



Cambridge International AS & A Level

BUSINESS

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Paper 3 Business Decision-Making

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INSERT

1 hour 45 minutes

INFORMATION

- This insert contains the case study.
- You may annotate this insert and use the blank spaces for planning. **Do not write your answers** on the insert.



This document has **4** pages.

Lithium Battery Metals (LBM)

Lithium is an essential raw material used in batteries for electric vehicles, smart phones and other products. LBM has developed techniques to detect lithium using mapping technology. LBM sells its survey results to other mining companies. LBM's annual revenue is less than \$1 million and it is losing \$2–3 million per year. LBM is planning to start its own lithium mining operations in country G, where it is based. 5

LBM has researched and developed two effective ways of mining lithium. The first is hot water mining and the second is hard rock mining. LBM became a public limited company one year ago. LBM has substantial finance obtained from grants, shareholders and crowdfunding available for investment. LBM's revenue is forecast to rise rapidly once mining begins.

Sales forecasting 10

Annual global demand for lithium is rising considerably and forecasts show world supply will not meet demand after 2030. As LBM establishes its own mining operations it will need to forecast sales. There are likely to be variations in demand for electric vehicles and smart phones over time. It is difficult to vary the output from lithium mines at very short notice. Holding inventory of this raw material involves high costs. Alternatives to lithium are being developed. 15

Concerns of government

LBM is the only business in country G planning to mine lithium. The government is very concerned that:

- demand from industry for lithium in country G will not be met in the long-term
- LBM is currently unprofitable
- LBM may be a target for a hostile takeover from a multinational business. 20

The government is therefore considering nationalising LBM.

Hot water lithium mining

Despite local opposition, LBM plans to open its first mine in four months' time. Hot water from three kilometres underground will be pumped up to a factory where lithium and possibly other rare raw materials will be extracted from the water. After the extraction process the hot water can then be used for heating local housing. The Operations Director, Astor, estimates the project has a 15-year life span. However, future cash flows beyond six years become increasingly uncertain. 25

Table 1.1 shows the data used by LBM in the decision to go ahead with the hot water mine. The data excludes costs and revenues from extracting other raw materials that may be found in the water. LBM has enough finance for the hot water mine if there are no adverse variances to the budget. 30

Table 1.1: Investment appraisal for hot water lithium mining

Year	Cash outflow (\$m)	Cash inflow (\$m)	Net cash flow (\$m)	Discounted net cash flow at 8% (\$m)	
0	(200)	0	(200)	(200.00)	35
1	(120)	0	(120)	(111.11)	
2	(80)	120	40	34.29	
3	(80)	160	80	63.51	40
4	(80)	170	90	66.15	
5	(80)	180	100	68.06	
6	(80)	200	120	75.62	
7-15	uncertain	uncertain	uncertain	uncertain	

Human resource management (HRM) and the hot water mine 45

LBM uses a 'soft' HRM approach for its current 35 graduate employees. They are given delegated powers and decide their own work patterns individually or in self-selected teams. Many of these graduates are involved in using the mapping technology to find new mines and developing mining techniques.

LBM has started recruiting 150 people to be employed at the hot water mine site. Ten new employees will be technology specialists who will closely supervise the work. The other new employees will be trained to operate machinery. The directors plan to use a 'hard' HRM approach for these machine operators. 50

Hard rock lithium mining

LBM is also planning to open a hard rock lithium mine in two years' time. Lithium is found inside hard rock layers underground. LBM plans to drill into these, bringing rock to the surface to be treated to extract lithium. Astor has identified a suitable area 500 metres underground. Table 1.2 and Figure 1.1 show the results of some of his operations planning. The data was obtained from mining industry sources, suppliers of drilling equipment and the LBM Research and Development (R & D) team. 55
60

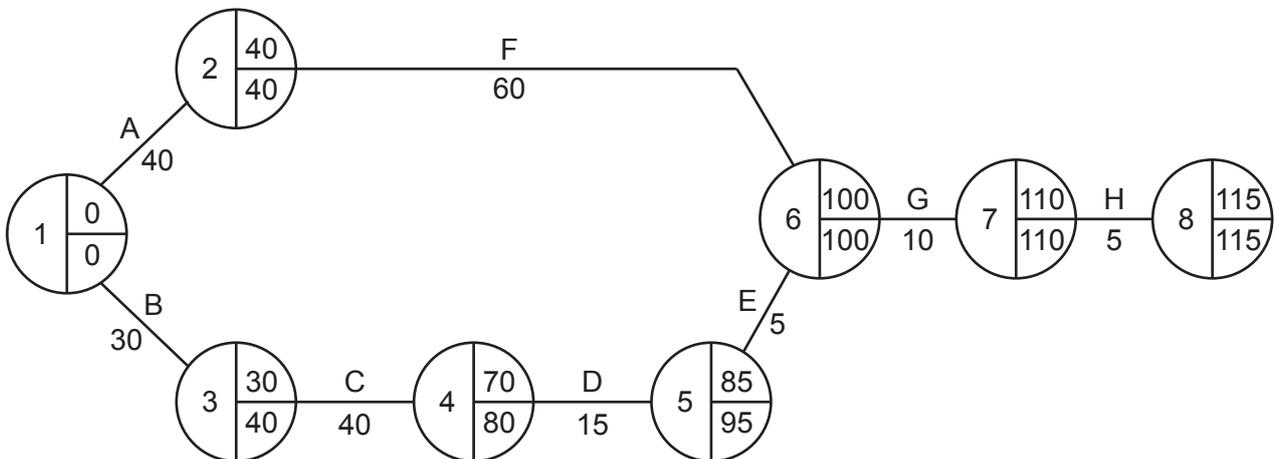
Table 1.2: Hard rock lithium mining project activities used in Critical Path Analysis (CPA)

Activity	Activity
A	Obtain planning permission
B	Design drilling machinery
C	Obtain drilling machinery
D	Install drilling machinery
E	Test drill exercise
F	Build lithium extraction factory
G	Test quality of lithium
H	Review the project

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Figure 1.1: Network for hard rock lithium mining project (durations in weeks)



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