

Project Greenopia: A Case Study

Your group has been tasked with conducting a pre-feasibility study for **Greenopia**, a site whose development rights your company would like to procure. You are provided with a historical year's data for reference renewable production at the site, and some preliminary cost numbers for CAPEX and OPEX of various renewable energy technologies and their variants.

You have made an agreement with the local electricity company (off-taker) who is willing to take all your power production at a fixed PPA price with a connection limit of 25 MW, which is maximum transmission capacity available for the site with shallow costs. Moving beyond that limit incurs deep costs, as provided in the excel sheet.

Below are the questions related to financial feasibility that you would like to find answers for. Make reasonable assumptions in addition to those in the excel sheet. Answer as many as you can.

1. Base Case:

- a. For a base case of PV (P1) installed capacity of 25 MW and no wind, assuming a discount rate of 3%, lifetime of 25 years and a fixed PPA of 70 \$/MWh, calculate the NPV and IRR of the project. In which year of operation does the project breakeven?
What is the LCOE for this plant configuration?
- b. What happens to these numbers when you flip the configuration to 25 MW of wind (W1) and no solar?
- c. What about different variants of PV and wind? Which plant configuration (P1 or P2 or W1 or W2 or W3) gives the highest NPV?

2. Hybridisation:

- a. Is it worthwhile to hybridise this plant, i.e., combine wind and solar? What are some good combinations that you found? If you find that hybridisation makes sense, why do you think it is so?
- b. What if the fixed PPA price was 60\$/MWh instead? Does hybridisation still makes economic sense?
- c. For what kind of a revenue structure, would hybridisation make sense, broadly speaking?

3. Sensitivity studies: Characterise the sensitivity of the NPV to the following and rank them according to the degree of impact on the financial feasibility (NPV) of the project:

- a. fixed PPA price
- b. discount rate
- c. solar and wind degradation factors
- d. AEP overestimation

4. Intuitively, what kind of a site is Greenopia do you think? Is it in a largely sunny area or a largely windy area?