Navigating the Changing World of Reserves and Resources in the Context of the PRMS

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Economic v Commercial

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The presentation material is the view of the collaborators in general, but not necessarily in detail, and not necessarily the view of their employer or SPE. The material is provided to promote discussion amongst the workshop attendees on better understanding of PRMS.

Note: The presentation points out that the AG22 Ch 9 cashflow example, in some areas, is simply "not right"

Topics

- AG22 Ch 9 Cashflow Process - Issues
- Economic v Commercial definitions
- Commerciality Criteria (CC) and Commitment
- PRMS Terms in relation to CC 2.1.2.1 D and Commerciality
- Examples
- Net Cashflow inclusions
- General Process for Cashflow analysis -> Meet CC 2.1.2.1 D
- Take aways
- Questions

AG22 Ch 9 Cashflow Process - Issues

AG22 Ch 9 Cashflow Process has fundamental issues AND does not follow PRMS 2018 guidance …

General Process per AG22 Ch 9:

3.1.0.1). The cash-flow evaluation must incorporate elements A–F above through the following general process:

1. Test that the project is economic.
2. Determine the project life.
   a. Validate the economic viability for undeveloped projects.
   b. Determine undeveloped project commerciality.

Yes, all elements correct

(1) No, must determine "project life" first (ie earliest of technical, license, economic limit) -> cashflows to examine

(2) Require "economic limit".

- AG22 process and model assume that the "economic limit" is at the "maximum POSITIVE cumulative" NCF.
- PRMS 2018 says simply the "maximum cumulative" NCF

(3) This implies that a project that is "economic" may not be "economically viable"

- this does not make sense.
- a project that is "economic" must be "economically viable" and vice versa.

(4) This implies that a project that has a positive cumulative discounted net cashflow at the required hurdle rate is "commercial".

- This must only be referred to as "commercial" when all other commerciality requirements are met and commitment.
- Otherwise, one can have a project that is "commercial" but not "commercial" – this does not make sense.

Economic v Commercial - Definitions

PRMS 2018 has a specific definitions for some terms that are NOT universally understood or consistently used within the industry and other industries

Note this is an "example" NOT a definition. PRMS 2007 has a much better definition of "economic"

- Economic

Glossary: A project is economic when it has a positive undiscounted cumulative cash flow from the effective date of the evaluation, the net revenue exceeds the net cost of operation (i.e., positive cumulative net cash flow at zero percent discount rate).

PRMS 2007 Economic: ***In relation to petroleum Reserves and Resources, economic refers to the situation where the income from an operation exceeds the expenses involved in, or attributable to, that operation.***

- Commercial

Glossary: A project is commercial when there is evidence of a firm intention to proceed with development within a reasonable time-frame. Typically, this requires that the best estimate case meet or exceed the minimum evaluation decision criteria (e.g., rate of return, investment payout time). There must be a reasonable expectation that all required internal and external approvals will be forthcoming. Also, there must be evidence of a technically mature, feasible development plan and the essential social, environmental, economic, political, legal, regulatory, decision criteria, and contractual conditions are met.

Commerciality Criteria and Commitment

Typically, assessment conducted on the "best estimate", however all CC's must be met for "low" and "high" estimates to be "commercial" …

Abbreviation (For the examples)	PRMS 2018 2.1.2.1 Determination of Commerciality requirements (A-G)
Technical	A. Evidence of a technically mature, feasible development plan.
Finance	B. Evidence of financial appropriations either being in place or having a high likelihood of being secured to implement the project.
Timeframe	C. Evidence to support a reasonable timeframe for development.
Economics & Investment	**D. A reasonable assessment that the development projects will have positive economics and meet defined investment and operating criteria. This assessment is performed on the estimated entitlement forecast quantities and associated cash flow on which the investment decision is made**
Market	E. A reasonable expectation that there will be a market for forecast sales quantities of the production required to justify development. There should also be similar confidence that all produced streams (e.g., oil, gas, water, CO2) can be sold, stored, re-injected, or otherwise appropriately disposed.
Infrastructure	F. Evidence that the necessary production and transportation facilities are available or can be made available.
Environmental, Social and Governance (ESG)	G. Evidence that legal, contractual, environmental, regulatory, and government approvals are in place or will be forthcoming, together with resolving any social and economic concerns.
Commitment	Discovered recoverable quantities (Contingent Resources) may be considered commercially mature, and thus attain Reserves classification, if the entity claiming commerciality has demonstrated a firm intention to proceed with development and has met all the above CCs.

Part 1 "positive economics"

Part 2 "meet defined investment and operating criteria"

Ie "production forecast" NOT the "technical forecast"

PRMS Terms in relation to CC 2.1.2.1 D and Commerciality 1/3

Next slide uses PRMS Fig 3.1 to illustrate definitions or descriptions of terms in relation to “economic” for an Undeveloped Project …

The point to note is that the terms form a logical hierarchy

(3) Economically Producible: "A project's production is economically producible when the net revenue from an ongoing producing project exceeds the net expenses attributable to a certain entity's interest"(Refer PRMS 3.1.2.1 and 3.1.2.5). This is from the start of the project and ends at the Economic Limit.

Note:

(1) Cumulative undiscounted NCF from Effective Date > 0, includes development capital but not ADR

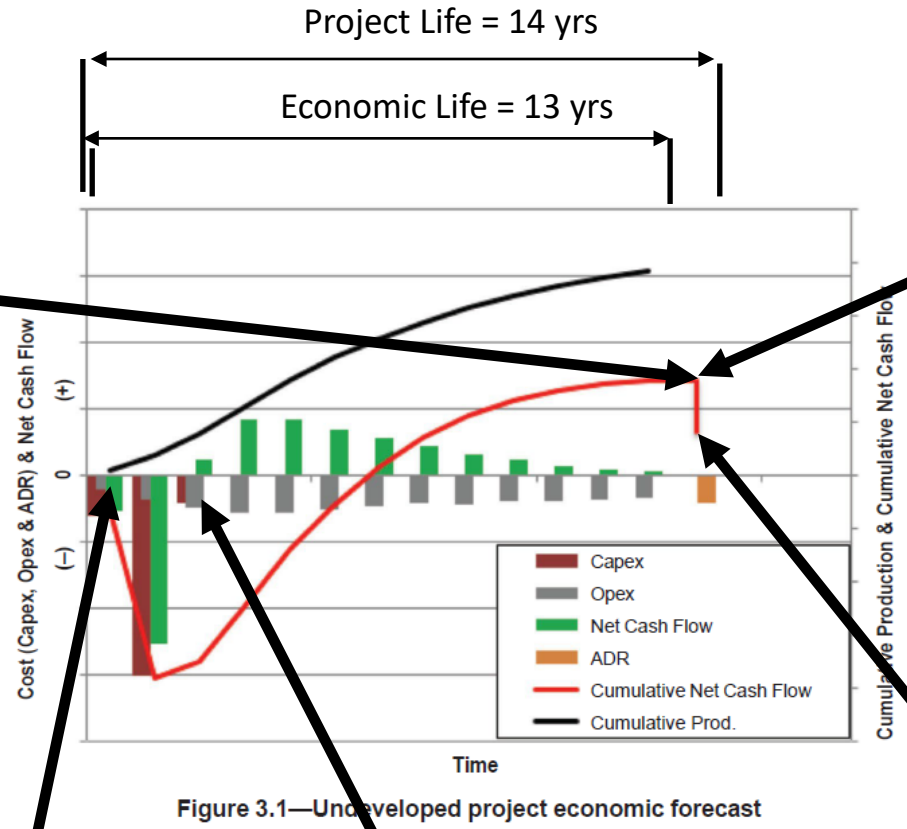


Figure 3.1—Undeveloped project economic forecast

(2) Economic Limit: Time when maximum cumulative NCF for a project occurs

+ Need to consider 3.1.3.1-3.1.3.4

Note:

(1) The Economic Limit is at the limit of Economic Production

(2) The cumulative NCF at this "time" may be positive, zero or negative

(3) ADR is excluded

(4) Undiscounted

(1) "Production from the project is **economic** when the revenue attributable to the entity interest from production exceeds the cost of operation." (PRMS 3.1.2.1). Can see this starts at Year 1 in this case and ends at the Economic Limit.

Note:

(1) The operation refers to the operation of production so includes all costs attributable to production (i.e. production costs) and does not include development capital or ADR

(2) NCF needs to be positive for 1 or more years

3.1.3.3 … no development costs can exist beyond the Economic Limit date => Economic Limit can not be before all dev capital costs expended. i.e. year 3 in this example.

(4) Economic = Economic Viability: Cum undiscounted NCF >0

Note:

(1) For an undeveloped project, the operation comprises development, production and ADR

Note: This example has the earliest truncation at the Economic Limit. Tests are done at the earliest truncation of technical, contract or economic limits (PRMS 1.2.0.4).

PRMS Terms in relation to CC 2.1.2.1 D and Commerciality (3/3)

Terms form a hierarchy from left (lowest) to right (highest)

Project	Economic Production	Economic Limit	Earliest Limit	Economically Producible	Economic = Economically Viable	Meet Defined Investment and Operating Criteria	Meet all other CC and Commitment
XXX	Yes or No	Time	Technical or Contractual or Economic	Yes or No	Yes or No Yes => "Positive economics" => Part 1 of CC 2.1.2.1 D achieved	Yes or No Yes => Part 2 of CC 2.1.2.1 D achieved	Yes or No Yes => Project is Commercial and has reserves assigned

Examples (1/9)

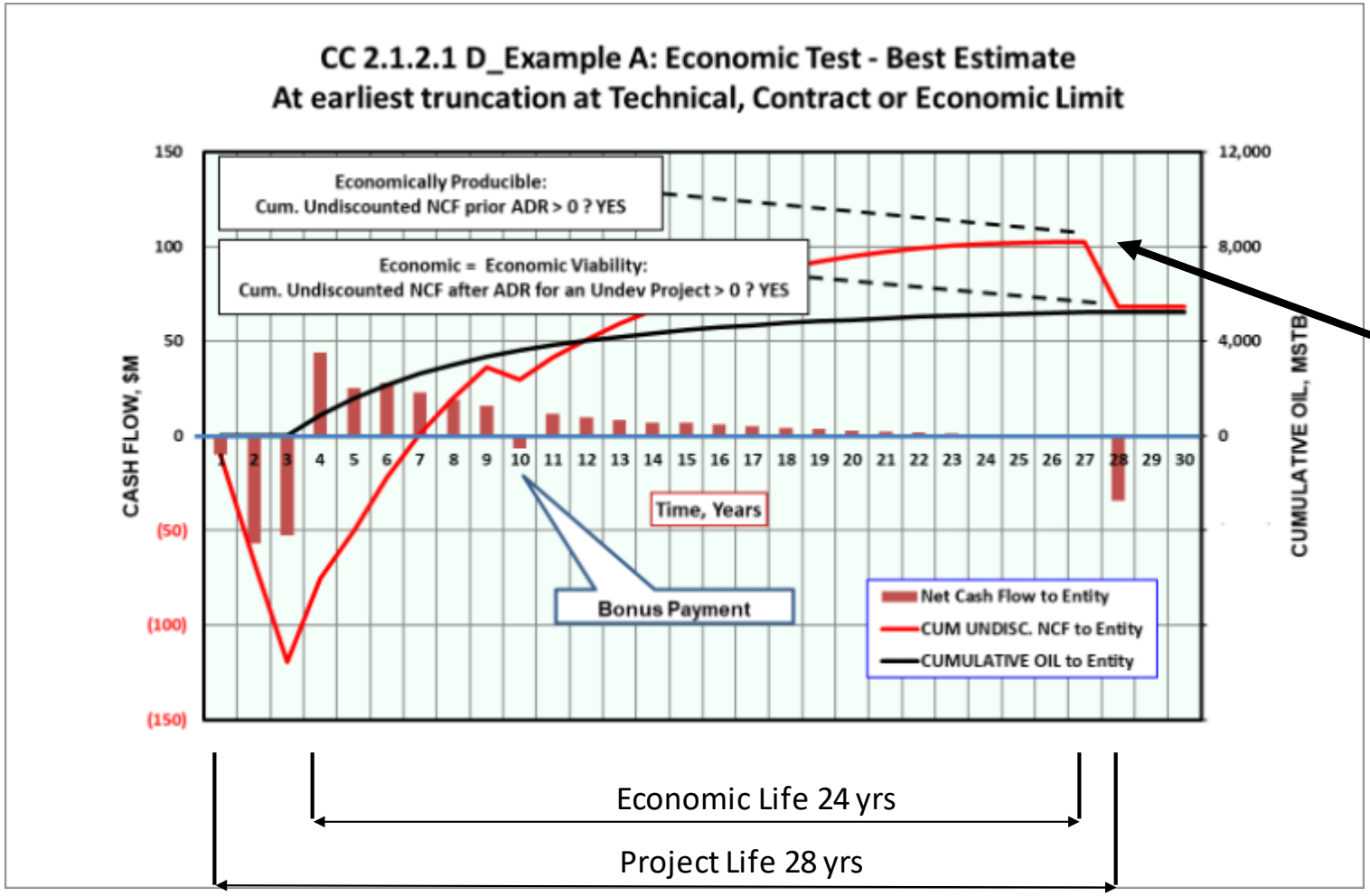
Purpose of slides is to use PRMS Fig 3.1 and the form of slides from AG22 Ch 9 example to illustrate definitions or descriptions of terms in relation to “economic” for an Undeveloped Project …

The only change in each graph is increasing Capex from $100 Million in steps to $225 million

Examples (2/9)

Example A – Redo of AG22 Ch 9 Example Cum Undiscounted NCF after ADR - $100 Million Facilities Capex

Has "positive economics" (shown) and "meets defined investment and operating criteria" (not shown)



Economic Limit: Time when maximum cumulative NCF for a project occurs

+ Need to consider 3.1.3.1-3.1.3.4

Note:

(1) The cumulative NCF at this "time" may be positive, zero or negative

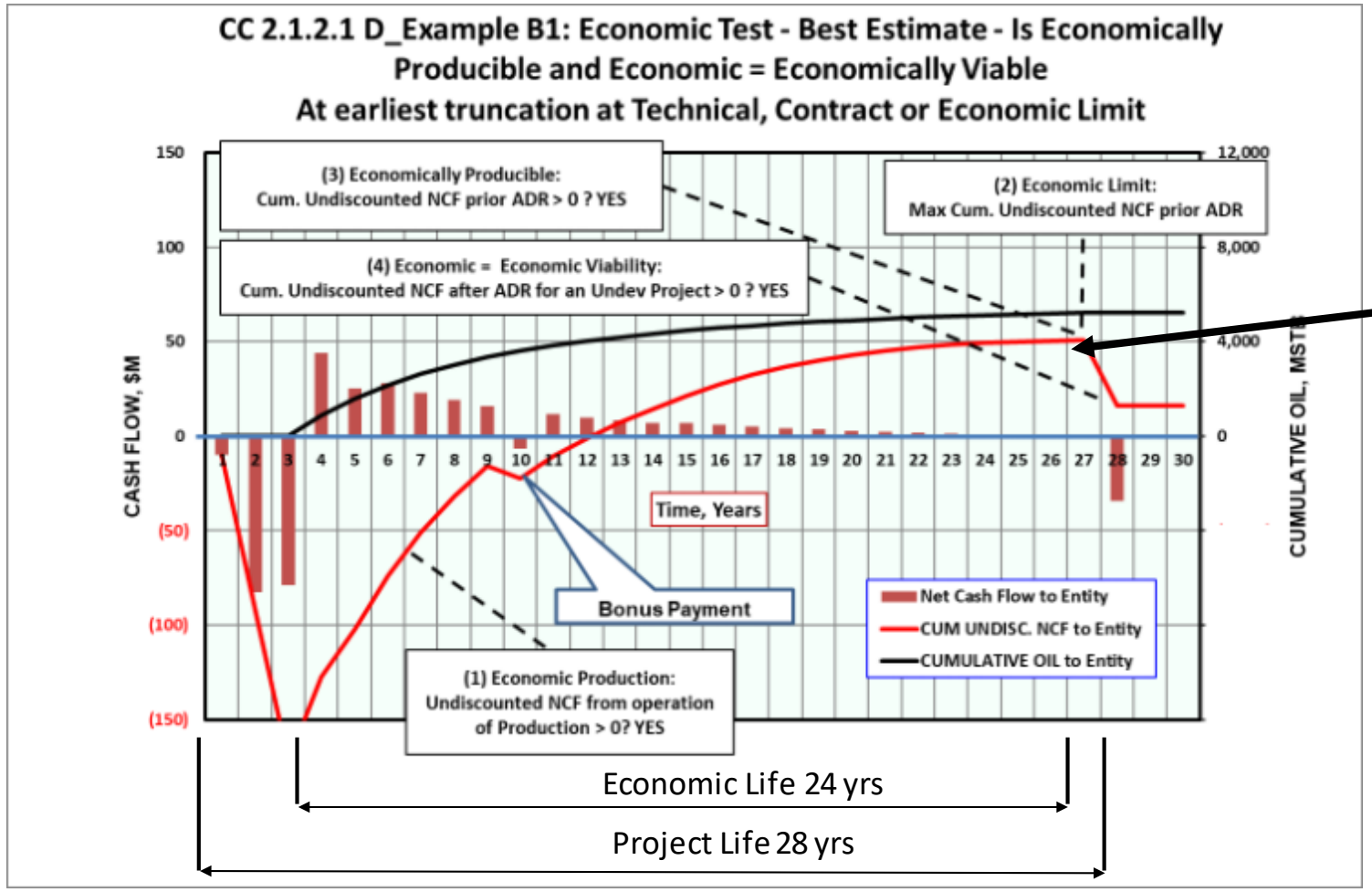
(2) ADR is excluded

(3) Undiscounted

Examples (3/9)

Example B1 – AG22 Ch 9 Example Cum Undiscounted NCF after ADR - $150 Million Facilities Capex

Has "positive economics" (shown) and DOES NOT "meet defined investment and operating criteria" (not shown)



Economic Limit: Time when maximum cumulative NCF for a project occurs

+ Need to consider 3.1.3.1-3.1.3.4

Note:

(1) The cumulative NCF at this "time" may be positive, zero or negative

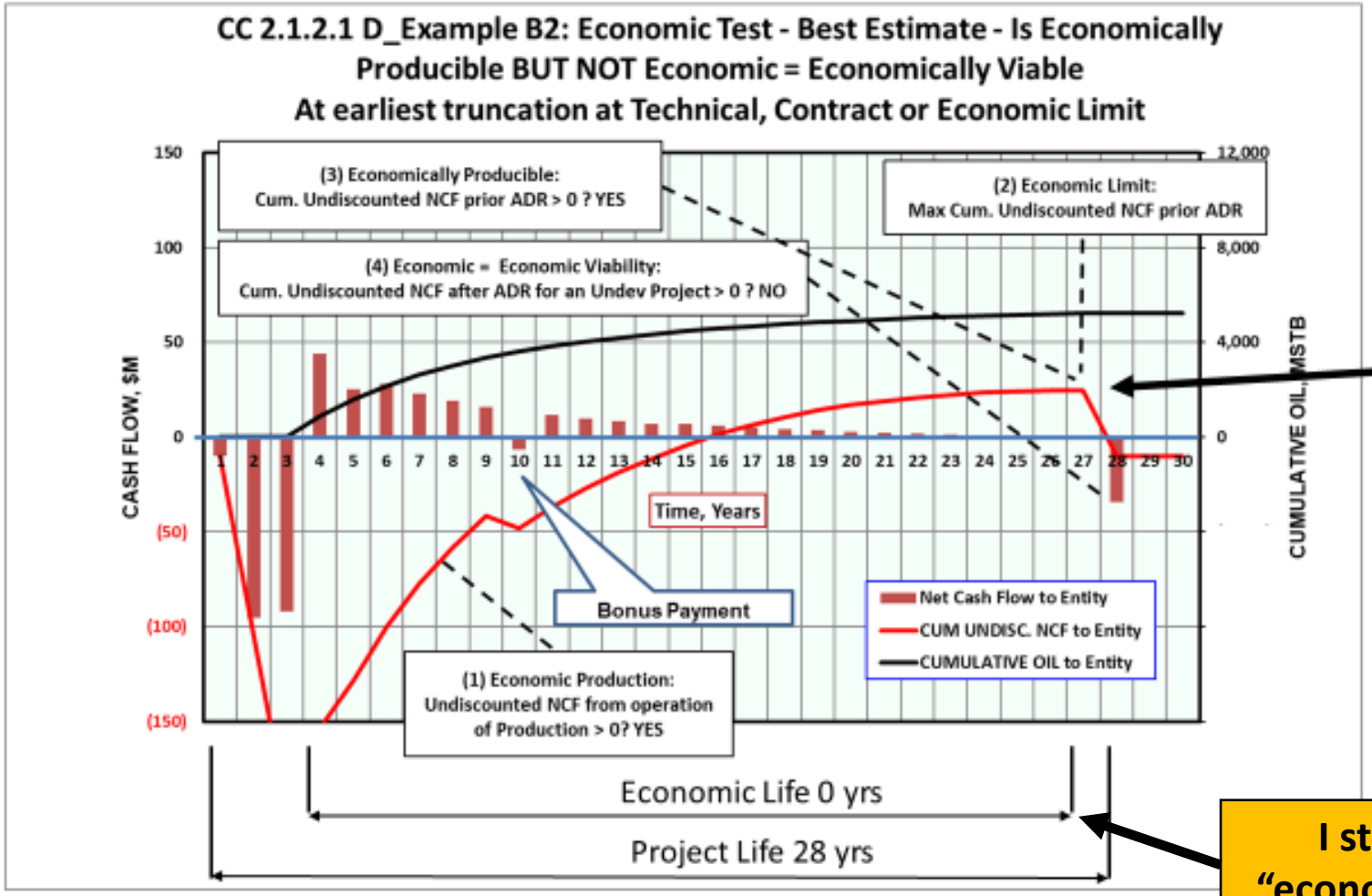
(2) ADR is excluded

(3) Undiscounted

Examples (4/9)

Example B2 – AG22 Ch 9 Example Cum Undiscounted NCF after ADR - $175 Million Facilities Capex

DOES NOT have "positive economics" (shown) NOR "meets defined investment and operating criteria" (not shown)



Economic Limit: Time when maximum cumulative NCF for a project occurs

+ Need to consider 3.1.3.1-3.1.3.4

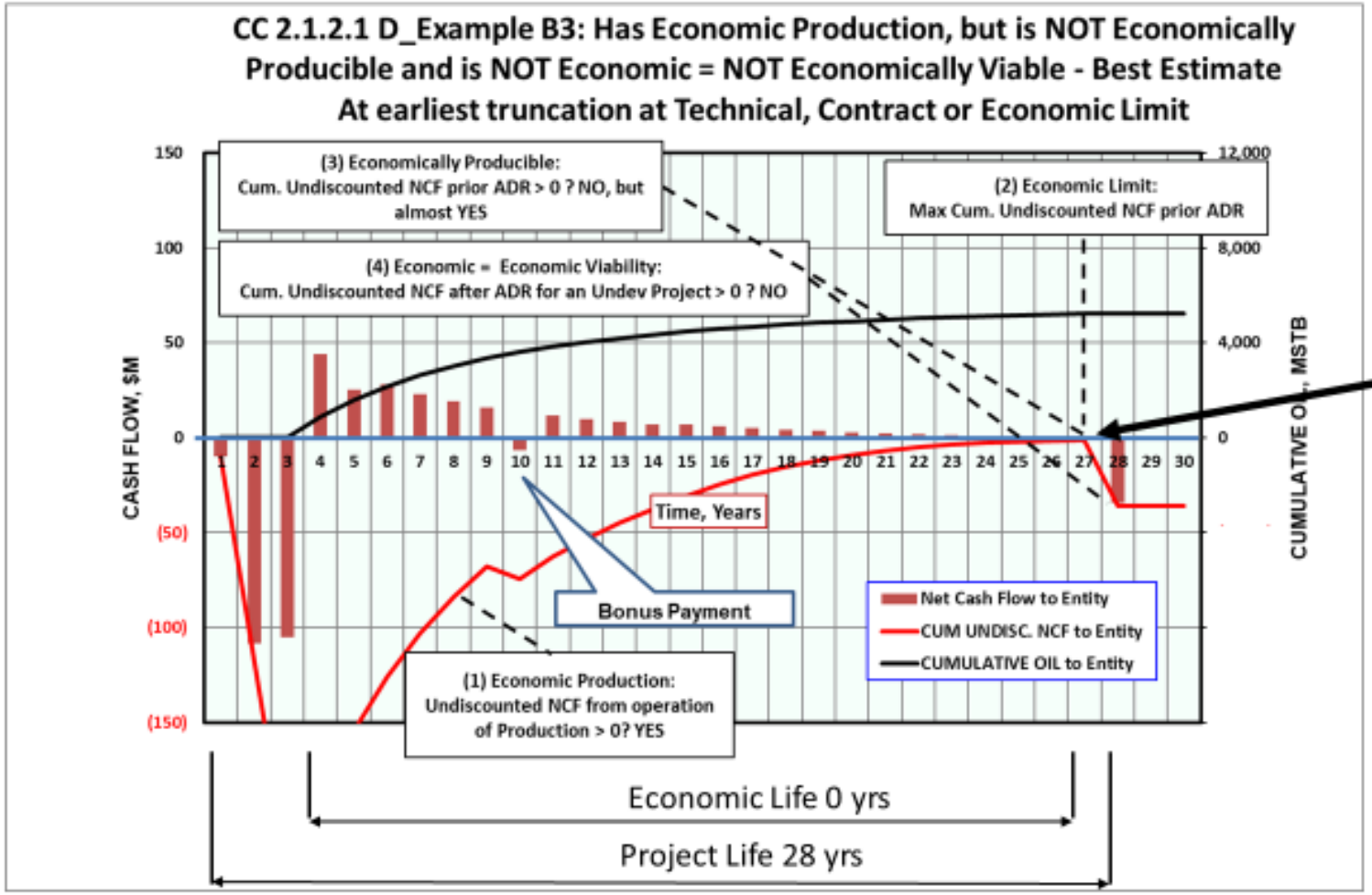
Note:
(1) The cumulative NCF at this "time" may be positive, zero or negative
(2) ADR is excluded
(3) Undiscounted

I struggle with the term "economic life"! I am not sure if this is right!

Examples (5/9)

Example B3 – AG22 Ch 9 Example Cum Undiscounted NCF after ADR - $200 Million Facilities Capex

Almost "economically producible"



Economic Limit: Time when maximum cumulative NCF for a project occurs

+ Need to consider 3.1.3.1-3.1.3.4

Note:

(1) The cumulative NCF at this "time" may be positive, zero or negative

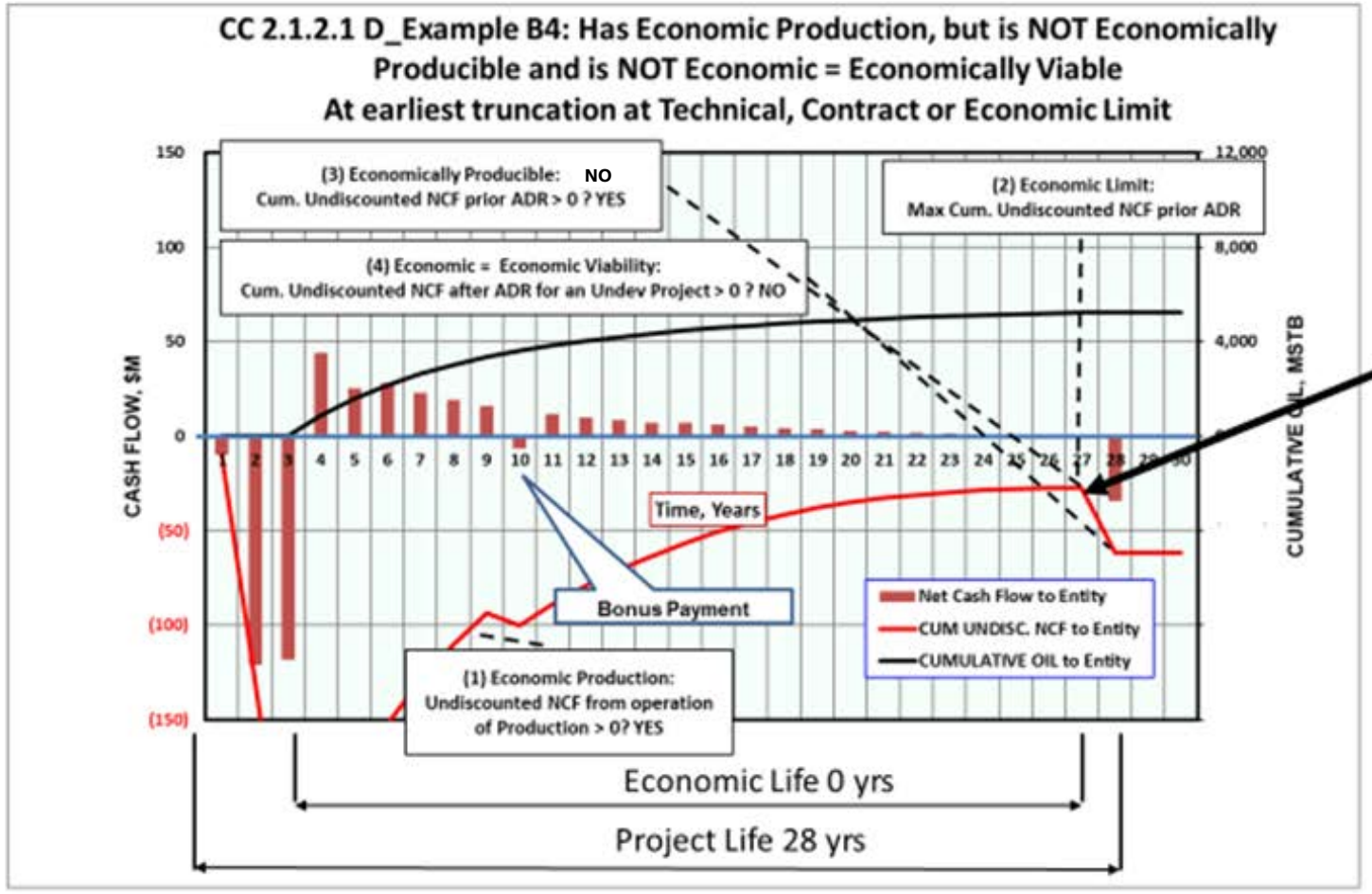
(2) ADR is excluded

(3) Undiscounted

Examples (6/9)

Example B4 – AG22 Ch 9 Example Cum Undiscounted NCF after ADR - $225 Million Facilities Capex

Only has “economic production” and “Economic Limit”



Economic Limit: Time when maximum cumulative NCF for a project occurs

+ Need to consider 3.1.3.1-3.1.3.4

Note:

(1) The cumulative NCF at this “time” may be positive, zero or negative

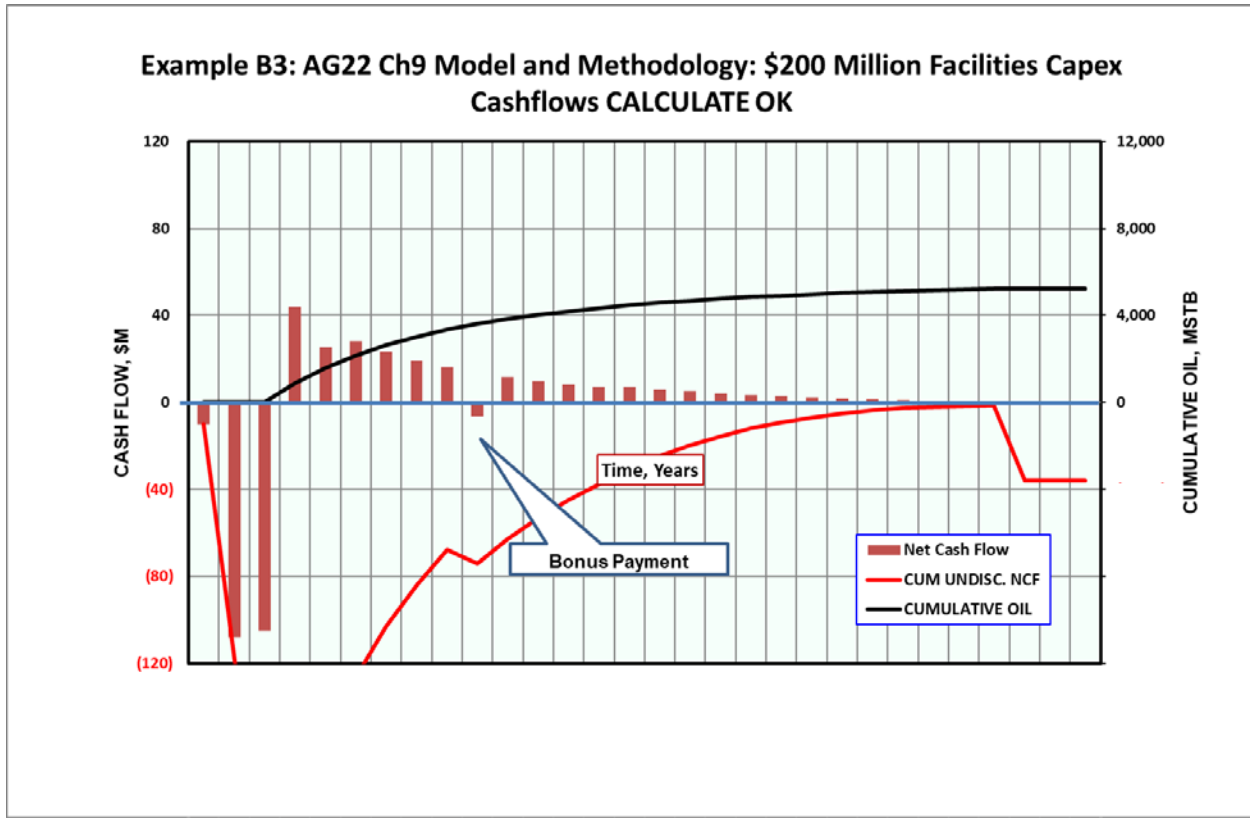
(2) ADR is excluded

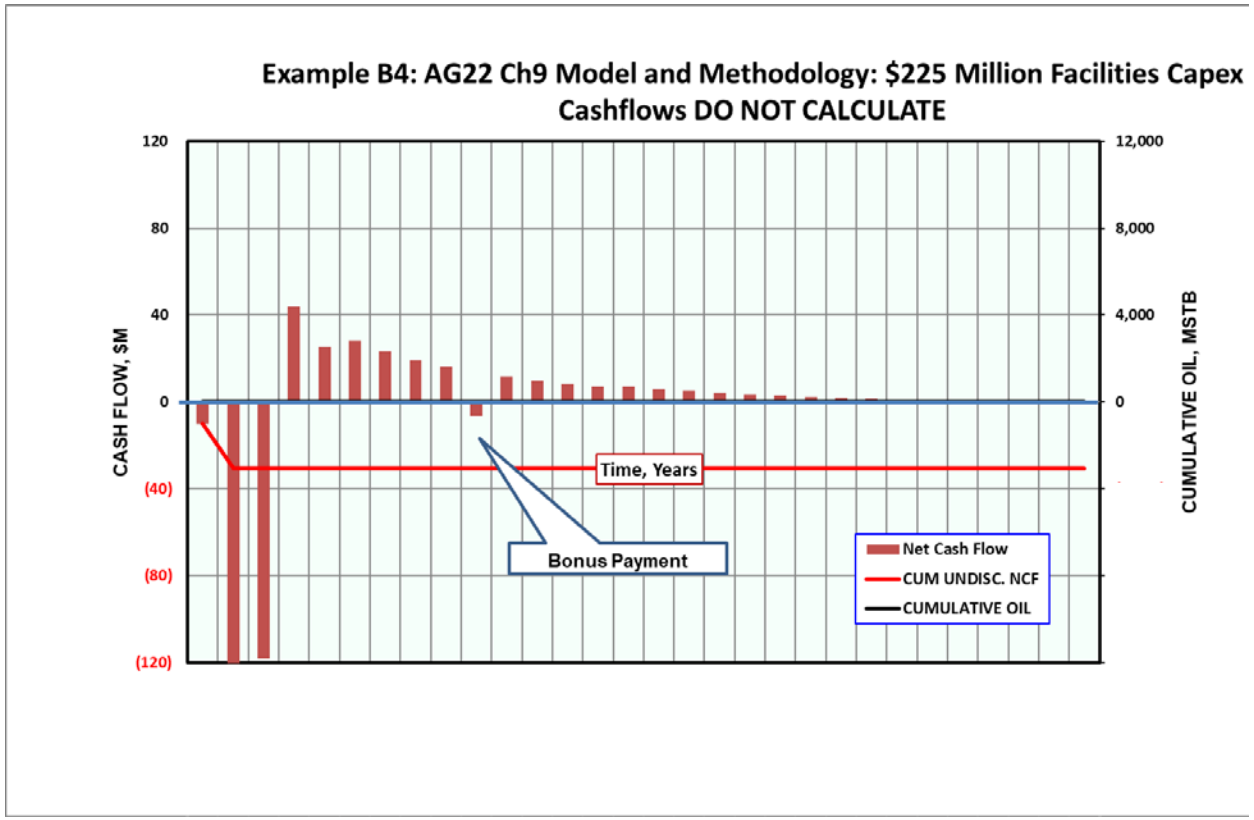
(3) Undiscounted

Examples (7/9)

Example B3 and B4 – with AG22 Ch 9 Model and Methodology for ECONOMIC LIMIT

Cashflows DO NOT CALCULATE FOR "UNECONOMIC SITUATION" (ie B4)





Examples (8/9)

Project	Economic Production	Economic Limit	Earliest Limit	Economically Producible	Economic = Economically Viable	Meet Defined Investment and Operating Criteria	Meet all other CCs and Commitment
Example A = Field Alpha Capex $100 MM	Yes	Yes	Economic Limit	Yes	Yes => Part 1 of CC 2.1.2.1 D achieved	Yes => Part 2 of CC 2.1.2.1 D achieved	Outside scope of Example
Example B1 = Example A Capex $150 MM	Yes	Yes	Economic Limit	Yes	Yes	No	Outside scope of Example
Example B2 = Example A Capex $175 MM	Yes	Yes	Economic Limit	Yes	No	No	Outside scope of Example
Example B3 = Example A Capex $200 MM	Yes	Yes	Economic Limit	Almost Yes	No	No	Outside scope of Example
Example B4 = Example A Capex $225 MM	Yes	Yes	Economic Limit	No	No	No	Outside scope of Example

Examples (9/9)

Name	Exemplifying …	Facilties Capex	Economic Limit	Project Life	Economic Life	Cum Undiscounted NCF to earliest limit (prior ADR) If > 0 => Econimically Producible	Cum Undiscounted NCF to earliest limit (after ADR) If > 0 => "Economic = Economic Viability" => Positive Economics	Cum Undiscounted NCF to earliest limit (after ADR, Corporate O/H and Income Tax) For Information	Cum Discounted NCF to earliest limit (after ADR, Corporate O/H and Income Tax) If > 0 => Meets defined investment and operating criteria	Oil	Gas	Energy Equiv	Consider for 2P Reserves if all other CC's are met and Entity commitment?
		$million	Yr	Yrs	Yrs	$Million	$Million	$Million	$Million	MSTB	MMSCF	MBOE	
Example A	Meets Part 1 and Part 2 of 2.1.2.1 D	100	27	28	24	103	68	56	3	5229	3137	5908	Yes
Example B1	Has "positive economics"	150	27	28	24	51	16	9	-38	5229	3137	5908	Maybe, but NOT recommended and only if justified
Example B2	Is "economically producible"	175	27	28	0	25	-10	-14	-58	5229	3137	5908	No
Example B3	Is almost "economically producible"	200	27	28	0	-1	-36	-38	-79	5229	3137	5908	No
Example B4	Has "economic production" and "Economic Limit" only	225	27	28	0	-27	-62	-62	-100	5229	3137	5908	No

Net Cash flow inclusions (1/2)

Net Cash Flow Inclusions for each of the terms used in determining whether a Project has "Positive Economics" (ie Part 1) and Meets Defined Investment and Operating Criteria (ie Part 2) - to meet the CC of PRMS 2.1.2.1 D - DRAFT 11/08/23 - (Page 1 of 2)

					Part 1	Part 2	
		Economic Production	Economic Limit (ie the limit of "economic production")	Economically Producible	Positive Economics Economic = Economic Viability	Meets Defined Investment and Operating Criteria	
					"Must" be economic (ie economically viable)	**"Recommended"** reflecting adherance to an Entity's usual defined investment and operating criteria	**"Permitted but not recommended"** (ie permissable for "strategic reasons" with jusification)
Net Cash-Flow Evaluation (PRMS 2018 3.1.1): (Summary only)	**Cashflow Criteria to pass Part 1 and Part 2:**	**Undiscounted cumulative net cash flow >= 0** Net to the Entity, From the Effective Date, Cumulative, Based on a defined Reference Point and Forecast Case (ie Defined Conditions). **Earliest of Technical, Licence or Economic limit.**				**Net Present Value (NPV) at Hurdle Rate A(Income)T >= 0** Net to the Entity, From the Effective Date, Cumulative, Based on a defined Reference Point and Forecast Case (ie Defined Conditions). **Earliest of Technical, Licence or Economic Limit.**	
	Inclusion or exclusion in NCF evaluation:	**Included in cash flow analysis?**	**Included in cash flow analysis?**	**Included in cash flow analysis?**	**Included in cash flow analysis?**	**Included in cash flow analysis?**	**Included in cash flow analysis?**
	Developed v Undeveloped:	**Developed** / **Undeveloped**	**Developed** / **Undeveloped**	**Developed** / **Undeveloped**	**Developed** / **Undeveloped**	**Developed** / **Undeveloped**	**Developed** / **Undeveloped**
A. Forecast production quantities	**Net to the Entity**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**
B. The estimated costs and schedule associated with the project, to reference point, inlcuding ADR. **Note Depeciation (and Depletion) charges are excluded since they are not cash flow items (though they are included in income tax calculations).**	**(1) Direct and Indirect Capital costs (excluding ADR) net to the Entity**	**NO** / **NO**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**
	(2) Direct and Indirect Operating costs net to the Entity; refer PRMS 3.1.3.2 for detail.	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**
	(3) ADR net to the Entity to the extent the Entity is liable (eg: ADR has special treatment in PSC/variable royaty contracts (PRMS 3.3.2.4)	**NO** / **NO**	**NO** / **NO**	**NO** / **NO**	**NO** / **Yes**	**NO** / **Yes**	**NO** / **Yes**
	(4) Other payments such as "bonus" refer AG22 example	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**
	(5) Allocation of Corporate Overhead or other costs not related specifically to the project	**NO** / **NO**	**NO** / **NO**	**NO** / **NO**	**NO** / **NO**	**Yes** / **Yes**	**Yes**, unless exclusion is justified / **Yes**, unless exclusion is justified
C. The estimated revenues from the quantities of production.	**Net to the Entity**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**	**Yes** / **Yes**

Net Cash flow inclusions (2/2)

Net Cash Flow Inclusions for each of the terms used in determining whether a Project has "Positive Economics" (ie Part 1) and Meets Defined Investment and Operating Criteria (ie Part 2) - to meet the CC of PRMS 2.1.2.1 D - DRAFT 11/08/23 - (Page 2 of 2)

								Part 1		Part 2			
Net Cash-Flow Evaluation (PRMS 2018 3.1.1): (Summary only)		**Economic Production**		**Economic Limit (ie the limit of "economic production")**		**Economically Producible**		**Positive Economics Economic = Economic Viability**		**Meets Defined Investment and Operating Criteria**			
								"Must" be economic (ie economically viable)		**"Recommended"** reflecting adherance to an Entity's usual defined investment and operating criteria		**"Permitted but not recommended"** (ie permissable for "strategic reasons" with jusification)	
	Inclusion or exclusion in NCF evaluation:	**Included in cash flow analysis?**		**Included in cash flow analysis?**		**Included in cash flow analysis?**		**Included in cash flow analysis?**		**Included in cash flow analysis?**		**Included in cash flow analysis?**	
	Developed v Undeveloped:	**Developed**	**Undeveloped**	**Developed**	**Undeveloped**	**Developed**	**Undeveloped**	**Developed**	**Undeveloped**	**Developed**	**Undeveloped**	**Developed**	**Undeveloped**
D. Future projected production- and revenue-related taxes and royalties expected to be paid by the entity	**(1) Production Taxes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
	(2) Corporate Income Tax	**NO**, unless specifically required to be included	**NO**, unless specifically required to be included	**NO**, unless specifically required to be included	**NO**, unless specifically required to be included	**NO**, unless specifically required to be included	**NO**, unless specifically required to be included	**NO**, unless specifically required to be included	**NO**, unless specifically required to be included	**Yes**	**Yes**	**Yes**, unless exclusion is justified	**Yes**, unless exclusion is justified
E. A project life that is limited to the period of economic interest or earliest occurrence of either technical, license, or economic limit.	**For immature projects, typically recovery estimates are "technical", however economics are calculated at the appropriate truncation point.**	**Yes, defines the length of the "Economic Life"**	**Yes, defines the length of the "Economic Life"**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
F. The application of an appropriate discount rate applicable to the entity at the time of the evaluation.	**(1) Undiscounted, ie discount rate = 0**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	For Information	For Information	For Information	For Information
	(2) Discount rate = Hurdle Rate, typcally greater than the WACC after Income Tax	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	**Yes**	**Yes**	**Yes** with justification	**Yes** with justification

General Process for Cashflow analysis -> Meet CC 2.1.2.1 D (1/2)

Preparatory Work

Then:

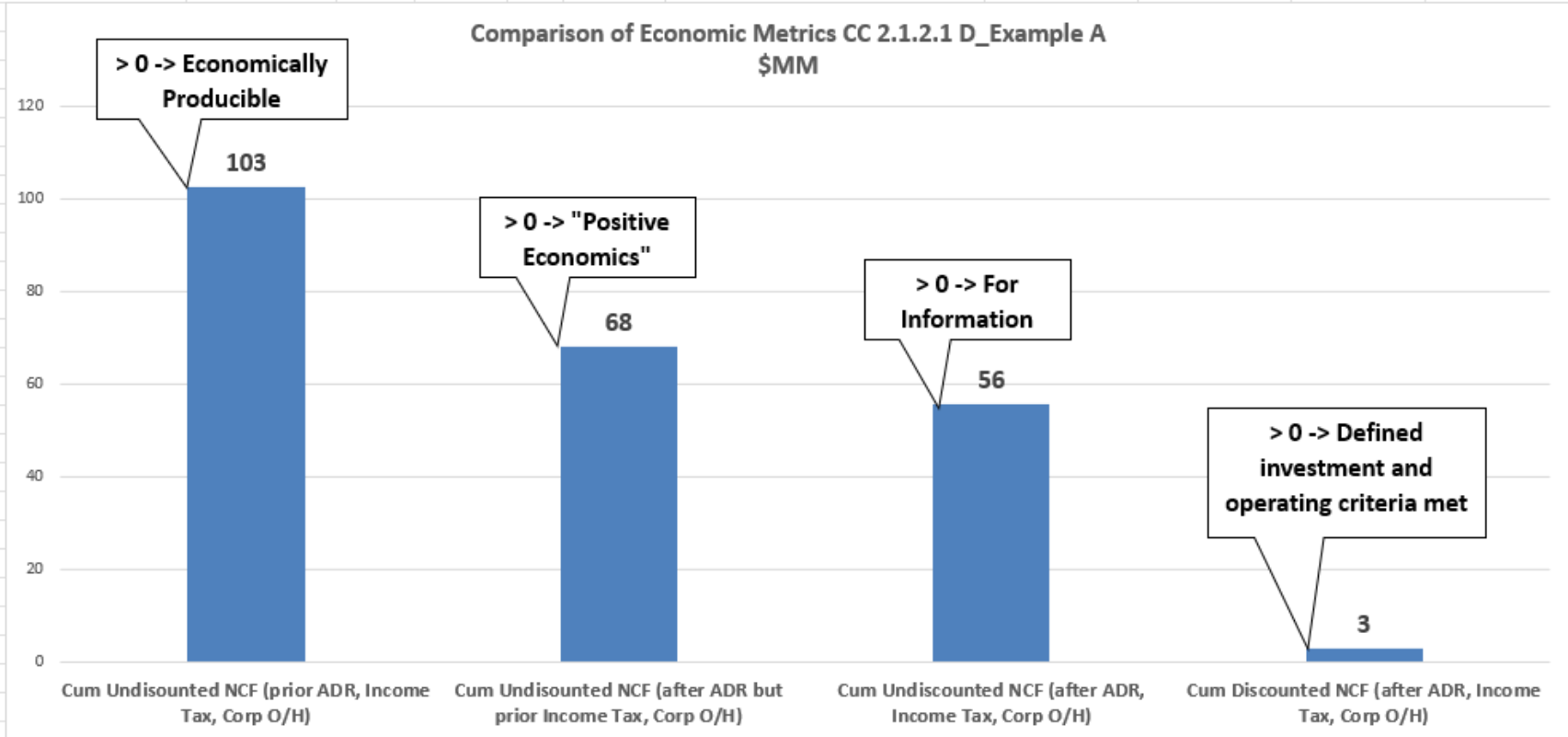
(1) Determine the earliest limit for the evaluation i.e. technical, contract or economic

(2) Evaluate the economic and defined investment and operating criteria metrics

(3) See whether the project has "positive economics" and "meets defined investment and operating criteria"

General Process for Cashflow analysis -> Meet CC 2.1.2.1 D (2/2)

Econometrics Comparison for Tests		$MM	Met?
Economically Producible?	Cum Undisounted NCF (prior ADR, Income Tax, Corp O/H)	103	Yes
"Positive Economics" (ie Economic and thus Economically Viable)?	Cum Undisounted NCF (after ADR but prior Income Tax, Corp O/H)	68	Yes
For Information	Cum Undiscounted NCF (after ADR, Income Tax, Corp O/H)	56	
"Defined Investment and operating criteria"?	Cum Discounted NCF (after ADR, Income Tax, Corp O/H)	3	Yes



Take-aways

- ***Beware*** an inconsistent understanding of “economic” and “commercial”, AND associated terms
- All such terms are ***“point forward”*** at the Effective Date (ED)
- All such terms are ***outputs*** from inputs in relation to Commerciality Criteria 2.1.2.1 A-G

  - 2.1.2.1 D Part 1 “positive economics” => “economic”

    Part 2 “ meet defined investment and operating criteria” => 2.1.2.1 D met

    Typically, ***cashflow elements are different*** for Part 2 vs Part 1

    Criteria may be relaxed for “strategic reasons”, but must be “economic”

  - Rest of 2.1.2.1 & Commitment met => “commercial”

- ***Inputs*** are “Defined Conditions” which may or may not have been met at the ED

  - If any Defined Conditions are not met => cannot be “commercial”

  - Eg: cashflow evaluations are done at all stages of project maturity; typically input criteria are assumed to be met

  - Other conditions, such as a low/high price, capex, opex are “sensitivities” (even though they may be defined)

Questions?