

Fram Energy Solar Dashboard – 1 Pager

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Key Assumptions

The key assumptions were based on the provided instructions, for which:

- Installed cost = \$2.50/W
- Annual generation = 1,400 kWh per kW DC
- Electricity prices in cents/kWh based on [Electricity Rates | May 2025](#)
- Price escalation = 2.5% per year
- O&M costs = \$15/ kW/ year
- ITC = 30% of installation costs
- Financing is 100% equity

Financial Model Structure

The model estimates 25-year cash flows for residential rooftop solar systems based on two inputs: system size (in kW DC) and U.S. state. The model assumes consistent generation across all states and excludes degradation, additional incentives, or interconnection fees for simplicity. Each year's cash flow is calculated as:

$$\text{Annual Cash Flow} = (\text{Annual Generation} \times \text{Electricity Price}) - \text{O\&M Cost}$$

Electricity price is escalated annually by 2.5%. The model accounts for:

- **Year 0:** Upfront cost reduced by 30% ITC
- **Years 1–25:** Energy savings vs. O&M
- **IRR:** Calculated using `numpy_financial.irr()` on the full cash flow array
- **Payback period:** First year where cumulative net cash flow > 0

Technical Architecture

- **Frontend:** Built using **Streamlit**, which provided the most straightforward method for creating an interactive UI and visualizing tabular cash flows with minimal setup.
- **Inputs:** State (dropdown) and system size (number input)
- **Outputs:**
 - System cost (after ITC)
 - Annual generation (kWh)
 - 25-year cash flow table
 - Project IRR
 - Payback period
- **Backend:** Financial logic encapsulated in `solar_model.py` to separate computation from presentation.
- **Data:** State-level electricity prices hardcoded via `state_prices` list, based on [Electric Choice](#).