



Society of Actuaries in Ireland

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# Let the sun shine – an actuarial view of solar investment

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Michael Marsh

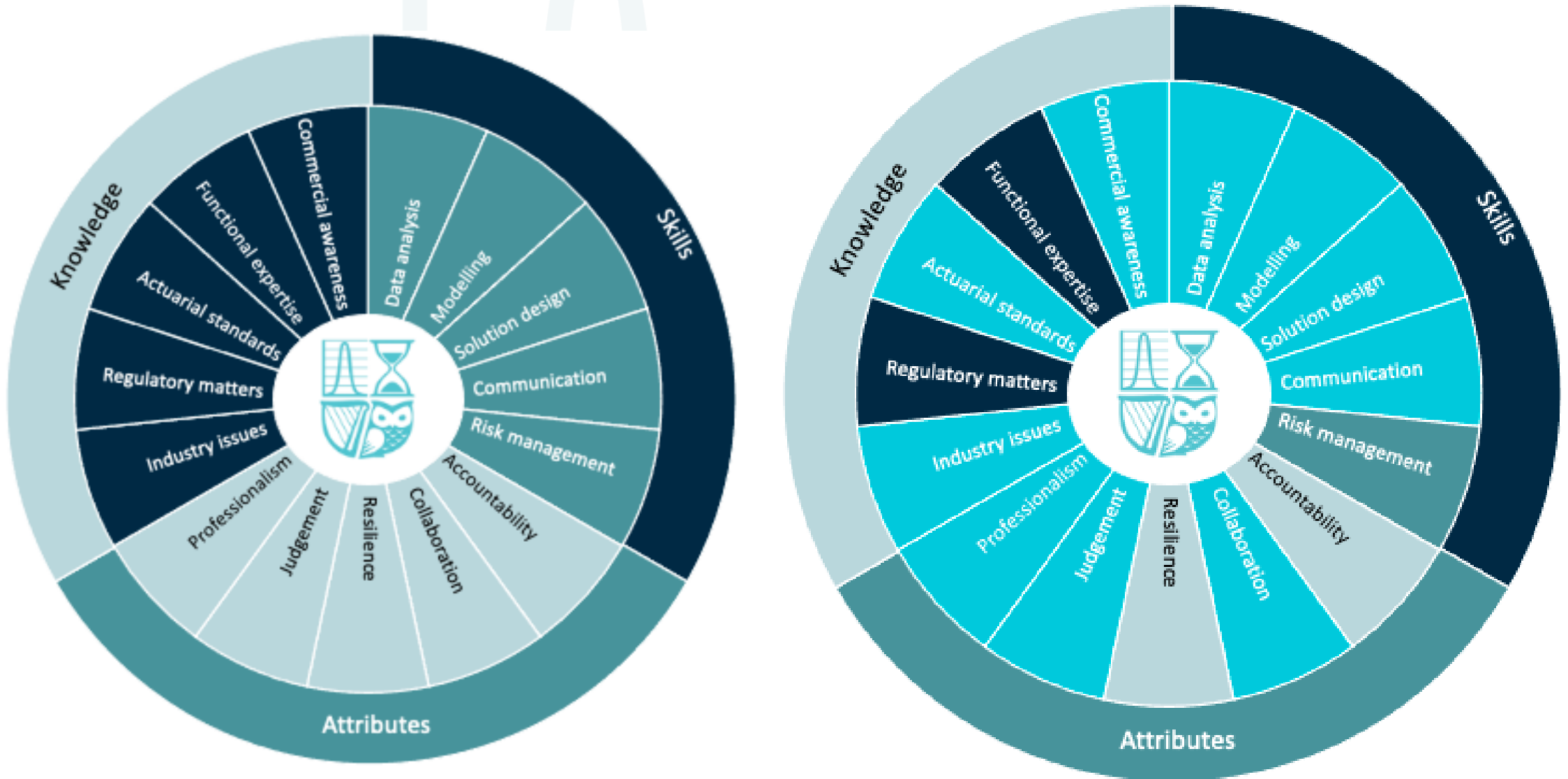
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# Disclaimer

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**The views expressed in this presentation are those of the presenter and not necessarily those of the Society of Actuaries in Ireland or their employees.**

# SAI Competency Framework from Current Strategy



# Solar Energy Production and Opportunities for Actuaries

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- My name is Michael Marsh and I am an Assistant Professor in the School of Mathematical Sciences in Dublin City University.
- I have worked in a number of areas as an actuary and in the last 10 years I have become involved with investment in solar farms in Italy.
- In this talk I would like to give you an insight in the solar renewable industry and also to suggest opportunities for actuaries in this area.



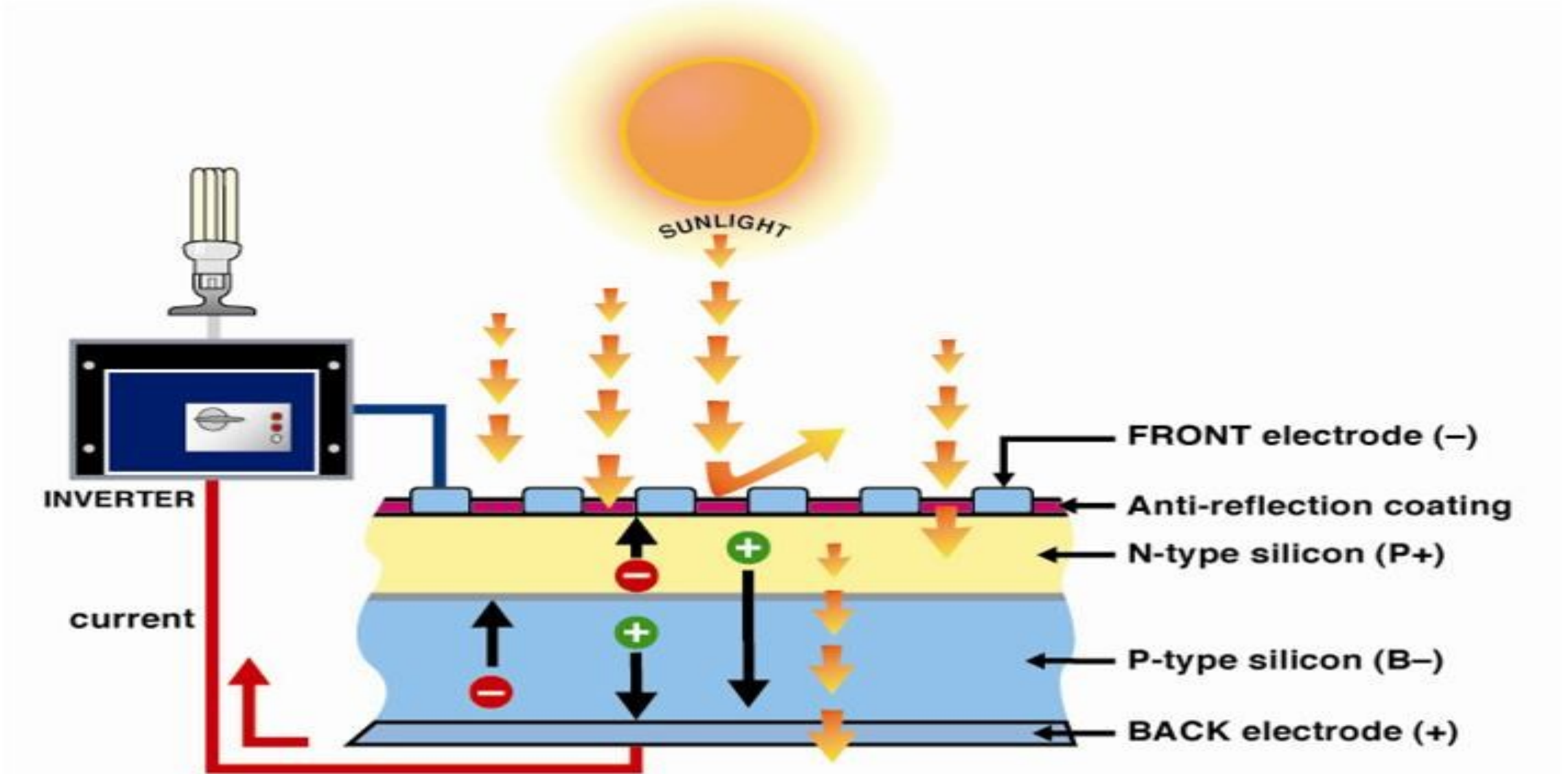
# Solar Renewable Energy Market

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- Global electricity demand by 2050 – 50% from solar
- Cost parity – huge potential
- Global warming
- Battery storage technology
- Europe – 21% annual growth
- Countries of particular interest



# How does Solar PV Work?





# Solar Power

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- How does solar PV work?
- What is solar radiation?
- What is solar irradiation?
- Long-term potential of solar power



# European Green Deal

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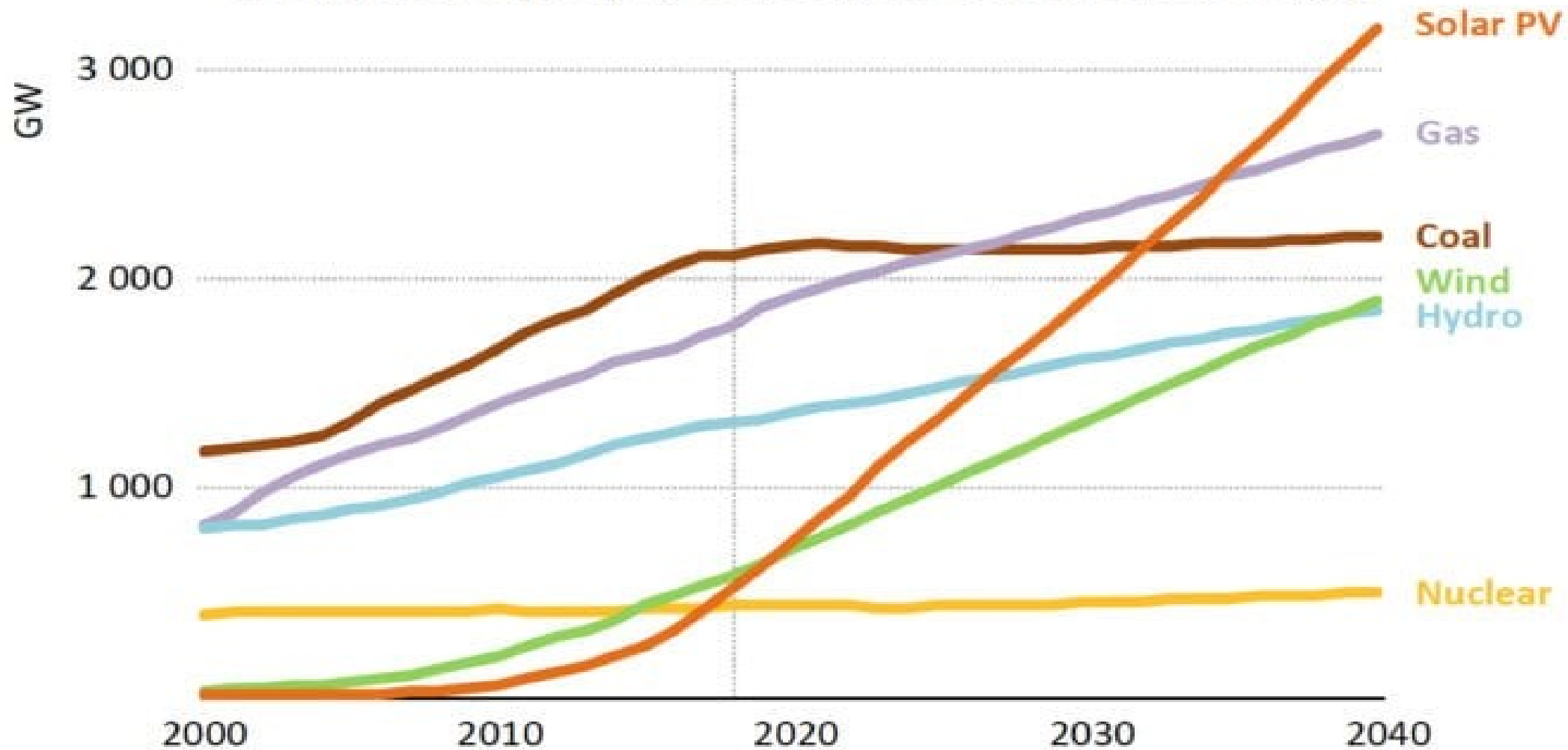
- Climate neutral by 2050
- Green house gas emissions to be reduced by 50% by 2030
- EU – 50% of electricity from renewable sources by 2050
- International Energy Association





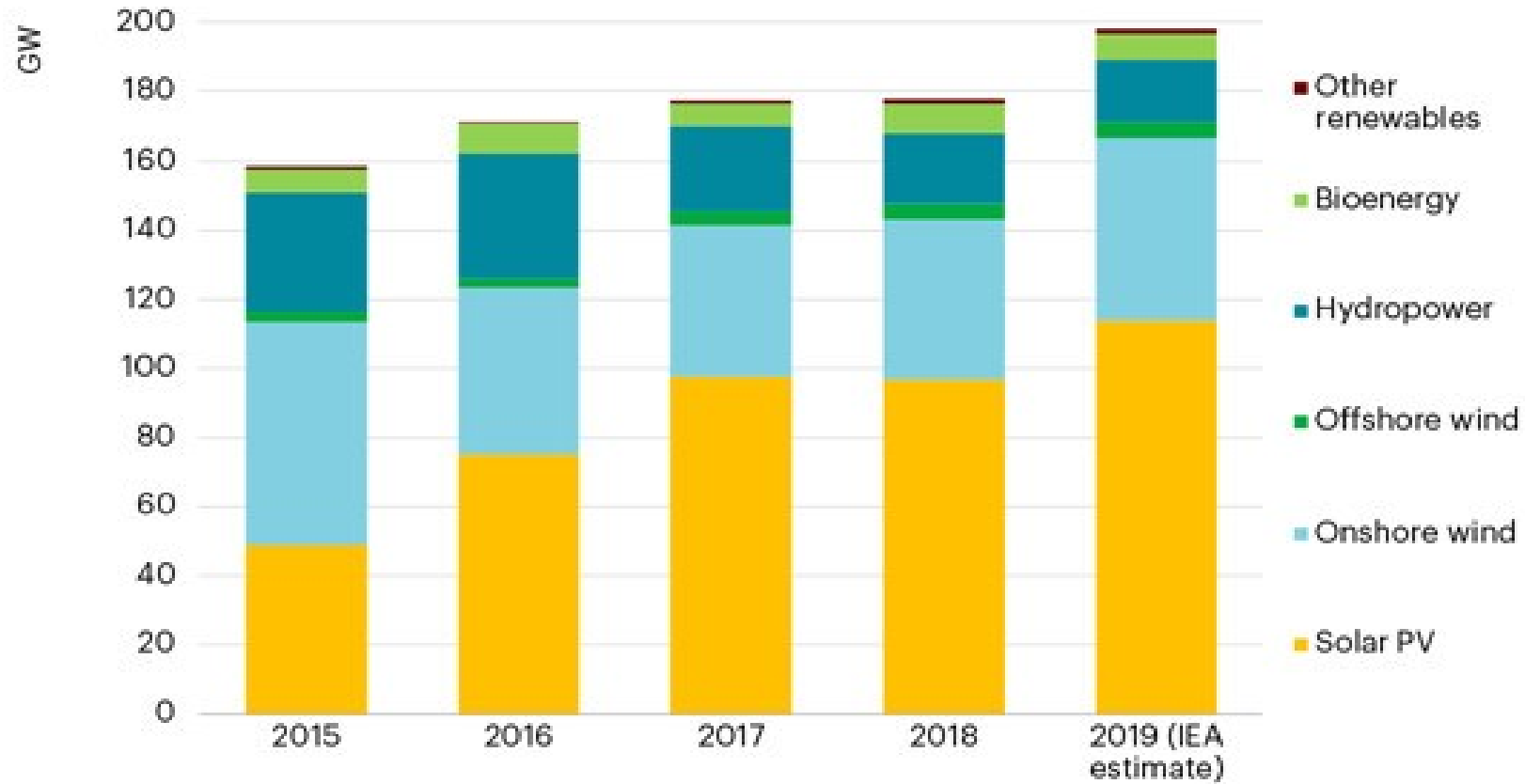
# Solar PV Global Capacity Projections 2000 - 2040

Global power capacity by source in the Stated Policies Scenario





# Solar PV versus other sources - historic data





# Technological Details

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- Panels
- Inverters
- Cabling
- Transformers
- Monitoring



# Solar plant purchase options

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- Purchase of plants with tariffs
  - turnkey projects
  - Government backed revenue stream
- Purchase of plants on a market parity basis



# Investment illustration

## Key Financial Projection Assumptions

**Fundraise: €20m in 2020**

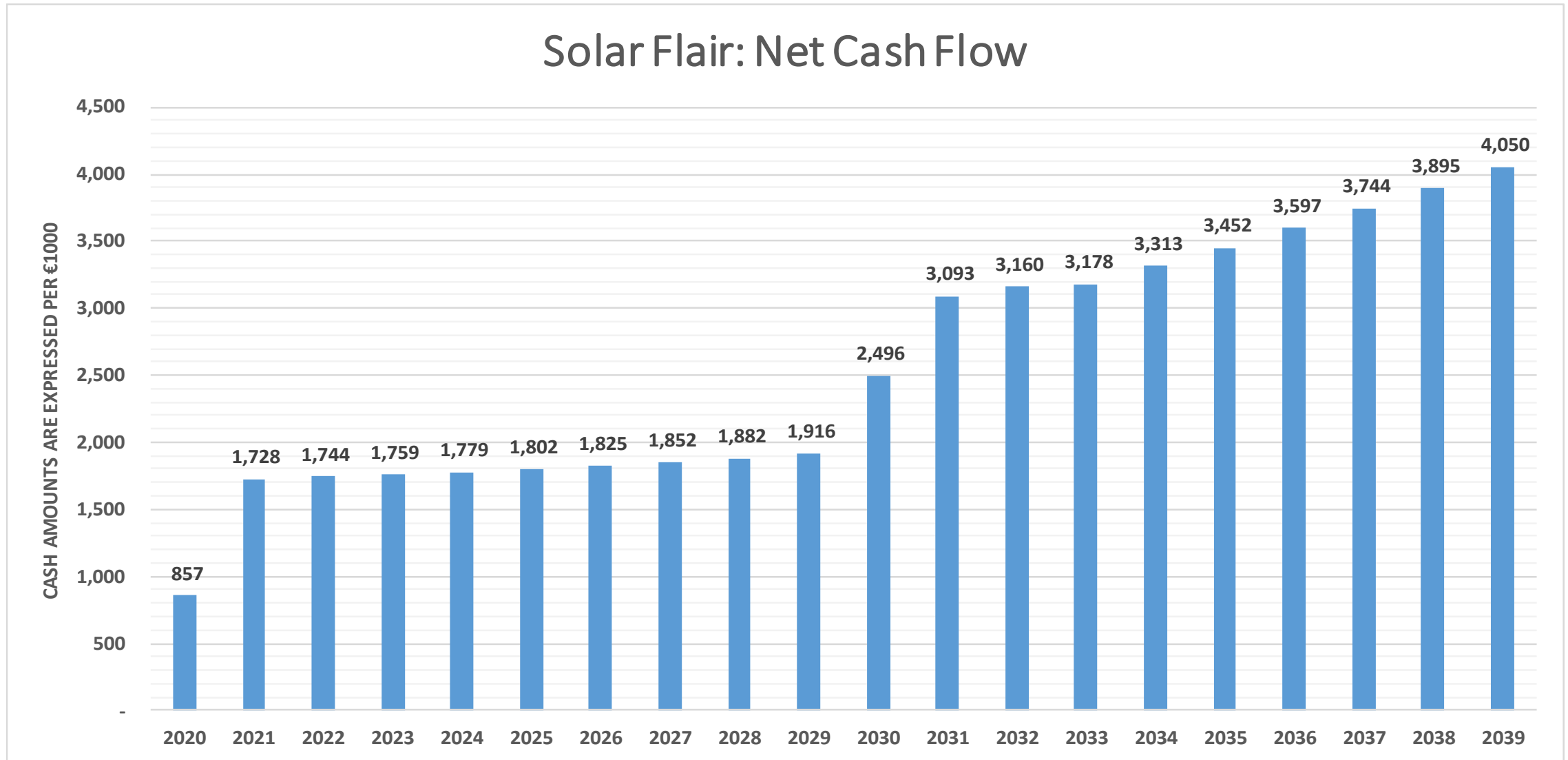
Borrowings: €20m in 2020. 10-year term with an interest rate of 5.25% per annum

**Number of plants with tariffs and average cost per MW: 13 MW of plants, with an average cost of €1.92m per MW, inclusive of Acquisition Fee of 2% of the gross sale price.**

Number of plants on a market parity basis and average cost per MW: 17 MW of plants, with an average cost of €0.79m per MW, inclusive of Acquisition Fee of 2% of the gross sale price.



# Cash flows projections





# Solar plant operations aspects

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- Plant management
- Plant maintenance
  - security
  - monitoring
- Warranties



# Risk factors

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- Operational risk
- Solar radiation risk
- Security risk
- Market risk





# Possible actuarial roles

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- Cash flow assessment
- Solar company discounted cash flow valuations
- Assessment of risks and derivation of actuarial probabilities and statistics for risks
- Investment opportunities for life insurance companies and pension funds

# Questions

Please click on the 'Raise Hand' icon to ask a question

and

wait to be unmuted

or

Use the Q&A function

