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**│ [main.py START] │**

**│ Load task\_file (site variants- INPUT FROM TASK 2 (NOT SURE WHAT NEW TASK IS CALLED FOR THIS—BASED ON GENETIC ALGORITHM) │**

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**│ Columns: │**

**│ - longitude, latitude (for weather data) │**

**│ - site properties (slope, cultivated, etc.)│**

**│ - Trans\_Dist (for grid cost) │**

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**│ For each row: │**

**│ [compute\_ssc\_from\_row] │**

**│ - Receives: row, data\_dir │**

**│ - Inputs for SAM: │**

**│ • capacity → system size (20MWdc nameplate) │**

**│ • longitude/latitude → resource lookup │**

**│ • Solar Weather file → site solar (GHI, DNI, DHI), temp, elevation dew point, distance to grid, air pressure, wind – (30 minute data NSRDB) │**

**│ - calls: │**

**│ • Weather file fetch/generate (from data\_dir, by lat/lon) |**

**│ • System config (standard/defaults) |**

**│ • Financial params (default) |**

**│ • Losses/layout (default) |**

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**│ [SAM/SSC Simulation Engine] │**

**│ Receives: │**

**│ - Resource data (from weather file) │**

**│ - System design (capacity, config) │**

**│ - Site factors (slope, land use, etc.) │**

**│ - Financials (CAPEX, OPEX, etc.) │**

**│ - Losses/layout (as available) │**

**│ Outputs: Performance & cost results │**

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**│ Collect & write results (results\_path) │**

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**│ Run LCA (calculate\_lca\_pv) on results │**

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**│ Return Results to Task 2 (or whatever new name is │**

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| --- | --- | --- | --- | --- | --- |
| SAM Input | Source/Location in Your Workflow | Critical? | Defaulted/Approximated? | | Notes |
| Site Location | task\_file (longitude, latitude) | Yes | No | Directly from row; critical for weather/resource lookup. | |
| System Size | task\_file (capacity) | Yes | No | From row. Units must be consistent (kW/MW). | |
| Resource Data | Likely data\_dir (weather file, e.g., TMY) | Yes | Maybe | Must exist for site; if missing, script may interpolate/use nearest, or fail. | |
| Module Parameters | Not in row; likely code default or config | Yes | Yes | Assumed standard/default module specs unless set elsewhere. | |
| Inverter Parameters | Not in row; likely code default or config | Yes | Yes | As above. | |
| Array Geometry | Not in row; likely code default or config | Yes | Yes | (Tilt, azimuth, row spacing, tracker/fixed?) | |
| Losses (Soiling, etc.) | Not in row; code default | No | Yes | Default/typical values in processing function. | |
| Shading | Not in row; code default | No | Yes | Likely assumed negligible or typical for open land. | |
| Degradation Rate | Not in row; code default | No | Yes | Standard value (e.g., 0.5-1%/yr) used unless set in config. | |
| Financial - CAPEX | Not in row; possibly code default or data\_dir | Yes (for finance) | Yes | E.g., $/Watt or $/kW from config or external cost table. | |
| Financial - OPEX | Not in row; possibly code default or data\_dir | Yes (for finance) | Yes | Typical annual O&M cost ($/kW-yr) used unless specified. | |
| Financial - Lifetime | Not in row; code default | Yes (for finance) | Yes | E.g., 25 or 30 years typical. | |
| Financial - Discount rate | Not in row; code default | Yes (for finance) | Yes | Used for NPV, LCOE, payback. | |
| Electricity Rate/Tariff | Not in row; code default | Yes (for finance) | Yes | Fixed $/kWh or from config. | |
| Site Slope, Cultivated | task\_file | No\* | No | Used for feasibility or cost adj., not SAM-required. | |
| Trans\_Dist | task\_file | No\* | No | Used for cost modeling, not core SAM input. | |
| Grid Interconnection | Not in row; code default | No | Yes | Likely assumes simple export. | |
| Tax Incentives, Depreciation | Not in row; code default | No | Yes | Used for advanced financial modeling, else skipped/default. | |