



# Solar Electricity for Europe – Feasibility

## Study of a 10MW Solar Power Plant in Iran

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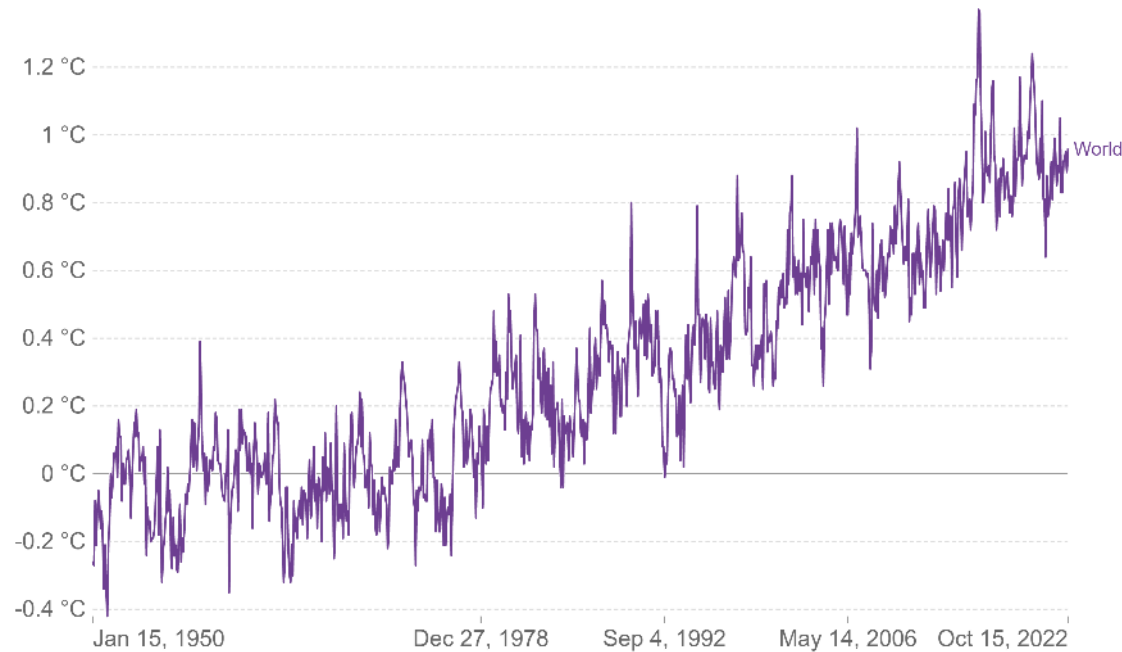
FACULTY OF ECONOMICS AND POLITICAL SCIENCE

# Overview: Climate Change and EU's Energy Crisis

## Global warming: monthly temperature anomaly

The combined land-surface air and sea-surface water temperature anomaly is given as the deviation from the 1951–1980 mean.

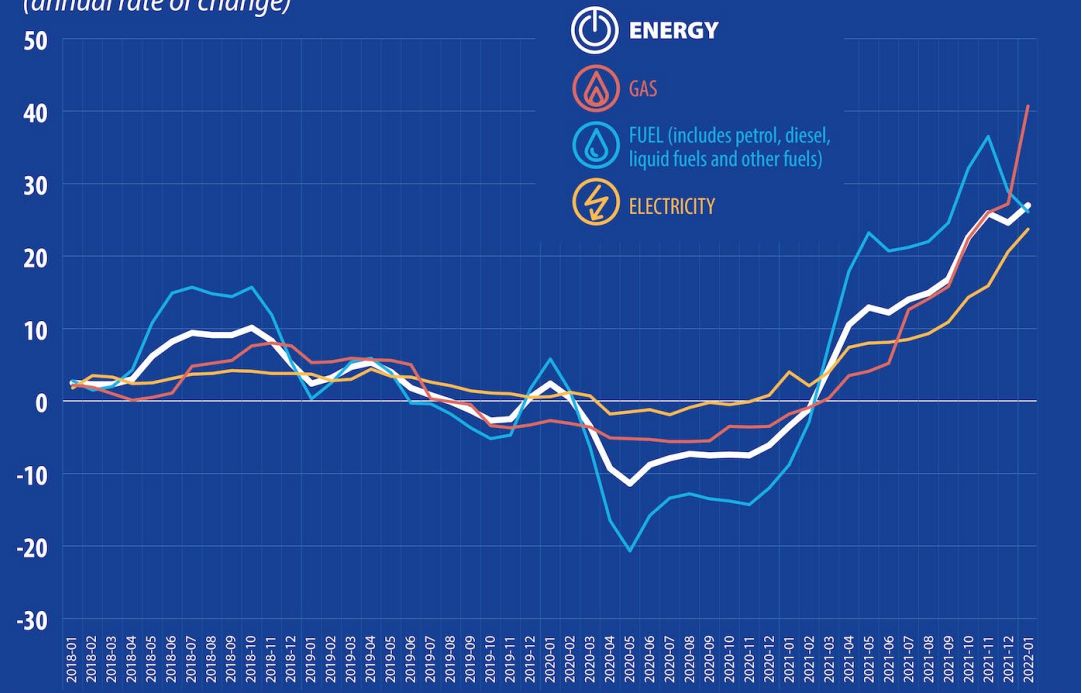
Our World in Data



Source: National Aeronautics and Space Administration (NASA), Goddard Institute for Space Studies (GISS)

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## Evolution of energy prices in the last 5 years, EU (annual rate of change)



[ec.europa.eu/eurostat](https://ec.europa.eu/eurostat)

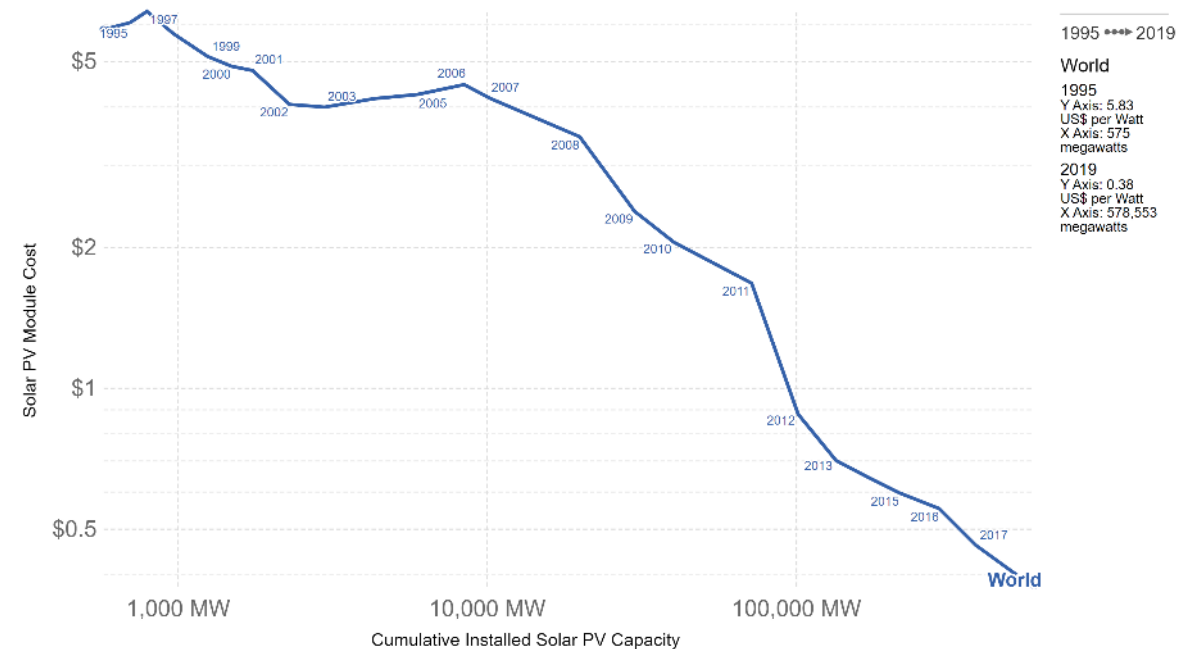
# Overview: Solar Energy as a Solution

- ✓ Sun, An Unlimited Source of Energy
- ✓ Solar Power, A Green Alternative to Fossil Fuels
- ✓ Solar Energy is Getting Cheaper and Cheaper

## Solar PV module prices vs. cumulative capacity

Solar photovoltaic (PV) module prices are measured in 2019 US\$ per Watt. Cumulative installed solar PV capacity is measured in megawatts. This represents the 'learning curve' for solar PV.

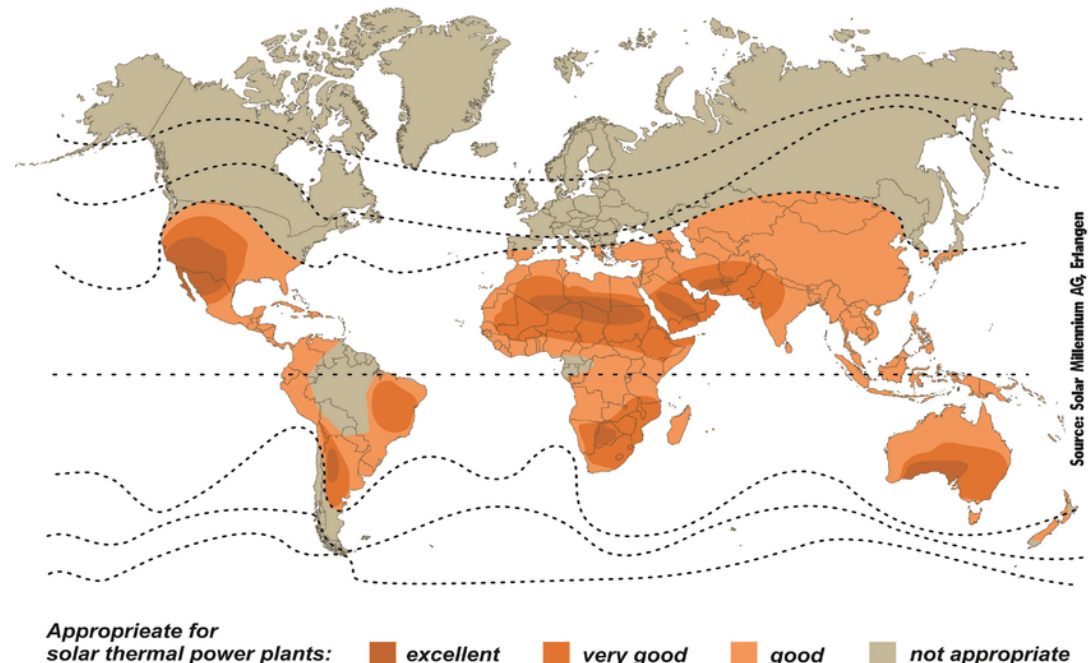
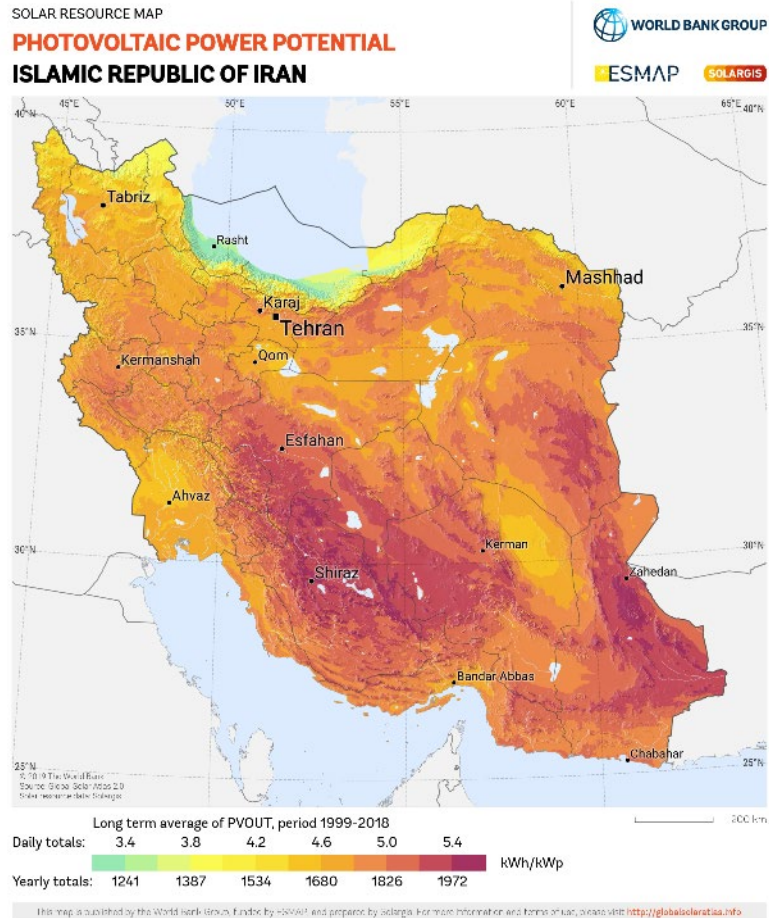
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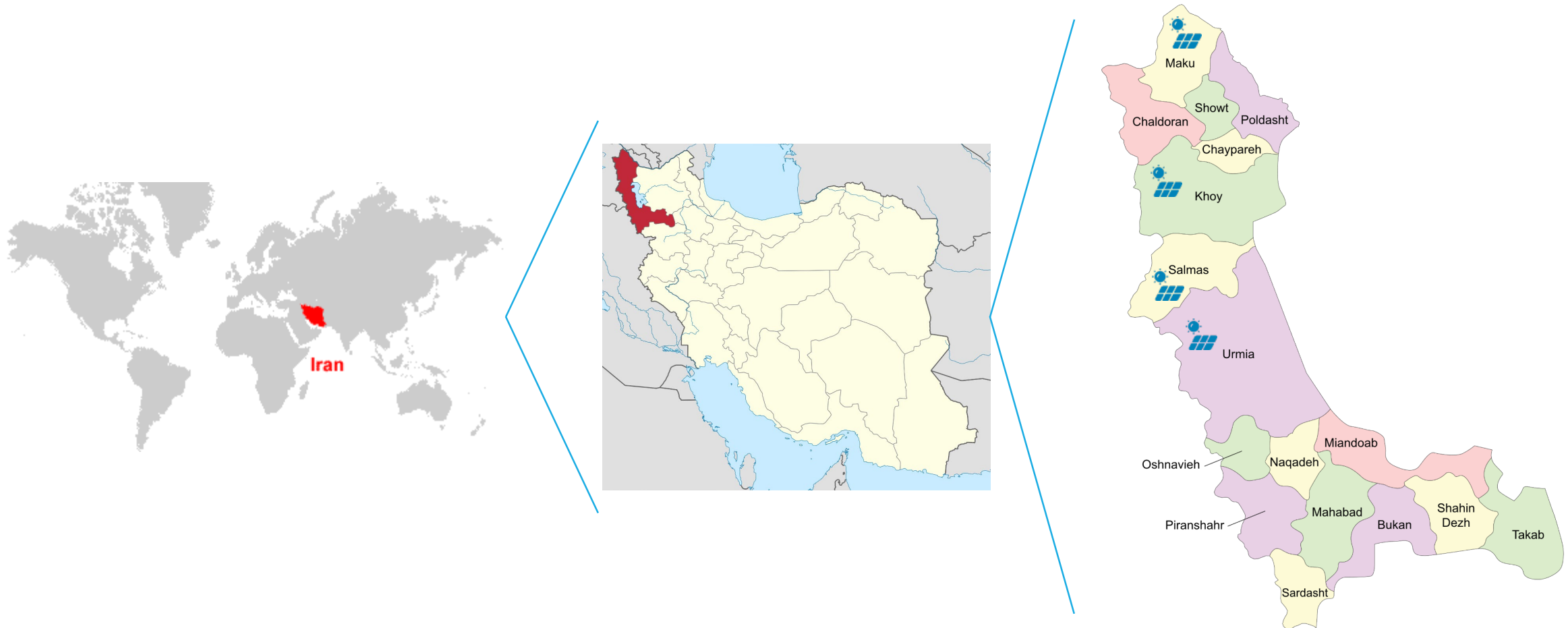
Source: Lafond et al. (2017); IRENA Database

OurWorldInData.org/renewable-energy • CC BY

# Overview: Iran, a Potential Global Solar Power Generator



# Overview: West Azerbaijan Province, Iran's Gateway to Europe

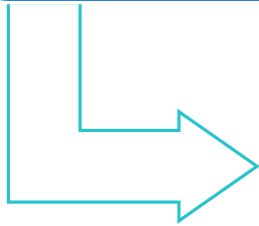


# Methods

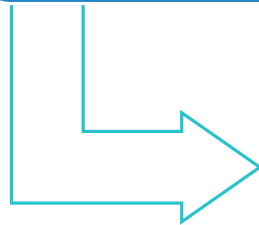
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- Finding the optimal region based on eight different parameters



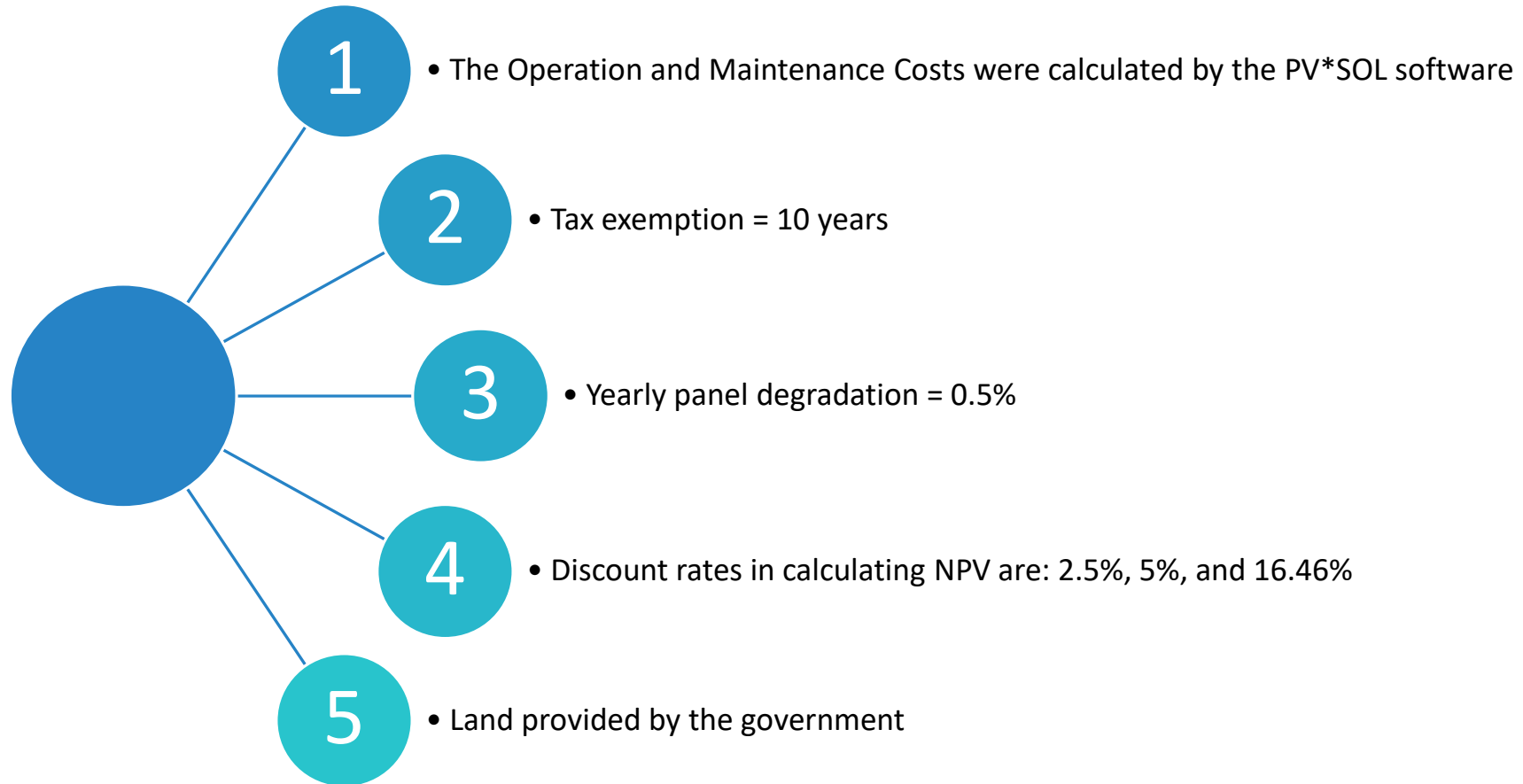
- Running a simulation to calculate the costs and revenues



- Calculating NPV, IRR, and Payback Period

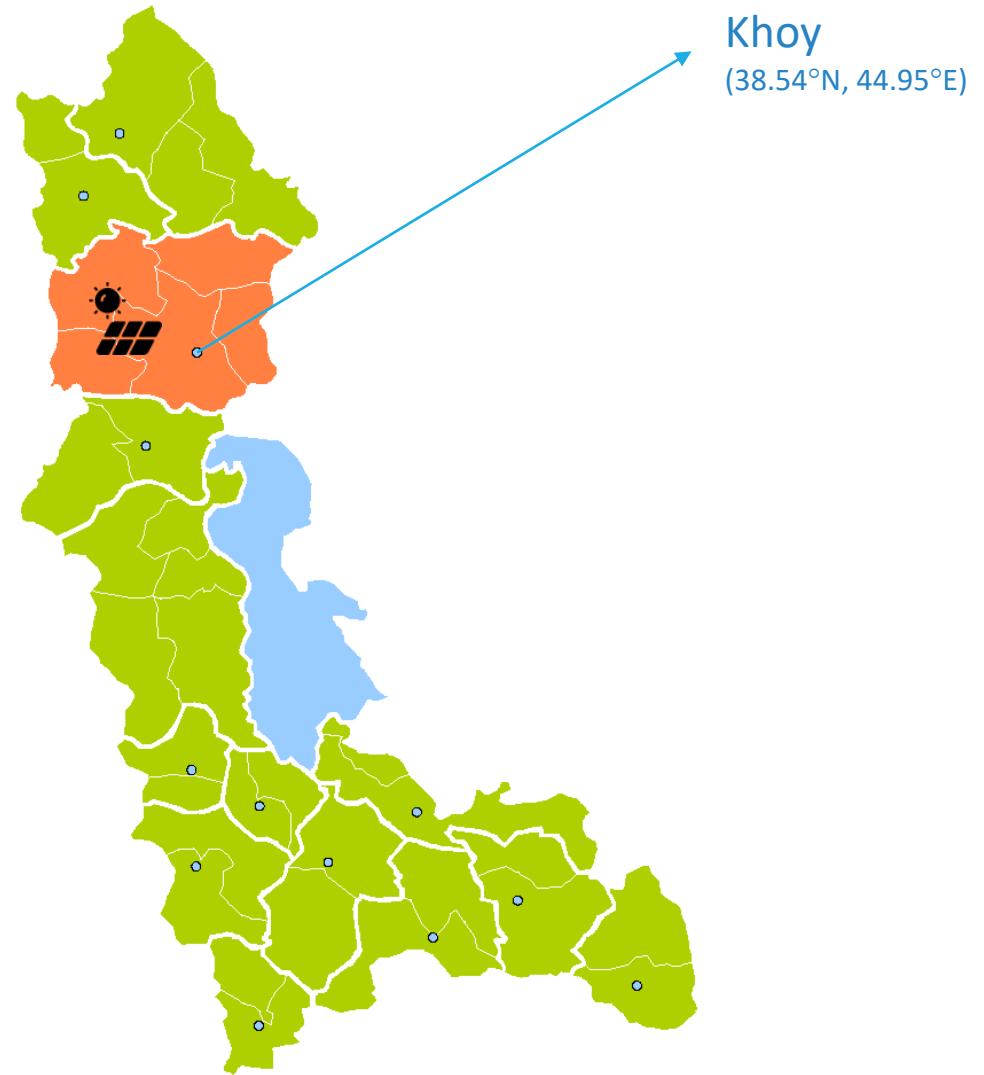
# Methods: Hypothesis

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# Results (TOPSIS Method)

Using Eight Parameters in TOPSIS method, the optimal region was found to be the Khoy county.



# Results (Simulation)

- ✓ The Cost of Construction = 12.481 million USD
- ✓ Annual Revenue (Electricity Price, Average-Case Scenario) = 6.9 million USD
- ✓ Annual Revenue (Electricity Price, Worst-Case Scenario) = 6 million USD
- ✓ Annual Energy Production = 26.28 GW
- ✓ Yearly Operation and Maintenance Cost = 400 thousand USD

# Results (Cash-Flow Analysis)

| Electricity Price Scenarios | NPV (i = 2.5%) | NPV (i = 5%)  | NPV (i = 16.46%) | IRR  | Simple Payback Period | LCOE        |
|-----------------------------|----------------|---------------|------------------|------|-----------------------|-------------|
| Europe (Average)            | \$ 94,000,000  | \$ 72,000,000 | \$ 29,000,000    | 1.05 | 1.94                  | 0.07\$ kW/h |
| Europe (Min)                | \$ 79,000,000  | \$ 61,500,000 | \$ 24,500,000    | 0.96 | 2.25                  |             |



# Conclusion

# References

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- [2] Makhija, S.P., Dubey, S.P., Bansal, R.C. et al. Techno-Environ-Economical Analysis of Floating PV/On-Ground PV/Grid Extension Systems for Electrification of a Remote Area in India.
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- [4] Abbas Asakereh, Mohsen Soleymani, Mohammad Javad Sheikhdavoodi, A GIS-based Fuzzy-AHP method for the evaluation of solar farms locations: Case study in Khuzestan province, Iran, *Solar Energy*, Volume 155, 2017, Pages 342-353, ISSN 0038-092X,
- [5] Ivan T. Oloya, Tar JL. Gutu, Muiyiwa S. Adaramola, Techno-economic assessment of 10 MW centralised grid-tied solar photovoltaic system in Uganda, *Case Studies in Thermal Engineering*, Volume 25, 2021, 100928, ISSN 2214-157X.

Thank You for Your Attention

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