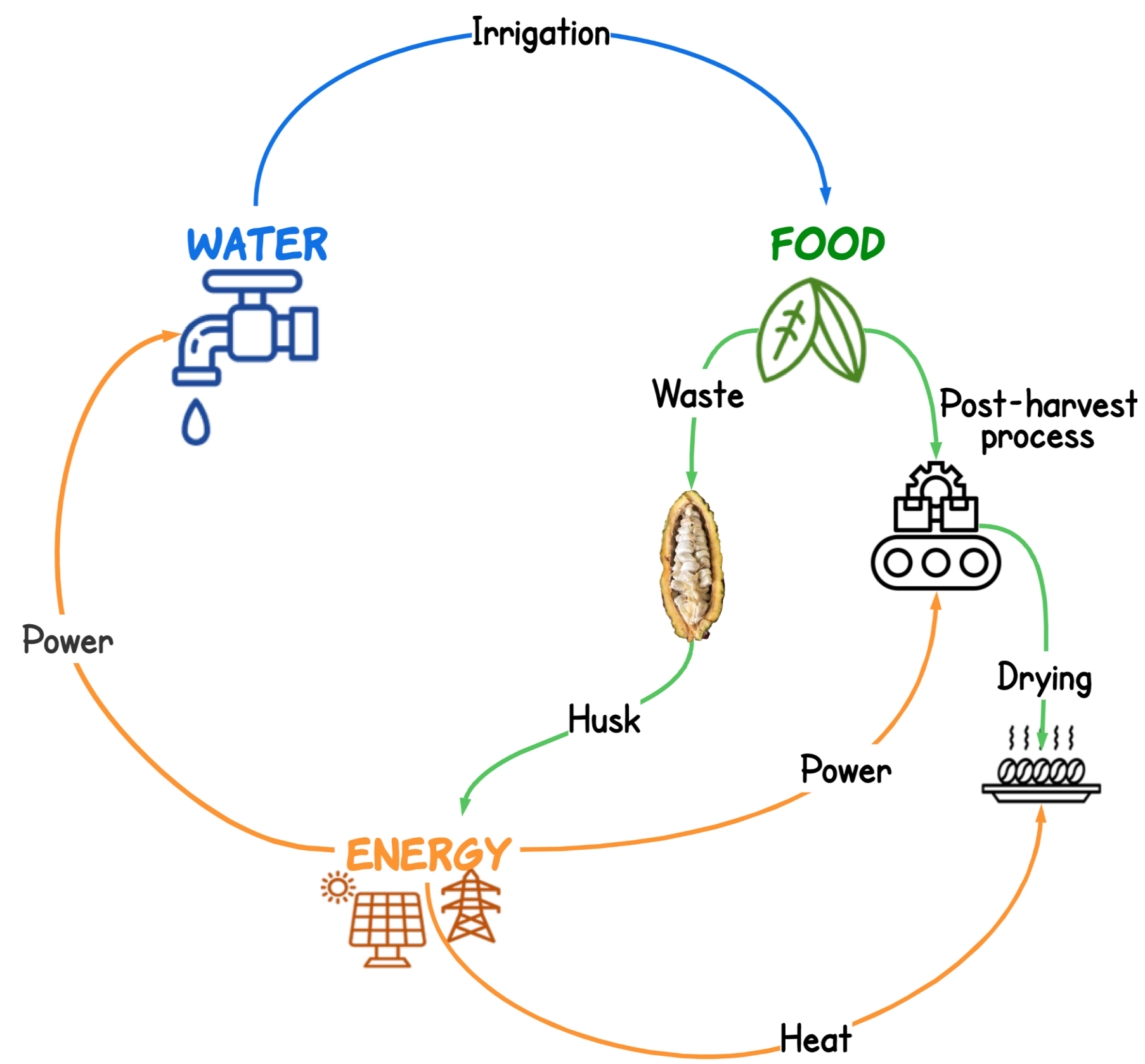


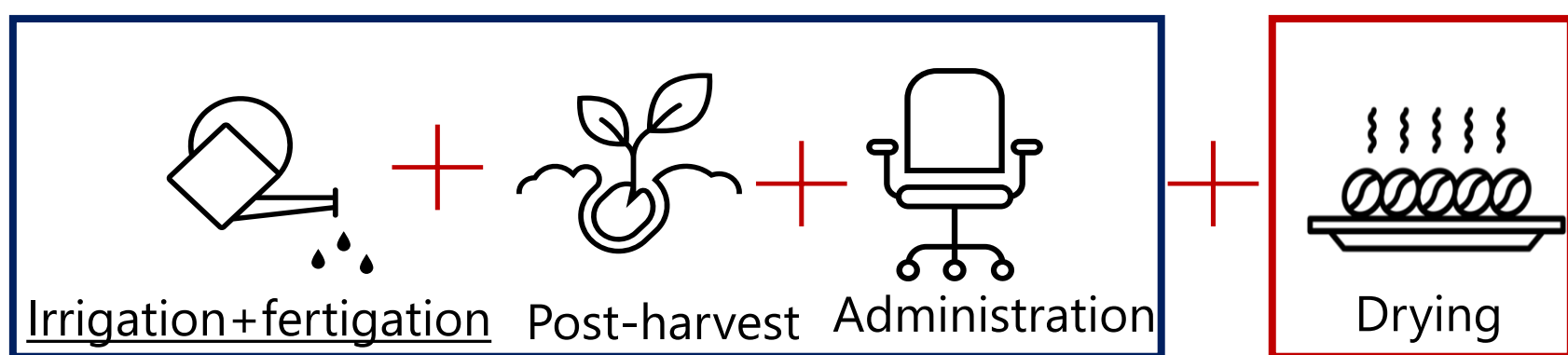
# Analysis of Energy Alternatives Under the Water-Energy-Food Nexus Approach

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## Water-Energy-Food Nexus



## Energy demand projection for cocoa plantation (10 years)



## Energy technologies and scenarios

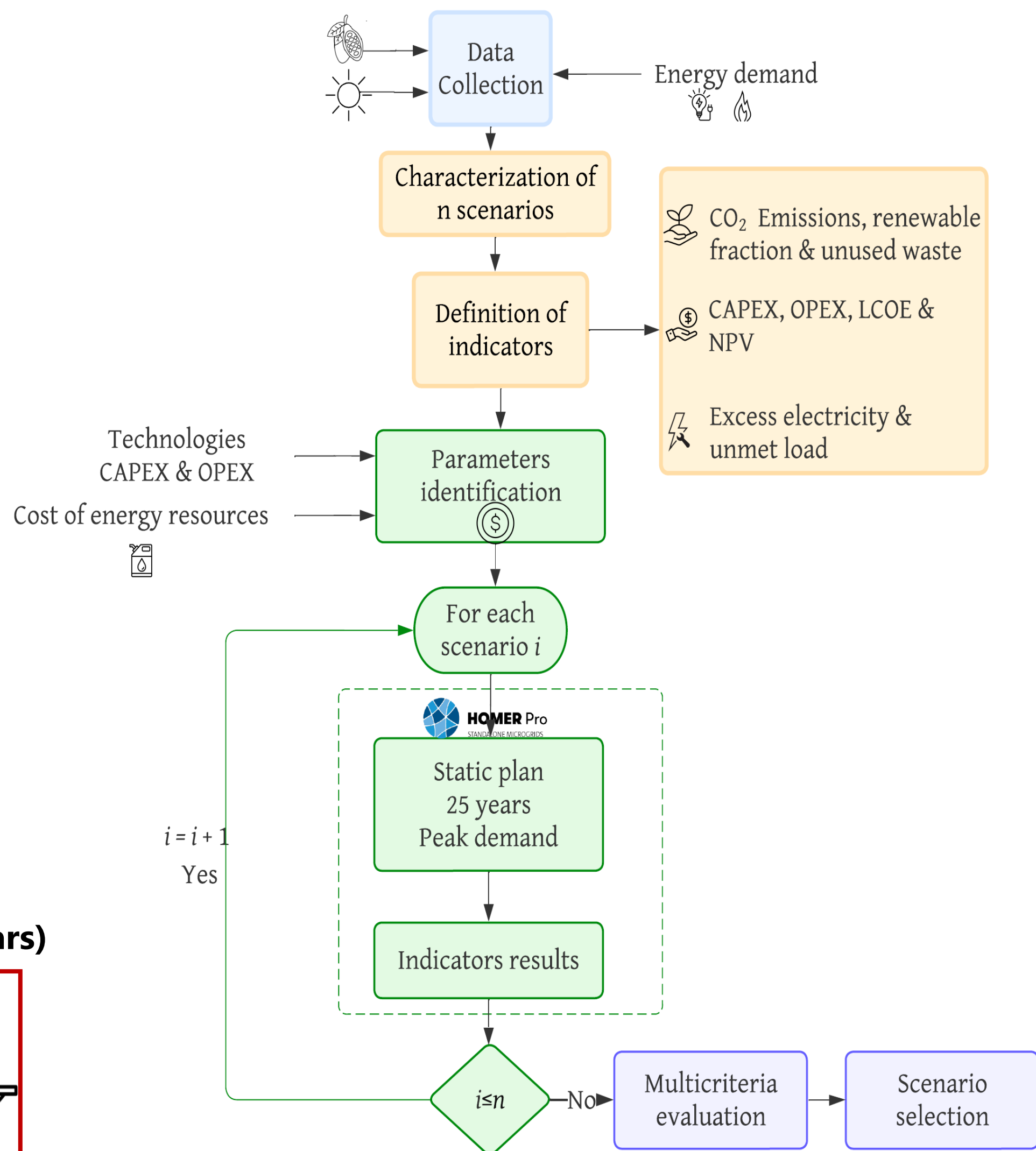
Table 2. Energy scenarios

Scenario	Solar PV	Biomass to thermal	Biomass to biogas	Batteries	Diesel genset	Power grid
1	✓				✓	✓
2		✓			✓	✓
3			✓		✓	✓
4	✓	✓		✓	✓	✓
5						✓
6 (BaU)					✓	✓

Table 3. Environmental and technical indicators results

Scenario	Environmental indicators			Technical indicators	
	CO <sub>2</sub> Emissions [KgCO <sub>2</sub> /year]	Unused organic residues [Ton/year]	Renewable fraction [%]	Excess electricity [%]	Unmet load[%]
1	1,174,137	49,366	80	5.7	0.78
2	2,989,785	3,016	82	0.6	0.36
3	2,888,829	46,350	59	0.23	0.36
4	439,490	3,123	93	5.17	1.30
5	644,576	49,366	0	0	6.56
6 (BaU)	2,104,058	49,366	0	0	2.74

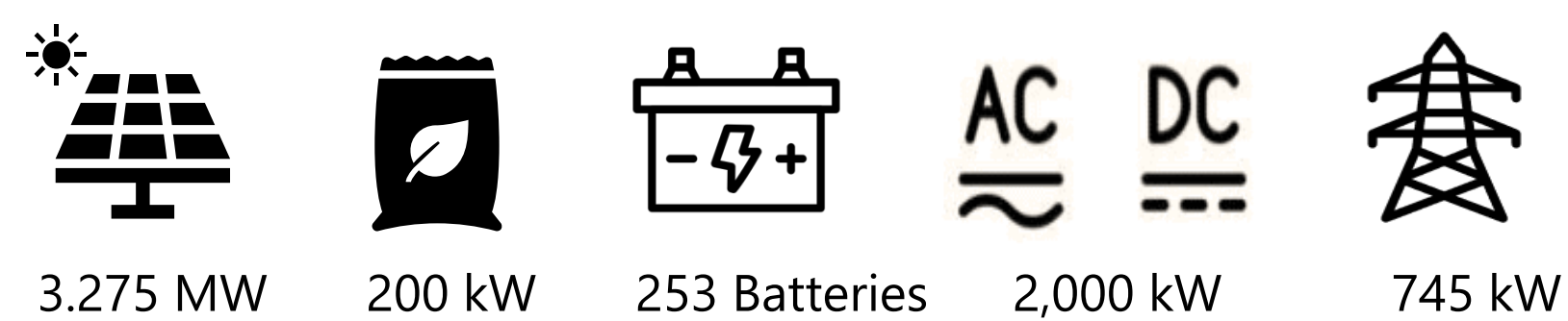
## Methodology



## Results and selection of energy solution

Table 2. Economic indicators results

Scenario	Economic indicators			
	CAPEX [MUSD]	OPEX [USD/year]	LCOE [USD/kWh]	VPN [MUSD]
1	\$ 5.209	\$ 904,633	\$ 0.114	\$ 1.4
2	\$ 1.529	\$ 2,301,535	\$ 0.147	\$ -4.1
3	\$ 0.530	\$ 1,178,345	\$ 0.176	\$ 1.8
4	\$ 5.729	\$ 1,317,553	\$ 0.075	\$ -3.3
5	\$ 1.345	\$ 1,294,991	\$ 0.060	\$ 0.9
6 (BaU)	\$ 0.273	\$ 1,543,632	\$ 0.188	-



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