

# Himani Meshram



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## SKILLS

### Tools/ Platforms

- TRNSYS
- QGIS
- PVSYST
- MS Office full Package
- Tableau

### Programming Languages

- Python with scientific libraries
- MATLAB Onramp
- Simulink

## Professional Summary

Aiming to advance pioneering research in sustainable energy technologies and systems, with a particular focus on clean energy integration, carbon reduction strategies, and techno-economic analysis for a net-zero future.

## Education

- **Indian Institute of Technology Delhi**  
Master of Technology in Energy Studies  
GPA: 8.75/10
- **National Power Training Institute**  
Bachelor of Engineering in Power Engineering  
GPA: 8.42/10
- **Sindhu Mahavidyalaya**  
Higher Secondary School Certificate  
Percentage: 69.38%
- **Guru Nanak High School**  
Secondary School Certificate  
Percentage: 88.80%

## Professional Experience

- **CSIRO Australia**  
Student Researcher  
Worked on the “Techno – economic modelling of Green Steel Production pathways between India and Australia
- **Czech Technical University, Prague**  
Worked on developing code for “High Efficiency combined power cycle using Supercritical CO<sub>2</sub>”

## Publications

- “A comparative study of sensible energy storage and hydrogen energy storage apropos to a concentrated solar thermal power plant” - *Journal of Energy Storage*
- doi.org/10.1016/j.est.2023.106629
- “Applications of Phase Change Material Thermal Energy Storage/ Battery in Waste Heat Recovery” – (Book Chapter) – Elsevier
- “High Temperature Nuclear Cogeneration utilizing supercritical CO<sub>2</sub> for enhanced thermal efficiency” – (under review)
- A comprehensive overview of Hydrogen storage and transportation via adsorption – (under review)

## Conference

### Amercian Society of Mechanical Engineers (ASME)

Hybrid sCO<sub>2</sub> and Orc Integration for Enhanced Waste Heat Recovery and Power Generation Efficiency

October 11, 2024

## Internship

### Rural Technology Action Group (RUTAG), IIT Delhi

June, 2023 – August, 2023

## Key Projects

- **Techno – economic modelling of green steel production pathways between India and Australia**  
*CSIRO Australia | June 2024 | Guide: Dr. Stuart DC Walsh, Dr Manish Pande*
  - Utilized geospatial analysis to optimize logistics and reduce transportation emissions in green steel production.
  - Conducted techno-economic analysis comparing traditional BF-BOF and Electric Arc Furnace (EAF) processes with green steel technologies.
  - Created a web-based tool for calculating energy requirements and cost analysis for green steel production.
  - Investigated decarbonization strategies, including gas separation technologies and electric melting furnaces, to reduce emissions in steel production.
  - Developed custom code for energy and cost modelling in line with project goals.
  - Collaborated on the integration of innovative green steel technologies for emissions reduction and economic feasibility.
- **Enhancing Energy Efficiency and Sustainability in Buildings: Exploring Next-Generation Smart Envelope**  
*Schneider Electric | August 2023*
  - Developed a Python code which carries out the Energy Audit of buildings (residential & commercial). including HVAC, insulation, air leakage, orientation & shading, lightning efficiency, and thermal mass assessment.
  - Based on the results obtained from the assessment suggestions are made to reduce the energy consumption and reduce the carbon footprint.
  - An algorithm was developed which suggests the best combination of Porous PCMs and gaseous insulators as per the surrounding temperatures thereby adjusting the indoor temperatures for occupant comfort and reduce the overall energy consumption of the building by 56%.

## Master's Thesis

- **Multi-criteria Investigation of a Pilot Scale Power Plant Employing Carnot Battery**  
*IIT Delhi | October 2022 | Guide: Dr. Thomas Hamacher, Dr. Dibakar Rakshit*
  - A 25 kW PV based Pilot scale plant was designed using TRNSYS.
  - The Carnot Battery performance was evaluated based on the round-trip efficiency, coefficient of performance and energy and power density.
  - It was found that if a waste heat source is included the round-trip efficiency could reach a value greater than 1.
- **TRNSYS-based Carnot Battery Assisted Milk Pasteurization Plant: A Comprehensive Analysis of Exergy, Life-Cycle, and Techno-Economics**  
*IIT Delhi | January 2023 | Guide: Dr. Thomas Hamacher, Dr. Dibakar Rakshit*
  - A Carnot Battery assisted milk pasteurization plant of 20000 l/hr capacity was designed using TRNSYS.
  - The results obtained reveal that the exergy of the newly designed plant surpasses that of a conventional milk pasteurisation.
  - plant by an impressive 64%. Additionally, a noteworthy overall energy savings of 64.56% was achieved.
  - The proposed milk production case resulted in significantly lower emissions compared to the base case obtained as a result of LCA Analysis.
- **Numerical study of sCO<sub>2</sub> Brayton Cycle based Carnot Battery: A thermodynamic analysis**  
*IIT Delhi | May 2022 | Guide: Dr. Dibakar Rakshit*
  - Comparison of a sensible heat storage using molten salt was done with that of chemical heat storage using Ca (OH)<sub>2</sub> and sCO<sub>2</sub> Brayton Cycle
  - The round-trip efficiency of the chemical heat storage Carnot Battery increases to 45% when the hydration reaction was carried at 190°C from 32.8% achieved by the sensible heat storage Carnot Battery
  - The Carnot Battery proposal showed that chemical heat storage can reduce system volume by 58% compared to tanks of molten salt, indicating cost advantages in device manufacturing.

## **Bachelor's Thesis**

- **Performance evaluation of a 300 MW Grid-connected Solar Power Plant**

*NPTI | January 2018 | Guide: Engg. Prashant Mawle*

- A 300MW solar power plant was designed using the PVSYST software for the chosen location of Chandrapur district of Maharashtra.
- The performance ratio of the designed plant for the proposed site came out to be 78.1% and the plant was found to give acceptable results in terms of cost.

## **Industrial Training**

### **Khaparkheda Power Plant (1340 MW)**

*August 2015 – December 2018*

- Completed multiple visits to Khaparkheda Power Plant for hands-on experience in power plant operations and maintenance
- Gained practical knowledge of a coal-fired thermal power plant, operating, and maintaining equipment, and power generation, transmission, and distribution processes
- Developed understanding of environmental and regulatory concerns associated with power generation

### **Sasan Ultra Mega Power Project (6X660 MW)**

*December 2016*

- Completed a 10-day vocational training program at Sasan Ultra Mega Power Project, a coal-fired thermal power plant with an installed capacity of 3,960 MW
- Gained practical knowledge of the working principles of various equipment such as boilers, turbines, generators, and auxiliaries used in power generation.
- Assisted in the inspection, maintenance, and troubleshooting of equipment, ensuring optimal performance and efficiency of the power plant

## **Awards and Scholarships**

- **Deutscher Akademischer Austauschdienst (DAAD Scholarship)**

*September 2022 – 23*

Awarded for doing Master Thesis at the Technical University of Munich

- **International Model United Nations**

*April 2023*

Participated as a delegate on the issue of one the Sustainable Development Goals of “No Poverty and Zero Hunger”

- **Schneider Go Green Challenge**

*August 2023*

Secured 8<sup>th</sup> position among all the participants from the Greater India Domain for developing “Energy Audit tool for buildings and suggest the most suitable PCM combination for reducing the energy consumption of the building”

- **Finnish Indian Consortia for Research and Education (FICORE)**

*August 2023*

Received the FICORE Scholarship for doing PhD at Åbo Akademi University, Finland on the topic “Development of Bioinspired Sensing and Self-regulating Thermal Energy Storage Systems for Biomass Processing”

- **IIT Bombay Monash Research Scholarship**

*December 2023*

Received the IIT Bombay Monash Research Scholarship for doing Joint PhD at IIT Bombay and Monash University Australia in collaboration with CSIRO Australia for doing PhD on the topic “Techno – economic modelling of green steel production pathways between India and Australia”.

- **Monbukagakusho Shōgakukin (Ministry of Education, Culture, Sports, Science and Technology, MEXT Scholarship)**

*April 2024*

Received the MEXT Scholarship from the Japanese Government for doing a PhD at Kyushu University on the topic “Development of a hybrid adsorption-compression hydrogen energy storage system”.

## Awards and Scholarships

- **Business Finland program**

*September 2024*

Åbo Akademi University through the Business Finland Program on the research topic “Developing simulations for Thermal cracking of Ammonia for Hydrogen Storage”.

## Positions of Responsibility

### Dept. Placement Coordinator

*OCS Placement Team | IIT Delhi | November 2022 - December 2022*

- Coordinated recruitment activities for 2000+ students from various departments.
- Worked with 55-member team to organize job fairs, workshops, and seminars to enhance students’ employability.
- Developed relationships with recruiters to provide better job opportunities for students.

### Teaching Assistant

*Department of Energy Science and Engg. | IIT Delhi | September 2021 – December 2022*

- Assisted MTech Coordinator Prof Kaushik Saha with teaching and grading graduate students’ coursework.
- Prepared lectures on Heat Transfer and Thermodynamics.
- Facilitated student discussions and provided one-on-one assistance during office hours to support students’ academic progress.
- Collaborated with other TAs to maintain consistency in grading and feedback for students.

## References

- **Dr Dibakar Rakshit**

*Professor*

**Indian Institute of Technology Delhi**

*email: dibakar@dese.iitd.ac.in*

*Phone: (91) – 11 - 26597313*

- **Dr Bidyut Baran Saha**

*Professor*

**Kyushu University, Japan**

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- **Dr Thomas Hamacher**

*Chair of Renewable and Sustainable Energy*

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