a further amount of potential cost overrun on which they will be advised by the independent engineer. This strategic, or unidentified, contingency will also need to have committed funding, split between a committed overrun facility from the project finance lenders and committed shareholder funding.

73 It is notable that even with fixed price turnkey contracts covering 95% of project scope lenders will usually incorporate a 10% cost overrun provision (above a small identified contingency). Rather less prudently, they then frequently agree to fund 90% of the overrun from their overrun facility.

74 As the potential extent of the strategic contingency recommended by the independent engineer increases to reflect the underlying risks of LCP as attenuated through procurement, and the likelihood of its being drawn upon also increases, lenders are likely to insist on a much greater proportion of committed funding from the shareholder.

75 The question will then arise as to whether the shareholder is willing to make such a commitment, and, if they are, whether the lenders will regard the shareholder as good for the money.

Project still economic

76 Secondly, assuming the project achieved completion, lenders would then need to be assured that they have a reasonable prospect of having their loans repaid. This prospect is measured by the various cover ratios that lenders use.

77 If, as envisaged, some of the construction risk is to be shared with the offtakers then this will serve to attenuate the reduction in cover ratios experienced by the lenders. Clearly, if the lenders' proportion of overrun funding is limited to the proportion of the risk shared with the offtakers then their original base case cover ratios will be preserved.

78 Such risk sharing with the offtakers would probably mean that they would wish to appoint their own independent engineer to review the construction risk. The lenders might also have concerns regarding the credibility and competitiveness of the offtake contracts once their prices were adjusted to share the cost overrun.

Base costs and the Banks' Base Case

79 What implications does this have for the Owner's approach to the trade-off between base cost and contingency?

- 80 In principle, lenders should calculate the size of the project finance loan facility they are prepared to advance to LCP by:
- 1 projecting the future revenues of the project, making assumptions regarding hydrology, availability, indexation, and spot or medium-term offtake prices
 - 2 calculating the NPV (discounted at the loan interest rate) of net revenues after operating costs and tax
 - 3 dividing this figure by their desired cover ratio, which should reflect their perceived risks associated with the net revenues and their exposure to construction risks
 - 4 testing this Base Case loan amount with sensitivity analysis to confirm the adequacy of the Base Case cover ratios
- 81 The calculation of the Base Case loan amount has no connection with the cost of construction. The gap between the base cost and the Base Case loan amount is therefore a residual and has to be met entirely by the shareholder.
- 82 The Owner therefore has just as much an interest in ensuring that increases in base cost represent value for money in terms of reduced contingency as it would if the project were entirely shareholder funded. Indeed, relative to the shareholder funding, the Owner has say 5x more interest in economising on base costs when it is funding only 20%.
- 83 Others things being equal, the Owner and shareholder have a strong interest in preferring lower base costs and higher contingency amounts. Identified contingency may not be fully required, whilst fixed prices are fixed prices. This preference is even reinforced to the extent that the lenders are prepared to fund part of the strategic contingency.
- 84 This then is a highly pertinent example of the tension between lenders and owners referred to in the Introduction. Were the Owner to pursue its preferred trade-off extensively then the approach would quickly lose credibility with the independent engineer.
- 85 So how to proceed? The Owner must convince the independent engineer that they are adopting a prudent approach to procurement. Within the bounds of prudence, however, the Owner may choose to adopt a lower base cost than might otherwise have been selected and allow the independent engineer to impose a higher contingency.
- 86 To sum up, whilst the approach to procurement needs to be carefully planned within the overall risk management framework, this on no account means “fixed price at any cost”; it means “fixed price, where appropriate”. The more rigorous the approach taken to procurement planning, the more likely will the Owner be able to persuade the independent engineer to approve an approach that does not always adopt a fixed price solution.

Project formation network

- 87 The formation phase of a complex project is frequently more complex than the project itself. Partly because it involves soft activities, and partly because it is carried out separately from the engineering, it frequently suffers from a lack of planning.
- 88 It is clear from the foregoing recommendations that the commercial, financial, design, and procurement workstreams during Phase 3 (and now Phase 3A) are highly interrelated. Moreover, design and procurement effort is being brought forward from the Execution Phase with an associated complexity of activity. In order to inform and relate to that activity, activities within the other workstreams will also need to be brought forward.
- 89 Much of the effort during the project formation phase will involve a cumulative confidence-building exercise with all the stakeholders, whilst at the same time maintaining the tension with many of those same stakeholders that a “Go” decision at Project Sanction still requires their contribution to the project’s economics. Such a communication strategy has to be carefully managed, and therefore planned.

90 The commercial and financial workstreams are working toward greater detail regarding their methodology and approach this will need to be consistent with the design and procurement effort, and co-ordinated critical path progress plans will need to be developed. This will need to be captured in much more detailed Level 2 and Level 3 networks for Phases 3 and 3A leading to Project Sanction and Financial Close.

Variegated project risk

91 The nature of the underlying risk within the scope of LCP is highly variegated. It includes:

- 1 Low-risk commodity supply and erection with many potential suppliers and contractors, multiple potential workfronts, low geological risk, and low interface risk: **HVAC transmission**
- 2 High-risk specialised supply and installation with two or three potential suppliers and installers, a single workfront, high geological risk, and high interface risk: **Strait of Belle Isle HVDC subsea link**
- 3 Low-risk specialised supply and installation with three or four potential suppliers and installers, two workfronts, low geological risk, and medium interface risk: **HVDC converter stations and lines**
- 4 Medium-risk specialised supply and installation with three or four potential suppliers and installers, multiple workfronts, low geological risk, and medium interface risk: **turbine-generator sets**
- 5 High-risk construction with a few credible contractors, a single workfront, very high geological risk, and high interface risk: **dam excavation and fill**

92 As recommended above, these activities merit very different approaches to procurement.

93 The **Strait of Belle Isle HVDC subsea link** involves such very high underlying risk combined with shallow depth of market and high market activity, and is of such a strategic nature, that its procurement should be prioritised and advanced and every effort made to secure factory and installation slots. Thorough marine surveys have already been carried out to plot routes through trenches that minimise scour risk. Even more detailed pre-installation surveys would probably be carried out by the installers in order to reduce geological risk as much as possible. The possibility of letting this package as a fixed-price turnkey contract should therefore be investigated.

94 The **dam excavation and fill** is also of such a high-risk nature, involving high geological risk that cannot be entirely reduced by borehole surveys, that a fixed-price approach is probably ruled out. The close integration of the spillway excavation and the rockfill dam construction would indicate a single contractor, but reliance on a single contractor in such a remote location for such a strategic package would also carry risk. It is possible that a multiple contractor, multiple workfront approach, accepting the consequential heightened interface risk would give the Owner the best way of managing the overall risk.

95 It is possible that the risk associated with the **dam excavation and fill** can neither be reduced nor mitigated. It is also possible that any attempt to reduce or mitigate the risk would be viewed with scepticism by the independent engineer, so that any reduction in identified contingency would simply be replaced by an increase in strategic contingency. Assuming that was not viewed as a fatal flaw by the independent engineer, then it might be possible to retain this as a high-risk activity with a high contingency amount, so long as the risk over the rest of the project scope was moderate.

96 This might mean that more fixed-price contracts would have to be let over the rest of the project scope than would otherwise be preferable. To put this in perspective, the estimated cost of the **dam excavation and fill** is approximately C\$ 0.5 bn, compared with a Full Power scope cost of about C\$ 6.0 bn. A 100% contingency on this would be equivalent to 8% on the full project scope base cost.

Project management resources

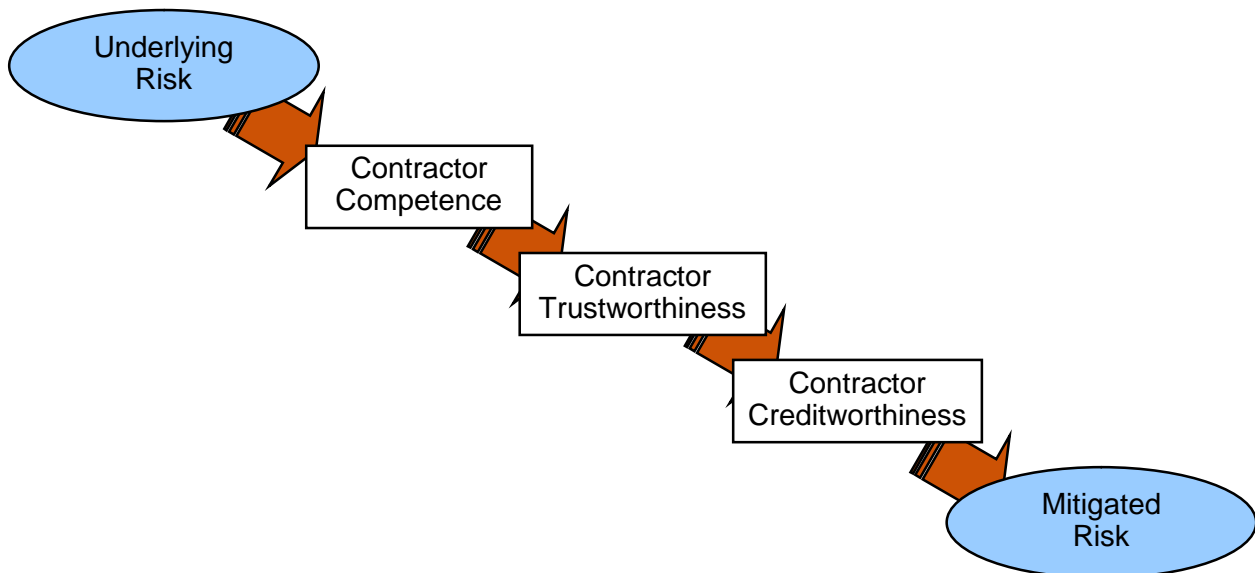
97 The bringing forward of design and procurement activities clearly has implications for staffing requirements, both in-house and contracted. Activities to recruit and procure these should be accelerated. There are sound engineering and procurement reasons to procure by way of functional specifications, but a further advantage is the reduced resource requirement and lead time to tender.

Interface with rating agency methodology

- 98 Both Standard & Poor's and Moody's have recently published methodologies designed to categorise construction risk.
- 99 It would be useful exercise to apply these methodologies to LCP in a rapid manner to help to identify possible fatal flaws and areas to concentrate upon.
- 100 Depending on the results of this rapid study, it would probably be worthwhile developing an interface with the risk management framework that would score LCP's construction risk according to the rating agencies' methodologies. This would help to monitor the likely perception of construction risk as project formation proceeded towards Project Sanction and Financial Close, and would obviously facilitate discussion with the rating agencies if and when they began a rating assessment.

Contractor credit risk

- 101 This is an important element in the overall project risk, which needs to be managed throughout the procurement and execution phases, since it affects the effectiveness of the risk mitigation that the Owner is seeking to achieve through its procurement plan, as illustrated below:



- 102 There are a number of agencies that provide trade credit rating services for the universe of limited liability companies, such as Dun & Bradstreet, Coface and Standard & Poor's.
- 103 Some of these services simply allocate companies to, say, 5 categories, according to their ability to repay relatively small sums. The more sophisticated services might give the client a probability of company failure over a medium-term horizon.
- 104 Larger companies are likely to be rated by one or more of the credit rating agencies, but many contractors are not rated.
- 105 Accordingly, there has not been to date a readily accessible external service that can provide a consistent rating process for contractors taking on contracts in the C\$ 10s or 100s of millions range, although it is possible that they might provide a customised serve in this regard.
- 106 But the principal flaw in the credit rating approach is not to address the nature of the credit risk being taken. Firstly, it is a contingent obligation, rather than a debt, but one where, if it does eventuate, it implies that the company has made a substantial loss as well as needing to find the amount in cash. Secondly, and this is true for many well-known contractors, the loss could be very substantial relative to the size of the company and consequently could itself trigger company failure.

107 Contractor creditworthiness is therefore a function of the combination of two credit characteristics: a company's longevity (its probability of survival outwith the contract, but for the life of the contract) and its resilience (its probability of survival in the event that the contract risk eventuates), as shown below:



- 108 This broad methodology has been applied to the assessment of bids to construct a new nuclear power station, but has mainly been used as a ranking tool for financial strength in order to prequalify contractors.
- 109 We would strongly recommend that a rigorous approach is taken to the prequalification of the bulk of contractors and suppliers seeking to join LCP's accredited list. This might result in their being graded according to the size and nature of the contract that they could reasonably be expected to take on.
- 110 However, for the say 10-12 largest contractors or suppliers for the big-ticket specialist construction or equipment packages, it would not be sensible to exclude any qualified company from a tender list.
- 111 Accordingly, we would recommend that LCP should draw up a list of such contractors and task us with assessing their creditworthiness with a view to informing the approach to be adopted towards risk transfer and the bonding structure demanded of each contractor.

PricewaterhouseCoopers

12 February 2008

Glossary

Base costs

The sum of all required construction costs, representing fixed prices where those have been obtained, otherwise the best estimate (most likely or P50) for non-fixed price packages, and excluding any contingency.

Identified Contingency

The scope for cost growth from the base costs, usually calculated on a specific, or bottom-up, basis. It is usually included within the construction budget and its disposal controlled by the project manager. The amount would be designed to be sufficient to meet cost growth 90% of the time.

Unidentified Contingency

The scope for cost growth arising from strategic, unidentified, or unappreciated risks. It is unlikely to be set with a specific probability level in mind, but conceptually should be at least at the 95% level (the required breakeven success rate for a project finance portfolio) and should be set at a higher level than this (say, 97.5% to 99%).