

54th American Solar Energy Society National Solar Conference 2025 (SOLAR 2025)

Innovation for Universal Renewable
Energy Access

Boulder, Colorado, USA
4-6 August 2025

Print ISBN: 979-8-3313-2921-1

eISBN: 979-8-3313-2972-3

DOI: <https://doi.org/10.52202/083252>

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2025) by American Solar Energy Society
All rights reserved.

Printed with permission by Curran Associates, Inc. (2025)

For permission requests, please contact American Solar Energy Society
at the address below.

American Solar Energy Society
2525 Arapahoe Ave, Ste E4-253
Boulder, Colorado 80302
USA

Phone: (303) 443-3130

info@ases.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

CONVERGING TECHNOLOGIES AND STRATEGIES ORAL SESSION

Competitions: A Pedagogical Framework for Design Education	1
<i>Nea Maloo</i>	

ENABLING THE ENERGY TRANSFORMATION ORAL SESSION

Opportunities and Challenges for Equity and Decarbonization in the Inflation Reduction Act Home Energy Rebate Programs and Federal Tax.....	7
<i>Ayusha Gautam</i>	

POSTER SESSION 1: TECHNOLOGY RESEARCH & APPLICATIONS

Comparative Analysis of Net-Zero Energy and Well-Lit Schematic Design Layouts for Homes in Semi-Arid Regions	12
<i>Tasbeeh Alaqtum</i>	
AI-Driven Optimization of Integrated Solar PV and Smart Home Systems for Enhanced Energy Efficiency and Predictive Maintenance	17
<i>Boris Budagyan</i>	
Evaluating Overall Building Envelope U-Value Via Low-Cost ESP-Based Data Datalogging System During a Snowstorm in Omaha, NE	21
<i>Bing Chen</i>	
Solar Powered Transportation – We Can Do It!	25
<i>Burford Furman</i>	
Review of Factors Influencing the Cost of Mass Timber Construction.....	30
<i>Ramtin Mirmohammad Sadeghi</i>	
Machine Learning Driven Cloud Detection Using Solar Power Production	37
<i>David Mueller</i>	
Case Study: Off-Grid Solar Home in the Colorado Rockies	42
<i>Dave Renné</i>	
The Humble Airlock (or Vestibule) Elevated to Useful, and Beautiful Relevance.....	47
<i>Steven Stevens</i>	
A Comparative Case Study on Photovoltaic Rooftop and Window Systems for Primary School Buildings Using EnergyPlus.....	53
<i>Yizhou Yang</i>	
Simulation of Heat Transfer in Building -Integrated Photovoltaics (BIPV) Using Computation Fluid Dynamics	58
<i>Yong You</i>	

POSTER SESSION 2: ENABLING THE ENERGY TRANSFORMATION

Exploring Attitudes Towards Industrial Solar with Undergraduate Researchers in the Mojave Desert	63
<i>Jennifer Bernstein</i>	
A New Solar Narrative: The Unfinished Business of Universal Solar	67
<i>Jill Cliburn</i>	
Performance and Economic Analysis of a Large Residential PV System	72
<i>Ahmed ElDifrawi</i>	
Solarizing Community Water Supply in Ethiopia: Sustainable Private Sector Development Model	76
<i>Robert Foster</i>	
A Study of Emissions of Electric Vehicles, Preliminary Results	80
<i>Rahim Khoie</i>	
Seasonal Forecasting for Renewable Energy Management.....	85
<i>Nir Krakauer</i>	
Solar 4 Schools: Pennsylvania Learns from National Best Practices	89
<i>Liz Robinson</i>	
Retrofit Passive and Active Solar with Thermal Storage for Emergencies.....	93
<i>Martin Smallen</i>	

Author Index