

# SEEA Training Seminar for Bhutan (Fall 2023)

## Exercises on Asset accounting

### Valuation of Coal deposits

The government has asked you to estimate the value of resource rent earned from the extraction of coal in the country and also an assessment of the value of the remaining coal using the net present value (NPV) approach. You should assume that the rate of extraction and the resource rents stay the same into the future. No new discoveries of coal are expected.

The government would like the estimate of the value of the coal to be based on a discount rate of 3% but, for the purposes of understanding the sensitivity of the value, it would also like a valuation based on a discount rate of 11%.

You have the following information.

- Total coal deposits at current balance sheet date are 1200 tonnes
- Extraction for the past accounting year was 200 tonnes and this rate is expected to continue.
- Production prices and costs for the past accounting year
  - Output price of coal: \$250 per tonne
  - Intermediate costs: \$140 per tonne
  - Compensation of employees: \$30 per tonne
- There are no relevant taxes or subsidies to consider
- Capital/produced assets are valued at \$100,000. Costs of produced assets involve depreciation at a rate of 4% and a return on produced assets of 6%.
- NPV formula:

$$V_t = \sum_{\tau=1}^{N_t} \frac{RR_{t+\tau}}{(1+r_t)^\tau}$$

where:

$V_t$  = value of asset in time  $t$

$N$  = asset life

$RR$  = resource rent

$N$  = reserve life, i.e. closing stock  $\div$  extraction

$r_t$  = discount rate

Estimate the following:

1. Gross operating surplus for the past accounting year
2. User costs of capital/produced assets for the past accounting year (depreciation + return on capital)
3. Resource rent per tonne of coal extracted for the past accounting year
4. Asset life of the coal deposit
5. Projected stream of resource rent over the asset life (expected tonnes extracted per year x expected resource rent per tonne)
6. Discount factors for each year of the asset life (at 3% & at 11%)
7. Net present value of the coal deposit at the beginning of the accounting period (based at 3% and also 11%)
8. Interpretation: What does a discount rate of 3% versus 11% say about the weight we put on future generations?

Reference:

**Output** (sales of extracted environmental assets at basic prices, includes all subsidies on products, excludes taxes on products)

*Less* Operating costs

Intermediate consumption (input costs of goods and services at purchasers' prices, including taxes on products)

Compensation of employees (input costs for labour)

Other taxes on production plus other subsidies on production

*Equals* Gross operating surplus—SNA basis<sup>a</sup>

*Less* Specific subsidies on extraction

*Plus* Specific taxes on extraction

*Equals* Gross operating surplus—for the derivation of resource rent

*Less* User costs of produced assets

Consumption of fixed capital (depreciation) + return to produced assets

*Equals* Resource rent

Depletion + net return to environmental assets<sup>b</sup>

Answers

1.  $GOS = \$ 200 * (250-140-30) = \$16,000$
2.  $Costs\ of\ produced\ assets = (100,000 * 0.04 + 100,000 * 0.06) = 10,000$
3.  $Resource\ rent\ / \ tonne = \$(16,000-10,000) / 200 = 30$
4.  $Asset\ life = 1200 / 200 = 6\ years$
5.  $Stream\ of\ income = 30 * 200 = 6,000\ per\ year$
6. Discount factors

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
@ 3%	1.03	1.0609	1.0927	1.1126	1.1592	1.1940
@11%	1.11	1.2321	1.3676	1.5181	1.6851	1.8704

7. Net present value

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	NPV
@ 3%	5,825	5,656	5,491	5,331	5,176	5,025	32,503
@11%	5,406	4,870	4,387	3,953	3,561	3,208	25,381

8. What does a discount rate of 3% versus 11% say about the weight we put on future generations?  
 A discount rate of 0 says that \$1 today is worth \$1 tomorrow—no preference on money today vs. the future. A discount rate above zero says that a dollar today is worth more than a dollar in the future, when we will enjoy higher incomes. In addition, it reflects peoples’ tendency to prefer incomes today rather than in the future. So, a high discount rate implies that people put less weight on the future and less investment is needed to guard against future costs. A low discount rate puts more weight on the future and indicates that more investment is needed to protect future generations.