Review of Financial Analysis Terms

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Financial Analysis Requirements

Economic Evaluation of Potential TUR Techniques (310 CMR 50.46A)

- The TUR plan must include the **discount rate, cost of capital, depreciation rate, or payback period**, if any, used in each analysis
- The discount method, depreciation rate, and payback period must be consistent with the toxic user's current capital budgeting procedures
- The economic feasibility decision must be made at least consistent with the toxic user's current business decision making practices

Financial Analysis

PURPOSE

- To determine whether an investment adds economic value to a company

METHOD

- Calculate cash flows over the life of a project and apply measure(s) of profitability

PROCESS

- Collect incremental cost information
- Determine cash flows
- Apply measures of profitability
- Interpret Results

What Costs to Include

ref: 310 CMR 50

LABOR	MATERIALS	EQUIPMENT	OTHER
Production	Raw materials	Production	Depreciation
Material handling	Solvents	Cleaning	Maintenance
Inspection	Cleaners	Degreasing	Waste disposal
Recordkeeping	Process water	Material handling	Insurance
Reporting	Cleaning water	Storage	Taxes
Monitoring	Office supplies	Waste treatment	Utilities
Labeling	Training materials	Water treatment	Regulatory fees
Manifesting	Safety materials	Air pollutioncontrol	Lab fees
Stocking	Parts	Painting	Health & Safety
Training		Protective	Liability
		Safety	

Environmental Management Accounting (EMA) – definition 1

The identification, collection, estimation, analysis, internal reporting, and use of materials and energy flow information, environmental cost information, and other cost information for both conventional and environmental decision-making within an organization (EMARIC)

Environmental Management Accounting (EMA) – definition 2

The management of environmental and economic performance through the development and implementation of appropriate environment-related accounting systems and practices. While this may include reporting and auditing in some companies, environmental management accounting typically involves life-cycle costing, full-cost accounting, benefits assessment, and strategic planning for environmental management (IFAC)

Benefits of EMA (IFAC)

Compliance	• EMA supports environmental protection via cost-efficient compliance with environmental regulation and self-imposed environmental policies
Eco-efficiency	• EMA supports the simultaneous reduction of costs and environmental impacts via more efficient use of energy, water and materials in internal operations and final products.
Strategic position	• EMA supports the evaluation and implementation of cost effective and environmentally sensitive programs for ensuring an organization's long-term strategic position.

Environment-related Cost Categories (IFAC)

Materials Cost of Product Outputs	• Includes the *purchase costs of natural resources such as water and other materials that* are converted into products, by-products and packaging.
Materials Cost of Non-product Outputs	• Includes the *purchase (and sometimes processing) costs of energy, water and other* materials that become Non-Product Output (Waste and Emissions).
Waste and Emission Control Costs	• Includes costs for: *handling, treatment and disposal of Waste and Emissions; remediation and compensation costs related to environmental damage; and any* control-related *regulatory compliance costs.*

Environment-related Cost Categories (IFAC)

Prevention and Other Environmental Management Costs

- Includes the costs of *preventive environmental management activities such as cleaner* production projects. Also includes costs for *other environmental management activities such as environmental planning and systems, environmental measurement,* environmental communication and any other relevant activities.

Research and Development Costs

- Includes the costs for *Research and Development projects related to environmental* issues.

Less Tangible Costs

- Includes *both internal and external costs related to less tangible issues. Examples* include *liability, future regulations, productivity, company image, stakeholder relations and externalities*

Financial Analysis Terms

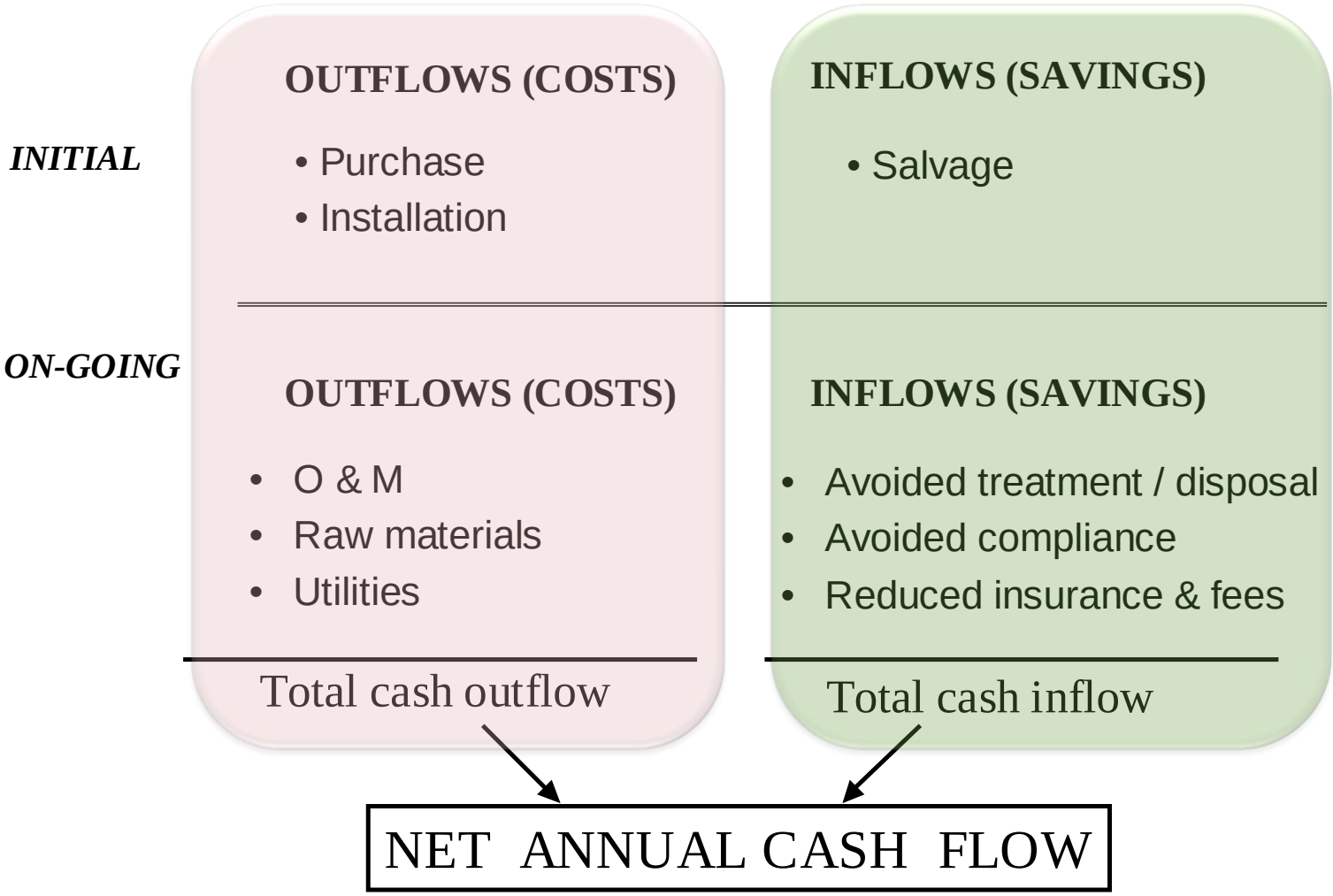
Incremental Cash Flow

- Cash Flow Timeline
- Economic Lifetime

Time Value of Money

- Future Value
- Present Value
- Annuity

Incremental Cash Flow



Incremental Cash Flow: Example

Purchase of hard-piped solvent recovery system for a metal finishing plant.

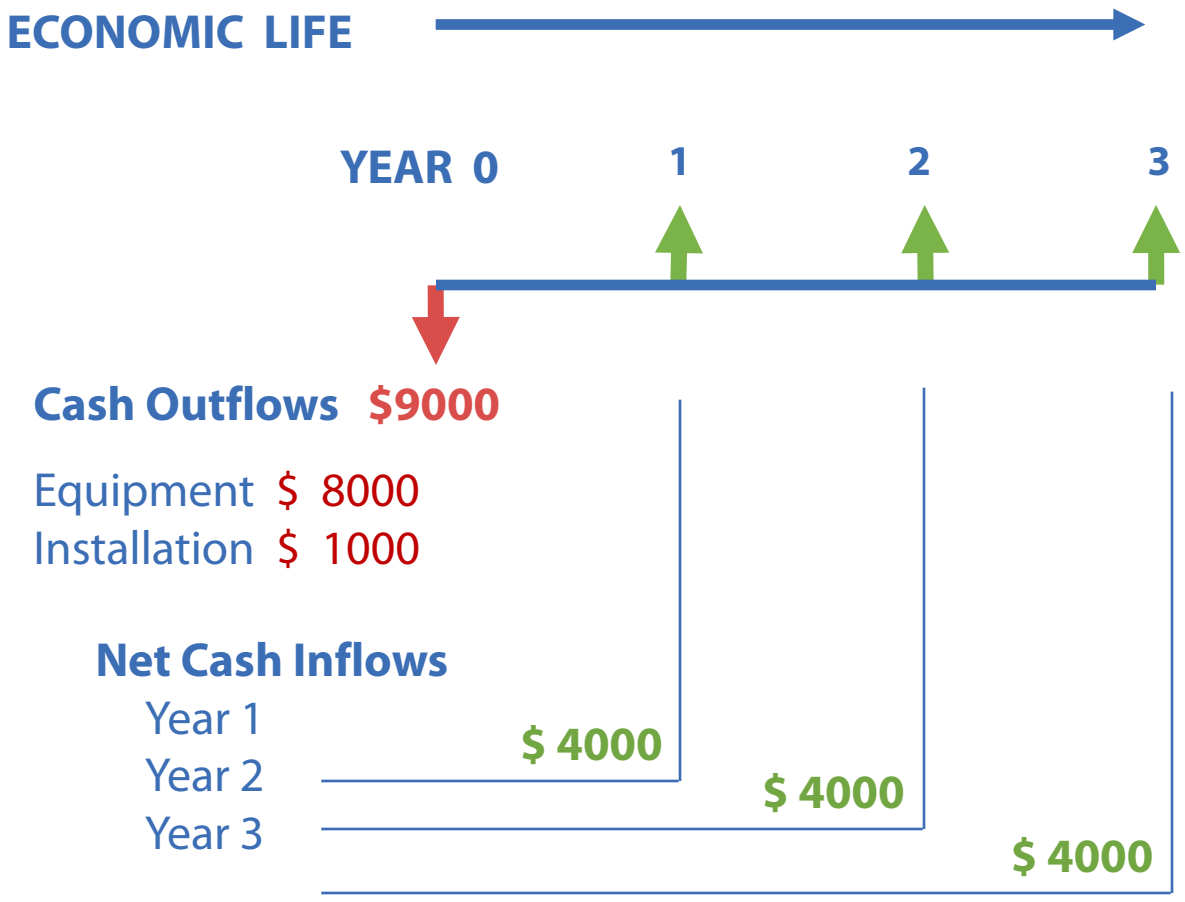
- **Costs**:
  - Equipment cost $ 8,000
  - Installation $ 1,000
  - Annual Operating Costs $ 2,000

- **Savings**: The project will generate $6,000 in savings in each of the next three years

- Annual Incremental cash flow?

- **SHOULD THE PROJECT BE IMPLEMENTED?**

Cash Flow – Economic Lifetime



Time Value of Money

Measures the value of money at different points in time as determined by an ***opportunity discount rate***

- **rate of interest** or **return** that a business or person can earn on the best alternative use of the money at the same level of **risk**.
  - » **DISCOUNT RATE**
  - » **HURDLE RATE**: Minimum rate of return that a project must earn

- $1,000 given to you today is not the same as $1,000 given to you in 10 years
  - If you have $1,000 today, you can invest it in a range of options with varying rates of return at varying levels of risk:
    - » Commodities futures
    - » Emerging growth stocks
    - » Blue chip stocks
    - » Corporate bonds
    - » Insured savings deposit

TVM – Present and Future

FUTURE VALUE: The value of current cash calculated at some point in the future at a given interest rate.

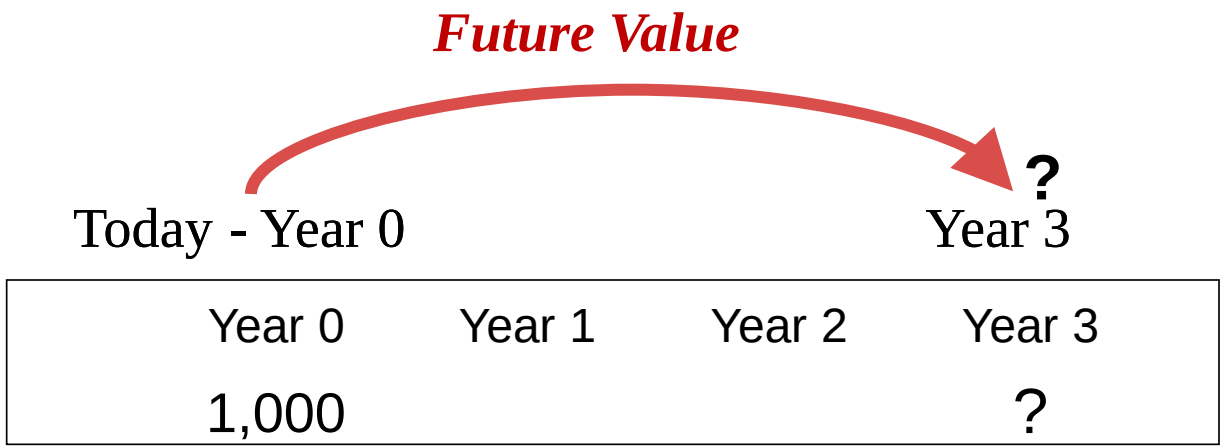
- FV of $1,000 today received in ten years at 4% = $1,480

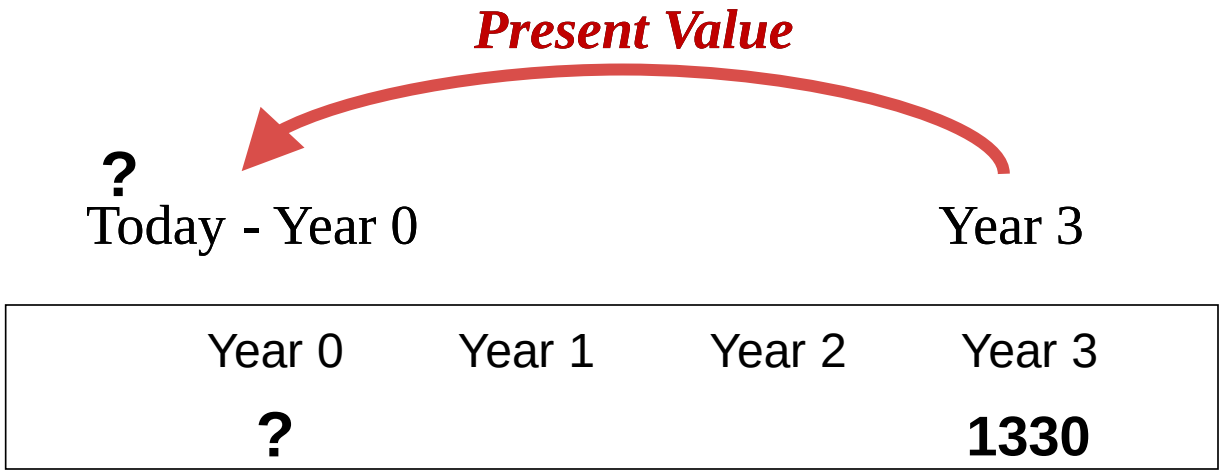
PRESENT VALUE: The value of future cash calculated today at a given discount rate.

- PV of $1,000 in ten years received today at 4% = $675

» ***Present value*** *is the critical element in financial analysis because we translate a project's future cash flows into today's dollars (present value).*

TVM – Present and Future





TVM Formulas

Future Value

$$FV = PV \times (1+r)^T$$

Present Value

$$PV = \frac{FV}{(1+r)^T}$$

- FV = Future Value
- PV = Present Value
- r = Rate at which funds could be invested (discount rate)
- T = Number of time periods (usually years)

TVM – Using Tables

- **Present value of single future year: *Table A***

  Future value multiplied by the factor from intersection of year and discount rate

  Example:

  PV of $1,000 in year 4 at 8% = $1,000 x .7350 = $735

- **Present value of an Annuity: *Table B***

  Annuity: a stream of equal $ amounts over period of years

  PV = the sum of the PV of each year

  Annual amount multiplied by the factor from intersection of year and discount rate

  Example:

  PV of $1,000 a year for four years at 8% = $1,000 x 3.3121 = $3312

TVM - Example

Which would you take, if your discount rate were

5%? 8%? 12%?

- $800 today
- $120 a year for 10 years
- $1,600 in 10 years

Answers to Examples

Discount Rate Example

Which would you take, if your discount rate were

5%? 8%? 12%?

- $800 today
- $120 a year for 10 years
- $1,600 in 10 years

5%	8%	12%
800	800	800
926	805	678
982	741	515

Measures of Profitability

SIMPLE RETURN

- Payback
- Return on Investment (ROI, ARR)

DISCOUNTED CASH FLOW

- Net Present Value (NPV)
- Internal Rate of Return (IRR)

Payback

- **Measure**: Time Required for cash flows to equal initial investment

- **Formula**: $\frac{\text{Initial Investment (\$)}}{\text{Annual Savings (\$/Year)}}$

- **Example**: Initial Investment = $9,000

  $8000 (Purchase Price) + $1000 (Installation)

  Annual Savings = $4,000

- **Payback**: = ?

Payback (cont.)

ADVANTAGES

- Simple & Easy

DISADVANTAGES

- Does not consider the time value of money
- Does not measure the scale of gain of project

WHEN TO USE

- First-cut analysis or small / simple projects

WHEN NOT TO USE

- Long payback periods
- Variable cash flows
- Ranking multiple projects

When Payback May Not be Good

1. **Long Payback Periods**

A 2-3 year payback threshold may exclude good projects

2. **Variable Cash Flows**

Payback may miss large gains in ‘out’ years

3. **Ranking Projects**

	Project 1	Project 2
Year 1	13,000	20,000
Year 2	17,000	17,000
Year 3	20,000	13,000

Net Present Value

- **Measure**: Investment proposals are evaluated on the present value created by the investment

- **Method**: Discount all cash flows by the appropriate discount factor and sum the present values

- **Formula:**

  NPV = PV (Cash Inflows) – PV (Cash Outflows)

NPV – Interpretation

GENERAL RULE:

- If NPV > 0: the project should be accepted
- If NPV < 0: the project should be rejected
- If NPV = 0: the project generates exactly the return that is required

If NPV = 0: The savings generated by the project is sufficient to:

- (1) pay off the initial outlay of funds
- (2) pay off interest payments to creditors who lent money
- (3) provide the required return to shareholders

If NPV > 0: The savings generated by the project is sufficient to accomplish 1, 2 & 3 plus:

- increase economic value of the business

Incremental Cash Flow: Example

Purchase of hard-piped solvent recovery system for a metal finishing plant.

- **Costs**:
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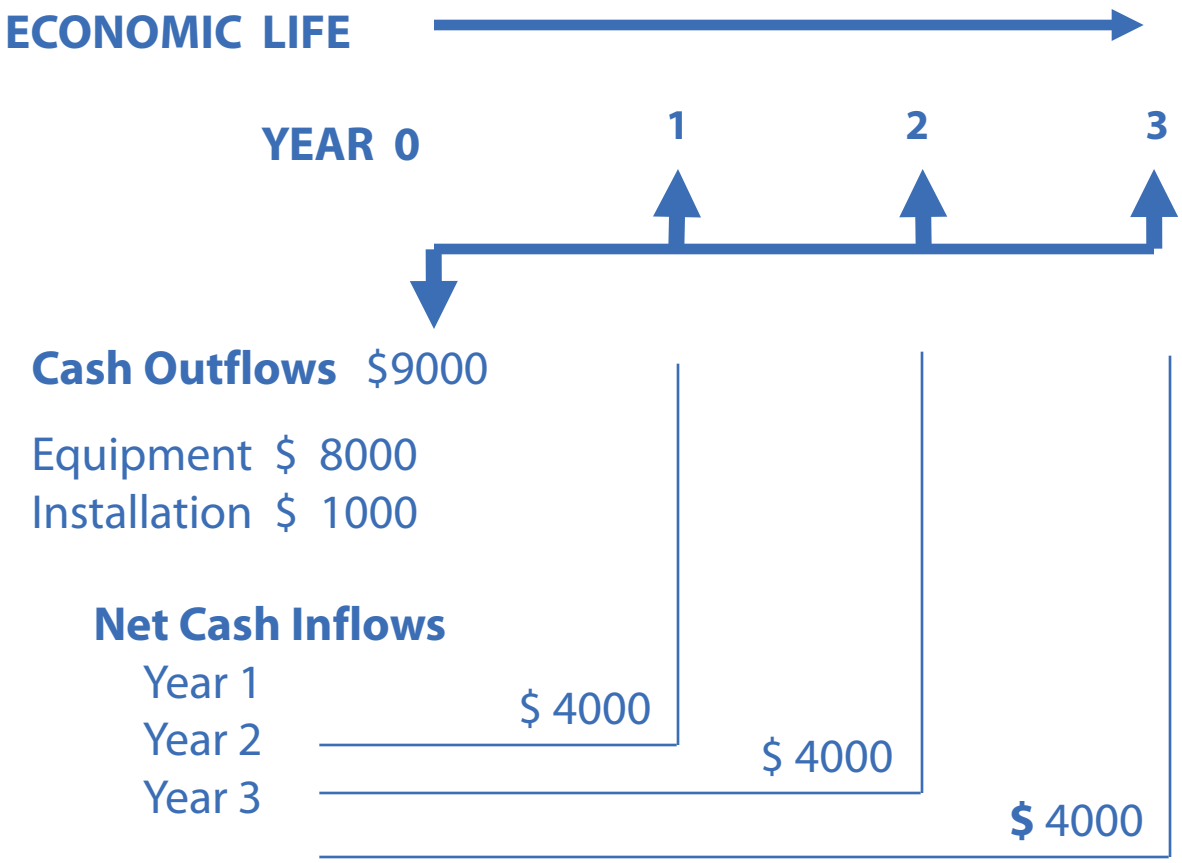
  - Annual Operating Costs $ 2,000

- **Savings**: The project will generate $6,000 in savings in each of the next three years

- Annual Incremental cash flow?

- **SHOULD THE PROJECT BE IMPLEMENTED, if discount Rate is 20%?**

Cash Flow – Economic Lifetime



Answers to Examples

Net Present Value

CALCULATION: Sum of the present values of all the cash flows.

Net Present Value (NPV) Spreadsheet:

Year	Cash Flow	Discount Factor	Present Value
0	($ 9,000)	1.000	($9,000)
1	$ 4,000	.8772	3509
2	$ 4,000	.7695	3078
3	$ 4,000	.6750	2700
Net Present Value of Cash Flows	=		287

NPV (cont.)

ADVANTAGES

- Accurate; Considers time value of money
- Measures risk-adjusted value added to business

DISADVANTAGES

- More information and calculation intensive
- Requires estimation of cash flows over life of project and calculation of discount rate.

WHEN TO USE

- Major project assessment and wherever conditions indicate that payback may be insufficient

Internal Rate of Return

- **Measure**: Discount Rate at which the Net Present Value is equal to Zero

- **Method**: Try different discount rates until you narrow the NPV as close to zero as possible *or* **use a computer or business calculator**.

- **Interpretation:**
  - If IRR > Hurdle Rate **accept** the project
  - If IRR < Hurdle Rate **reject** the project