Re-cap of the Financial Payment System Modeling for Polymetallic Nodules

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Presentation to International Seabed Authority
Open Ended Working Group on Financial Modeling
Kingston, Jamaica
March 22, 2022

Decision Analysis Framework & Review of Cash Flow Approach

Underlying philosophy of the analysis

Identify payment systems that **maximize** the return to the common heritage of mankind

Key Question for Today: Financial Payment Mechanism

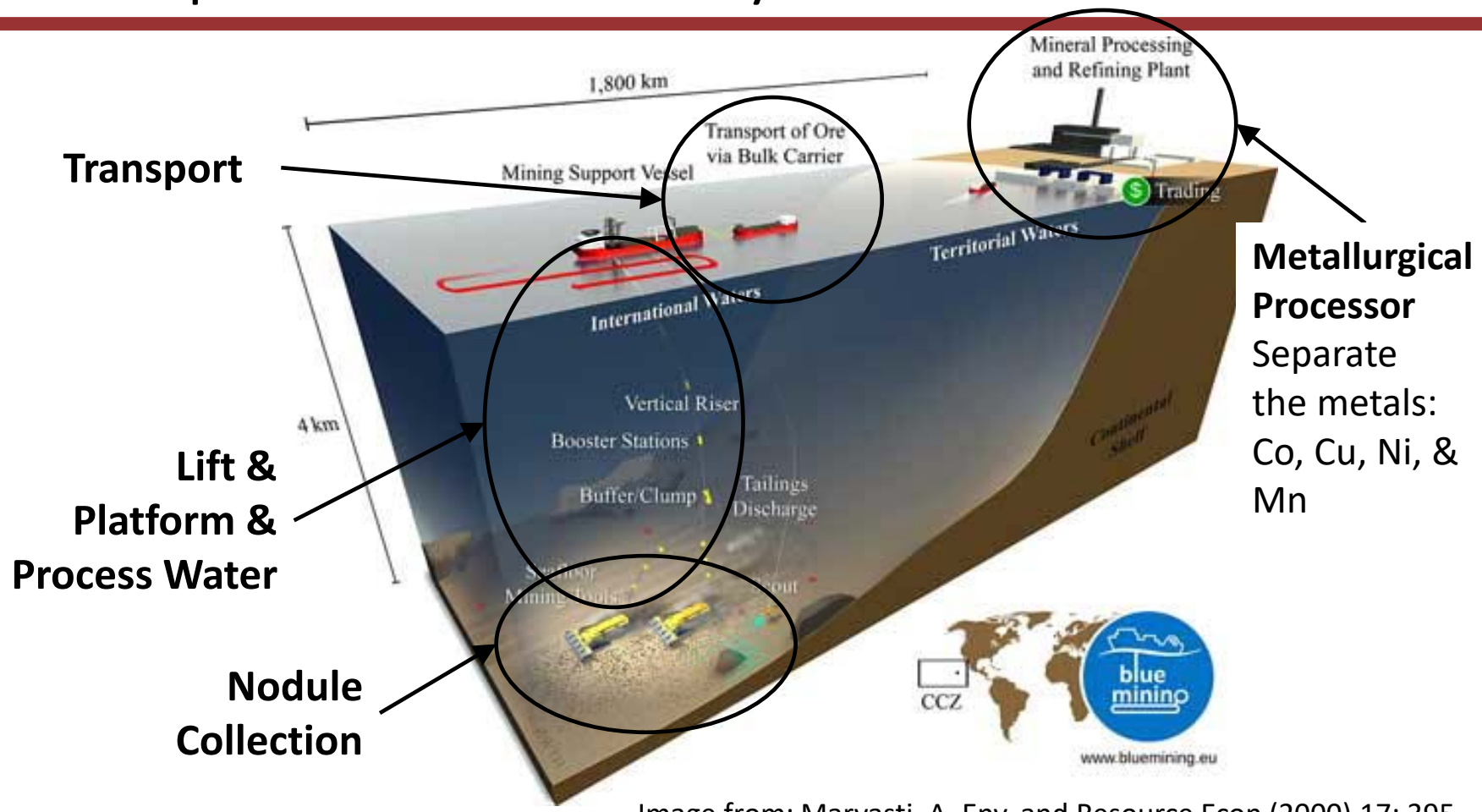
Key Elements of Payment System

- Which financial payment option should we choose?
  - Option #1: One Stage Fixed Ad-valorem
  - Option #2: Two Stage Fixed Ad-valorem
  - Option #3: Two Stage Blended Ad-Valorem plus Profit Share System
  - Option #4: Two Stage Variable Ad-valorem

- What should be the rate of payment?
- If ad-valorem, what metal prices should be used to determine value?
- Should we assume that other administrative fees and/or an environmental / liability fund will be assessed?

To Design an Effective System, We Model & Simulate Each Component of the System

- Process-based cost models of
  - Collector Operations
  - Environmental monitoring
  - Transport
  - Metallurgical processor
- Cash Flow Models
  - Costs
  - Revenues
  - Royalties
  - Taxes & fees
- Compute performance metrics
  - Cumulative Payments to the ISA



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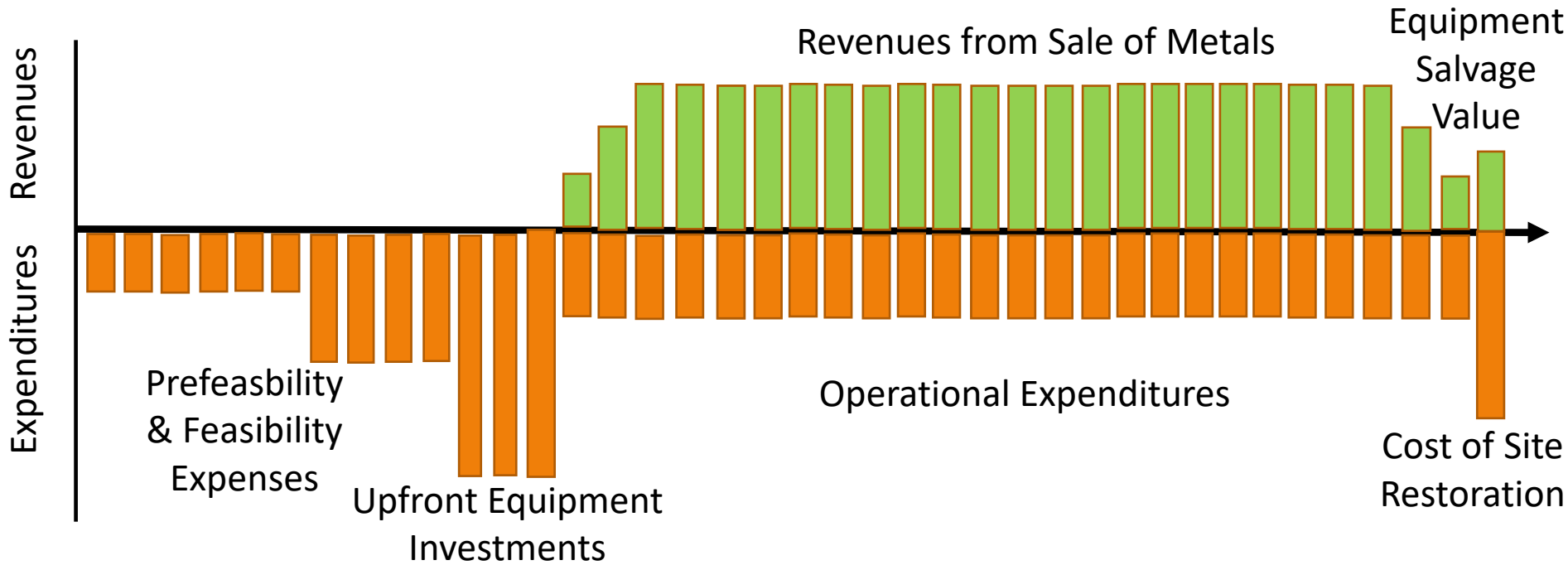
Let’s look at the different types of cash flows throughout the project



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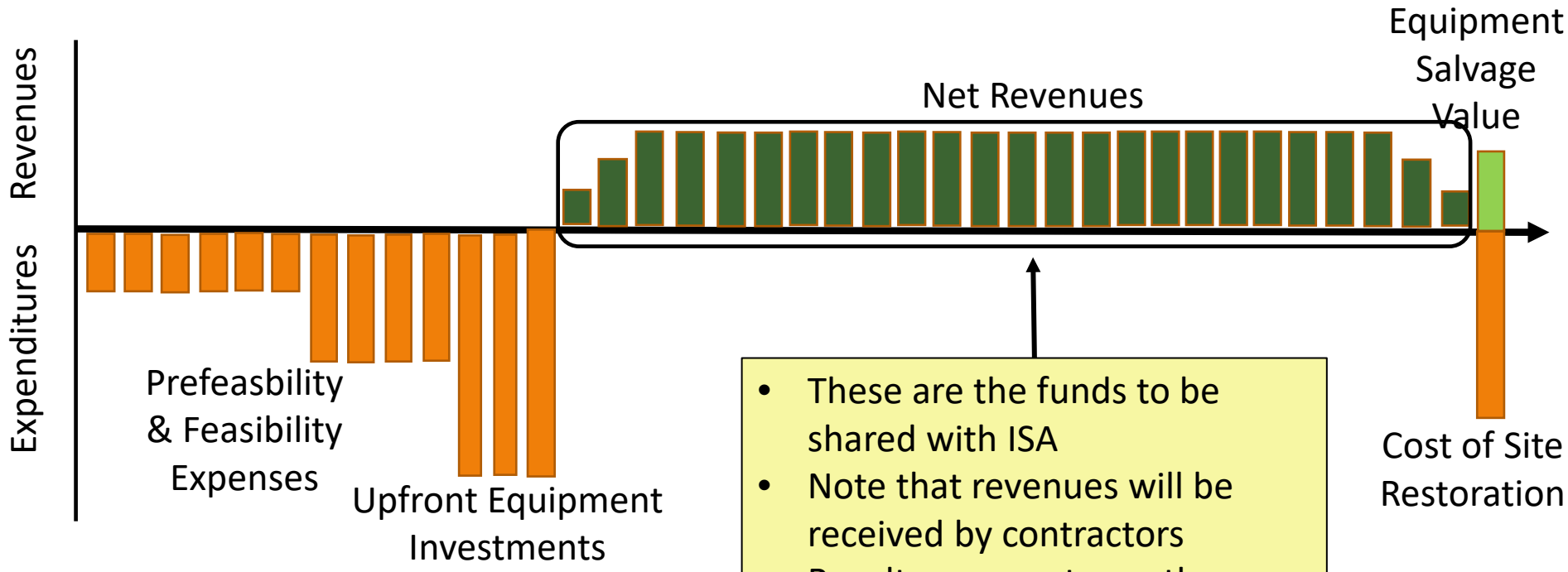

- These are the funds to be shared with ISA
- Note that revenues will be received by contractors
- Royalty payments are the mechanism for sharing those revenues with the ISA

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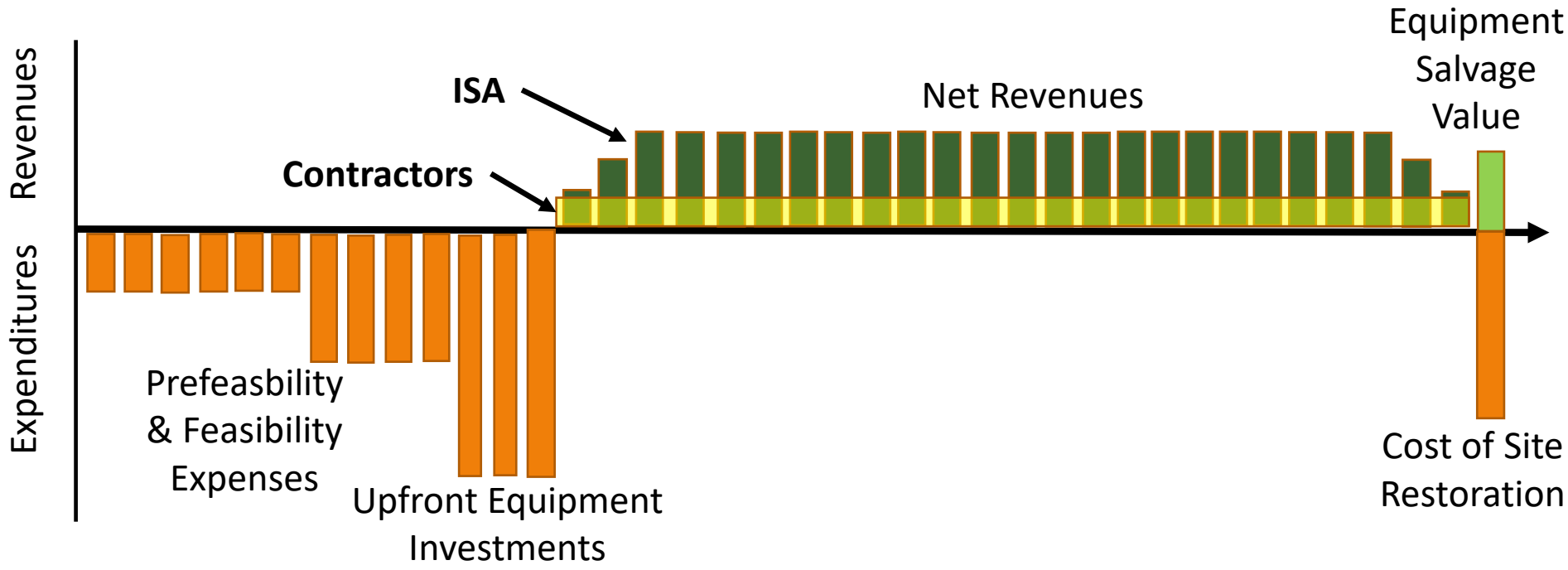


What would make a system for revenue sharing **FAIR**?
What should be the mechanism for calculating the payment to the ISA?

How can we think about making the payment system FAIR?

- Meet revenue targets for ISA/Common Heritage
- Within norms of land-based mining payment systems
  - The joint report from CRU/RMB laid out some of these norms
  - Full MIT report considered these norms when providing values for rates
- Neither advantage nor disadvantage seabed mining compared with land-based mining
- Sufficient returns to justify upfront investments by contractors

All Proposed System Options can be designed to achieve desired levels of the objectives
The specific quantities of these objectives should be used to set the values of the royalty rates

Financial Payment Systems Under Consideration

Four Options

1. Fixed ad valorem - one stage
2. Fixed ad valorem - two stage
3. Blended Profit – two stage
   (fixed ad valorem 1st stage, blended profit & fixed ad valorem 2nd stage)
4. Variable ad valorem - two stage
   (fixed 1st stage, variable 2nd stage)

One Stage vs Two Stages:

- One stage: same rate in all years
- Two stage: rate changes in 2nd stage

Financial Systems:

- Fixed ad valorem rate
  (in each stage)
- Variable ad valorem rate
  (rate changes with metals prices)
- Blended ad valorem and profit

All systems can be designed to yield the same revenue to the ISA under baseline conditions

Let’s review how royalties are calculated

- Ad Valorem Royalties
  - Payment = Rate * Value
    - Rate is usually specified as a percent of the value
    - Value is calculated by the total revenue generated (price * quantity)
    - Rate, price and quantity must all have a consistent basis
      - Price of what? Metal? Nodule? Intermediate Product?

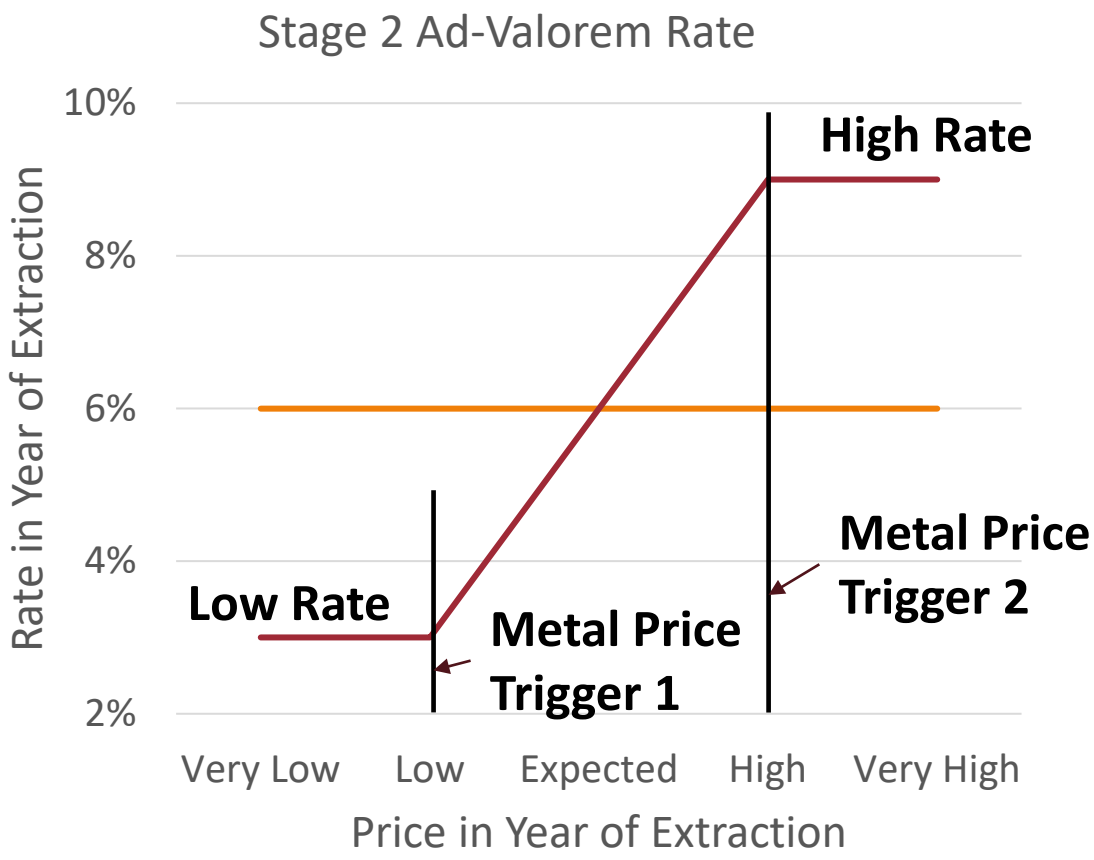
- Fixed vs Variable Rate Ad Valorem Systems
  - Fixed: the rate is constant
  - Variable: the rate itself is a function of the price of the resource

- Profit Based Royalties
  - Payment = Rate * Profit
    - Profit must be calculated based on detailed accounting principles

How Does Variable Rate Ad-valorem Work?

- In all cases, we assume fixed 2% rate for first five years
- For second five years, …

  Variable ad-valorem requires more definition
  - Low rate
    - Price at prices below Trigger 1
  - Metal Price Trigger 1
    - Price above which rates go up
  - Metal Price Trigger 2
    - Price at or above which rates are at maximum
  - Max rate



How Do the Systems Differ?

- Timing of payments to ISA

- Provide different amounts to the ISA if future does not equal baseline conditions that were forecast
  - Future metals prices turn out to be different than forecast
  - Different levels of metals recovery rates are achieved
  - Contractor cost overruns or savings

- Different complexities for administering the systems

Timing Opportunities

- Would the ISA be willing to accept lower payments in the first few years in return for higher total revenues across the lifetime of the project?
- If so, how much lower in early years and for how much higher in the future?

Example:

One Stage System:
$100 million/year for 25 years

vs.

Two Stage System:
$50 million/year for 1st 5 years
$150 million/year for next 20 years

Lifetime Revenue = $2.5 billion

Lifetime Revenue = $3.0 billion

Can be designed to provide contractors with same return for either system
Takes advantage of contractor need to pay off debt earlier, if ISA is willing to wait

How Do Systems Respond to Different Future Conditions?

- Goal:
  - Capture “upside potential” if future exceed expectations
  - Limiting the “downside risk” if future conditions fail to meet expectations.
- Sources of “upside potential”
  - Higher than expected future metals prices
  - Higher than expected metals recovery rates
  - Lower than expected contractor costs
- If these occur, the total net revenues are higher
- A system can be designed to let ISA capture different shares of these additional revenues.

However, it's impossible to design a system that only gives upside benefits without downside risks

- Any system that limits the upside rewards to contractors, must also limit their downside risk
  - Required to keep the "expected" or average value constant.

- This is essential because the systems and rates will be chosen to give contractors only what they need and no more on average.

- Lower net revenues to be divided between ISA and contractors

How much downside risk would you be willing to accept to achieve higher upside potential?

Simplified example:

- equal probability of different future net revenues:
  - 20% below forecast baseline values
  - Equal to forecast baseline values
  - 20% higher than forecast baseline values

- For simplicity sake, let's assume lifetime net revenues at the baseline forecast values are:
  - ISA = $3.0 billion
  - Contractors = $3.0 billion

Total System Net Revenue = $6.0 billion

Several approaches to risk & reward sharing: Simplified Example

		Shared Risk/Reward		All Risk/Reward to ISA	
	System Net Revenue	ISA	Contractor	**ISA**	Contractor
Low Net Revenue Future					
Expected Net Revenue Future	$6.0 billion	$3.0 billion	$3.0 billion	$3.0 billion	$3.0 billion
High Net Revenue Future					

Options #1 & #2: ISA & Contractors share benefits if metals prices rise

Options #3 & #4: ISA gains greater share of upside potential if metals prices rise (and bear more risk if metals prices fall)

Adminstrative Complexity: Steps for Calculating the Payment

Ad Valorem(fixed or variable)

1. Monitor mass of nodules retrieved
2. Measure the quantities of each metal in nodules
3. Look up prices of 4 metals on global markets
4. Calculate the value of the metal retrieved from the seabed
5. Calculate royalty rate associated with the metals prices
6. Apply royalty rate to the metal value retrieved to obtain payment

Profit Based System

1. Track all capital expenditures
2. Monitor all ongoing expenses
3. Monitor all revenues (this is based on the sale price of the nodules and not the directly on the metals prices)
4. Monitor all other accounting charges including capital depreciation, local taxes, R&D expenditures, etc.
5. Calculate “profit”
6. Apply rate to profit to get the payment

Establishing Rules for Different Systems

Ad Valorem

1. Establish all royalty rates and trigger prices
2. Specify global price indexes for each metal
   (for example: LME 30 day Copper)
3. Establish a system for monitoring:
   - amount of nodules retrieved
   - measuring metal content from a sample of those nodules

Profit Based System

1. Establish the rate of payment on profits
2. Develop full accounting code for treatment of all expenses & revenues
   (possibly adopt existing system?)
3. Establish a system tracking all cash flows
   - Amount of nodules sold
   - Nodule transfer price
   - All expenditures

*Note: A blended system with profit and ad valorem rates require all of the above

Multiple Jurisdictions May Allow Strategies for Reducing Payments from a Profit Based System

Mining firms often strategize on how to minimize royalty payments

- Move revenues between jurisdictions
- Move expenses
- Strategic use of R&D to offset profits

Some examples of risks specific to Deep Sea Mining

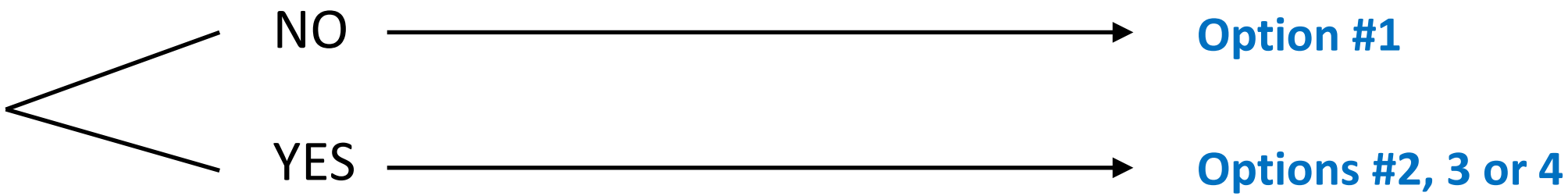
1. Nodules sold at low transfer price to an affiliated on-shore company
   Result: Collector profits are lower → ISA revenue is lower

2. Company-wide R&D done by (and charged to) seabed mining division
   Result: greater offsets against profits → ISA revenue is lower

Detailed accounting rules can help address these, but can be complex and challenging

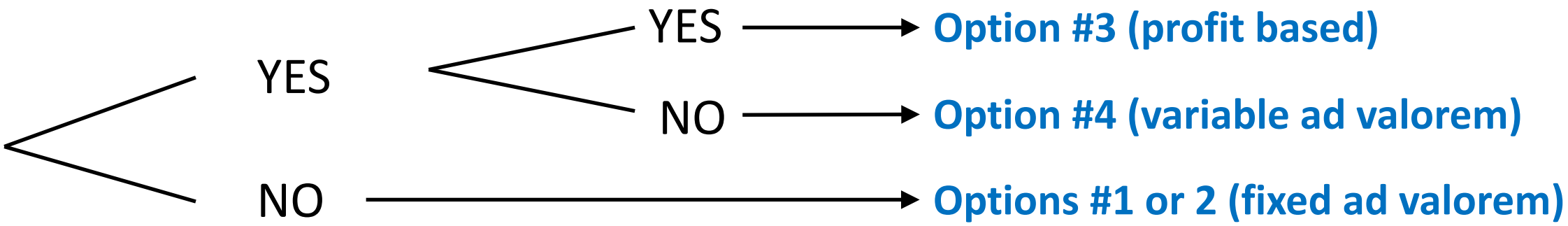
How to Select a Financial Payment System?

1. Are you willing to sacrifice some early revenue to get a greater total?



2. Willing to take on extra downside risk to get more upside rewards?

3. Willing to implement full accounting system? Willing to accept risks of "gaming" the system?



Summary & MIT Recommendations for Financial Payment System

1. One Stage with a Fixed Ad Valorem
2. Two Stage with a Fixed Ad Valorem
3. Blended Profit plus Fixed Ad Valorem
4. **Two Stage with a Variable Ad Valorem**

Two stage system with a variable ad valorem allows:

- ISA to capture a good amount of upside benefits with only limited downside risk.
- Can be designed to give higher overall revenues to ISA accepting slightly lower revenues in the 1st stage