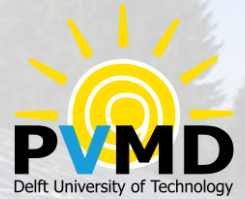
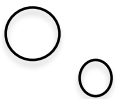
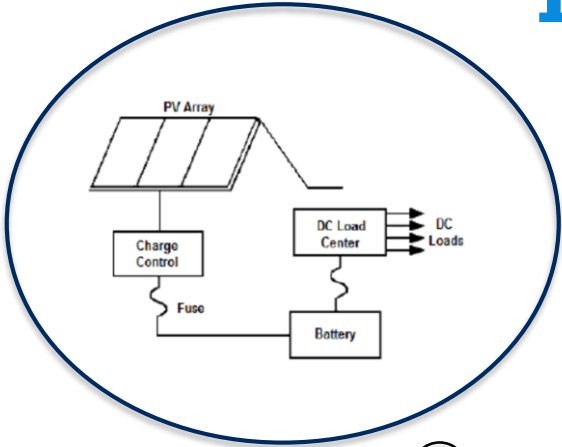


Development of PV System Sizing Tool with Economic Analysis

Shruti Sriram



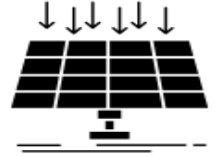
Introduction



What would be the most accurate system sizing methodology for TSS?

Constraints

- Inaccurate irradiance data



- High operating temperatures



- Remote locations



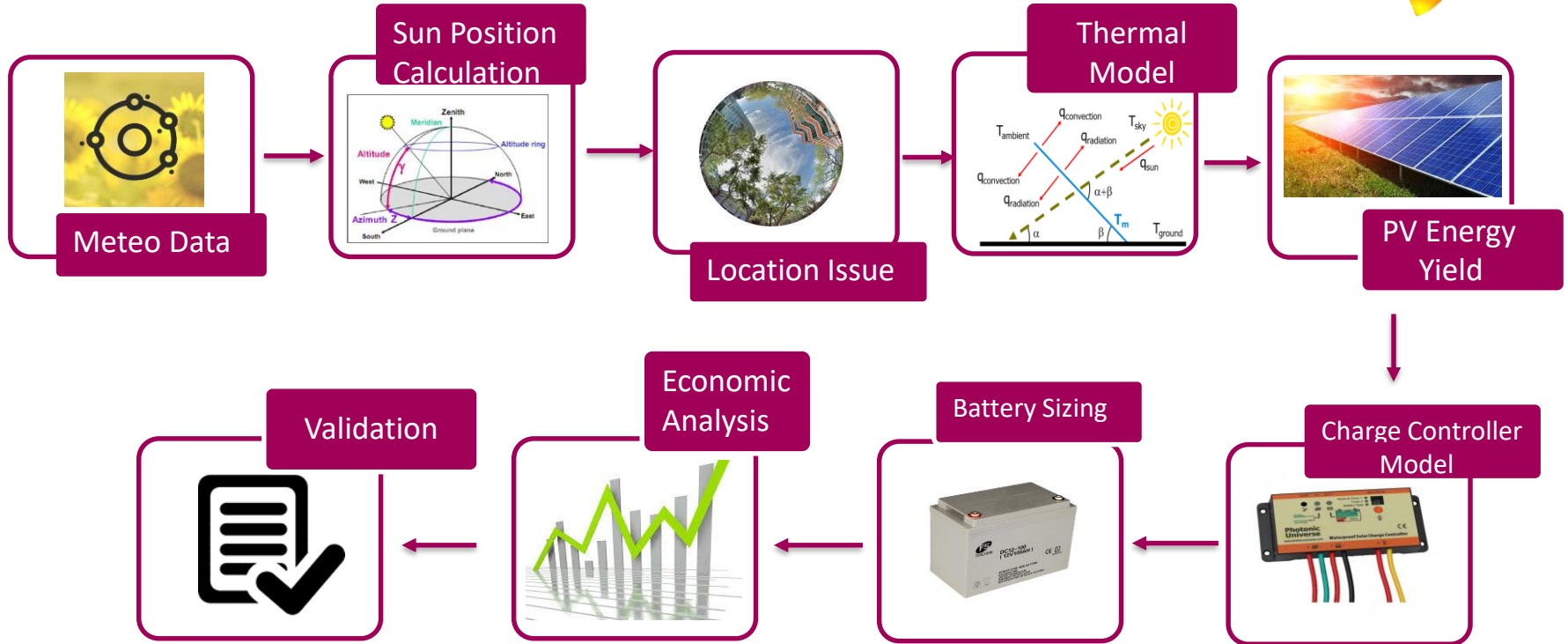
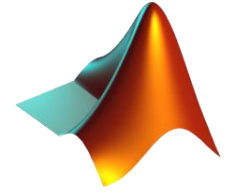
Objective

- *Development of system sizing tool.*
- *Choice of charge control technique- PWM or MPPT?*
- *Economic analysis of Hybrid PV-Diesel systems.*

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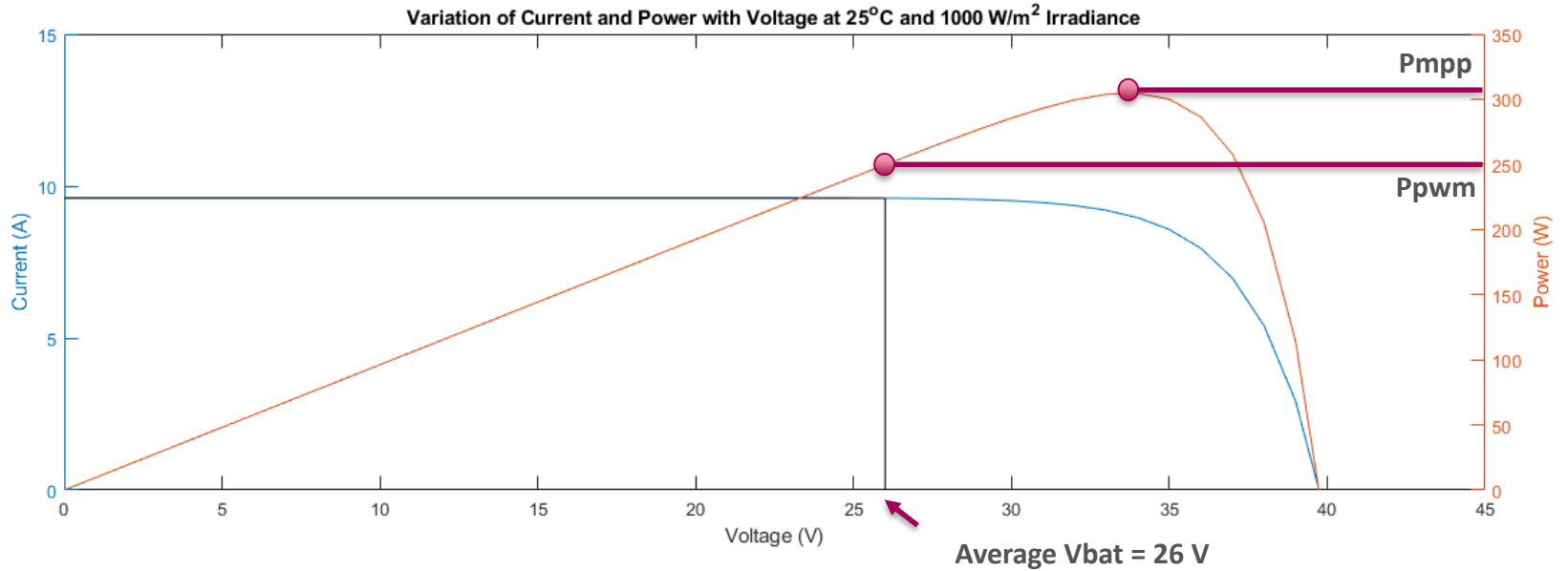
System Sizing Tool



Objective

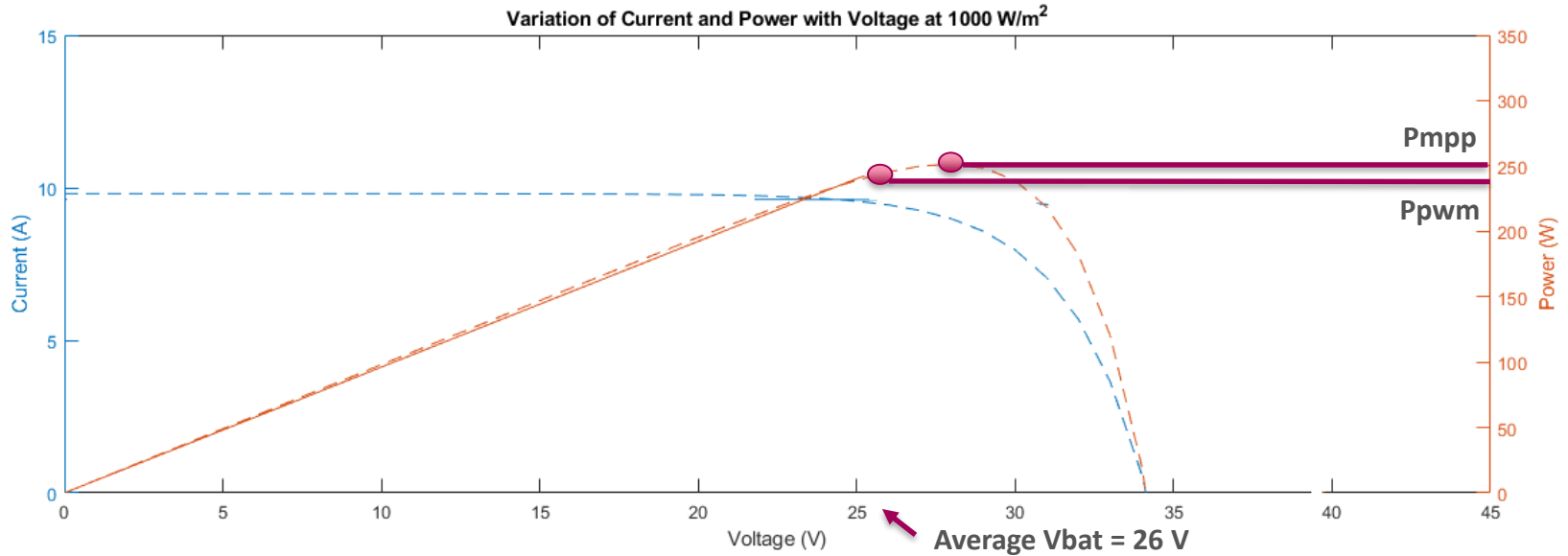
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PWM vs MPPT at Cell Temperature of 25°C



Difference in power extracted = 54.6 W

PWM vs MPPT at Cell Temperature of 70°C









Difference in power extracted = 6.28 W

Difference Between MPPT and PWM

Category	Low Temperature	High Temperature
Power Extracted	PWM : 18.2 % < MPPT	PWM : 2.5% < MPPT
System Costs	PWM : 13.0% > MPPT	PWM : 1.0% < MPPT

In terms of power extracted, advantage of MPPT over PWM reduces at higher temperatures.

PWM vs MPPT

Factors	PWM	MPPT
Space Constraint?		
Reliability?		
Shaded Condition?		

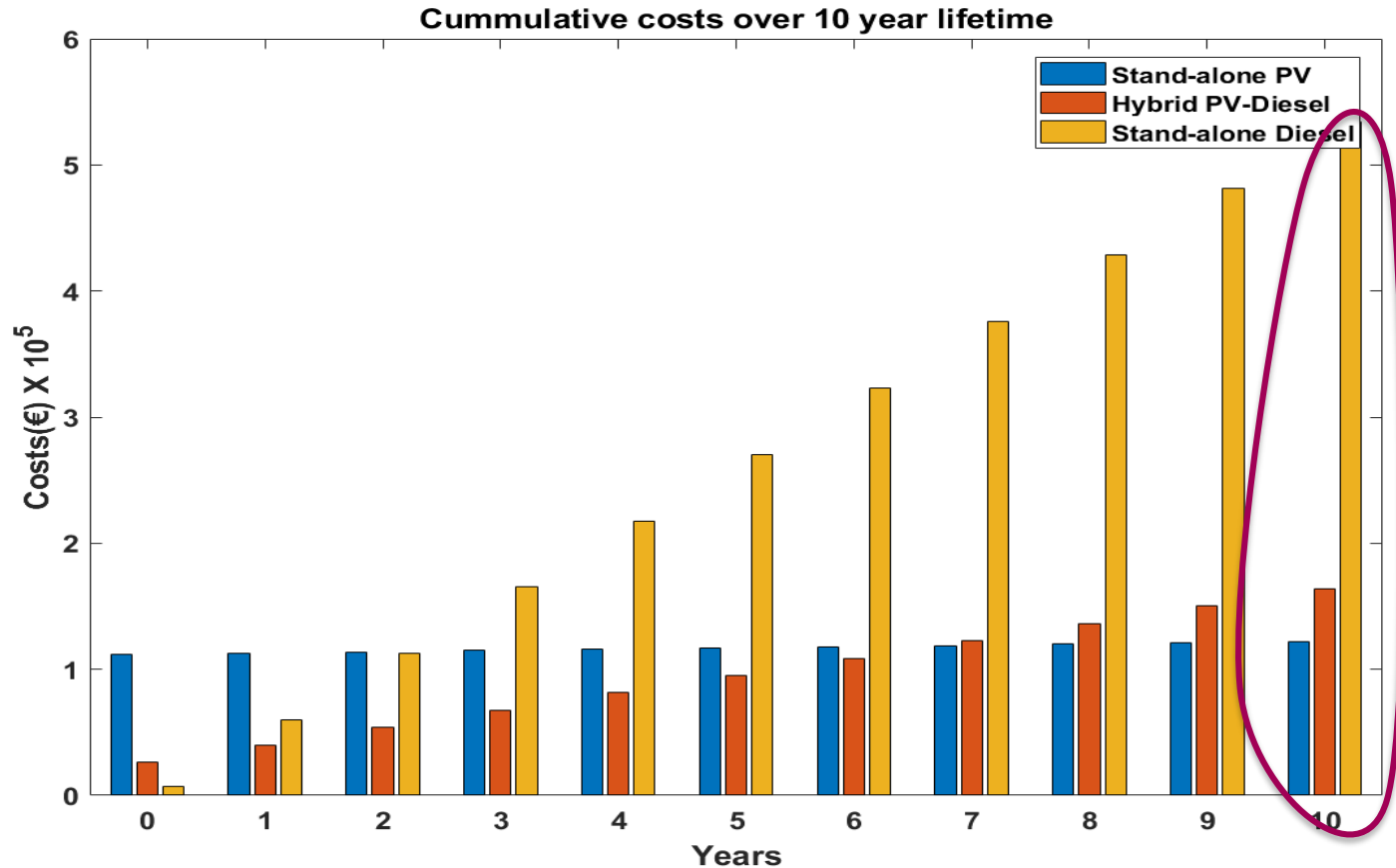
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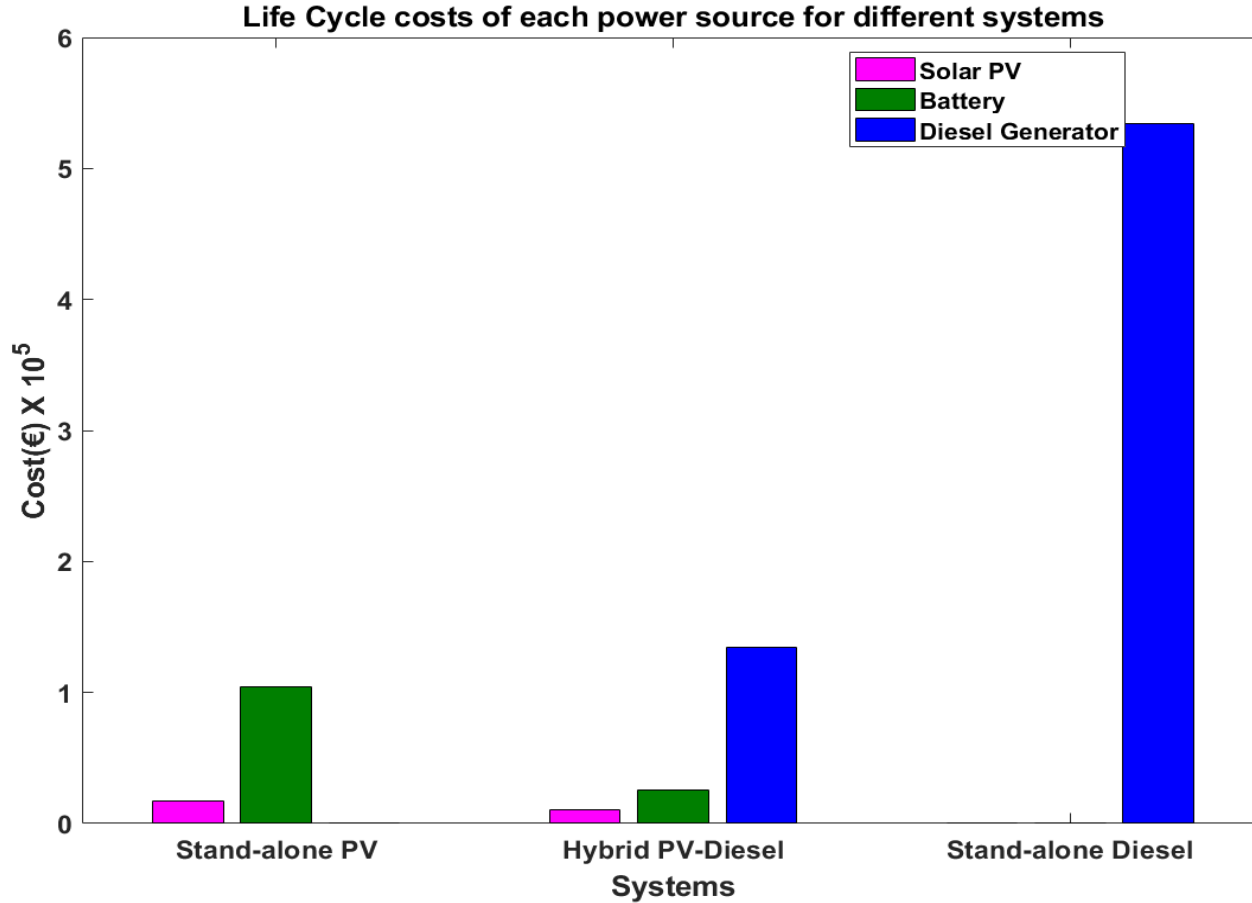
Systems Considered

Component	Stand-alone PV	Hybrid PV-Diesel	Stand-alone Diesel
Load (kW)	3	3	3
Number of PV Modules	57	25	0
Battery Capacity (Ah)	12175	4084	0
Diesel Run hours/year	0	55.2	8760

Cummulative Costs over 10 years



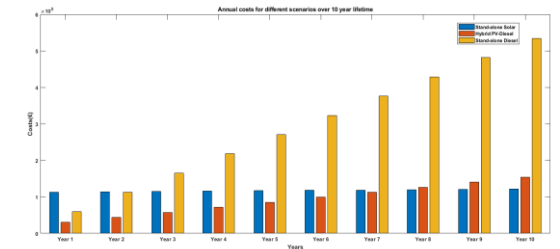
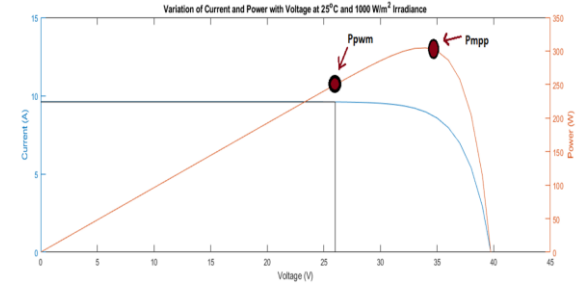
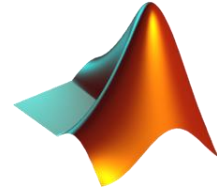
Lifecycle Costs of Power sources over 10 years



Conclusion

Conclusion

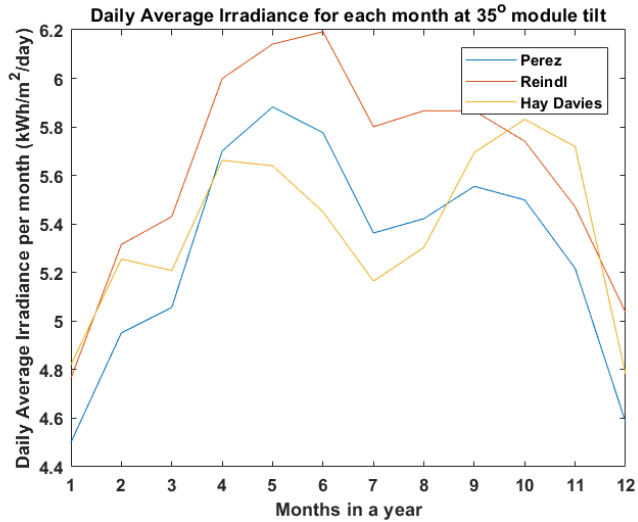
- PV system Sizing Tool Developed, implemented and validated
- Both PWM and MPPT can be surveyed due to influence of various factors
- Hybrid PV-Diesel systems – more economical in short term



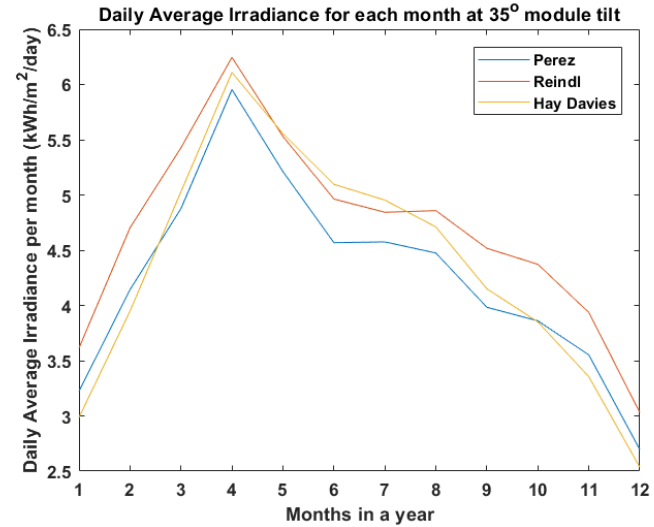
Thank you for your attention!



Irradiation Transposition models



Abu Dhabi at 35° module tilt



Jakarta at 35° module tilt

Thermal model - NOCT

