Teach yourself how to build a Business Case for any industry including mining

1j Hands On Modelling: Cashstream #2 – Capex

near Bulawayo Zambia

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This module contains personal opinions.





Cashstream #2: Capital Costs

The 'Capex' in a model has two parts as shown in this simplest example ...

Part A: Capex

Part B: Tax deductions for capex

To be used later in the calculation of taxes

Years ->	Units	Total	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8
Cashstream 2: Capital Costs										
Major Development Capex										
3 Dec 2020 2014 Carlo Embre: Email - Initial capex estimates										
Major Development Capex	A\$ millions real	123	25	98						
Ongoing Capex										
5 Dec 2020 2014 Carlo Embre: Email - on-going capex @ 5% of total in	itial capex									
ongoing capex	% of initial capex		5%	5%	5%	5%	5%	5%	5%	5%
ongoing capex	A\$ millions real	31	0	0	6	6	6	6	6	0
Cashstream 2: Capital Costs	AS millions real	154	25	98	6	6	6	6	6	0
Years>	Units	Total	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8
Tax deductions for Capital Expenditure										
This assessment: -										
15Nov 2020 G Rose: For this business, tax legislation reads that the bul	k of the capex is deduct	ed over 5 years	straight line.	So in the cal	culations bel	ow the dimir	hishing value	rate is 100%	/5 years *150	0% = 30% .
23Nov 2020 G Rose: And the tax legislation is that deductions for new e	quipment start with cor	mmercial produc	tion, with cap	ex being ded	ucted fully in	the year in v	which it is spe	ent.		
Tax Deduction for Capital Expenditure	% diminishing value		30%	30%	30%	30%	30%	30%	30%	30%
23Nov20 G Rose, Accountant emailed that \$7M has been spent on the p	roject (and is capitalise	ed in the account	s) but only \$2	2M remains u	inclaimed dec	ductions in th	ne tax returns			
Undeducted capex - opening balance	A\$ millions real		2	27	125	92	69	52	41	0
Undeducted capex - added to pool	A\$ millions real	154	25	98	6	6	6	6	6	0
Undeducted capex - in pool	A\$ millions real		27	125	131	98	75	58	47	0
Undeducted capex - available for deduction	A\$ millions real	409	0	0	131	98	75	58	47	0
23Nov20 G Rose: Unclaimed tax deductions can be claimed in the final	year of use.									
tax deduction for capital expenditure	A\$ millions real	156	0	0	39	29	22	18	47	0
Undeducted capex - closing balance	A\$ millions real		27	125	92	69	52	41	0	0
Check if deductions = capes		OK								

Cashstream #2: Capex

Here is a slightly more detailed example ...

Part A: Capex

Part B: Tax deductions for capex

To be used later in the calculation of taxes (Usually this is much easier than you might expect.)



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Calendar Year>	Units	Total	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8
Cashstream 2: Capital Costs										
Initial Capex - cash payments										
2020 11 3 M Ramero: Report of capex estimates dated 30/10/202	20. IMPORTANT: This	is the cash expe	nditure rather t	han the commit	ments to contra	cts - which woul	d be earlier.			
Prestrip	A\$ million Real	40	10	30						
Mine Mineral Processing Plant	A\$ million Real	120	50	60	10					
Infrastructure & Utilities	AS million Real	83	30	45	20					
Spares and First Fill	A\$ million Real	12			12					
EPCM	A\$ million Real	56	20	30	6					
Indirects & Contingency Other	A\$ million Real	77	25	45	7					
Initial capex	A\$ million Real	828	265	500	63	0	0	0	0	0
Ongoing Capex - cash payments										
2020 11 3 M Ramero: Report of capex estimates dated 30/10/202	20									
ongoing capex - general	% of initial capex		3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
oppoing capex - major items	AS million Real	373	0	0	25	25	25	25	25	25
ongoing capex	A\$ million Real	433	0	0	25	25	25	50	25	25
Capex - Total cash payments in A\$	A\$ million Real	1,261	265	500	88	25	25	50	25	25
Fores: AS = USS - mid case	2 A\$1.00 = 05\$		0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Cashstream 2: Capital Costs - Mid Case	US\$ millions Real	983	207	390	69	19	19	39	19	19
-										
Calendar Year>	Units	Total	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8
Tax deductions for Capital Expenditure ("tax	depreciation")								
Compute in Nominal terms										
2020 10 21 Peter Card: These deductions need to be computed in Inflator	NOMINAL terms to inc	orporate the ero:	sion of inflation,	then converted	back to REAL ter	ms.				
2020 12 5 D Marcelo: email of the Company's forecast of inflatio	in rate									
Inflation - Australia	% /annum		2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Inflator	from start year 1		1.01	1.03	1.05	1.07	1.09	1.12	1.14	1.16
1. Prestrip										
2020 10 21 Peter Card: The prestrip is treated as an operating cost	and so immediately o	eductible in Aus	tralia.	20	0	0	0	0	0	0
Prestrip	A\$ millions NOMINA	40	10	31	0	0	0	0	0	0
Deductions for prestrip available	A\$ millions NOMINA	41	10	31	0	0	0	0	0	0
2. wine and wineral Processing 2020 10 23 T Braga - Tax Specialist: Mine and mineral processing	le capex is predomini	antly deducted o	ver 5 vears with	balance mainly	v over 10 years	Assume an weig	thed average of	18% straight line	and so use dow	l ble this rate f
Mine	A\$ million Real	120	50	60	10	0	0	0	0	0
Mineral Processing Plant	A\$ million Real	440	130	290	20	0	0	0	0	0
Mine & Mineral Processing	A\$ million Real	560	180	350	30	0	0	0	0	0
Tax Deduction for mine & mineral processing	% diminishing valu	36.0%	182	301	32	0	0	U	U	0
2020 10 23 T Braga: Unclaimed deductions for past capex have	an opening balance o	f A\$3 million.								
Undeducted PAST capex - opening balance	A\$ millions NOMINA	L	3	185	545	369	236	151	97	62
Mine & Mineral Processing	A\$ millions NOMINA	574	182	361	32	0	0	0	0	0
Undeducted capex deductions avail for mine & mineral proc - step 1	A\$ millions NOMINA	576	185	545	208	133	235	54	35	22
deductions avail for mine & mineral proc - step 2	A\$ millions NOMINA	577	0	0	208	133	85	54	35	22
checl	ĸ	OK								
3. Other Capex incl ongoing capex				la ana mainte a		and the second states of		tenintet line and a		
Infrastructure & Utilities	A\$ million Real	83	30 years with ba	45	8 8	0	0	0	0	0
Spares and First Fill	A\$ million Real	12	0	0	12	0	0	0	0	0
EPCM	A\$ million Real	56	20	30	6	0	0	0	0	0
Indirects & Contingency Other	AS million Real	77	25	45	7	0	0	0	0	0
ongoing capex	A\$ million Real	433	0	0	25	25	25	50	25	25
3. Other Capex incl ongoing capex	A\$ million Real	661	75	120	58	25	25	50	25	25
3. Other Capex incl ongoing capex	A\$ millions NOMINA	757	76	124	61	27	27	56	28	29
2020 10 23 T Braga: Unclaimed deductions for past canex have	an opening balance o	f A\$13 million								
Undeducted PAST capex - opening balance	A\$ millions NOMINA	L	13	89	212	224	205	191	202	189
3. Other Capex incl ongoing capex	A\$ millions NOMINA	757	76	124	61	27	27	56	28	29
Undeducted capex	A\$ millions NOMINA	602	89	212	273	251	233	246	230	218
deductions avail for other & ongoing capex -step 1 deductions avail for other & ongoing capex - step 2	A\$ millions NOMINA	770	0	0	49	45	42	44	41	39
checl	¢	ОК								
4. Total Deductions for Capex	AC	1 200	10	21	267	170	127	00	76	61
Convert back to Real terms	A THINONS NOMINA	1,388	10	31	257	178	127	99	/6	61
deductions for capex incl prestrip - available	A\$ millions REAL	1,196	10	30	244	166	116	89	67	53
5. Check: Check: total NEW capex to be deducted	A\$ million Real	1,261	265	500	88	25	25	50	25	25
check	>	OK								
Check: PAST capex to be deducted	A\$ million Nominal	0	16	500		25	25	50	25	25
LINECK: TOTAL Capex to be deducted	AS million Real	1,277	281	500	88	25	25	50	25	25
erosion of tax deductions by inflation 2020 10 21 Peter Card: So the impact on NPV of the erosion of tax	deductions by inflat	81 tion is this abov	e amount multic	lied by the tax i	rate and discour	nted by a numbe	r of years - shoul	ld be relatively m	inor!	
Calendar Year>	11	Tetel	V-4	V-2	V-2	V. A	V.F	F vec	V-7	V-0
	Units	Iotal	۲r1	Yr2	۲rЗ	۲r4	rr5	D ^{Yrb}	۲r/	۲rð
Cashstream 3: Operating Costs										

This module covers Part A: Capex

- a. The Big Picture
- b. Layout
- c. Ongoing capex
- d. 'Capitalise it!'
- e. Should you generate the capex estimates from bottom-up?
- How to avoid common errors



Part A: Capex - Understand the 'big picture'!

- Of the four cashstreams, Capex, is likely to be the least detailed and most summarized part of the business model.
- Along with Opex, it is likely to be less important than Revenue but more important than Taxes.
- Work closely with the engineers and estimators and get them to verify the capex section of your model.

Do not get trapped by others into being expected to know all about capital and operating costs 'because you handle financial matters'. If data is missing or looks wrong do not let others put the onus back on you. Be open and explain that capex is not your area of expertise. Discuss how this data can be estimated. Be wary of people trying to trip you up.

- I usually set up my capex section so that the engineers/technocrats can recognise their estimates.
 (I might include their items that actually are 'expenses' and so should be in the opex it really does not matter if an item is included under capex or under opex so long as it is treated correctly when calculating tax deductions.
- Do not include items like 'interest payments during construction' because these are part of the 'financing'
- Check that the ongoing capex is sensible too often it is forgotten or grossly understated because it reduces the viability!
- Cross-check your totals of initial capex and ongoing capex with the source data.
- But do not get lost in detail.
- Most important: The business model works in cash as it is spent.

Many capital estimates show when the money is <u>committed</u> over the years/months, which may be earlier than when it is outlaid in cash. The estimators/engineers may have to make their best estimate of how the cash will be spent over time.



Layout of 'Cashstream #2: Capex'

This simple example illustrates a typical layout of Capex: -

Blue Font = fresh data input Green font = referenced here from another worksheet Black font = calculation



In a long, detailed and complex model, 'Cashstream #2: Capex' is likely to have its own worksheet

Increase the detail in the Capex Worksheet only if it makes a difference to the results and to peoples' understanding. Do not be tempted to add more detail just to make the capex look more credible Do not get carried away with highly accurate tax deduction categories until you have read 'Capex Part B' below.



Ongoing Capex ...

There are many different names for 'ongoing capex' and it does not matter which are used as long as they portray the capex properly. Two common terms are: **Development Capex** – expenditure for a later expansion of facilities so is lumpy, or zero **Sustaining Capex** – expenditure to keep the existing facilities going.

Under-estimating ongoing capex has been a major deficiency of evaluations: -

Too many models have completely omitted or grossly under-estimated the costs – too often deliberately to enhance project returns. When discovered later it can significantly reduce NPV and IRR - and greatly embarrass you!

Sometimes it can be difficult to get expert engineers/estimators to make a forecast; especially if the project is marginal and this might tip it under. As default in a mining/metallurgical facility a starting point that you might use is 2% to 4% of initial direct capex.

It is common for 'ongoing' capex to be omitted/understated in the first years of operations.

Sustaining capex possibly can be tapered and ceased in the final years but this will hardly improve NPV if it is a long time off.

If a facility is expanded then the sustaining capex is likely to increase proportionately.

Be wary of people with a vested interest who may want to grossly understate ongoing capex or even dismiss it.



Is it capex or is it an operating expense?

In a business model, most costs will fall naturally into either capital costs or into operating expenses. Sometimes there will be an item or two included in an estimate of capital costs that actually should be shown as an operating expense or vice versa. Fortunately in a business model it does not matter if you include any particular item amongst the capex inputs or amongst the operating expenses.

- You can choose to include any particular item in one or in the other if that helps others to recognise your input data and therefore to more readily understand your business model.
- <u>All you need to do is to treat it correctly when calculating the tax deductions</u> if it is a significant amount. Opex is deducted immediately whereas capex is deducted over years. This is straight forward, as will be explained more fully in the next module which covers tax deductions for capex. If the item is minor then you probably do not need to do the extra computations.

Accounting versus Tax Returns vs Business Models

Accounting: When creating your business model you are not replicating an accounting statement.

• A business model does not use Accounting definitions of capital and of operating expenses. In Accounting, feasibility costs might be 'capitalised' and spread over future years whilst closure costs would be brought forward.

Tax: When creating your business model you are not replicating a detailed tax return.

• But a business model does use the country's Tax Office's definitions of capex and opex when calculating the tax deductions for capex and opex. If you do not have a tax expert advising you, then you may need to use the internet to research the tax laws of the country where the business is located.

Business Model: When creating your business model you should keep your computations in perspective. When doing evaluations at concept and pre-feasibility stage the difference between treating any item as capital versus operating expense in the calculation of tax deductions is unlikely to significantly impact the evaluation and hence the decision-making. In the final feasibility model you may need to be more exact; especially to give your model credibility in the eyes of accountants and tax specialists who may audit it.



"Capitalise it!"

Some operational and technical people have a strange idea that if you "capitalise" a major cost that will improve the **business case**. The project leader may suggest you do this. But don't because you cannot and because the opposite is true: -

- Inside your company Accountants follow strict, world-wide accounting rules that determine if an item is 'capital' or an 'operating expense'. An Accountant cannot simply "capitalise" an operating expense if it is not capital according to global accounting rules.
- Inside your company, your **Business Model** will compute income tax in the 'tax' section according to the tax laws of that country. There is no discretion to reclassify an item. (Tax rules may differ from Accounting rules.)
- As already explained: When doing a **Business Model**, you can put a capex item into the 'opex' worksheet or an opex item into the 'capex' worksheet if that helps others to recognise your input data and understand your model. But you must give it the correct treatment further down the model when computing income tax.
- The biggest fallacy of 'Capitalise it!" is that while it might improve the accounting profit in a particular year, it would actually decrease the overall business case and its NPV. An item classified by tax laws as 'capital' is deducted from revenue over some years. By contrast an operating expense is deducted in its year of expenditure. The overall numeric tax deduction/benefit would be the same in both cases (in Nominal Terms). The difference is that if it is an operating expense that tax benefit is realised in the year of expenditure, the income tax is lower and so the net cashflow is higher in that year. But if it is a capital deduction then that tax benefit is spread over a number of years so the cashflow benefit is not upfront but spread over ensuing years. "Capitalising it" makes the NPV lower for two reasons: firstly the tax benefit is later and secondly because the tax benefit in Real Terms is eroded by inflation.

"Capitalise it" backfires!



• So why would they say that? In the Company Accounts the rules have the reverse effect. They would make the accounting profit look better in that first year of expenditure but worse in ensuing years! 'Capitalising it' would mean that that the expenditure in cash on a capital item is not recognised in full in its year of expenditure but spread in some logical way over ensuing years. (Of course, a business model is about cashflow so it has to recognise the cash when it is spent)

Should you generate the capex estimates from bottom-up?

NO! The capital estimate should be computed by experts in their own workbooks, external to your model. This is a specialist skill where the main capex units may look straight forward but the inter-connections, peripherals and the indirects need lots of expertise.

Do not waste everyone's time by reproducing the expert's capex estimate from bottom-up inside your model. Instead take the expert's output and summarise it in your model. The exception may be the 'indirects' as explained below.



How to efficiently and effectively model capex ...

- Capital estimates frequently are estimated and published on a commitment basis rather than as the cash is spent. So you will need to work with the engineers and estimators to extract the **cash expenditures** on a year-by-year (or other time period) from the various estimates. This may have to be a best estimate, for example as a typical distribution over time, rather than actual item by item calculations. (For example: 30% year1, 60% year2, 10% year3).
- Sometimes you may need to take the lead and compose a best estimate for others to review. Do not fuss over minor capital.
- Do not enter every line item unless you have a specific reason. Instead input the sub-totals of the natural major groupings.
- Usually the 'indirects' in an estimate of capital cost are percentages of direct costs. (For example: contingency = 15% of direct capex). You may want to use those percentages inside your model so that if the estimate of any major capital item is modified then the indirects will be recomputed automatically.
- Interest on capital during construction MUST NOT be included anywhere in your economic evaluation model. It is part of the financing and recognized in the discount rate. (Instead it should be included in the separate "financing model")

How to avoid common errors ...

Capex sourced from overseas: -

- For capex sourced from overseas, check if the estimators have used the same exchange rate as you will use. For example: The initial capex is US\$100 million real. You investigate and find 40% is sourced in Japanese Yen. Next you find the estimator used US\$1=Yen100 whereas your company wants to use US\$1 = Yen110. Your business model should have the capex inputs in their ORIGINAL currencies of sourcing so that one section will sub-total to \$60 million in US\$'s and another section sub-total to Y10 000 million in Yen. The business model will automatically use US\$1 = Yen 110.
- **II. Revising exchange rates:** If later you want to change the exchange rate, the capex will update automatically.

Mistakes in real and nominal terms can be severe: Many capital estimates do not specify whether they are real or nominal. Persist until you get it defined. In your model use full descriptions in the units column like 'US\$ million real'. *Use italics for 'nominal' terms* and vertical for 'real'

Cost Cutting: Many experienced engineers and estimators can forecast capital costs with high accuracy. The problem is when project managers/engineers want 'their project' to proceed for personal reasons. They decide to reduce capital costs so their project will be approved. They apply direct or subtle pressure on estimators and engineers to make their work 'more realistic with current trends' and so pressure these 'experts' to understate capex estimates.

Mismatched capex and production plans: A study can get squeezed for time and so immediate answers can be demanded by senior management. At the last minute, production and sales are increased to improve the economics. In the rush you might forget to revise the capex.

Poor layout: If you source the capex from a number of experts then aggregate them into one cogent worksheet and have it audited. Otherwise errors will creep in such as: omissions, double counting, mis-matching exchange rates, different base date wrong indirects, mismatches, superseded items. If you calculate the capex of any item from the production plan, then have a production plan referenced across (whole rows in green font) to the capex worksheet and use small obvious steps.

Creditors: Probably are needed only in advanced evaluation models

northern Zambia

Zambia: North Luangwa National Park: Desperately searching for a campsite in the unfenced reserve – many lions, hyenas and leopards

inish, two home truths about Studi

- Feasibility Studies often cost far more than anticipated and take much longer.
- Final Approvals both external and internal often take much longer than the engineers allow in their project timelines.