



EU - VIET NAM SUSTAINABLE ENERGY
TRANSITION PROGRAMME (SETP)



Project “Accelerating energy efficiency (EE) in large industries through energy management system, system optimisation and the promotion and adoption of EE in SMEs” (IEEP)

TRAINING PROGRAMME

FINANCIAL ANALYSIS OF ENERGY EFFICIENCY INVESTMENT PROJECTS



Ha Noi, 06 - 07/10/2025

AGENDA

TRAINING PROGRAMME

FINANCIAL ANALYSIS OF ENERGY EFFICIENCY INVESTMENT PROJECTS

From 06/10/2025 to 07/10/2025

Adonis Hotel, 55 Quang Trung street, Hai Ba Trung ward, Hanoi

Day 1 - 06/10/2025

Time	Contents	Speakers
8.00-8.30	Registration and welcome	
8.30-8.35	Introduction	UNIDO Project
8.35-8.45	Opening speech	MOIT/UNIDO Project
8.45-10.00	Criteria for Financial Analysis of Investment Projects; Individual exercise	National Expert & Trainees
10.00-10.15	Tea break	
10.15-12.00	Criteria for Financial Analysis of Investment Projects (continued); Exercise	National Expert & Trainees
12.00-13.30	Lunch at the Hotel	All participants
13.30-14.30	Estimating costs of energy efficiency projects; Example	National Expert
14.30-15.00	Estimating benefits of energy efficiency projects; Notes in estimating; Example	National Expert & Trainees
15.00-15.15	Tea break	
15.15-16.15	Group Assignment (case study)	National Expert & Trainees
16.15-16.50	Group Exercise & Home works	National Expert & Trainees
16.50-17.00	Day 1 wrap-up	National Expert

Day 2: 07/10/2025

Time	Contents	Speakers
8.00-8.30	Registration	
8.30-10.00	Financing options for energy efficiency projects Exercise (Calculating Principal and Interest Repayments) Environmental Protection Fund, VSUEE Project...	National Expert & Trainees
10.00-10.15	Tea break	
10.15-10.30	Impacts of EE projects on business performance and company balance sheets Exercise (Develop cash flow, income statement and balance sheet)	National Expert & Trainees
12.00-13.30	Lunch at the Hotel	
13.30-14.30	Preparing loan applications for EE projects Exercise (Applications of financial analysis)	National Expert & Trainees
14.30-15.00	Financial Negotiation	National Expert
15.00-15.15	Tea break	
15.15-16.50	Risk and sensitivity analysis for EE projects Exercise (Conducting sensitivity analysis)	National Expert & Trainees
16.50-17.00	Wrap-up	National Expert

FINANCIAL ANALYSIS OF ENERGY EFFICIENCY INVESTMENT PROJECTS

Nguyen Thi Mai Anh
Nguyen Thi Huong Lien

10/2025

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TRAINING OBJECTIVES

- Understand the criteria used to assess the financial feasibility of an investment project
- Know how to develop cash flows for an energy efficiency project
- Be able to evaluate the financial feasibility of energy efficiency projects
- Have the ability to analyze and select appropriate financial options for an energy efficiency project
- Know how to conduct sensitivity analysis for an energy efficiency project
- Understand and know how to prepare loan application documents

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CONTENTS

1. Importance of analyzing the financial feasibility of investment projects
2. The time value of money
3. Key criteria for assessing financial feasibility of investment projects
4. Developing cash flow projections for energy efficiency projects
5. Financial options for energy efficiency projects
6. Conducting sensitivity analysis for energy efficiency projects

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1. IMPORTANCE OF ANALYZING THE FINANCIAL FEASIBILITY OF INVESTMENT PROJECTS

WHY CONDUCT FINANCIAL ANALYSIS OF INVESTMENT PROJECTS (1)

- To assess profitability and ensure efficient use of capital
 - To determine the profitability and payback period of investment projects.
 - To avoid investing in projects that are technically feasible but economically inefficient.
 - Because investment capital is always limited; financial analysis helps identify projects with the highest economic benefits.
- To ensure the ability to mobilize capital
 - Since banks, investors, and development funds always require financial analysis reports to assess risks

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WHY CONDUCT FINANCIAL ANALYSIS OF INVESTMENT PROJECTS (2)

- Risk management orientation and cost optimization
 - Identify key factors that significantly affect project performance (capital, operating costs, maintenance costs, etc.).
 - Support project risk management
- Compliance with regulations and transparent reporting
 - Meet the requirements of regulatory authorities or benefit from investment incentive policies

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WHY CONDUCT FINANCIAL ANALYSIS OF INVESTMENT PROJECTS (3)

- Many EE projects require large capital investment.
- EE projects often apply new technologies.
- A project that is technically feasible may not be financially feasible if the investment cost is too high compared to the energy savings.
- The main benefit of EE projects is cost savings.
 - EE projects do not generate direct revenue but reduce energy and operating costs.
- Optimize investment and operating costs.
 - There are often multiple EE solutions in a company.
 - Make rational investment decisions, prioritizing EE solutions with the highest savings or ROI

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2. THE TIME VALUE OF MONEY

- Interest
- Present value and Future value

2.1 INTEREST

Which option would you choose –
receiving \$10,000 now or receiving
\$10,000 after 5 years?

If you choose to receive \$10,000 right
now
You have realized.

THE TIME VALUE OF MONEY!

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TIME AND INTEREST

Why is **Time** important in the decision
you just made?

Time gives us the opportunity to postpone
our consumption in order to earn a **PROFIT**.

CLASSIFICATION OF INTEREST

- **Simple Interest**
 - Interest is calculated only on the initial principal, without compounding in subsequent periods.
- **Compound Interest**
 - Interest is calculated on both the principal and the accumulated interest from previous periods.
 - Interest is added to the principal to calculate interest for the next period.

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THE FORMULA FOR CALCULATING SIMPLE INTEREST

Formular

$$SI = P_0(i)(n)$$

- SI:** Simple Interest
P₀: Initial capital (t=0)
i: Interest rate
n: number of periods

EXAMPLE – SIMPLE INTEREST

- Assume you deposit **\$1,000** in a bank with a simple interest rate of **10% per year for 2 years**. How much **total interest** will you earn after 2 years?
- $SI = P_0(i)(n)$
 $= \$1,000 \times (10\%) \times (2)$
 $= \$200$

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EXERCISE 1

Suppose a person deposits **\$100** in a bank with a simple interest rate of **10% per year for a period of 5 years**. By the end of the 5th year, how much **total interest** will this person have earned?

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ANSWER 1

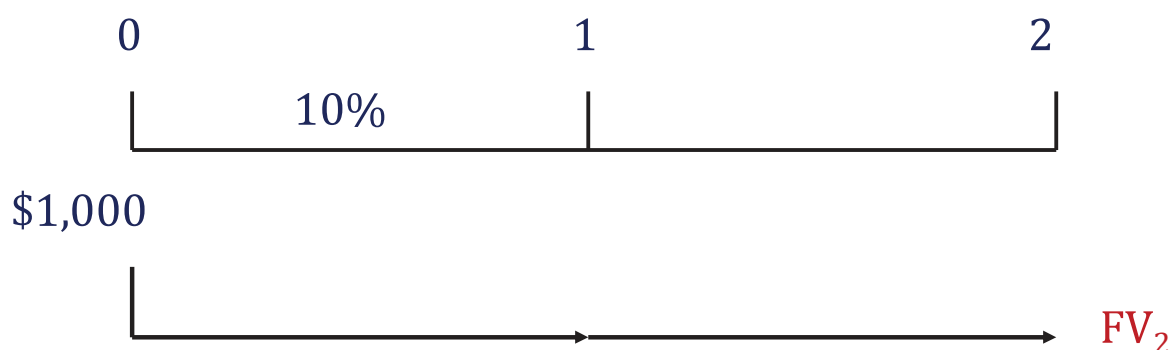
With simple interest, the interest from previous periods does not generate additional interest.

- Year 1: 10% of \$100 = \$10 + \$100 = \$110
- Year 2: 10% of \$100 = \$10 + \$110 = \$120
- Year 3: 10% of \$100 = \$10 + \$120 = \$130
- Year 4: 10% of \$100 = \$10 + \$130 = \$140
- Year 5: 10% of \$100 = \$10 + \$140 = \$150

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COMPOUND INTEREST

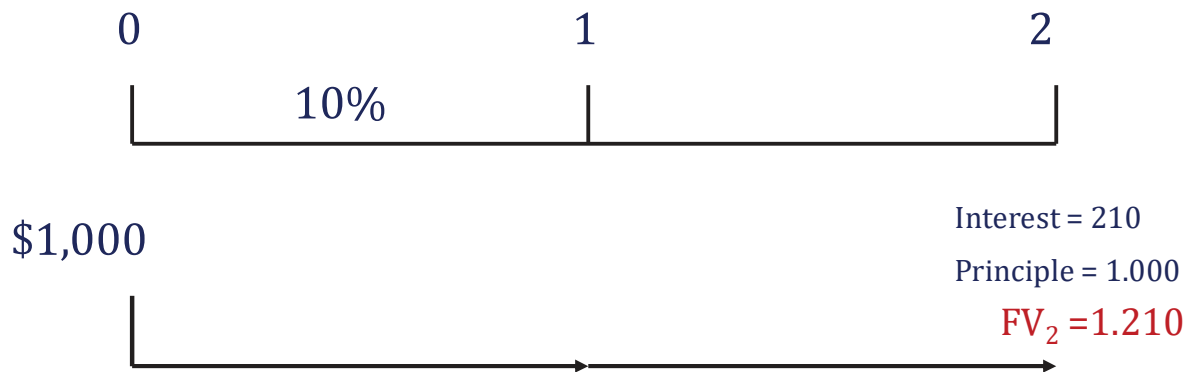
Suppose you deposit **\$1,000** in a bank with a compound interest rate of **10% per year for 2 years**. How much total interest will you have earned by the end of the 2nd year?



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COMPOUND INTEREST

- Year 1: 10% of \$1.000 = \$100 + \$1.000 = \$1.100
- Year 2: 10% of \$1.100 = \$110 + \$1.100 = \$1.210



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HOW TO COMPUTE COMPOUND INTEREST

$$FV_1 = P_0 (1+i) = \$1,000 (1.1) = \$1,100$$

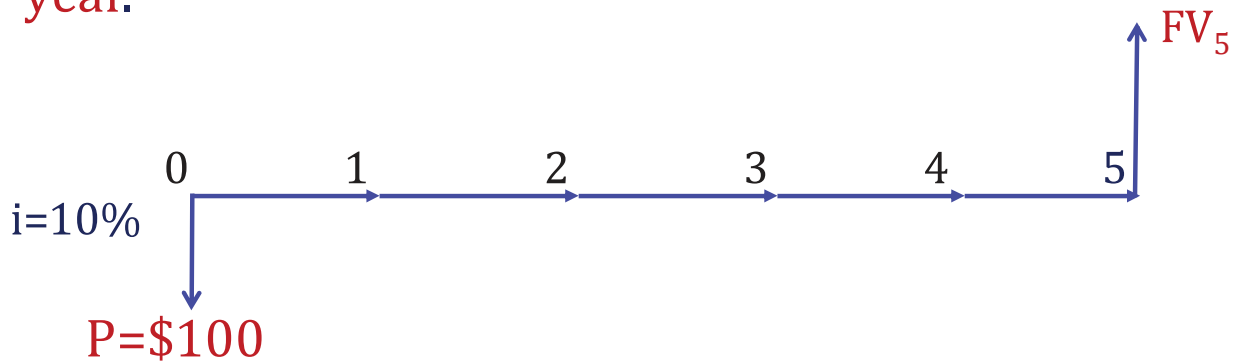
$$\begin{aligned}
 FV_2 &= FV_1 (1+i) \\
 &= P_0 (1+i)(1+i) = P_0 (1+i)^2 \\
 &= \$1,000(1.1)^2 \\
 &= \$1,210
 \end{aligned}$$

You earn an additional **\$10** in interest over 2 years when calculated with compound interest.

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EXAMPLE 2

Lan wants to know how much money she will have after 5 years if she deposits **\$100** in the bank today with an annual compound interest rate of **10% per year**.



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COMPOUND INTEREST

- With compound interest, the interest on the principal also earns interest!
- Year 1: 10% of \$100,00 = \$10,00 + \$100,00 = \$110,00
- Year 2: 10% of \$110,00 = \$11,00 + \$110,00 = \$121,00
- Year 3: 10% of \$121,00 = \$12,10 + \$121,00 = \$133,10
- Year 4: 10% of \$133,10 = \$13,31 + \$133,10 = \$146,41
- Year 5: 10% of \$146,41 = \$14,64 + \$146,41 = **\$161,05**

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THE FORMULA FOR CALCULATING COMPOUND INTEREST

$$FV_1 = P_0(1+i)^1$$

$$FV_2 = P_0(1+i)^2$$

...

General formular:

$$FV_n = P_0 (1+i)^n$$

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ANSWER

According to the above formular:

$$FV_n = P_0 (1+i)^n$$

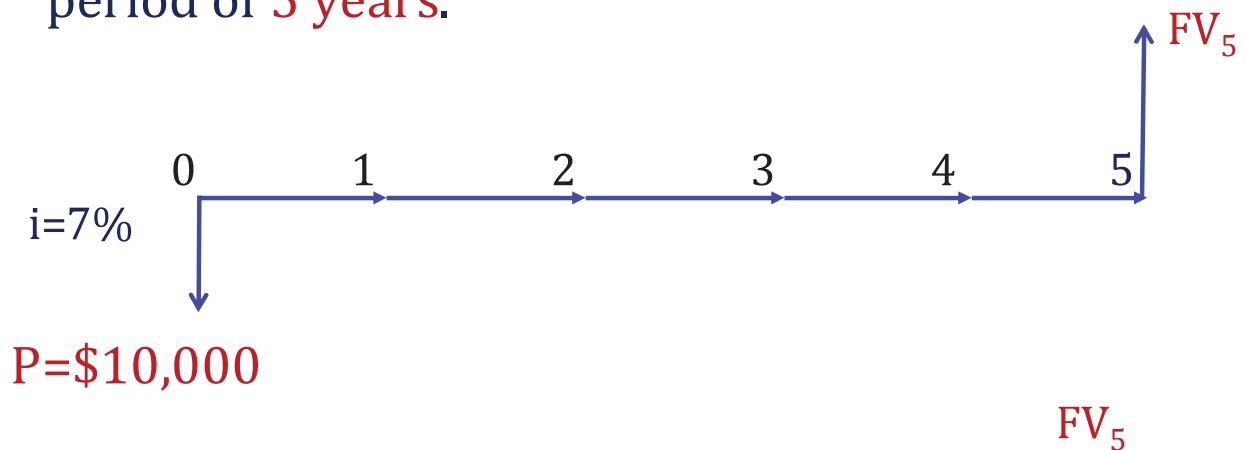
$$FV_5 = \$100 (1+ 0.10)^5$$

$$= \$161.05$$

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EXERCISE 2

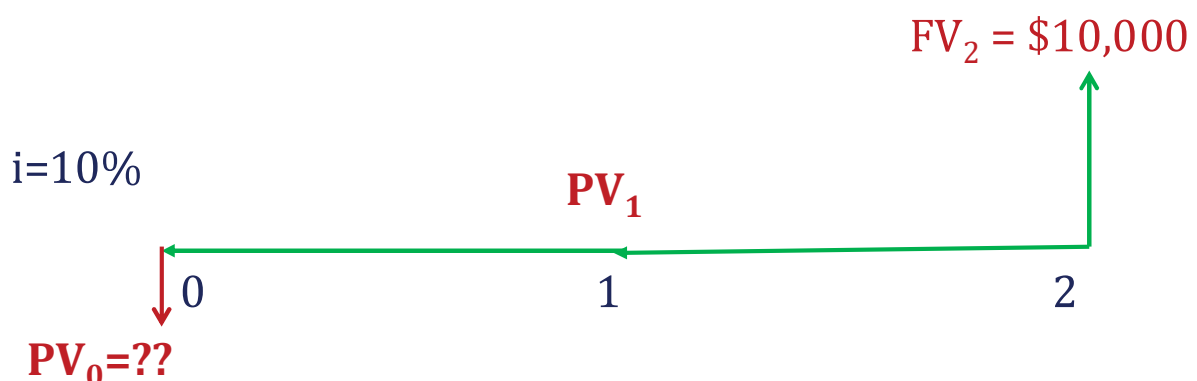
Thanh wants to know how much money she will have if she deposits **\$10,000** in the bank today with a compound interest rate of **7% per year** for a period of **5 years**.



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EXERCISE 3

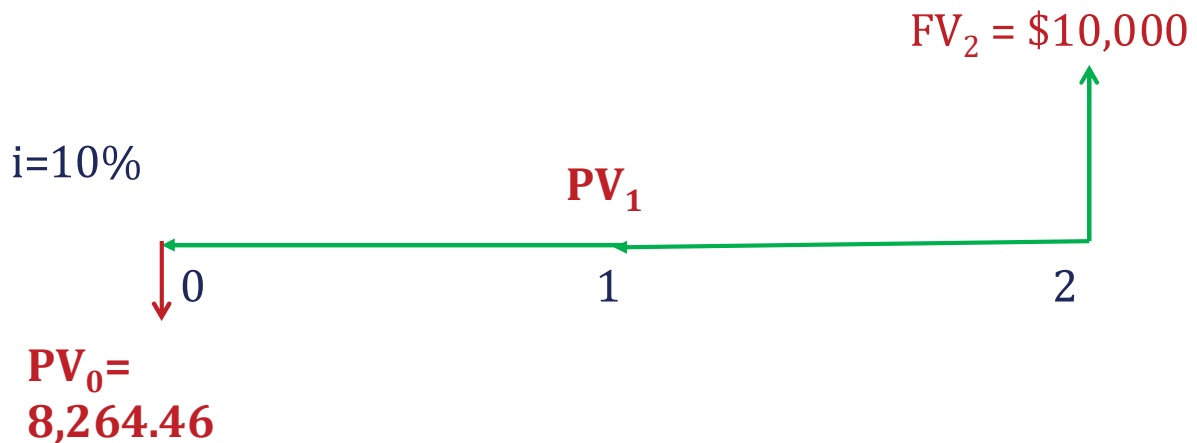
Suppose you need an amount of **\$10,000 after 2 years**. How much money do you need to deposit in the bank today, given that the bank's compound interest rate is **10% per year**?



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2.2 PRESENT VALUE

$$\begin{aligned}
 PV_0 &= FV_2 / (1+i)^2 = \$10,000 / (1.1)^2 \\
 &= FV_2 / (1+i)^2 = \$8,264.46
 \end{aligned}$$



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THE FORMULA FOR DISCOUNTING MONEY TO PRESENT VALUE

$$PV_0 = FV_1 / (1+i)^1$$

$$PV_0 = FV_2 / (1+i)^2$$

....

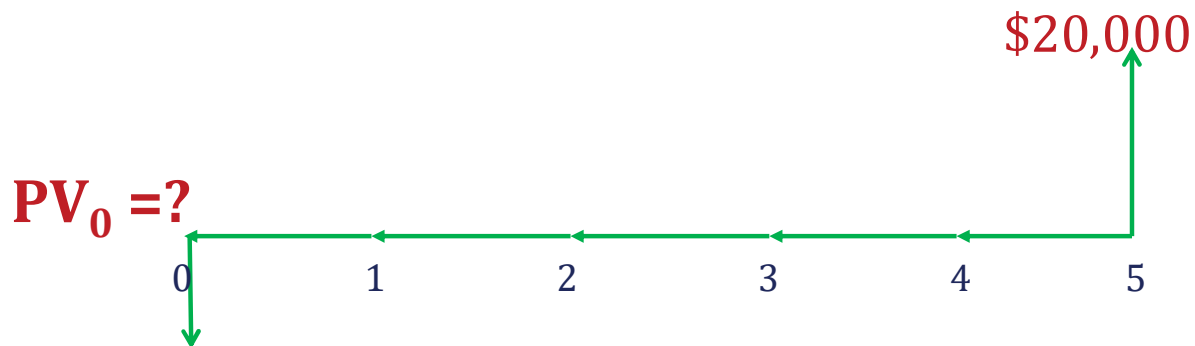
The General Formula for Discounting Money to Present Value:

$$PV_0 = FV_n / (1+i)^n = FV_n (1+i)^{-n}$$

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EXERCISE 4

Linh wants to know the total amount of money she needs to deposit in the bank today in order to have **\$20,000 after 5 years**, given that the bank's interest rate is **7%** per year.



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FUTURE VALUE >< PRESENT VALUE

Given P \longrightarrow **Find $F_n = P_0(1+i)^n$**

Present values

Future values

?? $P_0 = F_n(1+i)^{-n}$ \longleftarrow **Know future value**



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FUTURE VALUE >< PRESENT VALUE

- Future value (F_n)
 - $F_n = P_0(1+i)^n$

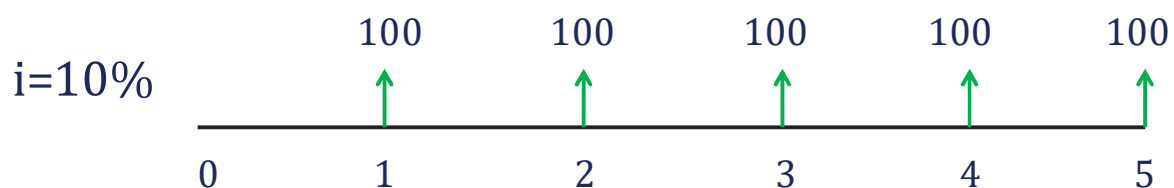
- Present value (P)
 - $P_0 = F_n / (1+i)^n = F_n(1+i)^{-n}$

 - i : discount rate
 - n : Number of compounding periods

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ANNUITY CASH FLOW

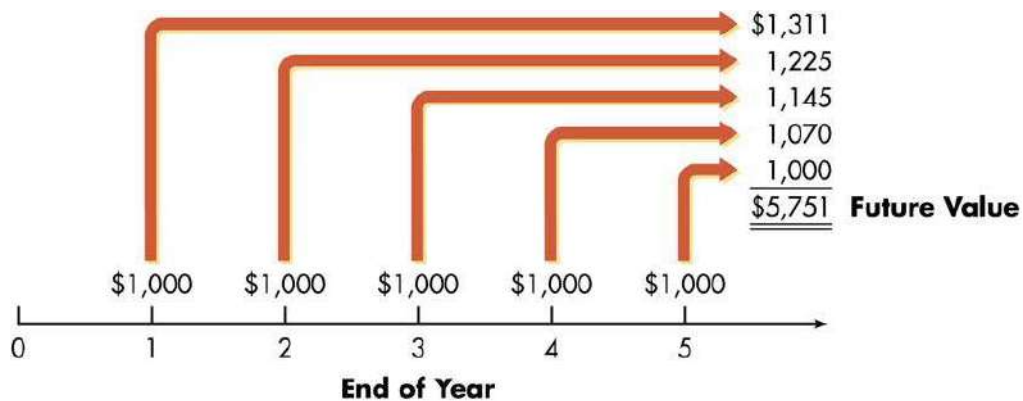
- Equal amounts of money at different periods.
- It can be either equal outflows or equal inflows.



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EXERCISE 5

- Minh wants to know how much money she will have at the end of the 5th year if she deposits **\$1,000** into the bank every year with the following cash flow, given an annual interest rate of 7% per year.



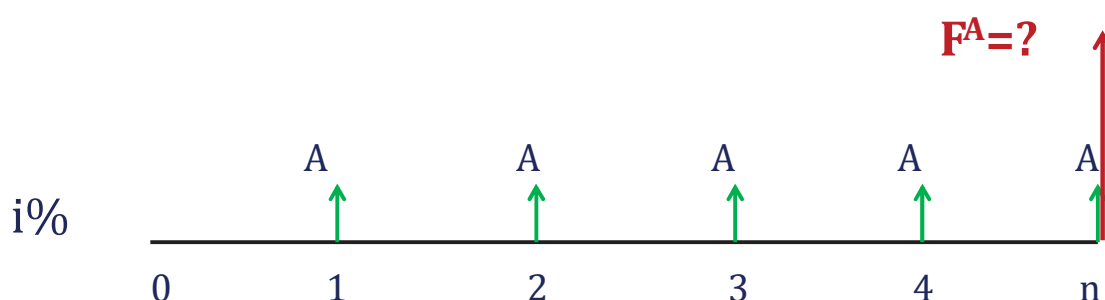
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FUTURE VALUE OF ANNUITY

$$F_n^A = A \left\{ \frac{(1+i)^n - 1}{i} \right\}$$

F_n^A : Total future value of an annuity after n periods

A: Equal payment each period



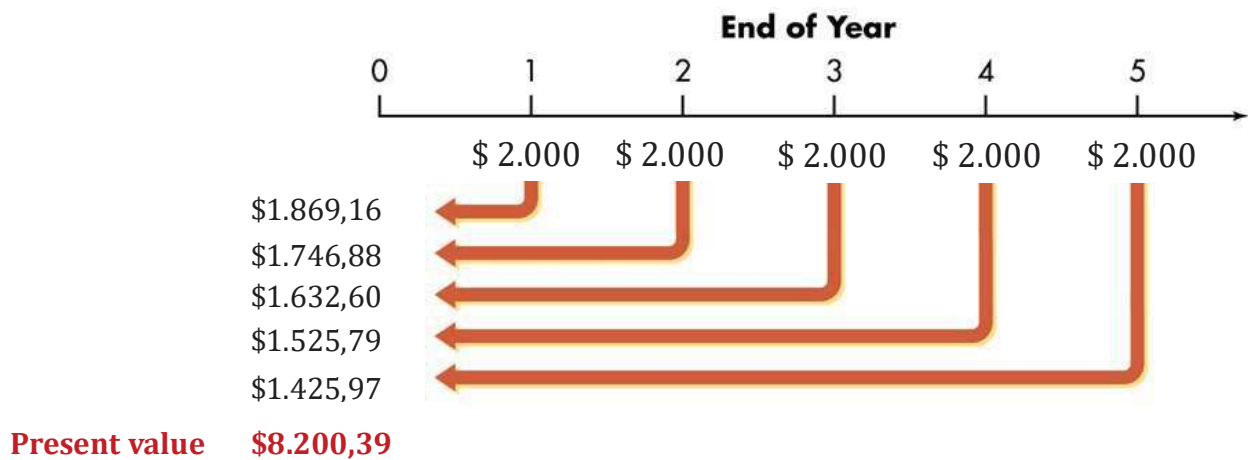
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PRESENT VALUE OF ANNUITY

- Mrs. Hoa is calculating the money needed for her son study university in Hanoi. She estimates every year her son needs \$2,000 for allowance. How much money does she need to deposit in a bank so that her son will have \$2,000 every year starting from year 1. He studies 4 years. The compound interest rate is 6% per year.

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PRESENT VALUE OF ANNUITY



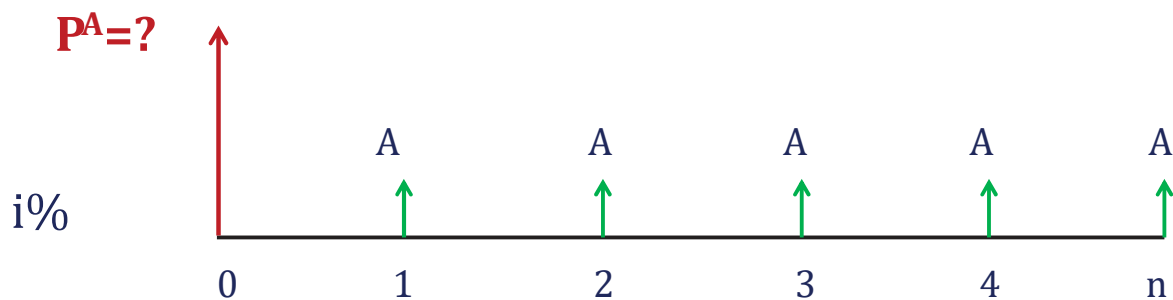
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PRESENT VALUE OF ANNUITY

$$P^A = A \left\{ \frac{(1+i)^n - 1}{i(1+i)^n} \right\}$$

P^A : Present value of an annuity

A: Equal payment each period



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EXERCISE 7

- A plastic factory plans to invest in a high-efficiency air compressor. The total investment cost is approximately VND 2 billion. The supplier offers the following payment options:
 - Immediate payment: VND 1.9 billion.
 - Equal annual payments over 4 years: VND 650 million each year, starting from year 1.
 - Increasing payments: Starting at VND 500 million in year 1, increasing by VND 100 million each year until year 4.
 - Single payment in year 4: VND 3.1 billion.
- **Additional information:**
 - The new machine saves VND 500 million in electricity costs and VND 60 million in maintenance costs annually.
 - Bank interest rate: 10% per year.
- Which option will you choose? Explain

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INFLATION

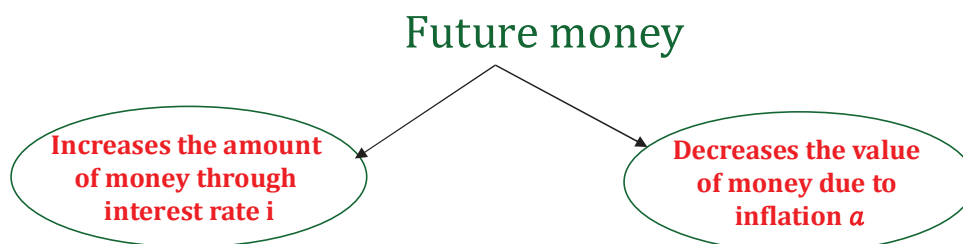
- Inflation is a measure of the loss of purchasing power of money.
 - the increase in the prices of goods and services

$$P_f = P_p(1+a)^n$$
 - P_f : Future price
 - P_p : Present price
 - a : Inflation
 - n : Time period
 - The value of money in the future is less than the value of money today:

$$F = P / (1 + a)^n$$
 - F : Future value
 - P : Present value
 - a : Inflation
 - n : Time period

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EFFECTS OF INFLATION AND INTEREST RATE



- Combined effect:
 - Increases the amount of money through interest rate i
 - Decreases the value of money due to inflation a
 - The future value of money considering both effects is:

$$F = P (1+i)^n / (1+a)^n$$

$$\theta = (i-a) / (1+a) \text{ then } F = P (1+\theta)^n$$

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EXERCISE 8

- Ms. Minh is calculating the VND 700,000,000 she has deposited in the bank over the past 5 years, trying to estimate its real value because prices of goods have increased significantly in recent years. Please help Ms. Minh calculate:
- The amount of money she will have after 5 years of saving with an interest rate of 8% per year.
- The real value of that money, considering an inflation rate of 3% per year.

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3. CRITERIA FOR EVALUATING THE FINANCIAL FEASIBILITY OF AN INVESTMENT PROJECT

- Net present value - NPV
- Internal Rate of Return – IRR
- Pay back period (Thv)
- Benefit and Cost ratio (B/C)
- Discount rate

3.1 NET PRESENT VALUE - NPV

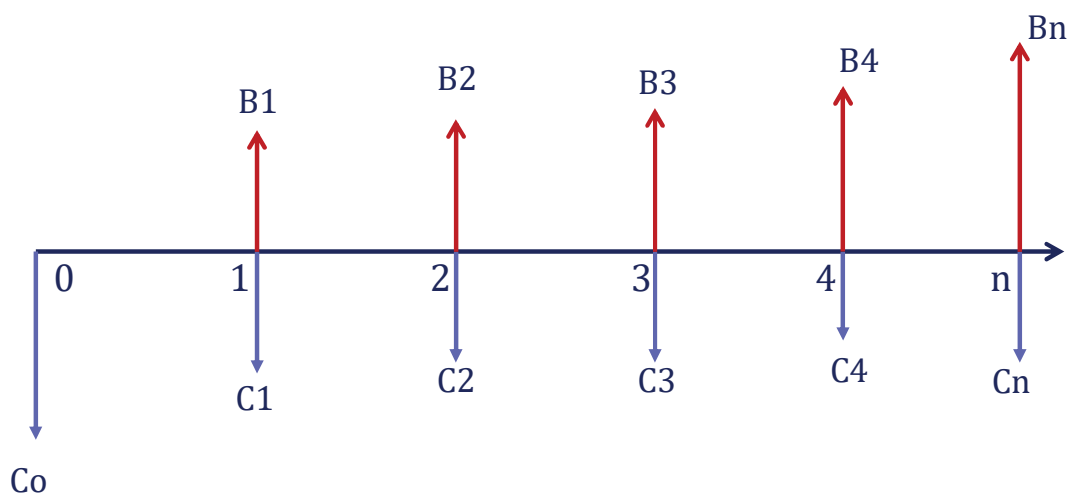
- Net Present Value (NPV): The total profit of the project discounted to the present time.

$$NPV = \sum_{t=0}^n (B_t - C_t)(1+i)^{-t}$$

B_t	Revenue in year t	i	Discount rate
C_t	Cost in year t	n	Project life time

- NPV > 0 Project is feasible
- NPV = 0 Considering
- NPV < 0 Not feasible
- NPV = Max Best

NPV



NET PRESENT VALUE - NPV

- NPV provides the total profit of the project at the present time
- NPV is computed as

$$\text{NPV} = \text{PVB} - \text{PVC}$$
- It is a widely used indicator in evaluating investment projects
- The value of NPV depends on the discount rate i .

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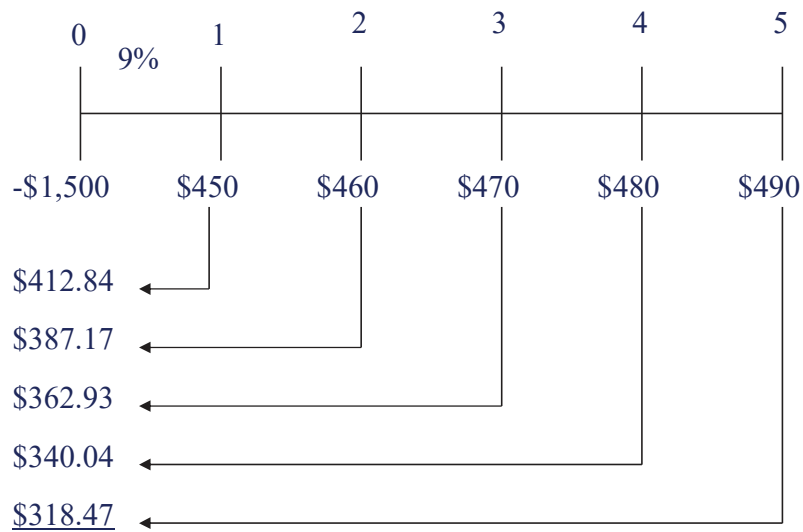
NPV - EXAMPLE

- You have two projects with the following information. The discount rate is 9% per year. Please calculate the NPV of Project A and Project B, comment

Project	A	B
Year 0	-1,500	-3,000
Year 1	450	755
Year 2	460	855
Year 3	470	955
Year 4	480	1,054
Year 5	490	1,150

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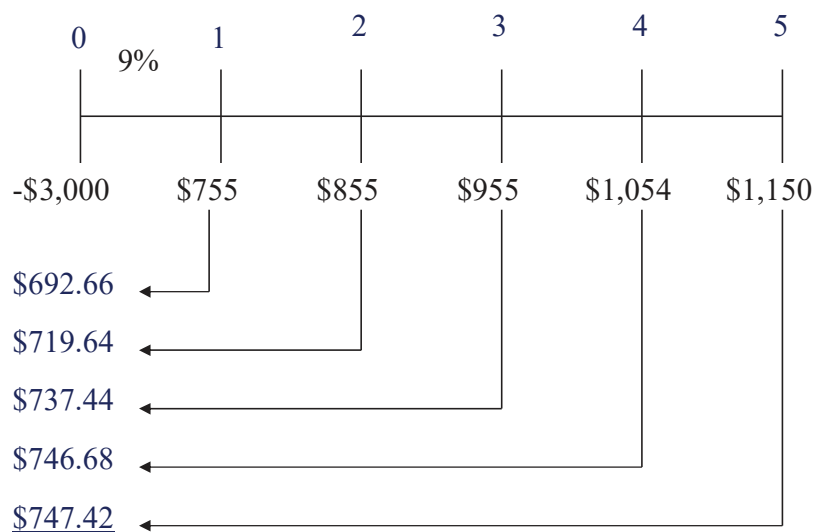
NPV - PROJECT A



\$ 321.45 = Net Present Value

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NPV - PROJECT B



\$ 643.83 = Net Present Value

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3.2 INTERNAL RATE OF RETURN - IRR

- Internal Rate of Return (IRR): The discount rate at which the NPV equals zero ($NPV=0$)

$$NPV = \sum_{t=0}^n (B_t - C_t)(1 + IRR)^{-t} = 0$$

- B_t Revenue in year t i Discount rate
 C_t Cost in year t n Project life time
- IRR > IRR* Project feasible
 - IRR < IRR* Not feasible
 - IRR = IRR* Considered
 - IRR = Max Best

IRR* Expected internal rate of return

The IRR must be greater than or equal to the cost of capital for the project to break even and generate a profit.

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IRR - PROJECT A & B

Project	A	B
Year 0	-1,500	-3,000
Year 1	450	755
Year 2	460	855
Year 3	470	955
Year 4	480	1,054
Year 5	490	1,150

Use Excel: = IRR(B2:B7) = 16.82%

Use Excel: = IRR(C2:C7) = 16.37%

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3.3 PAY BACK PERIOD - T_{hv}

- The time required for a project to recover its investment.
- The shorter the payback period, the better

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PAY BACK PERIOD - T_{hv}

- **Payback Period:** The point in time at which the NPV=0

$$NPV = \sum_{t=0}^{T_{hv}} (B_t - C_t)(1+i)^{-t} = 0$$

$T_{hv} < T_{hv}^*$ Feasible

$T_{hv} > T_{hv}^*$ Not feasible

$T_{hv} = T_{hv}^*$ Consider

$T_{hv} = \text{Min}$ Best

T_{hv}^* is expected payback period or required

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PAY BACK PERIOD - T_{hv}

- The payback period (T_{hv}) criterion informs investors how many years it will take for the project to recover its initial investment.
- The payback period (T_{hv}) criterion does not consider cash flows after the investment is recovered. For example, Project A may have a shorter payback period than Project B, but Project B may have a higher NPV than Project A.
- The payback period (T_{hv}) criterion is widely applied in the analysis and evaluation of high-risk projects.

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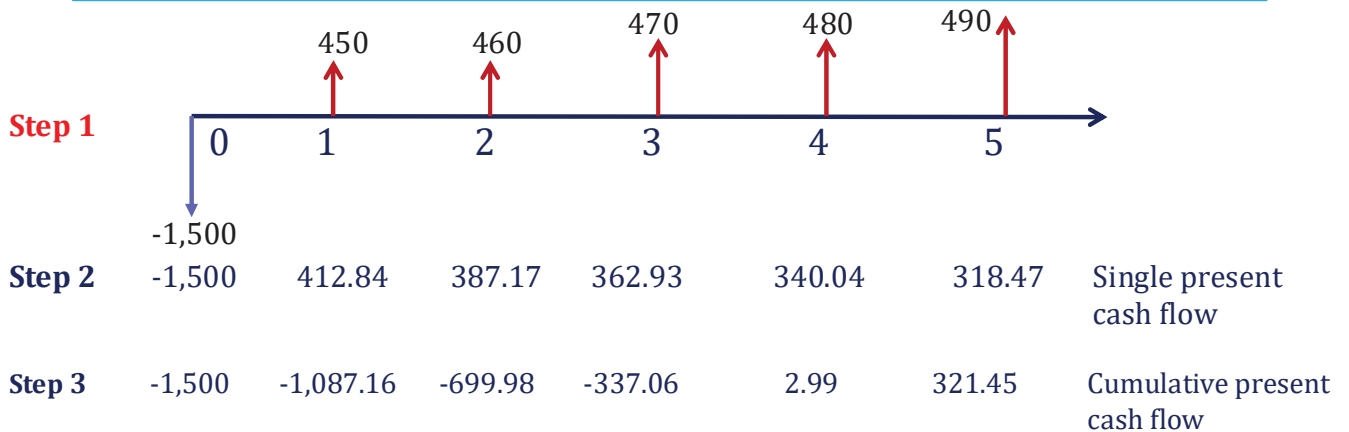
PAY BACK PERIOD – EXAMPLE

- You have two projects, A and B, as shown below. Given a discount rate of 9% per year, please calculate the payback period for both projects.

Project	A	B
Year 0	-1,500	-3,000
Year 1	450	755
Year 2	460	855
Year 3	470	955
Year 4	480	1,054
Year 5	490	1,150

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PAY BACK PERIOD – EXAMPLE

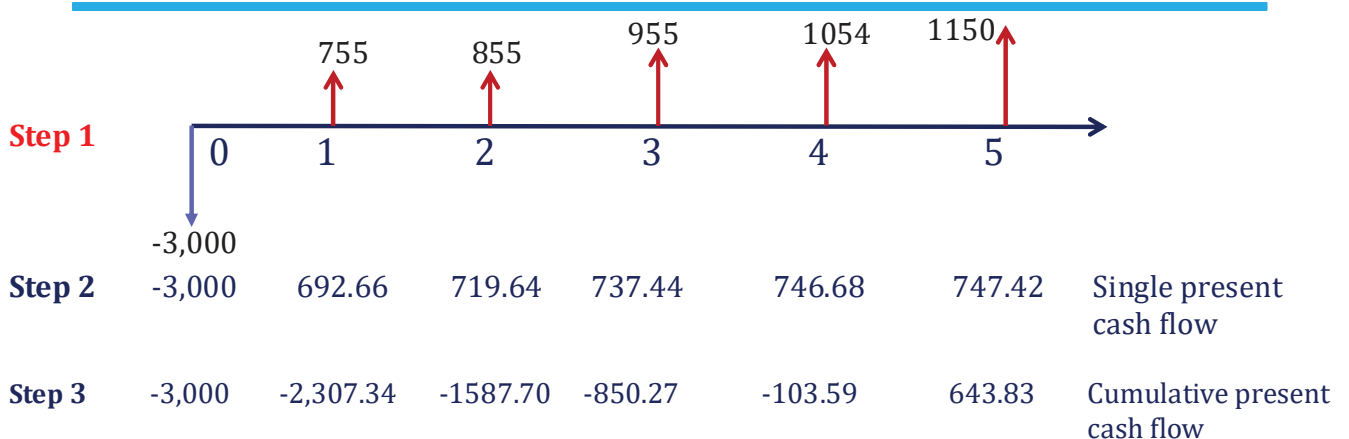


The last cumulative year with a negative cash flow is year 3.

Step 4 $Thv = 3 + (337.06 / (337.06 + 2.99)) = 3.99$

Thv = 3.99 year

PAY BACK PERIOD – EXAMPLE



The last cumulative year with a negative cash flow is year 4.

Step 4 $Thv = 4 + (103.59 / (103.59 + 643.83)) = 4.14$

Thv = 4.14 year

3.4 BENEFIT – COST RATIO B/C

- **Benefit-Cost Ratio (B/C):** The ratio between the total present value of revenues and the total present value of project costs.

$$\frac{B}{C} = \frac{\sum_{t=0}^n B_t (1+i)^{-t}}{\sum_{t=0}^n C_t (1+i)^{-t}}$$

- B/C > 1 Feasible
- B/C < 1 Not feasible
- B/C = 1 Consider
- B/C = Max Best

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BENEFIT – COST RATIO B/C

- The B/C criterion is relative, indicating how much present value of revenue is generated by one unit of the project's present value cost.
- The B/C criterion is widely applied in analyzing and evaluating investment projects of different scales.

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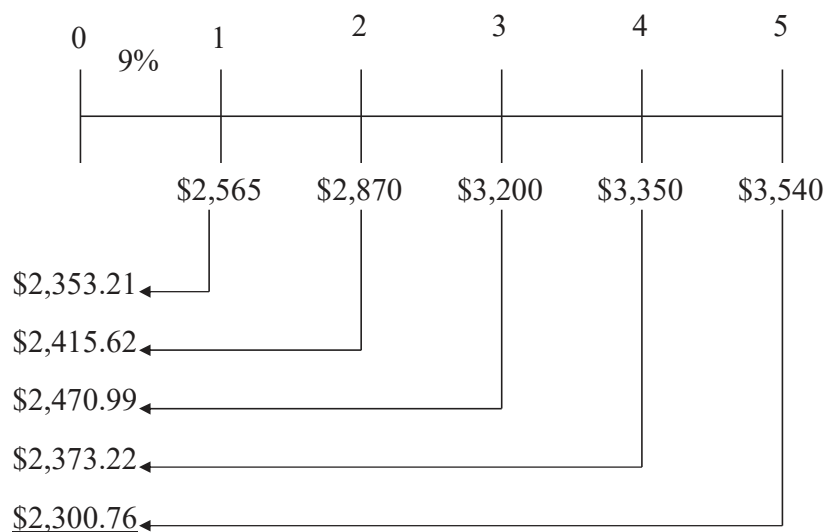
EXAMPLE - B/C

- You are given a project with information below. The discount rate is 9% per year, please calculate the Benefit-Cost Ratio (B/C) of this project.

Year	Outflow	Inflow	NET cash flow
0	3,000		-3,000
1	1,810	2,565	755
2	2,015	2,870	855
3	2,245	3,200	955
4	2,296	3,350	1054
5	2,390	3,540	1150

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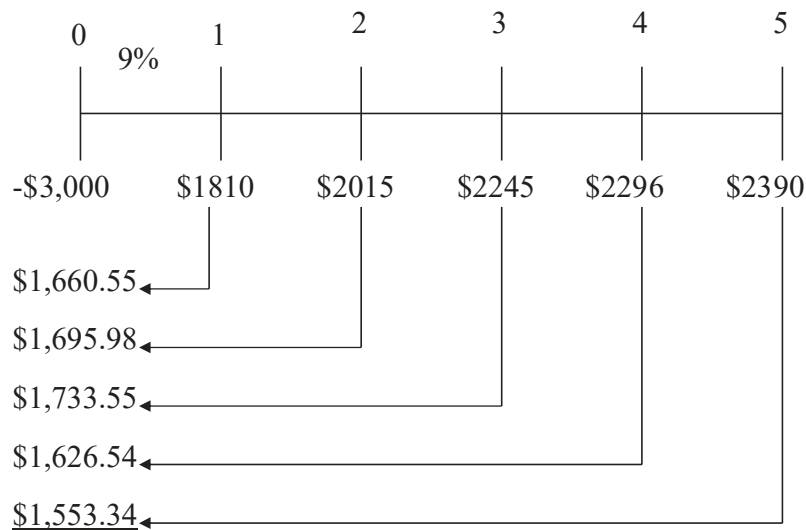
PVB - THE PRESENT VALUE OF CASH INFLOWS



\$ 11,913.80 = PVB (Total cash inflow at present time)

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PVC - THE PRESENT VALUE OF CASH OUTFLOWS



\$ 11,269.97 = PVC (Total cash outflow at present time)

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BENEFIT – COST RATIO (B/C)

- $$B/C = PVB/PVC$$

$$= 11,913.80 / 11,269.97$$

$$= 1.057$$

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EXERCISE 9

- Duong Dong Co., Ltd. has a frozen food plant in Long Hau Industrial Park (Long An). The existing cooling system consists of two old, low-efficiency chillers and pumps/fans running at constant speed. The company plans to replace them with one high-efficiency invert chiller, install VFDs for the chilled-water pump, condenser-water pump, and cooling-tower fan, and optimize the controls. The total investment cost, including dismantling and purchasing new equipment, is VND 5.5 billion.
- The estimated electricity savings are 700,000 kWh/year; maintenance costs decrease by VND 80 million/year; however, operating costs increase by VND 30 million/year due to additional chemicals, filters, and sensor calibration. The project lifetime is 10 years, and the residual value is 5% of the initial equipment investment (VND 5 billion).
- Discount rate: 12%/year. Average electricity tariff: VND 2,200/kWh.
- **Please calculate four criteria to assess the feasibility of this** 61

3.5 DISCOUNT RATE

- Interest rate (%)
- Discount rate (%)
 - Opportunity cost
 - Avoided cost
 - MARR - Minimum Attractive Rate of Return
 - WACC – Weighted Average Cost of Capital

DISCOUNT RATE

- **The discount rate** (i) is expressed as a percentage (%)
- It represents the expected return on invested capital, also known as the productivity of capital
- At the same time, it reflects the opportunity cost of using capital
- In principle, the discount rate should be greater than or at least equal to the minimum acceptable rate of return on investment.

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EXAMPLE

- A person has the following investment opportunities:
 - Investing in a business
 - Investing in a business with USD 3,000 at an interest rate of 18%
 - Depositing USD 20,000 in a bank at an interest rate of 9%
 - This person also has the following debts to repay
 - USD 4,000 tuition with an interest rate of 11%
 - USD 1,000 car payment with an interest rate of 12%
 - So, what are the investment opportunities here?
 - **Remember**, debt repayment is also a form of investment – because it also leads to an increase in cash flow just like a new investment.

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EXAMPLE

	Investment	Interest rate (%)
Investment opportunities	3.000	18%
	1.000	12%
	4.000	11%
	20.000	9%
Cumulative	0	18%
	3.000	18%
	3.001	12%
	4,000	12%
	4.001	11%
	8.000	11%
	8.001	9%
	20.000	9%

- Calculate the discount rate of the following investment: USD 400; USD 6,000.
- The discount rate for USD 400 is 18%.
- The discount rate for USD 6,000 = $(3,000 \times 18\% + 1,000 \times 12\% + 2,000 \times 11\%) / 6,000 = 14.67\%$

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HOW TO DETERMINE THE DISCOUNT RATE

- The discount rate in financial analysis depends on the cost of capital.
- The discount rate is determined based on the weighted average of the interest rates of different funding sources (e.g., loans from commercial banks, concessional loans) and the minimum required rate of return on equity capital.

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WACC – WEIGHTED AVERAGE COST OF CAPITAL

- WACC (weighted average cost of capital) is accounted as below

$$\text{WACC} = \text{Interest rate} * t_{\text{loan}} * (1 - \text{Income taxes rate}) + \text{MARR} * t_{\text{equity}}$$

t_{loan} : % Share of loan in total investment

t_{equity} : % Share of equity in total investment

MARR: Minimum Attractive Rate of Return of equity

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WACC

- WACC is used to calculate NPV and other financial indicators in investment project analysis.
- WACC reflects the project's average risk level through the weighted cost of capital.
- Businesses need to understand WACC to evaluate financial feasibility.
- The lower the WACC, the lower the cost of capital, which enhances the project's financial efficiency.

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EXAMPLE

- Calculate the WACC for an investment project in the field of energy efficiency (EE). The project has 70% debt with an interest rate of 12% per year. Equity accounts for 30% with an MARR of 15%. The corporate income tax rate is 20%.

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4. CASH FLOW OF AN ENERGY EFFICIENCY PROJECT

- Cost estimation
- Benefit estimation
- Net cash flow

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4.1 COST ESTIMATION

- Principles for estimating cash outflows
- Initial investment cost
- Additional operating costs
- Other incurred expenses

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WHAT ARE COST

- Cost is the total amount of resources that must be expended to achieve a specific objective or obtain a certain benefit.
- Cost is usually measured in monetary terms (USD, EUR, VND...), reflecting the value of resources consumed.

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PRINCIPLES OF COST ESTIMATION (1)

- Understand the project clearly before estimating costs
 - Define project objectives: Why is this investment necessary?
 - Determine project scale (small, medium, or large).
 - Clarify capacity, location, and project owner.
 - Assess project lifespan (expected operational period).
 - Identify project start date, schedule for implementation.
 - Does the project require significant costs?
- Relevant financial factors
 - Consider whether foreign currency is involved.
 - Check applicable investment incentives, taxes, fees, & support policies.
 - Account for price escalation and inflation.

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PRINCIPLES OF COST ESTIMATION (2)

- Use reliable data as the basis for calculations.
- Make reasonable and transparent assumptions, always citing sources and methods.
- Include only relevant costs that are directly attributable to the project.
- Consider multiple cost scenarios to assess risks and flexibility.
- Allow for contingency: add sufficient reserves to cover potential fluctuations.
- Handle data gaps properly: don't panic, always use reasonable assumptions – never ignore costs.
- Update estimates regularly as new information and data become available.

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ENERGY EFFICIENCY PROJECT COSTS

- Initial investment cost
- Additional operating cost
- Additional management and compliance cost
- Additional financial cost
- Other additional costs
- Contingency Costs

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INITIAL INVESTMENT COSTS

- Purchase of equipment, machinery, new technology
- Technical design, consulting, supervision
- Installation, commissioning, acceptance
- Renovation, related infrastructure construction
- Cost for stop operating

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ADDITIONAL OPERATING & MAINTENANCE COSTS – O&M

- Additional operating costs (if any)
 - Fuel, electricity, water, and additional chemicals for the new equipment.
 - Additional operating labor
- Maintenance, repair, and consumables costs
 - Costs of periodic inspections, preventive maintenance, and corrective repairs.
 - Costs of replacing spare parts and consumables (filters, lubricants, gaskets, belts, etc.).
- Training costs for operation and safety
 - Costs of organizing training courses on the operation of the new equipment.
 - Costs of safety training on occupational health and safe maintenance practices.

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ADDITIONAL MANAGEMENT & COMPLIANCE COSTS

- Licensing and administrative fees
- Energy audit, Monitoring, Reporting, Verification (MRV)
- Compliance with environmental & safety standards

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ADDITIONAL FINANCIAL COSTS

- Interest on bank loans or concessional loans
- Credit guarantee fees, insurance fees
- Capital issuance costs or opportunity cost of equity capital

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OTHER INCREMENTAL COSTS & CONTINGENCY COSTS

- Other Incremental Costs
 - Taxes, customs, transportation
 - Legal advisory, project communication
 - Construction & equipment insurance
 - Increased taxes due to reduced energy costs, or additional taxes arising from increased revenue (e.g., selling old equipment).
- Contingency Costs
 - Price fluctuation of equipment and materials
 - Schedule delays, technical risks
 - Unforeseen costs

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SOURCES OF DATA FOR COST ESTIMATION IN ENERGY EFFICIENCY PROJECTS

- Suppliers/manufacturers
 - Equipment prices, training costs, technical specifications.
- Government guidelines and regulations
 - Import taxes, tax incentives, and support policies.
- Specialized websites on energy efficiency technologies
 - Updates on trends, technologies, and benchmark costs.
- Financial institutions
 - Interest rates, concessional loans, repayment plans.
- Discussions with company management
 - Information on equity capital, debt structure, and financial capacity.
- Experience from similar projects
 - Cost lessons, technical parameters, and investment outcomes.

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EXERCISE 10 (1)

- A paper manufacturing company in Binh Duong is considering investing in an energy efficiency system for its paper drying line. After conducting an energy audit, the consulting firm proposed replacing the old ventilation fans and cooling water pumps with high-efficiency equipment, combined with an automatic control system and smart sensors. Provided Information below:
 - Equipment Costs
 - 4 high-efficiency ventilation fans: 1.2 billion VND
 - 2 energy-efficient cooling water pumps: 800 million VND
 - Automatic control system (sensors, PLC, VFD): 1.5 billion VND
 - Installation and Commissioning Costs
 - 1 supervising engineer + 3 skilled workers + 4 unskilled worker
 - Installation time: 20 days
 - Plant downtime: 10 days (estimated revenue loss of 200 million VND/day)

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EXERCISE 10 (2)

- **Consulting Service Costs**
 - Energy audit and solution design: 50 million VND (waived if the project is implemented)
 - Supervision and acceptance: 30 million VND
- **Financial Costs**
 - The project is financed with 50% bank loan at an annual interest rate of 8%
- **Additional Operating & Maintenance Costs (O&M)**
 - Extra electricity consumption due to control system: 50 million VND/year
 - Consumables (lubricants, gaskets, air filters, etc.): 70 million VND/year
 - Training for 5 staff in operation and safety: 100 million VND
- **Other Costs/Incomes**
 - Proceeds from selling old equipment: +300 million VND
 - Import tax for new equipment: 5%
 - Corporate tax incurred from savings

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EXERCISE 10 (3)

- List all costs and incomes related to the project, and classify them into:
 - Initial investment costs
 - Operating & Maintenance (O&M) costs
 - Financial costs
 - Other costs/incomes
- **Impact analysis**
 - Which ones are most likely to be underestimated or overlooked if not carefully considered? Why?
- **Discussion**
 - If you were the financial manager of the company, which cost category would you prioritize when making the investment decision?
 - Propose 2 ways to minimize the risk of unexpected costs.

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LIST OF COSTS

Cost Category	Detailed Items
DIRECT COSTS	<ul style="list-style-type: none"> - Cost of purchasing main equipment (boiler, high-efficiency motors, LED lighting systems, automatic control systems, etc.) - Cost of purchasing auxiliary equipment (inverters, sensors, meters, monitoring systems, etc.) - Materials, cables, pipelines, and related construction structures - Cost of dismantling and transporting old equipment - Labor costs for installation, commissioning, and acceptance - Additional operating costs (fuel, electricity, water, chemicals, if the new equipment consumes more)
INDIRECT COSTS	<ul style="list-style-type: none"> - Design cost, energy audit, technical consulting - Import tax, customs fees, VAT (if not deductible) - Financial costs: bank loan interest, credit guarantee fees, capital issuance costs - Cost of production downtime during installation - Training costs for operation and occupational safety - Costs of maintenance, periodic repairs, and consumables - Insurance costs for equipment and facilities- Project management costs (project management board, internal supervision, administration) - Tax-related costs (e.g., increased corporate income tax due to energy cost savings, or tax when selling old equipment)

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POINTS TO NOTE WHEN ESTIMATING COSTS (1)

- **Correctly define the scope of costs**
 - Only include additional costs arising from the project.
 - Exclude costs that the enterprise must pay regardless of the project (e.g., general administrative expenses).
- **Standardize units and financial factors**
 - Convert all costs into the same currency (preferably local currency, accounting for exchange rates).
 - Include taxes, financial fees, and opportunity costs (e.g., lost revenue due to production downtime).

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POINTS TO NOTE WHEN ESTIMATING COSTS (2)

- **Consider Hidden Costs and Side Effects**
 - Check whether the investment costs affect working capital (e.g., installing an oil-fired boiler may require an additional oil storage tank).
 - Account for additional operating, maintenance, and training expenses.
- **Take into Account Project Specifics and Context**
 - Each energy efficiency (EE) project has its own characteristics in terms of technology, scale, and operating conditions.
 - Adjust cost estimates according to the actual context, and avoid mechanically applying assumptions from other projects.

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COST CHECK LIST

Cost	Yes/No	Note
Incremental Initial Investment Costs		
Main equipment (boiler, high-efficiency motors, LED system, control system, etc.)		
Auxiliary equipment (variable frequency drives, sensors, monitoring systems, meters, etc.)		
Materials, wiring, piping, and related construction structures		
Dismantling and transporting old equipment		
Installation labor, commissioning, and acceptance testing		
Consulting, design, and energy audit services		
Additional Operating & Maintenance (O&M) Costs		
Fuel, electricity, water, and additional chemicals (if consumption increases)		
Additional operating labor (if required)		
Regular maintenance, repair, and consumables (filters, lubricants, gaskets, etc.)		
Training for operation and safety for personnel		
Insurance for equipment and facilities		

COST CHECK LIST

Cost	Yes/No	Note
Financial Costs		
Bank loan interest, credit guarantee fees		
Capital issuance costs, opportunity cost of equity		
Financial incentives (if any)		
Other Costs / Revenues		
Production disruption costs during installation		
Import duties, customs fees, VAT (if non-deductible)		
Project management costs (management board, internal supervision, administration)		
Tax impacts: increase in corporate income tax due to energy savings, tax on selling old equipment		
Income from liquidation of old equipment		

4.2 INFLOW ESTIMATION

- Project revenues of the Energy Efficiency Project
- Principles for estimating cash inflows
- Check list

BENEFITS/INFLOWS

- Revenues/benefits are the economic, financial, and non-financial values that the EE (Energy Efficiency) project brings.
- These benefits may include:
 - Monetary: cost savings, additional revenue, policy incentives.
 - Non-monetary: reputation, improved working environment, risk reduction, enhanced reliability, etc.

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BENEFITS

- Direct revenues from project activities
- Revenues from cost savings and avoided costs
- Revenues from financial & policy incentives
- Salvage value of equipment
- Non-financial benefits

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DIRECT REVENUES

- Direct revenues from project activities
 - Revenues from selling main products or services generated by the project
 - Additional revenues from by-products (if any) (excess steam, surplus electricity, recycled products, etc.)
 - Revenues from old equipment
 - Example: Waste heat recovery system → selling excess steam to another company.

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REVENUES FROM COST SAVINGS AND AVOIDED COSTS

- Revenues from cost savings and avoided costs
 - Energy cost savings: electricity, coal, oil, gas...
 - Labor cost reduction: fewer shifts, fewer workers
 - Reduced operation & maintenance (O&M) costs
 - Avoided costs (expenses the company no longer has to pay thanks to the EE project): environmental treatment fees, penalties for non-compliance, downtime costs...
 - Example: High-efficiency dust filtration system → the company no longer has to pay annual environmental fees

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REVENUES FROM FINANCIAL & POLICY INCENTIVES & SALVAGE VALUE

- Revenues from financial & policy incentives
 - Subsidies/grants from the government or international funds.
 - Tax incentives: accelerated depreciation, exemptions/reductions on import duties for equipment, reduced corporate income tax.
 - Carbon credits / Renewable Energy Certificates (RECs).
 - Indirect financial support: preferential interest rates, loans cheaper than market rates.
 - Example: The project is supported by UNDP with 20% of the initial investment cost.
- Salvage value of equipment
 - From machinery and equipment at the end of the project.
 - Can be liquidated or reused for another project.

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NON-FINANCIAL BENEFITS

- Enhancing corporate image, brand, and reputation.
- Compliance with laws, reducing the risk of penalties.
- Increasing system reliability.
- Reducing environmental impact (lower emissions).
- Improving product quality.
- Increasing the company's production capacity utilization.
- Expanding products into high-end markets.
- Improving workplace environment and employee health.
- Contributing to sustainable development goals (SDGs, ESG).

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NOTES WHEN ESTIMATING BENEFITS

- Only count the incremental benefits generated by the project.
- Identify all sources of revenue fully.
 - **Note: Do not overlook small items that may have long-term impacts.**
- Base on actual and transparent data:
 - Use actual measurement data or reports from similar projects.
 - Refer to market prices and supplier quotations.
 - Consider price fluctuations and market conditions (energy, raw materials, labor, inflation, etc.).
 - Account for cyclicity (peak vs. off-peak).
 - Revenues should be adjusted according to different price scenarios.
 - Avoid estimates based on overly optimistic assumptions.
 - Include risk provisions.

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EXERCISE 11 (1)

- GreenPack Packaging Company, located in Quang Minh Industrial Park, Hanoi, specializes in producing paper packaging for export. Due to rising energy costs, the company decided to invest in an energy efficiency project to upgrade its boiler system, fans, and LED lighting with the objectives of:
 - Reducing electricity and coal consumption
 - Lowering operating costs
 - Utilizing by-products to generate additional revenue
- Pre-project consumption data:
 - Fans: 1,800,000 kWh/year
 - Lighting: 250,000 kWh/year
 - Boiler coal: 500 tons/year
 - Average labor cost: 9 million VND/person/month

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EXERCISE 11 (2)

- Project information is as follows:
 - Installation of 15 industrial fans saving 18% of electricity consumption.
 - Replacement of 600 LED lamps, saving 28% of lighting electricity.
 - Upgrade of the old boiler, reducing coal consumption by 12%.
 - Reduction of direct labor for operating fans and boilers: from 6 down to 4 workers.
 - 12% of the total investment supported by the Green Energy Fund of the Ministry of Industry and Trade.
 - Sale of 8 old fans and 1 old boiler with a total salvage value of 120 million VND.
 - The plant will obtain ISO 50001 certification and is expected to receive a 5% tax incentive under the energy policy.
 - Industrial electricity tariff: 2,300 VND/kWh; Coal price: VND/kg.

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EXERCISE 11 (3)

- Based on the above information, list all the revenues/benefits generated by the project. Classify each revenue into the following five groups:
 - Direct revenues from project operations
 - Revenues from cost savings / avoided costs
 - Revenues from financial support / incentives
 - Salvage value
 - Non-financial benefits

BENEFIT CHECK LIST

Benefit items	Yes/No	Note
Direct revenues from the project		
Revenues from the main products/services generated by the project		
Revenues from by-products or additional products		
Revenues from liquidation of old assets		
Revenues from cost savings and avoided costs		
Energy cost savings (electricity, coal, oil, gas)		
Operating cost savings		
Maintenance cost savings		
Labor cost savings		
Avoided costs thanks to the project (environmental treatment fees, penalties, downtime costs)		
Revenues from tax reduction due to increased assets		

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BENEFIT CHECK LIST

Benefit items	Yes/No	Note
Revenues from financial support & policies		
Financial support from the government / international funds		
Tax incentives / accelerated depreciation		
Carbon credits / renewable energy certificates (if the project is eligible, to be sold or recorded as value)		
Salvage value of equipment		
Residual value of equipment at the end of the project		
Lợi ích phi tài chính		
Non-financial benefits (NTT1 reputation, ESG, environment) – not directly convertible into money, but should be acknowledged		

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4.3 CASH FLOW BEFORE TAX, AFTER TAX AND NET CASH FLOW (NET)

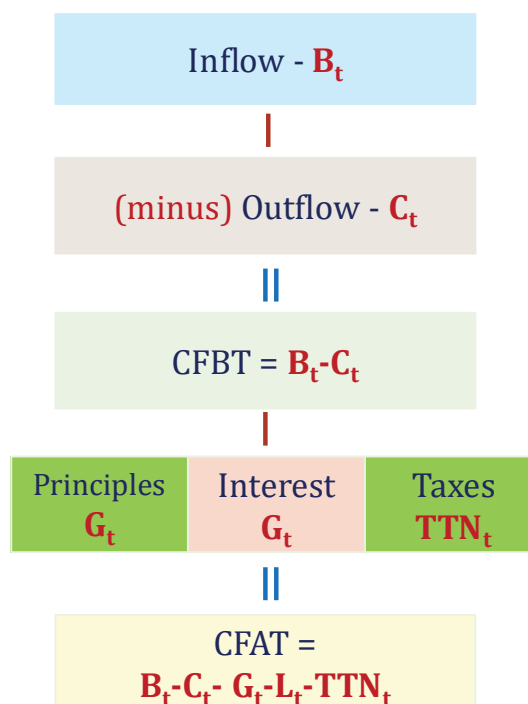
- Cash flow before tax
- Cash flow after tax
- Net cash flow- NET

CASH FLOW BEFORE TAX (CFBT) and AFTER TAX (CFAT)

CFBT	CFAT
<ul style="list-style-type: none"> • CFBT: Cash Flow Before Tax • Cash flow before debt service and taxes. • Used to assess the project's ability to generate cash. $\text{CFBT}_t = B_t - C_t$	<ul style="list-style-type: none"> • CFAT: Cash Flow After Tax • Cash flow after paying principles, interest and taxes. • Actual net cash flow received by the business – referred to as NET. $\text{CFAT}_t = B_t - C_t - G_t - L_t - \text{TTN}_t$

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THE RELATIONSHIP BETWEEN CFBT AND CFAT



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CFBT > CFAT

$$\text{CFBT}_t = B_t - C_t$$

$$\text{CFAT}_t = B_t - C_t - G_t - L_t - \text{TTN}_t$$

CFAT: Cash flow after taxes

CFBT: Cash flow before taxes

B_t : Inflow in year t

C_t : Outflow in year t (investment and operating cost)

G_t : Principles in year t

L_t : Interest in year t

TTN_t : Corporate tax in year t

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TAXABLE INCOME

$$\text{TNCT}_t = B_t - C_t - \text{KH}_t - L_t$$

- TNCT: Taxable income in year t
- B_t : Revenue in year t
- C_t : Cost in year t (Investment and operating cost)
- KH_t : Depreciation in year t
- L_t : Interest in year t

$$\text{TTN}_t = \text{TNCT}_t * \text{TR}_t$$

- TTN_t : Income tax for year t
- TR_t : Tax rate on taxable income in year t

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TAX AND DEPRECIATION

- **Depreciation** is the method of allocating the investment cost of a fixed asset over its useful life.
- **Main purposes:**
 - For financial reporting (accounting)
 - For corporate income tax calculation
- **Nature of depreciation:**
 - Depreciation represents the book value of the asset for each period.
 - It is not an actual economic cost (the asset was paid for once at the time of purchase).
 - It is not a financial expense (it does not generate any additional cash outflow).
 - In other words: Depreciation merely reflects the allocation of the investment cost on the books.

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TAX AND DEPRECIATION

- **Role in financial analysis:**
 - Depreciation does not reduce actual cash flow, but it reduces pre-tax profit → thereby lowering the taxes payable.
 - Formula for taxable income:

$$\mathbf{TNCT}_t = \mathbf{B}_t - \mathbf{C}_t - \mathbf{KH}_t - \mathbf{L}_t$$

- Thus, the value of depreciation indirectly affects **CFAT**.
- The higher the depreciation, the lower the taxes the company has to pay.

$$\mathbf{CFAT}_t = \mathbf{B}_t - \mathbf{C}_t - \mathbf{G}_t - \mathbf{L}_t - \mathbf{TTN}_t$$

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DEPRECIATION METHODS

- There are several depreciation methods
 - Straight-Line Depreciation
 - Equal depreciation expense each year.
 - Most common in accounting and energy efficiency projects.
 - Declining Balance Depreciation
 - Higher depreciation in the early years, decreasing over time.
 - Often applied to assets with rapid wear and tear.
 - Units-of-Production Depreciation
 - Depreciation is proportional to the actual usage or output of the asset.

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STRAIGHT-LINE DEPRECIATION METHOD

- Depreciation expense is the same each year
- Annual Depreciation = $(\text{Asset Value} - \text{Salvage Value}) / \text{Useful Life}$
- Example:
 - Asset value: 500 million VND, Useful life: 5 years
→ Annual depreciation = 100 million VND per year.

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EXERCISE 12

- Continue with Exercise 9 using the following new information:
- The equipment is depreciated on a straight-line basis over 5 years.
- The corporate income tax rate is 20% per year.
- Recalculate the 4 indicators for evaluating the project's feasibility

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5. FINANCING FOR INVESTMENT PROJECTS

- Financial Options
- Sources of Financing for Energy Efficiency Projects
- Negotiating Financial Solutions

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5.1 FINANCIAL OPTIONS

- Equity
- Loan
- Others

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KEY POINTS TO CONSIDER IN FINANCIAL EVALUATION (1)

- **Project Cash Flow Assessment**
 - Revenue and expenses: Are they sufficient to repay debt and generate profit?
 - Need for additional assets or investment: Will the project require new assets or supplementary investment?
- **Priority and self-financing capacity:**
 - Does the business have other projects competing for capital?
 - Equity availability: Is the equity sufficient, or is additional borrowing needed?

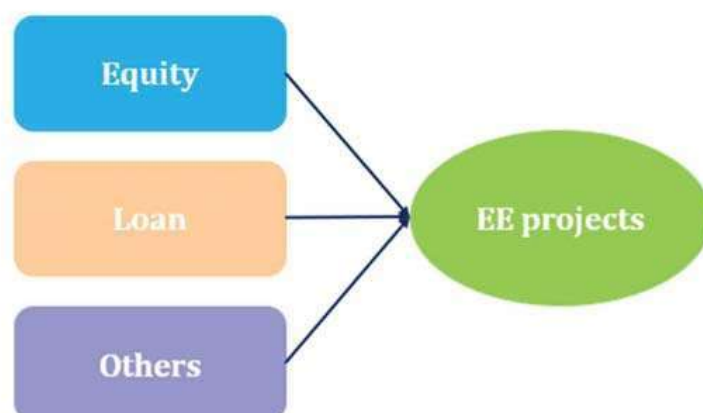
115

KEY POINTS TO CONSIDER IN FINANCIAL EVALUATION (2)

- **Assessing the Financial Health of a Business**
 - Balance sheet, debt/equity ratio, short-term and long-term liquidity:
 - These indicators affect borrowing capacity and cost of capital.
- **Consideration of financing conditions and incentives:**
 - Interest rates, loan terms, collateral requirements.
 - Energy efficiency support funds, tax incentives, and preferential credit.
- **Financial and legal risks:**
 - Fluctuations in electricity prices, fuel costs, interest rate
 - Compliance with energy efficiency regulations, transparent reporting, and clear repayment obligations.

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FINANCIAL SOURCES FOR EE PROJECTS



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FINANCIAL SOURCES FOR EE PROJECTS

- **Equity capital**
 - Capital owned and invested by the enterprise itself.
- **Debt capital**
 - Loans from banks, energy development funds, or concessional credit.
- **Financing from other sources**
 - From equipment suppliers
 - Financial leasing
 - Operational leasing
 - Third-party financing (partners, investment funds, ESCOs)

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EQUITY > LOAN

Criteria	Equity Capital	Debt Capital
Source	Owned by the enterprise	Banks, energy development funds, financial institutions
Cost	No interest payments	Interest must be paid according to the loan contract; mandatory debt repayment
Risk	Lower, no pressure to repay	Higher, risk of default if funds are insufficient
Scale	Usually limited, depends on the enterprise's financial capacity	Can raise large amounts, suitable for large projects
Control and procedures	Quick, simple, enterprise decides independently	Complex, requires documentation and approval
Dependence on cash flow	Not dependent on the enterprise's actual cash flow	Dependent on the enterprise's and project's cash flow to repay principal and interest

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SOURCES OF EQUITY

- Enterprise equity capital:
 - Cash, assets, or funds contributed by shareholders or business owners.
- Retained earnings:
 - Profits from previous business activities not distributed to shareholders.
- Share issuance:
- Applicable to joint-stock companies.
- Grants/non-repayable support: From the government or donors.
- Asset reduction: Selling certain assets to acquire more efficient ones.
- Equity is the riskiest capital because it is recovered only after all other debts have been settled.

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LOAN

- Lenders:
 - Commercial banks, central bank, and private development banks
 - Specialized funds
- Usually lend up to 70%–80% of the project's investment cost.
- Loan capital carries interest. Some lenders may require variable interest rates. Sensitivity analysis is needed to assess the impact of interest rates on the enterprise's ability to repay the loan.
- Consider the loan repayment period. Arrange the schedule to align with the project's payback period.

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LOAN

- **Lenders**
 - Commercial banks, central bank, private development banks
 - Specialized funds supporting energy efficiency projects
- **Loan scale**
 - Usually up to 70%–80% of the project's investment cost
 - The remaining portion is the enterprise's equity capital
- **Cost of debt**
 - Loan capital carries interest
- **Repayment term and plan**
 - Consider a repayment period that aligns with the project's payback period
 - Avoid early repayment pressure that could cause cash flow shortages

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KEY CONSIDERATIONS FOR OBTAINING LOANS

- **Prepare a clear and feasible energy efficiency project proposal**
 - Develop a detailed and realistic implementation plan
 - Present energy savings, costs, and economic benefits
- **Prepare projected cash flow statements based on the loan scenario**
 - Ensure debt repayment capacity
- **Consider collateral**
 - Prepare transparent asset documentation to secure the loan

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OTHER FINANCIAL SOURCES

- From equipment supplier
- Financial leasing
- Operational leasing
- Third-party financing

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1. FINANCING FROM EQUIPMENT SUPPLIERS

- Purchase equipment without immediate payment
- No collateral, only based on an agreement
- Limited choice, as only equipment offered under this arrangement can be selected
- Debt is usually short-term, typically up to 12 months
- Interest is often embedded in a higher sale price
- Commonly applied to main equipment; additional capital may be needed for other expenses

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2. FINANCIAL LEASING (1)

- Financial leasing is a form of capital financing in which the **lessor** purchases the asset according to the lessee's requirements and then allows the **lessee to use** the asset for a specified period, usually long-term.
- During the lease term, the **lessee** must make regular lease payments to the **lessor**.

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2. CHARACTERISTICS OF FINANCIAL LEASING (2)

- **Transfer of ownership:** At the end of the lease term, the lessee may have the option to purchase the asset at a minimal or negligible residual value, or return the asset to the lessor.
- **Long-term commitment:** Covers most of the asset's economic useful life.
- **Asset ownership remains with the lessor:** During the lease period, the asset legally belongs to the lessor, but the lessee has the right to use and derive economic benefits from it.
- **Non-cancelable contract:** A financial lease usually cannot be terminated early without mutual agreement, and the lessee must typically pay the full remaining value if they wish to end the lease early.

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3. OPERATIONAL LEASING (1)

- Operational leasing is a form of asset lease in which the lessee has the right to use the asset for a period shorter than its economic life, and the lease contract can be easily terminated before the end of the lease term.
- The lessee only pays for the use of the asset during the lease period.
- Operational leasing does not transfer ownership of the asset to the lessee.
- Lease payments are considered operating expenses.

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3. OPERATIONAL LEASING (2)

- **Short-term lease:** Typically shorter than the asset's economic life and can range from a few months to several years, depending on the agreement.
- **No transfer of ownership:** At the end of the lease, the asset is returned to the lessor, and the lessee has no right to purchase the asset (unless otherwise specified in the contract).
- **Flexible contract:** The lessee can easily terminate the contract early without paying the full remaining value.
- **Maintenance and servicing:** The lessor is responsible.
- **Lease cost treated as operating expense:** Lease payments are usually recorded as operating expenses in the financial statements.

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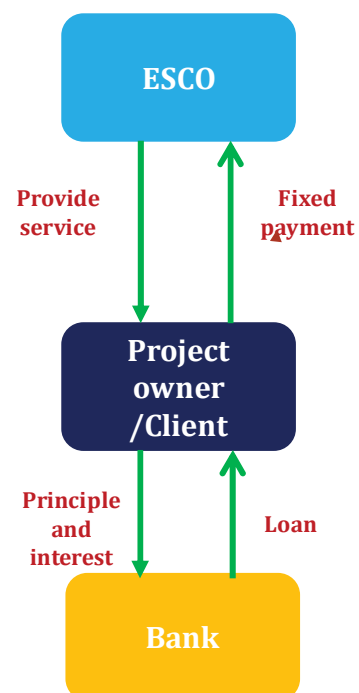
4. THIRD-PARTY FINANCING – IMPLEMENTATION CONTRACT

- It is a contract between the enterprise (customer) and the ESCO for energy services and financial provision.
- Payments are linked to the achieved energy savings.
- There are two types:
 - Guaranteed savings contract
 - Savings-sharing contract

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4.1 GUARANTEED SAVINGS AGREEMENT

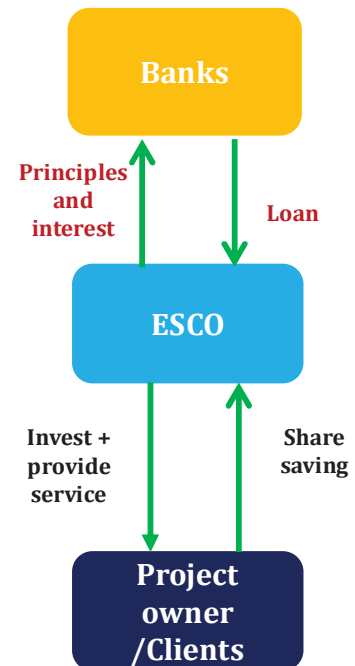
- The ESCO commits to a certain level of energy savings for the customer.
- If the guaranteed savings are not achieved, the ESCO will compensate the customer.
- The customer usually arranges their own financing.
- Payments to the ESCO are typically made as fixed periodic amounts.
- The ESCO bears the risk of achieving the guaranteed savings.
- The customer bears the financial risk.



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4.2 SHARED SAVING AGREEMENT

- The energy savings are shared between the ESCO and the customer according to the ratio agreed in the contract.
- The ESCO makes the **upfront investment** and receives payment from the savings over a specified period.
- The ESCO bears the financial risk as well as the energy savings risk.
- If the project does not achieve the expected savings, the ESCO's profit will decrease.



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FINANCIAL COMPARISON FROM DIFFERENT SOURCES

Criteria	Equipment Supplier	Financial Leasing	Operational Leasing	Third Party Financing
Capital Source	Equipment supplier itself	Supplier / leasing company	Supplier / ESCO	Financial institution, investment fund, third-party partner
Nature	Deferred payment or installment when purchasing equipment	Lease with gradual payments; ownership possible at end	Lease only for use; payment based on performance	Loan, lease, or co-investment from outside the project
Equipment Ownership	Enterprise owns immediately	May own at the end of lease	Does not own	Depends on contract; may or may not own
CFAT (Cash Flow After Tax)	Payments as agreed	Cash flow depends on repayment schedule	Cash flow depends on energy savings performance	Cash flow depends on contract terms with third party
Tax Treatment	No separate financial tax incurred	Lease interest may be tax-deductible	Not tax-deductible; treated as operating expense	Loan interest or payments to third party may be deductible depending on tax law
Risk	Low, only need to ensure deferred payment	Low if cash flow is sufficient	High if energy savings are not achieved	Depends on contract; risk can be shared
Advantages	Quick, reduces initial investment capital	Flexible, possible ownership of equipment	Reduces capital pressure, costs based on performance	Mobilizes large capital, shares risk, provides technical support
Disadvantages	Limited value, high interest rates	Must fully comply with contract payments	Total cost high, does not create fixed assets	Complex procedures, requires stable project cash flow

FINANCIAL OPTION SELECTION

- Business characteristics and financial strengths of the enterprise
 - Determine whether the enterprise has sufficient financial capacity to invest
 - Strengths: fixed assets, retained earnings, creditworthiness
- Other investment opportunities of the enterprise
 - Compare the energy efficiency project with other projects in terms of profitability and risk
 - Prioritize the project with the highest capital efficiency
- Opportunity cost of equity capital
 - Assess whether using equity for this project would forgo other investment opportunities

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FINANCIAL OPTION SELECTION

- Capital costs, taxes, and cash flow
 - Compare the cost of debt, equipment leasing, and equity issuance
 - Review cash flow to ensure debt repayment capacity and tax optimization
- Risk tolerance
 - Assess whether the enterprise can withstand financial risk, interest rate fluctuations, and project performance
 - Select a financing option that combines different capital sources to reduce risk while optimizing efficiency

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5.2. FINANCIAL SOURCES FOR EE PROJECTS

- VSUEE Risk Sharing Fund
- Vietnam Environment Protection Fund (VEPF)

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RISK SHARING FUND (RSF) – VSUEE

- The RSF is part of the “Promoting Energy Efficiency in Vietnamese Industries – VSUEE” project, funded by the Green Climate Fund (GCF) through the World Bank.
- Total scale: USD 75 million from the GCF Guarantee
- Main objectives:
 - Provide partial credit guarantees (RSF guarantee) for energy efficiency project loans.
 - Mitigate credit risk for financial institutions.
 - Help enterprises access capital more easily and reduce collateral requirements.

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RISK SHARING FUND (RSF) - VSUEE

- **Managing unit and partner banks**
 - SHB Bank
 - Participating financial institutions will sign a Framework Agreement to receive guarantees from the RSF.
- **Guarantee amount and conditions**
 - Guarantees cover up to 50% of the principal and interest of energy efficiency loans.
 - A maximum of USD 150 million can be guaranteed through callable capital from the GCF, with guarantee fees: upfront 0.25%, annual 0.70%.
- **Guarantee term: 6–10 years, with the guarantee issuance period lasting 5 years.**

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RISK SHARING FUND (RSF) - VSUEE

- **Beneficiaries**
 - Industrial enterprises and energy service companies (ESCOs) implementing eligible energy efficiency projects can receive guarantees.
- **Implementation and completion period**
 - The VSUEE project is implemented from March 2022 to January 2026, with the RSF primarily issuing guarantees during the first five years.

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CONDITIONS FOR OBTAINING A RISK SHARING GUARANTEE

COMPANY/ ESCO

- Complies with lending regulations
- No cross-ownership with the financial institution
- Has not violated any bank-imposed sanctions (fraud, corruption, etc.)
- Equity \geq 20% of total investment

PROJECT

- Minimum energy savings: 10%
- Maximum payback period: 10 years
- IRR \geq 10%
- Complies with environmental and social requirements of Vietnam and the World Bank

LOAN LIMITS

- Loan amount: from 250,000 to 15,000,000 USD
- Total guaranteed loans per financial institution \leq 50,000,000 USD

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ELIGIBILITY OF ENTERPRISES/ESCOs TO PARTICIPATE IN THE PROJECT

- Demonstrate the ability to repay the loan within the loan term
- Have equity capital \geq 20% of total investment
- Possess a business plan and loan purpose that meet the requirements for the proposed loan
- Have collateral assets that meet the loan requirements
- Maintain transparent financial status with no non-performing loans (groups 3–5) at the time of borrowing
- Comply with all World Bank regulations and avoid any sanctions

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VEPF - VIETNAM ENVIRONMENT PROTECTION FUND

Item	Updated Regulations
Loan amount	≤ 70% of total investment or up to ~VND 65 billion per customer
Loan term	Maximum 10 years (including grace period)
Interest rate	2.6% – 3.6% per year, not exceeding 50% of the government investment rate
Grace period	Up to 2 years
Principal & interest repayment	Flexible mechanism, depending on the contract (monthly, quarterly, or at the end of the loan term)
Processing time	Depends on documentation and appraisal (may take several months)

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PRIORITY PROJECTS

- Industrial waste treatment (industrial zones, factories, and enterprises)
- Treatment of wastewater and air emissions (units under Decision 64, factories, enterprises, and craft villages)
- Municipal solid waste management
- Deployment of clean, environmentally friendly, and **energy-efficient**; production of environmentally protective products
- Privatization/socialization of waste collection

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PREFERENTIAL BENEFITS FOR PRIORITY PROJECTS

- The current fixed interest rate (2025) is **2.6% per year**, applied throughout the loan term.
- The loan term can be up to **10 years**, with a **maximum grace period of 2 years**.
- **Eligible energy efficiency projects:**
 - Investment in equipment replacement or renovation to reduce energy consumption.
 - Projects upgrading production lines to energy-efficient technology.
 - Energy efficiency solutions aligned with greenhouse gas emission reduction, green transition, and circular economy objectives.

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REQUIREMENTS FOR BORROWERS

- Legal entity status
- Loan purpose: Must align with the fund's objectives
- Use of loan: Must follow the approved purpose
- Ensure debt repayment capacity
- Sufficient management capability
- Enterprise leadership
- Loan security: Collateral and guarantee (pledge is not accepted)

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CONTACT ADDRESS OF VEPF

- VIETNAM ENVIRONMENT PROTECTION FUND – HANOI
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 - Email: qbvmtvn@monre.gov.vn
 - Phone: (+84)24.37951221 –
 - Fax: (+84)24.39426329 Website: <https://www.vepf.vn/en/>
- SOUTHERN REPRESENTATIVE OFFICE
 - Room A.M01, Inter-Agency Area of the Ministry of Natural Resources and Environment, 200 Ly Chinh Thang, Ward 9, District 3, Ho Chi Minh City
 - Email: [qbvmtvn mn vepf@monre.gov.vn](mailto:qbvmtvn_mn_vepf@monre.gov.vn)
 - Phone: (028)35261166

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5.3. FINANCING NEGOTIATION

- Pay back interest and principle
- Interest negotiation
- Documents required for loan application

REPAYMENT: PRINCIPAL AND INTEREST

1. Equal principal and interest payments based on the remaining loan balance
2. Principal repaid at the end of the loan term, interest paid evenly each period
3. Full principal and interest paid at the end of the loan term
4. Equal total payments of principal and interest each period

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EXAMPLE

- A company borrows from a bank for investment purposes. The total loan amount is VND 100,000,000, with an interest rate of 10% per year. The loan term is 5 years, with no grace period. Calculate the annual principal and interest payments according to the four repayment methods mentioned above.
- Provide comments from the perspectives of both the borrower and the lender.

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COMMENTS

- Different interest rates will affect the choice of repayment methods.
- Different repayment methods carry different risks for both the lender and the borrower.
- Repayment schedules should be negotiated based on the project's cash flow.
- For commercial interest rates:
 - aim to repay principal early (equal principal payments).
- For preferential interest rates:
 - aim to negotiate delayed repayment of principal and interest (principal repaid at the end of the loan term).

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INTEREST

- Commercial interest rates are the rates used by commercial banks for lending.
 - VND loans range from 8% to 11% per year.
 - USD loans range from 2.5% to 4.5% per year.
- Some clients may be eligible for preferential interest rates.
- Foreign currency loans carry additional exchange rate risk despite lower interest rates.
- Certain sectors, such as export-oriented industries, may access loans at preferential rates.
- “Policy banks” offer preferential loans at 70%–75% of commercial interest rates.

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LOAN TERM

- **Borrower:**
 - Typically prefers a longer loan term so that the invested assets have time to generate returns and create cash flow for debt repayment.
- **Bank/Lender:**
 - Tends to prefer a shorter loan term to recover funds quickly and minimize credit risk.
- **Negotiation between the two parties:**
 - Requires balancing the company's cash flow needs with the bank's risk policy.
 - A reasonable loan term should be long enough to ensure project payback but not so long that it increases the bank's risk.
- **Recommendation:**
 - Negotiate a repayment schedule aligned with the actual payback period of the energy efficiency project.
 - Flexible repayment scenarios can be designed to support the company. 152

FINANCIAL INDICATORS

Profitability ratio

$$\text{Net Profit Margin} = \frac{\text{Net Profit after Tax}}{\text{Net Sales}}$$

Liquidity ratio

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

Solvency ratio

$$\text{DSCR} = \frac{\text{EBITDA}}{(\text{Loan Repayment} + \text{Interest})}$$

DSCR: Debt service cover ratio

EBITDA: Earning before interest, depreciation and amortization

INCOME STATEMENT

- It is a report showing the profit or income of the enterprise. It records the revenue, expenses, and profit/loss of the enterprise or project over a specific period.
- Purpose:
 - Shows how much revenue the enterprise has earned
 - Indicates what expenses have been incurred
 - Ultimately shows the profit or loss
- Helps evaluate business performance.
- Serves as an important basis for financial and managerial decision-making.

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INCOME STATEMENT

Items	2023	2024
1. Net Revenue	10,000	12,000
2. Cost of Goods Sold	7,000	8,400
3. Gross Profit	3,000	3,600
4. Selling Expenses	800	950
5. General & Administrative Expenses	600	700
6. Operating Profit	1,600	1,950
7. Financial Income	200	250
8. Financial Expenses (Interest)	300	350
9. Profit Before Tax	1,500	1,850
10. Corporate Income Tax (20%)	300	370
11. Net Profit After Tax	1,200	1,480

For the years ended December 31, 2023 and 2024

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CASH FLOW STATEMENT

- It is a report reflecting the cash inflows and outflows of the enterprise over a specific period.
- Main structure:
 - Operating activities – cash flow from sales and operating expenses
 - Investing activities – asset purchases, asset disposal, capital contributions, etc.
 - Financing activities – borrowing, debt repayment, share issuance, dividend payments
- Helps assess the enterprise’s ability to generate cash.
- Determines financial safety and payment capacity.

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CASH FLOW STATEMENT

Items	2023	2024
CASH INFLOW		
Revenue (Cash Sales)	900,000	900,000
Other income (in cash)	50,000	50,000
Total Inflow	950,000	950,000
CASH OUTFLOW		
Cost of Goods Sold	262,500	245,000
Operating Expenses	120,000	115,000
Interest Expense	30,000	35,000
Tax Payment	142,100	145,040
Total Outflow	554,600	540,040
NET CASH FLOW	395,400	409,960

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BALANCE SHEET

- Shows the status of assets, liabilities, and equity of an enterprise at a specific point in time.
- Reflects the “financial health” of the enterprise.
- Main structure:
 - **Assets:** What the enterprise owns (cash, inventory, buildings, machinery, etc.).
 - **Liabilities:** What the enterprise owes (bank loans, payables to suppliers, etc.).
 - **Equity**
- **Total assets = Total liabilities + Shareholder’s equity**
- Helps assess the enterprise’s payment ability and financial structure.
- Provides managers, investors, and creditors with a clear understanding of the enterprise’s resources and obligations.

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BALANCE SHEET

Items	2023	2024
ASSETS		
Current Assets		
• Cash & Cash Equivalents	500	600
• Accounts Receivable	300	320
• Inventory	400	380
Total Current Assets	1.200	1.300
Fixed Assets (Net)	1.800	1.900
TOTAL ASSETS	3.000	3.200
LIABILITIES & EQUITY		
Current Liabilities		
• Accounts Payable	250	260
• Short-term Loans	300	320
Total Current Liabilities	550	580
Long-term Liabilities	900	870
TOTAL LIABILITIES	1.450	1.450
Owner’s Equity		
• Share Capital	1.000	1.000
• Retained Earnings	550	750
TOTAL EQUITY	1.550	1.750
TOTAL LIABILITIES & EQUITY	3.000	3.200

Total Assets =
Total Liabilities
+ Equity

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EXERCISE 13: EE PROJECT OF COMPANY Z (1)

- Company Z is an industrial manufacturing company in food industry. Due to outdated and energy-inefficient equipment, production costs, especially energy costs, have been increasing, reducing the company's profitability.
- The management plans to invest in an Energy Efficiency (EE) project to reduce operating costs and improve competitiveness. The proposed measures include:

Measure	Description
Replacing old motors & pumps	Replace 20 IE1 motors with high-efficiency IE3/IE4 motors
Installing Variable Speed Drives (VSD)	Install VSDs for 15 large pumps/fans to control speed based on load
Upgrading to LED lighting	Replace all fluorescent lamps with high-efficiency LED lights with motion sensors
Installing Energy Management System (EMS)	EMS software to monitor energy use and control loads during peak hours
Insulating steam pipes & boilers	Insulate all steam pipes and hot water tanks to reduce heat loss

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EXERCISE 13: EE PROJECT OF COMPANY Z (2)

Item	Value
Total investment cost	4 billion VND
Project lifetime (operation)	7 years
Depreciation period	5 years (800 million/year)
Annual energy cost savings	2.7 billion VND/year
Additional annual O&M costs	40 million VND/year
Equity contribution	1 billion VND
Bank loan	3 billion VND
Interest rate	10%/year
Loan term	4 years (1-year grace, repayment in year 2-4)
Corporate income tax rate	20%

- With the given information, prepare:
 - The 7-year Profit & Loss statement, Cash Flow statement, and Balance Sheet
 - Calculate and analyze: Profitability, Debt service coverage ratio (DSCR)

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LOAN REPAYMENT

Unit: 1000 VND

Year	0	1	2	3	4	5	6	7
Loan Principal	3,000,000	3,000,000	3,000,000	2,000,000	1,000,000	0	0	0
Principal Repayment	0	0	1,000,000	1,000,000	1,000,000	0	0	0
Interest 10%	0	300,000	300,000	200,000	100,000	0	0	0
Total Payment	0	300,000	1,300,000	1,200,000	1,100,000	0	0	0

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PROFIT AND LOSS STATEMENT

Unit: 1000 VND

Year	0	1	2	3	4	5	6	7
From operation		0	0	0	0	0	0	0
Energy saving		2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000
Additional operating cost		40,000	40,000	40,000	40,000	40,000	40,000	40,000
Interest		300,000	300,000	200,000	100,000			
Depreciation		800,000	800,000	800,000	800,000	800,000		
Taxable income		1,560,000	1,560,000	1,660,000	1,760,000	1,860,000	2,660,000	2,660,000
Corporate tax rate (20%)		312,000	312,000	332,000	352,000	372,000	532,000	532,000
Additional profit after tax (1000 VND)		1,248,000	1,248,000	1,328,000	1,408,000	1,488,000	2,128,000	2,128,000

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CASH FLOW STATEMENT

Unit: 1000 VND

Year	0	1	2	3	4	5	6	7
Investment CF	4,000,000							
Operating CF								
Energy saving		2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000
Additional operating cost		40,000	40,000	40,000	40,000	40,000	40,000	40,000
Financial CF								
Borrow	3,000,000							
Principle		-	1,000,000	1,000,000	1,000,000			
Interest		300,000	300,000	200,000	100,000			
Equity	1,000,000							
Corporate tax	-	312,000	312,000	332,000	352,000	372,000	532,000	532,000
NET CF	-	2,048,000	1,048,000	1,128,000	1,208,000	2,288,000	2,128,000	2,128,000
Accrual cash flow		2,048,000	3,096,000	4,224,000	5,432,000	7,720,000	9,848,000	11,976,000

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BALANCE SHEET

Unit: 1000 VND

Year	-	1	2	3	4	5	6	7
ASSET								
Additional fixed asset	4,000,000							
Depreciation		800,000	800,000	800,000	800,000	800,000		
Salvage values		3,200,000	2,400,000	1,600,000	800,000	-	-	-
Cash	-	2,048,000	3,096,000	4,224,000	5,432,000	7,720,000	9,848,000	11,976,000
TOTAL ASSET	4,000,000	5,248,000	5,496,000	5,824,000	6,232,000	7,720,000	9,848,000	11,976,000
CAPITAL								
Equity	1,000,000	2,048,000	3,096,000	4,224,000	5,432,000	7,720,000	9,848,000	11,976,000
Loan	3,000,000							
Interest		300,000	300,000	200,000	100,000	-		
TOTAL CAPITAL	4,000,000	2,348,000	3,396,000	4,424,000	5,532,000	7,720,000	9,848,000	11,976,000

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FINANCIL RATIOS

Year		1	2	3	4	5	6	7
Energy saving	-	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000
Additional operating cost	-	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Depreciation	-	800,000	800,000	800,000	800,000	800,000	-	-
Interest	-	300,000	300,000	200,000	100,000	-	-	-
Additional profit before tax	-	1,560,000	1,560,000	1,660,000	1,760,000	1,860,000	2,660,000	2,660,000
Corporate tax	-	312,000	312,000	332,000	352,000	372,000	532,000	532,000
Additional profit after tax	-	1,248,000	1,248,000	1,328,000	1,408,000	1,488,000	2,128,000	2,128,000
Cash	-	2,048,000	3,096,000	4,224,000	5,432,000	7,720,000	9,848,000	11,976,000
Total repayment	-	300,000	1,300,000	1,200,000	1,100,000	-	-	-
EBITDA	-	2,360,000	2,360,000	2,460,000	2,560,000	2,660,000	2,660,000	2,660,000
Net Profit Margin	-	46.22%	46.22%	49.19%	52.15%	55.11%	78.81%	78.81%
Current Ratio	-	6.83	2.38	3.52	4.94	-	-	-
DSCR	-	7.87	1.82	2.05	2.33	-	-	-

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CONCLUSIONS FROM FINANCIAL RATIOS ANALYSIS

- **Profit:**
 - Although operating costs have increased, thanks to the energy efficiency measures, profits have risen, cash flow has improved significantly, especially with a substantial increase in the profit margin.
- **Short-term debt payment ability:**
 - Improves from poor to very good due to the implementation of energy efficiency measures.
- **Debt repayment capacity:**
 - Very high; no issues anticipated.

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LIMITATIONS OF FINANCIAL RATIO ANALYSIS

- Ratios depend on accounting policies and may vary between enterprises and over time.
- A favorable ratio does not guarantee that the underlying data is accurate or transparent.
- Enterprises can adjust certain ratios, so the reliability of the data must be verified.
- Ratios only reflect the financial situation at a specific point in time.
- Before drawing conclusions, ratios should be compared over time and benchmarked against similar enterprises.

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COLLATERAL

- Real estate, factories, leased property rights under contract
- Highly liquid assets
 - Machinery and equipment (planned and existing)
 - Vehicles
 - Goods/inventory
- Valuable documents
 - Bonds
 - Accounts receivable

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GUARANTEE

- **Third-Party Guarantee:**
- A third party (usually a guarantee fund, development financial institution, or credit organization) commits to guarantee part or all of the loan for the enterprise.
- **Purpose:** Reduce credit risk for the bank and help the enterprise access financing more easily.
- **Beneficiaries:** Small and medium enterprises, enterprises lacking sufficient collateral, and energy efficiency (EE) projects requiring large capital.
- **Guarantee coverage:** Typically 30%–80% of the loan, depending on the fund's policy.
- **Cost:** The enterprise may need to pay a guarantee fee.
- **Conditions:** The project must be financially and technically feasible and capable of generating cash flow for repayment.

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ENHANCING CREDIT ACCESS FOR EE PROJECTS (1)

- **Strong banking relationships:**
 - Established or maintaining stable relationships with banks (accounts, deposits, commercial credit, etc.).
- **Transparent financial reporting:**
 - Complete and clear financial statements, audited or prepared according to accounting standards.
- **Business performance:**
 - The enterprise has stable profits and operates efficiently.
- **Market reputation of products/services:**
 - Products or services are reputable and well-regarded by customers.

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ENHANCING CREDIT ACCESS FOR EE PROJECTS (2)

- Operating in a stable and promising industry:
 - Enterprise is in an industry with stable operations and growth potential.
- Qualified management and staff:
 - Employees and management are well-trained and experienced in managing and implementing projects.
- Good credit history:
 - No bad debts and no violations of prior credit agreements.
- Ability to generate cash flow:
 - The project and the enterprise can generate sufficient cash flow to cover debt and operational costs.

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DOCUMENTS REQUIRED FOR BANK LOAN APPLICATION

- Legal documents:
 - Business registration certificate, company charter, power of attorney (if any), and other documents proving legal entity status and the legal representative.
- Financial documents:
 - Financial statements for the last 2–3 years (audited or unaudited), business plan, debt and credit reports, detailed information on accounts receivable, accounts payable, and inventory.
- Project documents:
 - Feasibility study report, investment plan, internal approval decisions, investment registration certificate (if required), related procurement/implementation contracts.

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CONTENTS OF THE FEASIBILITY REPORT

- Introduction of the enterprise
- Introduction of the project
- Technical feasibility
- Financial feasibility
- Environmental feasibility (if applicable)
- **Appendices**
- Relevant legal documents
- Project implementation plan
- Detailed project information (charts, tables, etc.)
- Detailed cash inflows, outflows, and net cash flow of the project

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COMPANY INTRODUCTION

- Introduce the key information about the enterprise:
 - General information (year of establishment, location, field of activity, main products, etc.)
 - Organizational structure chart, management team, number of employees
 - Business performance results for the last two years
 - Experience, brand reputation, credibility, and trustworthiness with banks

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PROJECT INTRODUCTION

- Key information about the project's investment:
 - Project overview
 - Total investment cost
 - Financing plan
 - Implementation schedule

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TECHNICAL FEASIBILITY

- Key technical information of the project:
 - Project location
 - Current production output
 - Energy consumption level
 - Water consumption level
 - Energy efficiency (EE) solutions

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FINANCIAL FEASIBILITY

- Key financial information of the project:
- Financial benefits
 - Cost reductions and energy savings
 - Results of NPV, IRR, payback period, and B/C ratio
 - Project financing plan
- Economic benefits

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ENVIRONMENTAL FEASIBILITY

- Key environmental information of the project:
 - Reduction of CO₂ emissions
 - Reduction of other pollutant gases

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PREPARING DOCUMENTATION FOR THE BANK (1)

- Contact the bank once more to confirm the list of required submission documents.
- Prepare the list of documents to be submitted.
- Review the project one more time to ensure there are no errors.

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PREPARING DOCUMENTATION FOR THE BANK (2)

- Review all financial indicators required by the bank.
- Recheck the cash flow to ensure a positive net cash flow each year.
- Verify all financial indicators to ensure they meet the bank's requirements:
 - Profitability indicators
 - Short-term debt payment indicators
 - Debt repayment capacity indicators

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EXERCISE 14

- Please do case studies 1, 2 and 3

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6. SENSITIVITY ANALYSIS

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WHAT IS PROJECT RISK?

- Every decision carries a probability of leading to an undesired outcome.
- The outcome may be negative—these are the results the investor does not want.
- **Risk** is defined as the probability of an undesired outcome occurring.

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RISKS OF ENERGY EFFICIENCY PROJECTS

- Project cost increases (equipment, materials, etc.)
- Actual savings are lower than estimated savings
- Reduced equipment lifespan
- Financial institutions may refuse to provide loans after the project has already undertaken significant preliminary work

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RISKS OF ENERGY EFFICIENCY PROJECTS

- Energy service companies face difficulties and cannot meet customer requirements
- Incidents during equipment installation
- Energy efficiency solutions do not achieve the expected results
- Lack of alignment between the customer and the service provider on the level of savings
- Interest rate increases
- Emergence of cheaper energy sources or better technology

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HOW TO ASSESS RISK?

- There are many advanced techniques for risk analysis.
- Detailed risk analysis is usually conducted for large projects.
- Some “events” have a high impact but a low probability of occurrence.
- Some “events” have a lower impact but occur more frequently.
- It is important to identify risks at both extremes.

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SENSITIVITY ANALYSIS

- Sensitivity analysis is a simulation of project outcomes in response to potential risks.
- Sensitivity analysis:
 - Identifies which key risks will significantly affect the project's output.
 - Allows for effective anticipation and management of these key risks during project implementation and control.
 - Enables the implementation of appropriate risk mitigation measures from the outset.

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SENSITIVITY ANALYSIS METHOD -1

- Conduct a complete financial analysis for the base case scenario.
- Identify the key input variables that are likely to change—these key variables are essential for performing a robust sensitivity analysis.
- Variables whose values are uncertain or to which the project is highly sensitive are recognized as “critical variables” at this stage (e.g., investment cost, discount rate, energy consumption...).

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SENSITIVITY ANALYSIS METHOD -2

- Select key indicators to evaluate project outcomes (profit, NPV, IRR, etc.)
- Adjust input variables by $\pm 10\%$, $\pm 25\%$, or other reasonable ranges. These ranges are determined based on past fluctuations and expert forecasts.
- Recalculate the output indicators for each change in the input variables.

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EXERCISE 14 (continue)

- Case studies (continue)

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CONCLUSIONS

- To assess the financial feasibility of an energy efficiency project, all four indicators must be calculated: NPV, IRR, payback period, and B/C ratio.
- The WACC is used as the discount rate when calculating these four indicators.
- Different projects with different financing options will have different WACC values.
- Due to an uncertain future—where many input factors may change—it is necessary to perform sensitivity analysis.

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DISCLAIMER

This document was developed within the framework of the project “Accelerating energy efficiency in large industries through energy management systems, system optimization and the promotion and adoption of energy efficiency in small and medium-sized enterprises (IEEP)”, funded by the European Union (EU), managed by the Ministry of Industry and Trade (MOIT), and implemented by the United Nations Industrial Development Organization (UNIDO). The content of this document is the sole responsibility of the Project and does not necessarily reflect the views of any individual or organization.

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THANK YOU!