

The Kilo Joule



2022



RESEARCH

ND Energy 

WELCOME



June 26, 2022

Dear Friends and Colleagues,

I am especially pleased to welcome you to the 2022 annual report of the Center for Sustainable Energy at Notre Dame (ND Energy) as we celebrate our energy-interested community members and their major achievements and key initiatives throughout the year. This report also reflects a major turning point as Notre Dame resumed in-person gatherings and welcomed several esteemed guests and public events to campus. This return to normalcy seemed to also generate a greater appreciation and enthusiasm for social engagement and human interaction after dealing with the devastating affects of COVID.



Peter C. Burns

As you read through this report, I hope you gain a deeper understanding of the breadth of our programs and services and join us as we recognize our faculty, research associates, students, and general community who work vigorously to improve the future of energy. If you have any questions or would like additional details, please feel free to reach out to me or any member of the ND Energy team.

Thank you for your continued support and interest in our mission to create a cleaner, more sustainable energy future for generations to come. I hope you have a wonderful summer and are able to enjoy some quality time with family and friends.

Kindest regards,

A handwritten signature in black ink, appearing to read "Peter C. Burns". The signature is fluid and cursive.

Peter C. Burns

Henry J. Massman Professor of Civil and Environmental Engineering and Earth Sciences
Director of ND Energy

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This report covers calendar year 2022 and highlights the work of faculty affiliates, research associates, students, and other key partners of ND Energy, and the impact of their work on moving our mission forward.

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If you have questions or comments regarding this report, please contact Barbara Villarosa, Business and Communications Program Director, at bvillaro@nd.edu or Ginger Sigmon, Managing Director, at gsigmon@nd.edu.

INTRODUCTION



ND Energy has a long history of serving the Notre Dame community and providing resources to advance cutting-edge research in areas that address the grand challenges in energy. ND Energy also creates STEM education programs that prepare the next generation of leaders and collaborate with researchers on broader impacts to increase the knowledge and understanding of critical energy-related issues for the general public. By engaging faculty experts and research associates with groups of all ages and backgrounds on topics related to climate change and the harmful affects of greenhouse gas emissions, the importance of using renewable energy sources and increasing storage capacities, and how to improve energy efficiencies to reduce high energy costs and create a resilient and sustainable energy future, we also contribute to improvements in the future of our global economy, healthier communities, and energy justice for all.

The timeline below represents significant growth in our infrastructure as the need for a cleaner, more sustainable energy future has become a topic of critical importance worldwide. This urgency to change the way in which energy is produced and used has paved the way for increased funding in sponsored research programs, more opportunities in education and training, and additional support for developing viable and sustainable global energy solutions.

ND Energy addresses these issues by building a vibrant community of faculty experts, highly trained research associates, enthusiastic undergraduate students, and an expansive cohort of energy-interested alumni, community partners, industry leaders, and globally focused collaborators who are passionate and driven to make our common home a place for all to justly and equitably prosper and thrive.



Faculty affiliates are unique in that their research typically results in developing safer, more efficient methods and processes, better designs, and new materials that enable further developments in new technologies and energy systems with applications across a broad range of industries. This report highlights the many ways in which their research acumen enhances the education of all students and contributes to a broad range of career choices.

MISSION



Our mission is to enable advancements in energy-related research, education and outreach; to influence the most pressing global energy policy issues and questions of our time; and to address the global energy challenges in low- and middle-income regions.

COMMUNITY

With a vibrant community of faculty, research associates, and young scholars, there are ample opportunities for us to recognize research accomplishments and educational achievements, and while doing so, encourage and foster camaraderie. Below is a snapshot of the many ways in which we celebrate and promote our community members throughout the year.



ND Energy 

5th Annual RESEARCH SYMPOSIUM

Transitioning to a Cleaner, More Sustainable Energy Future through Research and Scholarship at Notre Dame

Thursday, March 31
8:45 a.m. - 5:00 p.m.
205/206/207 McKenna Hall

Registration required by March 21 for the luncheon presentation.

To learn more and register: 




Peter Burns, Emily Tsui, Alexander Dowling, Kyle Doudrick, Yamil Colón, James Thompson, Steven Asiala, Tengfei Luo, Jennifer Schaefer

UNIVERSITY OF NOTRE DAME | RESEARCH

Congratulations!

ENERGY STUDIES MINOR CLASS OF 2022



16th ANNUAL NOTRE DAME ENERGY WEEK 2022

Plus SEPTEMBER 11-22

PRESENTATIONS, TOURS & EVENTS FOCUSED ON:

- Food Waste
- Career Opportunities
- Urban Mitigation
- Carbon Capture
- Campus Infrastructure
- Plus MORE!



UNIVERSITY OF NOTRE DAME | RESEARCH energy.nd.edu



LAB

OLYMPIC GAMES

NOTRE DAME 2022




Leadership

Since 2014, **Peter C. Burns**, the Henry J. Massman Professor of Civil and Environmental Engineering and Earth Sciences, has served as faculty director, leading a team of **8 professional staff members** with expertise in research and proposal development, education and outreach, project management and grant administration, communications, and materials analysis. Many are long-term employees of the University, and all are committed to advancing energy-related research and education at Notre Dame.



Peter C. Burns
Director



Ginger E. Sigmon
Managing Director



Subhash L. Shinde
Associate Director



Barbara Villarosa
Business and Communications Program Director



Anne Berges Pillai
Education and Outreach Associate Program Director



Koby G. Keck
Administrative Coordinator



Ian V. Lightcap
Research and Facilities Program Director



Anna Matzner
Laboratory Specialist



Karl Cronberger
Electron Microprobe Technician

Faculty

There are 95 **faculty affiliates** from 6 colleges and schools and 14 departments. As new faculty join Notre Dame each year, ND Energy increases its affiliations with those faculty members whose research and teaching focus on energy. The six new faculty affiliates in 2022 are highlighted here.

95 Faculty Affiliates * 5 Colleges/Schools
13 Departments * 6 New Members



Patrick Brewick

Assistant Professor, Civil and Environmental Engineering and Earth Sciences



Morten Eskildsen

Professor and Department Chair, Physics and Astronomy



Emily Grubert

Associate Professor of Sustainable Energy Policy, Keough School of Global Affairs; Civil and Environmental Engineering and



Emily Johnson

Assistant Professor, Aerospace and Mechanical Engineering



Evan Kirby

Associate Professor, Physics and Astronomy



Matthew Rosenberger

Assistant Professor, Aerospace and Mechanical Engineering



6 Emeritus Faculty

Postdoctoral and Graduate Student Research Fellows

In 2022, the Notre Dame Environmental Change Initiative (ND-ECI), ND Energy, and the Center for Civic Innovation (CCI) created a **joint Postdoctoral Fellowship** to investigate the intersection of environment, energy, and sustainable regional systems using the South Bend—Elkhart region as a study area while incorporating environmental or energy policy that is broadly applicable.

The inaugural recipient of the joint fellowship is **Xiantao Fan** (Wang and Meng Labs). His project is titled, “Wind Energy Harvesting based on Flow-induced Vibrations and Community Acceptance.” The award covers up to 80% of a competitive annual salary and benefits for up to two years along with an annual travel allowance.



The **Patrick and Jana Eilers Graduate Student Fellowship for Energy Related Research** provides annual support to graduate students conducting energy-related research with faculty affiliates. In 2022, five graduate students received fellowships with awards of \$8,000 each. They are **Michael Dugas**, **Anthony Kipkorir**, **Deanna Poirier**, **Hui Xu**, and **Lingyu Yang**.

The **Forgash Fellowship for Solar Energy Research** provides annual support to a graduate student conducting solar energy research with a faculty affiliate. In 2022, the fellowship was awarded to **Jishnudas Chakkamalayath** in the amount of \$5,000.

The Eilers and Forgash Graduate Research Fellows are highlighted below.



Michael Dugas (Phillip Lab)
“Understanding Electrostatic Interactions in Functionalized Copolymer Organic Solvent Nanofiltration Membranes”

Anthony Kipkorir (Kamat Lab)
“Designing AgInS₂-CdS Heterostructure with Improved Charge Separations”

Deanna Poirier (Hicks Lab)
“Plasma-Assisted Catalysis for Upgrading Ethane to Valuable Liquid Products through Carbon-Nitrogen Coupling”



Hui Xu (O'Brien Lab)
“Operando Surface Enhanced Raman Spectroscopy (SERS) Platform for Studying the Structure and Dynamics of Amine-based Membranes in Complex Environments”

Lingyu Yang (Schaefer Lab)
“Development of a Novel Polymer Membrane Platform for Alkaline Fuel Cell Electrolyte Application”

Jishnudas Chakkamalayath (Kamat Lab)
“Interfacial Processes in Perovskite-Metal Hybrid Structure for Photocatalytic Applications”

Undergraduate Research Scholars

The **Vincent P. Slatt Fellowship for Undergraduate Research in Energy Systems and Processes** provides annual support for undergraduate students conducting energy-related research with faculty affiliates. In 2022, 24 undergraduate students received fellowships with awards of up to \$5,000 each. Students may choose to conduct research throughout the spring and fall semesters or during the summer. There were 13 students receiving semester awards and 11 summer awards. The undergraduate students receiving these awards are highlighted below. Two of the summer researchers are from the University of Puerto Rico-Mayaguez. They are Gabriela Perez and Yan Saltar. The other students are from Notre Dame.

ND Energy

MEET THE SLATT UNDERGRADUATE SCHOLARS 2022

**“Today a radical energy transition is needed to save our common home.”
- Pope Francis**

UNIVERSITY OF NOTRE DAME | RESEARCH

Students: Evan Bursch, Caitlyn Cano, Jeff Mwathi, Gabriel Pennington, William Cheong, Robert Crawford, Madison Pixler, Nicholas Poole, Vincent DiFilippo, Gavin Ealey, Gabriela Perez, Tomas Romero, Matrika Franklin, Nathaniel Hiott, John Sacris, Yan Saltar, Grace Hsu, Jiaqi Lu, Jeffrey Secrist, Ben Speybroeck, Laura Manukyan, Zachary Muetzel, Alex Tullman, Christina Urrea

Energy Boards

The **Alumni Energy Board** are members of the Notre Dame Alumni Association with interest in energy-related research and education at Notre Dame and provide advice and counsel on the strategic growth and financial direction of ND Energy. The current members are **Anthony F. Earley, Jr.** (Pacific Gas and Electric Company), **Michael A. O'Sullivan** (NextEra Energy Resources), **Robert N. Schleckser** (ExxonMobil Corporation), and **Richard L. Stanley** (GE Power and Water).

The **Student Energy Board (SEB)** are undergraduate students at Notre Dame with interest in designing and executing campus and community outreach activities. They also are the driving force behind the annual Notre Dame Energy Week. Members share their common interests through engagements with faculty, students, and the broader community.



Summer REU/Fellowship Programs

Summer Slatt scholars conducting research with faculty affiliates throughout the summer also participate in joint professional development workshops and social events with students from other programs. This includes the opportunity to present their research projects at the *Summer Undergraduate Research Symposium*, which is open to the broader Notre Dame and Saint Mary's communities.

ND Energy is instrumental in bringing together the administrators from other undergraduate research programs to share best practices and coordinate joint summer events for students. In 2022, this group also took on a special project involving the creation of four short videos for recruiting summer researchers to Notre Dame and to demonstrate the value of conducting undergraduate research to help discern their future career interests and goals.



The videos below are the result of multiple interview sessions with students, faculty, mentors, and academic administrators; several rounds of transcript reviews and revisions; and a final film splicing that pulled it all together for an impactful message. A special shout-out goes to Notre Dame Research Communications (NDRC) photographer and videographer Angelic Rose Hubert who created these amazing videos!



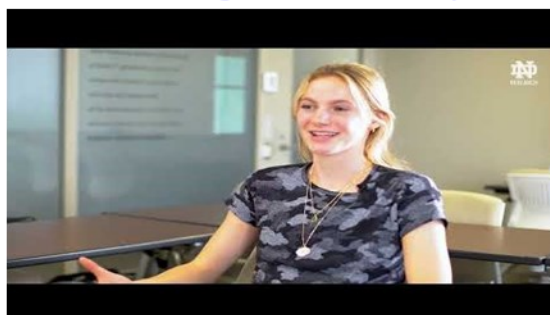
[Why ND?](#)



[Meaningful Mentorship](#)



[Relationship Building](#)



[Career Discernment](#)

SUMMER RESEARCH FOR UNDERGRADUATES

UNIVERSITY OF NOTRE DAME

The Stars!

Undergraduate Students

- Bennett Schmitt (Jaffe Lab, Chemistry)
- Benjamin Speybroeck (Guo Lab, CBE)
- Jeffrey Secrist (Go Lab, AME)
- Jeff Mwathi (MCF Lab, EE)
- Jocelyn Covarrubias (Haeffel, Psychology)
- Brandon Mammano (Hoggan, IDEA Center)
- Madeline Pooler (Laneman, EE)

Mentors

- Madelynn Watson (Dowling, CBE)
- Jeffrey DuBose (Kamat, Chemistry)
- Neha Mehra (Schneider, CBE)

Faculty Advisor

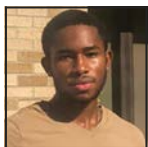
- David Go, AME

Administrators

- Yih-Fang Huang, Sr. Assoc. Dean of Engineering
- Jeffrey Thibert, Director of CUSE

Energy Studies Minor

The **Energy Studies Minor** is open to undergraduate students in all majors at Notre Dame offering a broad range of courses for students to gain a deep understanding of global energy topics and challenges. Students complete the minor after taking 16 credit-hours of coursework, including two required courses, electives, and a capstone. In 2022, there were 40 minor graduates, representing the largest cohort in the history of the minor.



Akinbobola M. Adegoke
Bronx, New York
Major: Mechanical Engineering
Future plans: Undecided



Sean Burns
Lloyd Harbor, New York
Major: Economics, Digital Marketing
Future plans: Clearsoft



Austin Gene Flaute
Centerville, Ohio
Major: Civil Engineering
Future Plans: Masters of Architecture,
University of Arizona



William S. Andrews
Kansas City, Missouri
Major: Finance, Economics
Future plans: Fund Accountant,
Northern Trust



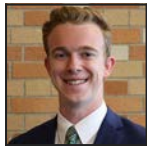
Grace Ann Castle
DeWitt, Michigan
Major: Environmental Engineering
Future plans: Analytical Chemistry
Technologist, Sandia National
Laboratory



Brian John Gannon
Park Ridge, Illinois
Major: Finance
Future plans: United States Marine
Corps



Margaret Mary Atwood
Holtsville, New York
Major: Civil Engineering
Future plans: Natural Gas Transmission
Engineer, National Grid



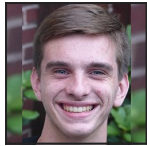
Michael Chmura
Wadsworth, Ohio
Major: Economics, Statistics (Supp.)
Future plans: Associate, Boston
Consulting Group



Mark David Horsfall
Westwood, Massachusetts
Major: Applied and Computational
Mathematics and Statistics
Future plans: Technology Consultant
Associate, Pricewaterhouse Coopers



Jack Bigej
Hubbard, Oregon
Major: Computer Science
Future plans: Software Development,
Bonterra



Andrew Christy
Morgantown, West Virginia
Major: Chemistry
Future plans: Ph.D. in Chemistry,
University of North Carolina - Chapel Hill



Bailey Jordan
Nokomis, Florida
Major: Architecture with Architectural
Practice and Enterprise Concentration
Future plans: Associate Architect,
McAlpine House



Meghan Anmarie Bolinger
Redford, Michigan
Major: Accountancy
Future plans: Masters of Science in
Accountancy, University of Notre Dame



Hannah Elizabeth Collins
Columbia, Maryland
Major: Chemistry, Studio Art
Future plans: Undecided



Emma Kerr
Monument, Colorado
Major: Chemical Engineering
Future Plans: Masters of Science in
Sustainable Energy Engineering, Trinity
College Dublin



Austin Jackson Booth
Lexington, Kentucky
Major: Chemical Engineering
Future plans: Ph.D. in Chemical
Engineering, Princeton University



Hannah Jane Collins
Oakmont, Pennsylvania
Major: Civil Engineering
Future plans: Civil Engineer 1/EDGE
Associate, Black & Veatch



Cara P. Kilmartin
Wilton, Connecticut
Major: Chemical Engineering
Future plans: Chemical Engineer, RTI
International



Olivia Ann Burke
Gilroy, California
Major: Environmental Engineering
Future plans: Water Resource
Engineer, Mead & Hunt



Samuel De La Paz
Huntley, Illinois
Major: Mechanical Engineering
Future plans: Undecided



Dayeon Kim
 Gyeonggi-Do, Republic of Korea
 Major: Civil Engineering with Hydraulics Concentration
 Future plans: Engineering consulting with an energy focus



Nicholas Anthony Poole
 Louisville, Kentucky
 Major: Chemical Engineering
 Future plans: Ph.D. in Nuclear Engineering, North Carolina State University



Kaitlyn Tomshack
 Vermillion, Ohio
 Major: Electrical Engineering
 Future plans: Electrical Engineer, Bialosky



Ashley Mae Klein
 Mission Viejo, California
 Major: Chemical Engineering
 Future plans: Operations Management Leadership Program, GE Aviation



Daniel Cole Ringrose
 Woodbury, Minnesota
 Major: Civil Engineering with Structural Engineering Concentration, Engineering Corporate Practice Minor
 Future plans: Masters of Engineering in Civil Engineering, University of British Columbia



Alexander Dalton Tullman
 Chester Springs, Pennsylvania
 Major: Finance
 Future plans: Co-founder and CEO, Verge Labs



Grace Elizabeth Kopischke
 Minneapolis, Minnesota
 Major: Chemical Engineering
 Future plans: Controls Engineer, ThermalTech



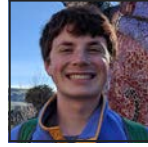
Patrick Ryan Roche
 Pelham, New York
 Major: Finance
 Future plans: Strategy Consulting Associate, L.E.K. Consulting



Lauren Margaret Walker
 Indianapolis, Indiana
 Major: Environmental Engineering
 Future plans: ESTEEM Graduate Program, University of Notre Dame



Erin Margaret Ludwig
 Granger, Indiana
 Major: Environmental Engineering
 Future plans: Business Development Analyst, Duke Energy Sustainable Solutions



Ben Scholl
 Portland, Oregon
 Major: Environmental Engineering, Philosophy
 Future plans: Undecided



Emily Morgan Yoo
 Aliso Viejo, California
 Major: Civil Engineering
 Future plans: Nuclear Engineer Associate, NextEra Energy



Ian Breden Martin
 Lakewood Ranch, Florida
 Major: Finance
 Future plans: Corporate Finance, Rheem



Tara Chimay Senn
 Austin, Texas
 Major: Chemical Engineering
 Future plans: Chemical Engineer, Coast Southwest



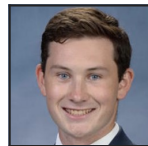
Elizabeth Anne Mathy
 Northbrook, Illinois
 Major: Electrical Engineering with Energy Concentration
 Future plans: Electrical Subsystems Engineer, Boeing



Keegan John Siebenaler
 Kalispell, Montana
 Major: Environmental Engineering
 Future plans: Undecided



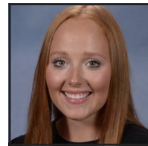
Isaiah Devin Murrell-Thomas
 St. Louis, Missouri
 Major: Environmental Engineering
 Future plans: Masters of Engineering, University of Notre Dame



Jacob Andrew Smith
 Canton, Michigan
 Major: Chemistry
 Future plans: Project Manager, Epic Systems

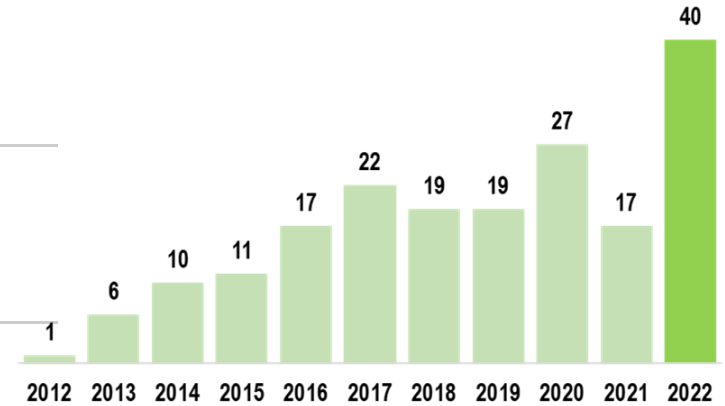


Amanda Patterson
 Naperville, Illinois
 Major: Environmental Science
 Future plans: Undecided



Julia Tihansky
 Sugarloaf, Pennsylvania
 Major: Chemical Engineering
 Future plans: Technical Sales Representative, Nalco Water

There are now 189 graduates with an Energy Studies Minor.



Fighting for Renewable Energy

In 2022, the minor capstone course — Puerto Rico: Road Map to a Renewable Future — was selected by NBC for a *What Would You Fight For* ad scheduled to air during the 2023 Football season. Filming for the ad occurred during the spring 2022 immersion in Puerto Rico over spring break.



<https://youtu.be/xUPPYiNjoso>

Twelve students participated in the capstone course. They were: **Lucas Barreto, Elizabeth Callahan, Robert Fitzpatrick, Austin Flaute, Eva Homberger, Lily Klezmer, Alexander Kuptel, Erin Ludwig, Caroline O'Brien, Tomas Romero, Luiza Vara, and Joshua Williams.** Students spent a few days in San Juan and then traveled to the mountain town of Adjuntas. They studied and experienced first-hand the energy challenges on the island and learned from local leaders about alternative paths to a more reliable and affordable future. They also installed solar panels on homes in Adjuntas of individuals with chronic health conditions. The panels were made possible through the generosity of Bill Jordan '85, Nancy Brennan Jordan '85, and Bernadette Jordan '16 from the Let's Share the Sun Foundation (LSTS); Luke Lewandowski '00 from Wood Mackenzie; BQ Energy; and John Moran '95.



Fighting For Story—Renewable energy could be a critical solution for Puerto Ricans who went months without power after Hurricanes Maria and Irma.

<https://fightingfor.nd.edu/2022/fighting-for-renewable-energy/>

Pre-College Interns

In 2022, 10 Mishawaka High School students participated in the **Notre Dame—Mishawaka High School Research Internship Program**. Students spent the fall and spring semesters conducting research with faculty affiliates and learning about key concepts in energy through group discussions and research experiences. At the end of the spring semester, seven of the students presented their research projects during a poster session for the Notre Dame community, Mishawaka High School teachers and administrators, and friends and family. Their projects are highlighted below.



Sarah Burns

Regime Shifts in Alaskan Post-fire Composition between 2014 and 2021

Faculty Advisor: [Adrian Rocha](#), Associate Professor of Biological Sciences



Linkin DeNeve

Molten Salt Creation and Calorimetry with Eutectic Nitrates

Faculty Advisor: [Peter Burns](#), Henry J. Massman Professor of Civil and Environmental Engineering and Earth Sciences



Ana DeVries

Synthesis of Silver Nanoplates

Faculty Advisor: [Svetlana Neretina](#), Associate Professor of Aerospace and Mechanical Engineering



Ellen Piechocki

Interactions of Uranyl Peroxide Nanoclusters in Solution and with Solid Supports

Faculty Advisor: [Amy Hixon](#), Associate Professor and Director of Graduate Studies of Civil and Environmental Engineering and Earth Sciences



Will Schalliol

Viscosity of Polyvinyl Acetate and Boric Acid

Advisor: [Anna Matzner](#), Laboratory Specialist, Materials Characterization Facility



Ashley Schoen

Characterization and Thermal Decomposition of Aqueous Uranyl-Acac Compounds

Faculty Advisor: [Peter Burns](#), Henry J. Massman Professor of Civil and Environmental Engineering and Earth Sciences



Grace Vandenburg

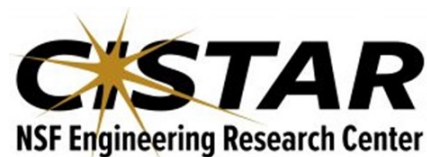
Co-axial and Dual Extrusion Design for 3D Printer

Faculty Advisor: [William Phillip](#), Associate Professor and Director of Graduate Studies of Chemical and Biomolecular Engineering

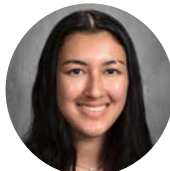
WNIT produced the following video segment on *Education Counts Michiana* about the Notre Dame—Mishawaka High School Research Internship Program with comments by students and members of the ND Energy team who administer the program.



https://youtu.be/F_DnefVji7s



ND Energy hosted two local high school students in summer 2022 who conducted research with Notre Dame faculty as part of the NSF ERC CISTAR pre-college program. **Aaviskar Khatiwada** was a senior at Riley High School in South Bend and is now a student at Notre Dame. **Erika Ruiz-Yamamoto** was a rising senior at John Adams High School in South Bend and is planning to study pre-medicine.



RESEARCH AND SCHOLARSHIP



Research conducted by faculty affiliates typically falls within one or more of the themes below. These areas provide a broad range of subtopics allowing faculty opportunities to collaborate with researchers in other disciplines and develop new ideas that extend their existing programs or create new areas for comprehensive investigation. The chart below highlights the accomplishments of faculty in 2022 for each theme area in terms of number of awards, award dollars, and percentage of total award dollars of \$12.4M. The subsequent pages provide other details regarding faculty awards and proposals.



Energy Conversion and Efficiency

Subcategories

Building Energy, Catalysis, Conversion of Energy, Fuel Cells, Hydrogen, Solar to Fuels/Chemicals

32.75 \$8,473,118 (68%)

Awards and \$ Amount and % Total Awards



Sustainable Bio/Fossil Fuels

Subcategories

Biofuels, Carbon Sequestration, Fossil Fuels

11.25 \$1,881,508 (15%)

Awards and \$ Amount and % Total Awards



Smart Distribution and Storage

Subcategories

Hydrogen Storage, Smart Grid Technology, Energy Storage

6.75 \$608,169 (5%)

Awards and \$ Amount and % Total Awards



Transformative Solar

Subcategories

Solar Photovoltaics, Solar to Fuels/Chemicals, Energy Conversion Efficiencies

3 \$333,666 (3%)

Awards and \$ Amount and % Total Awards



Sustainable and Secure Nuclear

Subcategories

Actinide Materials, Nuclear Forensics, Nuclear Physics, Nuclear Structures

5.25 \$751,146 (6%)

Awards and \$ Amount and % Total Awards



Transformative Wind

Subcategories

Structures, Turbines, Wind Engineering

3 \$336,017 (3%)

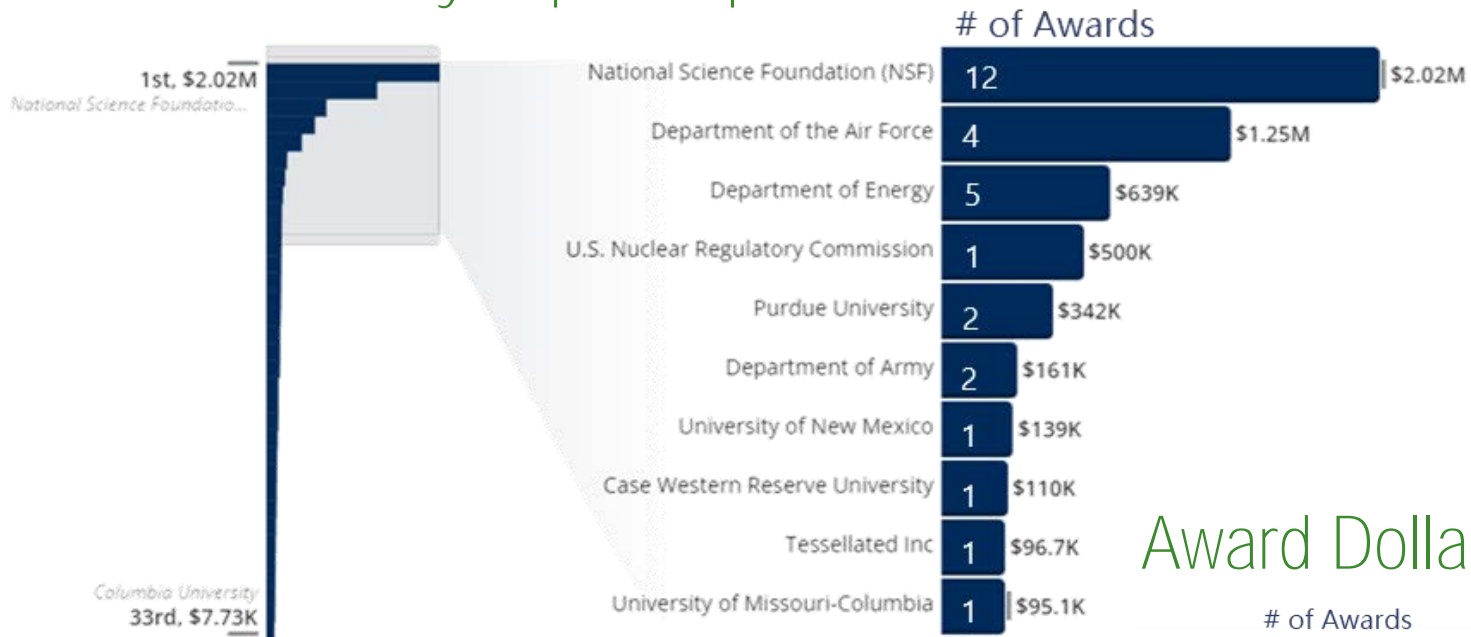
Awards and \$ Amount and % Total Awards

Total Awards

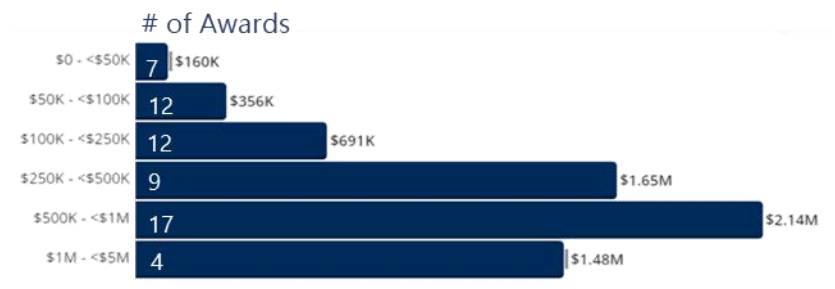
62 AWARDS	52% Affiliated	\$7.2M EXPENDITURES
\$12.4M TOTAL	\$6.5M Award Dollars	

CY 2022

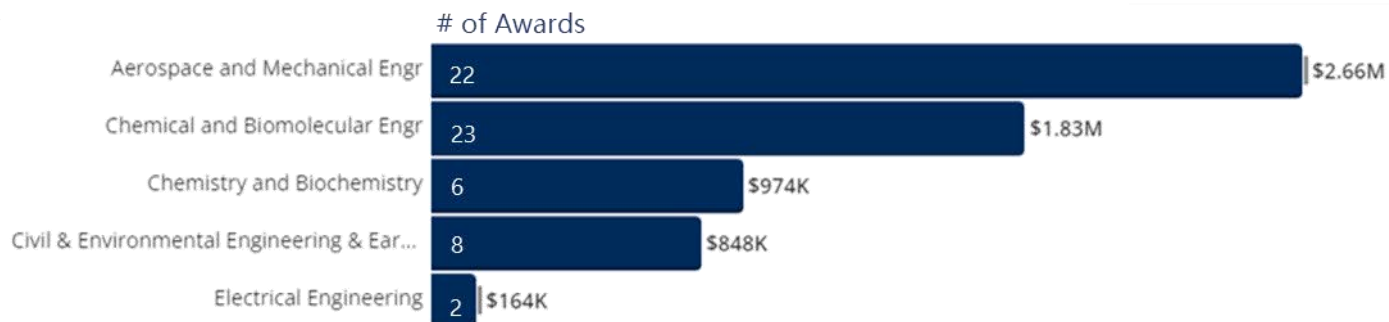
Award Dollars by Top 10 Sponsors



Award Dollars by Grouping



Award Dollars by Top 5 Departments



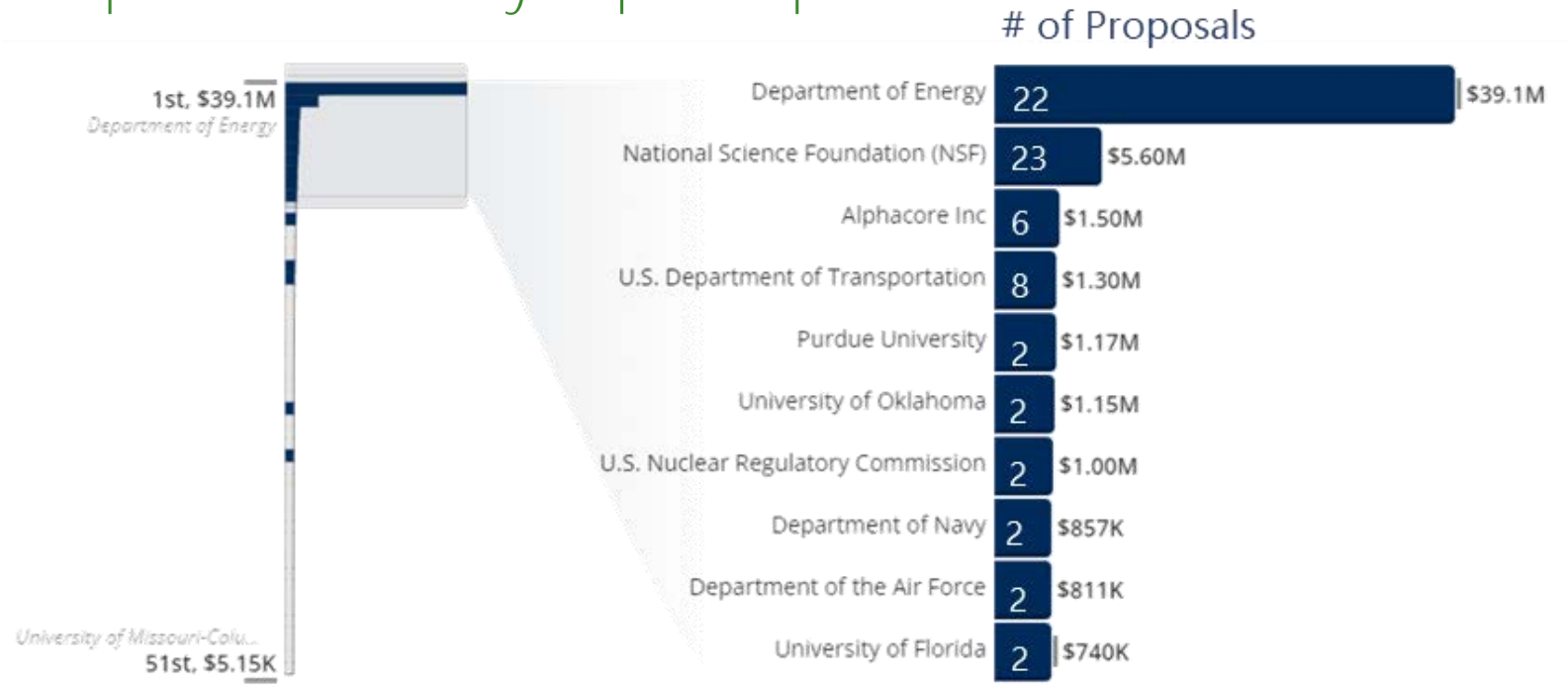
Total Proposals

90 PROPOSALS
\$84.3M TOTAL

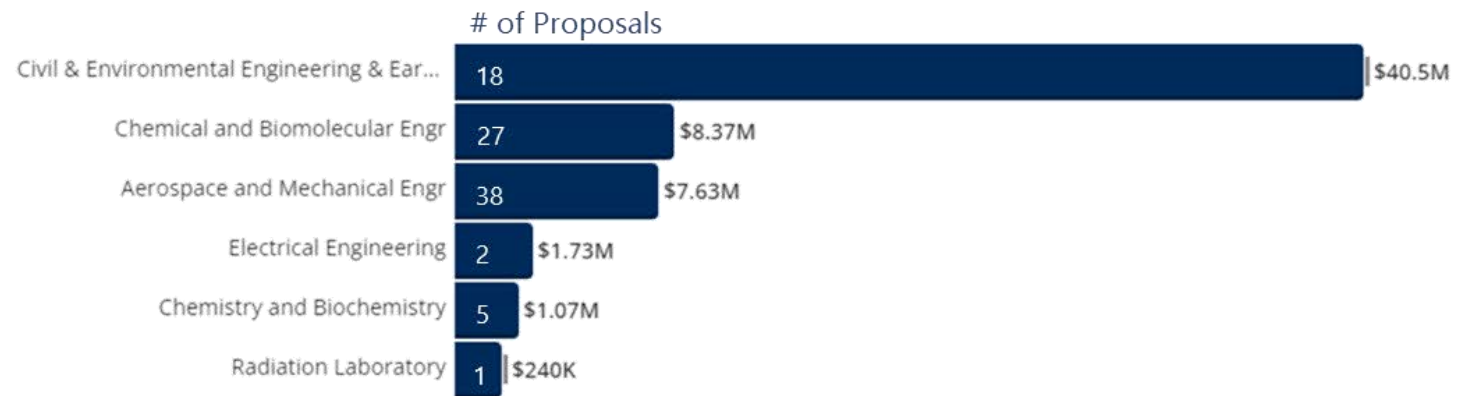
71% Affiliated
\$59.6M Proposal Dollars

CY 2022

Proposal Dollars by Top 10 Sponsors



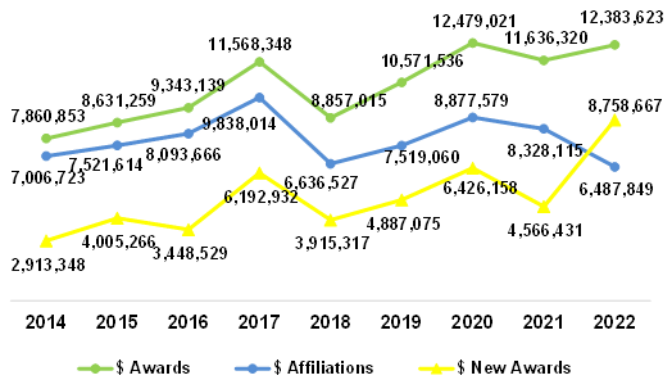
Proposal Dollars by Top 6 Departments



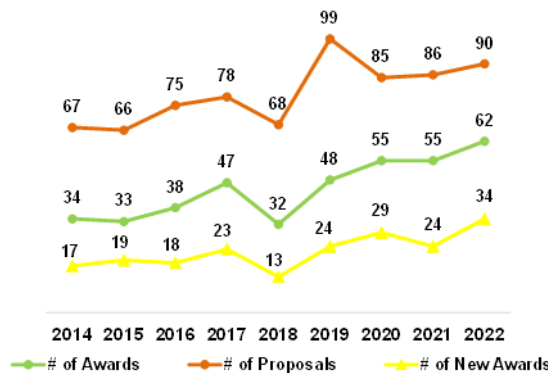
The charts below show the total award dollars, award and proposal numbers, and proposal dollars for each year beginning in 2014 through 2022. There are significant increases in every area except in award affiliation dollars. This reduction in affiliations could be related to faculty affiliating with multiple centers and institutes. It is important to note that awards and proposals affiliated with ND Energy are designated by the lead PI as attributable to energy-related research. This designation is optional and can be assigned to multiple centers and institutes for each project.

The percentage increases in the areas experiencing significant gain from the previous year are also explained below.

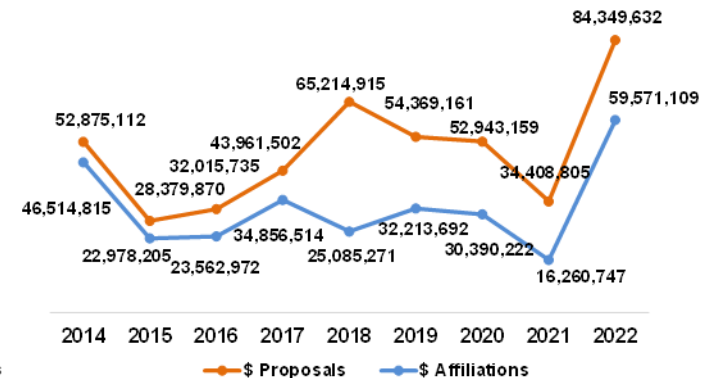
Award Dollars



Number of Awards and Proposals



Proposal Dollars

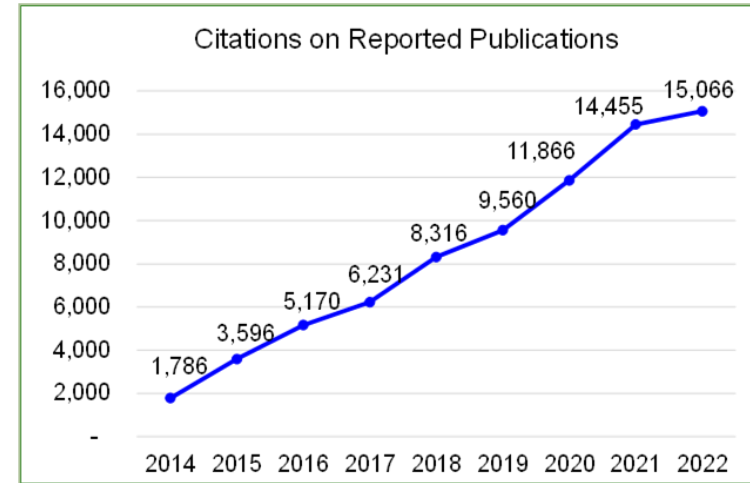
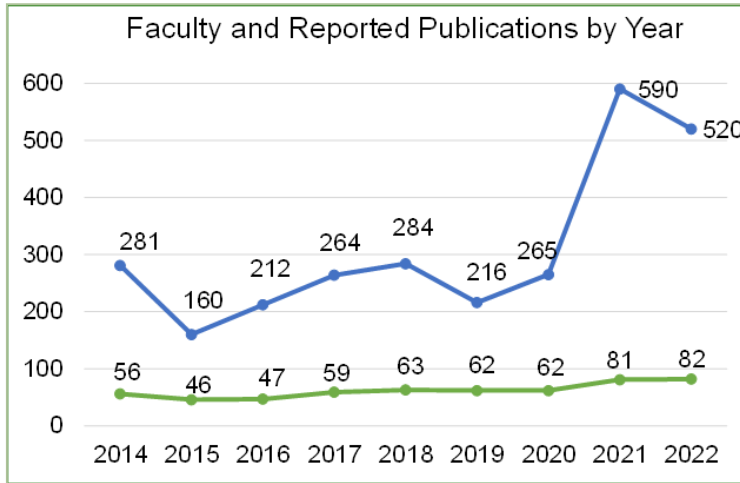


Increase in Dollars and Numbers from 2021 to 2022

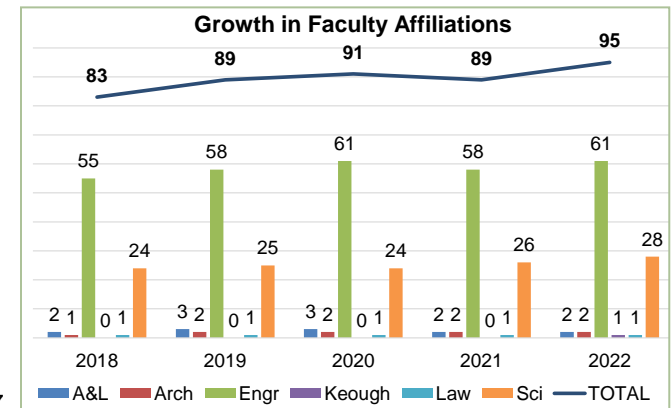
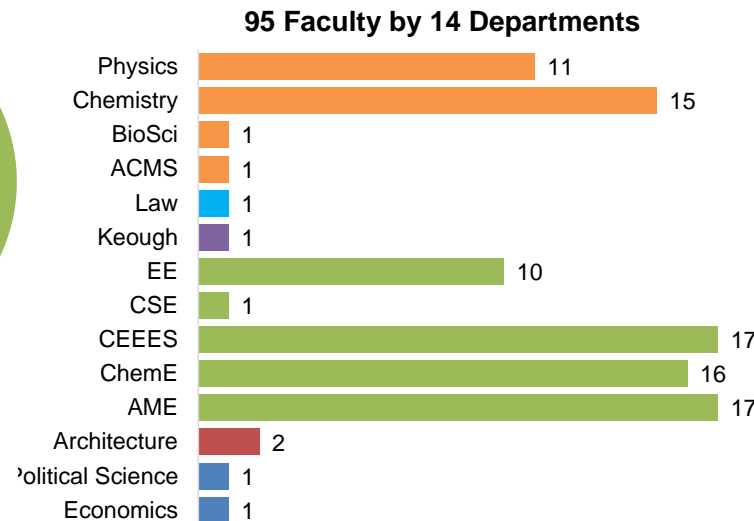
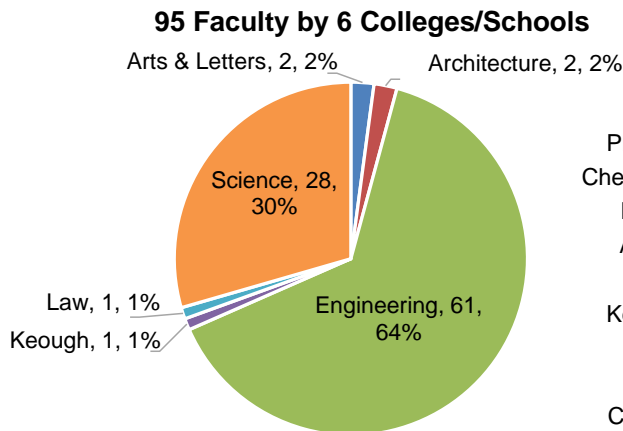
- 6.42% increase in award dollars
- 91.80% increase in new award dollars
- 4.65% increase in # of proposals
- 12.72% increase in # of awards
- 41.66% increase in # of new awards
- 145.14% increase in proposal dollars

Faculty Publications and Citations

In 2022, **82** faculty affiliates reported **520** energy-related publications. Since 2014, **2,792** energy-related publications were reported by faculty affiliates. Additionally, citations on reported publications increased by **4.2%** from the previous year. Since 2014, there were **76,046** citations on reported energy-related publications.



There are currently **95** faculty affiliates, representing **6** colleges/schools and **14** departments. Over the years, there has been a steady growth in the number of faculty affiliations.

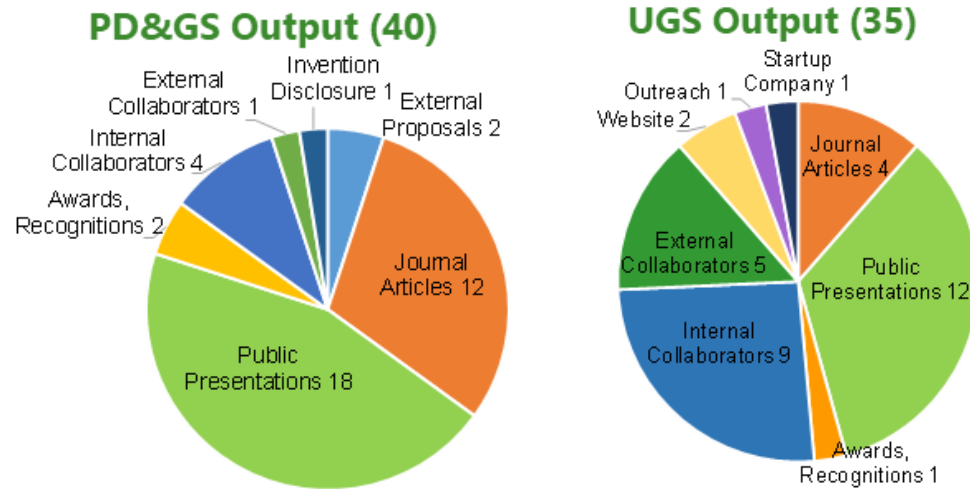


Student Scholarly Output

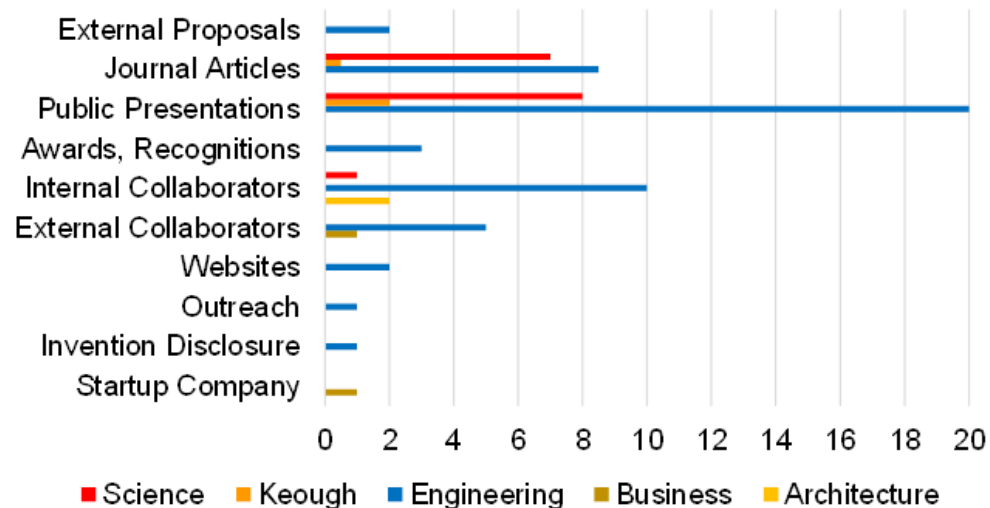
ND Energy awarded **30** research fellowships in 2022 to one postdoctoral research associate and 29 graduate and undergraduate students in collaboration with faculty in the Colleges of Business, Engineering and Science and the Schools of Architecture and Global Affairs. The output below highlights the overall scholarly achievements of research fellows during their award periods.

Total Output	
External Proposals	2
Journal Articles	16
Public Presentations	30
Awards, Recognitions	3
Internal Collaborators	13
External Collaborators	6
Websites	2
Outreach	1
Invention Disclosure	1
Startup Company	1
Total Output	75

Output by Student Group



Output by College/School

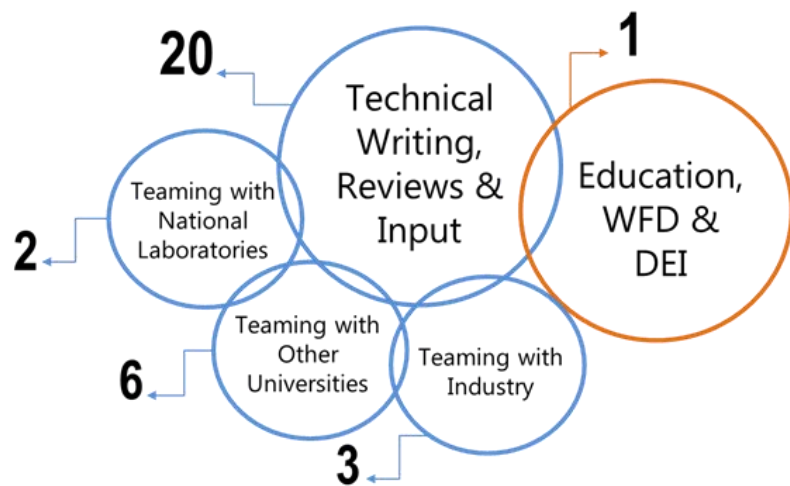


RESEARCH DEVELOPMENT



ND Energy engages with faculty to enable research advancements and other scholarly achievements. This includes proposal preparations and strengthening research collaborations with national laboratories, industry, and other academic institutions. It also includes project management involving input on technical achievements and milestones, developing outreach programs, engaging the local community in broader impacts, and overseeing administrative and reporting requirements. Below are highlights of these activities in 2022.

Proposal Preparations



Technical Writing, Reviews & Input included:

- Major contributions to proposal writing, technical reviews and input, reviewers response input, Red Team review participation, meetings and workshops, NDRA collaborations, budgets and budget justifications, facilities and equipment, and support letters.
- Midwest Alliance for Clean Hydrogen (MachH2) Hub Proposal (\$1B), Purdue's ELECTRIFY Proposal (\$70M)
- NNSA Nuclear Forensics Consortium (\$25M), NNSA Center of Excellence (\$12.5M), NASA SSERVI (\$7.5M), MRSEC and 2 EFRC preproposals, and Early Career proposals.

Project Management



Project Management included:

- ** NNSA SSAA, Actinide Center of Excellence: Hixon, LaVerne
- ** ORNL, Fuel Cycle Science Fellowship Program: Hixon
- ** NSF Early Career, *Molecular Scale Behavior of Actinide Elements at the Mineral-water Interface*: Hixon
- *** DOE Early Career, *Understanding the Chemical Complexity of Multi-component Systems: Uranium Polyoxometalates as Nanosorbents*: Hixon
- *** NSF ERC, Center for Innovative and Strategic Transformation of Alkane Resources (CISTAR): Schneider, Hicks, Guo, Dowling, O'Brien
- ** DOE EERE, *3D Printing for Construction and Energy Efficiencies*: Thrall, Go, CERL
- ** DOE EERE-AMO, *3D Printing Manufacturing of Thermoelectric Materials using Transfer Learning*: Luo, Zhang, Go, Dowling, INL
- ** DoD-AFOSR, *Optimizing Carbon/Carbon Composites Manufacturing by Identifying and Reducing Key Uncertainties for Hypersonic Applications*: Luo, Kinzel, Leonov, J-X Wang, Honeywell, AFRL
- ** DoD-NRC, *Lapped Connections for Accelerated Modularized Construction of Safety-Related, Non-Containment Reinforced Concrete Nuclear Buildings*: Kurama, Weldon, NMSU

Research Conferences, Symposia, and Workshops

ND Energy also engages with faculty to support and facilitate research meetings, conferences, symposia, and workshops. In 2022, ND Energy provided program facilitation, planning and logistics, on-site support, and financial assistance for the following research events on campus:

- NNSA Forensics Consortium Proposal Workshop
August 18, 2022
- NSF ERC CISTAR Biannual Meeting
October 17-19, 2022
- Notre Dame—Purdue Soft Matter and Polymers Symposium
October 29, 2022



Student Fellowships

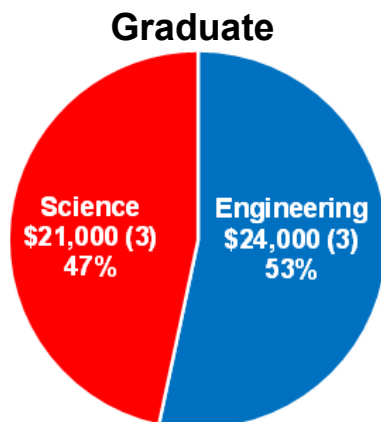
Student research fellowships are competitive research opportunities for graduate and undergraduate students interested in conducting energy-related research with ND Energy faculty affiliates. Awards provide financial support for student stipends, research supplies, and travel for students to present their research at a national conference. These awards also support the financial status of colleges and schools where recipients conduct their research. Below is a brief overview of the 2022 award distributions by college/school.

Patrick and Jana Eilers Graduate Student Fellowship for Energy Related Research
(since 2012)

John and Karla Forgash Graduate Student Fellowship for Solar Energy Research
(since 2009)

Vincent P. Slatt Fellowship for Undergraduate Research in Energy Systems and Processes (since 2006)

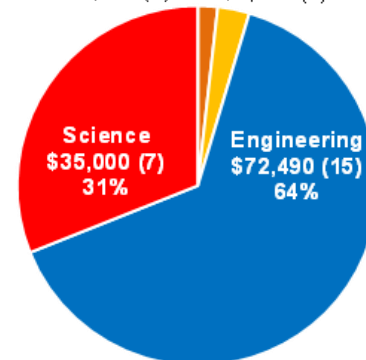
5 Awards
\$40,000



1 Award
\$5,000

Undergraduate
Architecture \$2,000 (1) 2%
Business \$3,200 (1) 3%

24 Awards
\$112,690



Postdoc & Graduate Student Seminar Series

ND Energy brings together postdoctoral research associates and graduate students collaborating with faculty affiliates to create a vibrant community of interdisciplinary research associates. In 2022, the research associates below presented their research projects in an effort to build stronger relationships and foster new collaborations. Summaries of their presentations can be viewed at <https://energy.nd.edu/about/associated-researchers/2022-seminars/>.



"Spacer Cations Dictate Photoinduced Phase Segregation in 2D Mixed Halide Perovskites"
by Preethi Susan Mathew ([Kamat](#) lab)
January 19, 2022



"Transformations of a Uranyl Hydroxide Phase: Probing Alteration Behavior through High Relative Humidity and Ionizing Radiation"
by Savannah Benjamin ([Burns](#) lab)
February 16, 2022



"Lead Chalcohalide Nanocrystals and Chalcohalide-Perovskite Heterostructures"
by Stefano Toso ([Kuno](#) lab)
February 16, 2022



"Effects of External Electric Fields on the Glass Transition of Ionic Liquids" by Fernando Carmona ([Maginn](#) lab)
March 16, 2022



"Nanoscale Interactions of Uranyl Peroxide Nanoclusters with Neptunium and Plutonium"
by Kyson Smith ([Hixon](#) lab)
March 16, 2022



"Abiotic Transformation of Perfluoroalkyl Acid (PFAA) Precursors Found Indoors to Terminal Products" by Liliya Chernysheva ([Doudrick](#) lab)
April 20, 2022



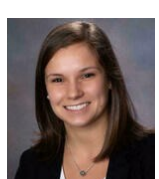
"Microscale Additive Manufacturing of Functional Devices for Thermoelectric Energy Harvesting"
by Mortaza Saeidi-Javash ([Zhang](#) lab)
April 20, 2022



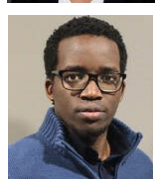
"The Production of Solvated Electrons in Glow Discharge Electrolysis" by Daniel Martin ([Go](#) lab)
May 18, 2022



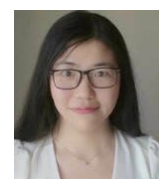
"Energy Cascading from Perovskite Nanocrystals"
by Jishnudas Chakkamalayath ([Kamat](#) lab)
September 21, 2022



"Plasma-Assisted Approaches for the Direct Conversion of Natural Gas to Value-Added Products" by Deanna Poirier ([Hicks](#) lab)
September 21, 2022



"Managing Photoinduced Electron Transfer in AgInS₂-CdS Heterostructures" by Anthony Kipkorir ([Kamat](#) lab)
November 16, 2022



"Operando Surface-Enhanced Raman-Scattering (SERS) Platform for Studying the Structure and Dynamics of CO₂ Facilitated Transport in Amine-based Membranes in Complex Environments" by Hui Xu ([O'Brien](#) lab)
November 16, 2022

Faculty Seminar Series

ND Energy brings together faculty from diverse disciplines to discuss specific topics to foster research collaborations and other scholarly endeavors. In 2022, the faculty below presented their research and led subsequent discussions to elicit input from other faculty on current research challenges and future opportunities.



"Graphene and Beyond. 2D Hybrid Materials for Energy Conversion and Storage" by Prashant V. Kamat, Rev. John A. Zahm, C.S.C., Professor of Science in Chemistry and Biochemistry and Radiation Laboratory
March 17, 2022



"Novel Photovoltaic Perovskites: Beyond Solar Cells" by László Forró, Aurora and Thomas Marquez Professor of Physics of Complex Quantum Matter, and Director of Stavropoulos Center for Complex Quantum Matter
April 21, 2022



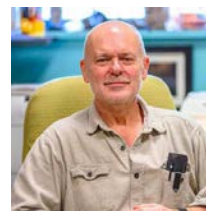
"Hybrid Bronzes: Organic-Inorganic Metal Oxides with Tunable Structural and Electronic Properties" by Adam Jaffe, Assistant Professor of Chemistry and Biochemistry
May 19, 2022



"Material Searches and Designs of Topological Superconductors" by Yi-Ting Hsu, Assistant Professor of Physics and Astronomy
September 22, 2022



"Digital Glass Forming" by Edward C. Kinzel, Associate Professor of Aerospace and Mechanical Engineering
October 27, 2022



"Why the Moon Needs a Globally Distributed, Long-Lived Geophysical Network" by Clive Neal, Professor of Civil and Environmental Engineering and Earth Sciences
November 17, 2022



"Bayesian Optimization and Adaptive Experiment Design for Additive Manufacturing of Thermoelectric Materials and Devices" by Alexander Dowling, Assistant Professor of Chemical and Biomolecular Engineering
December 15, 2022

Sponsorships

ND Energy welcomes the opportunity to support campus and community events in support of research and education by providing sponsorship funding and other services as needed. Below are major events sponsored by ND Energy in 2022.

- Fighting Irish Science Olympiad (FISO) (January)
- 2022 Indiana Conference on Energy Management (July)
- Seventh Annual EdTech in the Bend Technology Conference (August)
- Eighth Annual Chemical and Biomolecular Engineering Graduate Research Symposium (September)
- St. Francis of Assisi Week 2022 (October)
- Notre Dame-Purdue Soft Matter & Polymers Symposium (October)
- Mishawaka High School eGrandPrix (October)
- Twin Branch Elementary School LEGO Team (December)

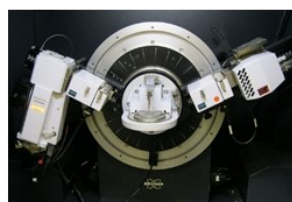
Materials Characterization Facility (MCF)

The Materials Characterization Facility (MCF) offers state-of-the-art instrumentation with unique capabilities and comprehensive analytical services and expertise to resolve some of the most relevant scientific problems facing researchers today. This core facility is open to both internal and external researchers and is led by Ian Lightcap, Ph.D., Research and Facilities Program Director; Anna Matzner, Laboratory Specialist; and Karl Cronberger, Electron Microprobe Technician.

An overview of the MCF and its major accomplishments in 2022 are highlighted below.



World-class analytical instrumentation, advanced materials analysis expertise, and training



Crystallography
Powder XRD
Single Crystal XRD
High-Res XRD



Electrochemistry
Solar Fuels and
Electrocatalyst Testing
Stations



Gas Analysis
GC-FID
GC-TCD
Triple Quad GC-MS



Particle/Polymer Analysis
SEC-MALS
Zetasizer and DLS



**Rheometry/DMTA/
Tribology**
Hybrid Rheometer



Spectroscopy
FTIR
FTIR Transmission
Confocal Raman Microscope
Solar Simulators
UV-Vis



Surface Analysis
ASAP 2020 Surface Area
and Porosity Analyzer
Profilometer
AFM Park XE7
XPS
Electron Microprobe
XRF



Synthesis
Microwave
Reactor
Thermal
Evaporator



Thermal Analysis
DSC
Calorimeter - Drop Solution
Calorimeter - Reaction
TGA/DSC
TGA/DSC-Mass Spec

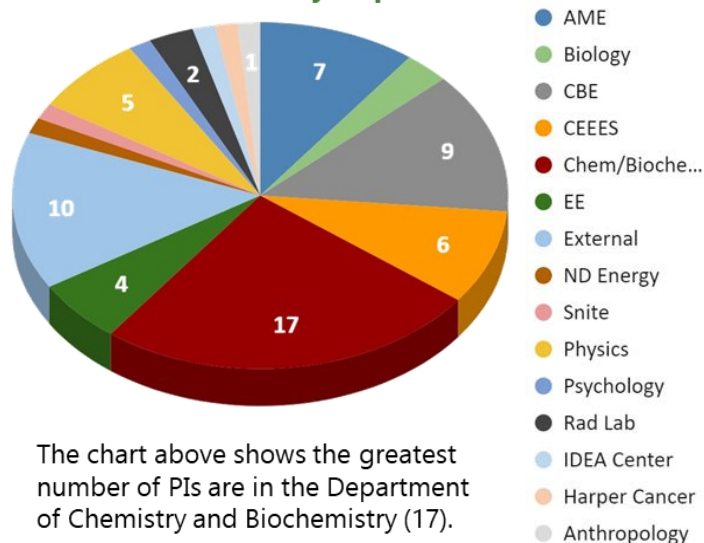
Mission Statement

The MCF provides researchers with high quality data, driving every aspect of its major goals, including to provide excellent training, customer service, education, and instrument acquisition.

MCF Community

68 different PIs from 14 different departments and centers/institutes used the MCF in 2022. This represents 177 active users, including 10 external groups.

Total Number of PIs by Department



The chart above shows the greatest number of PIs are in the Department of Chemistry and Biochemistry (17).

MCF in Numbers

30 state-of-the-art instruments with unique capabilities:

- Crystallography
- Electrochemistry
- Gas Analysis
- Polymer/Particle Analysis
- Rheometry/DMTA/Tribology
- Spectroscopy
- Surface Analysis
- Synthesis
- Thermal Analysis

3,809 Hours of Instrument Use
110 Individual Training Sessions
\$143,944 in Gross Recharge

6 Instruments Awarded

Spectrometers: UV-Vis, FTIR, Raman
GC-MS upgrade: 2D GC

Core Refresh: High Resolution X-Ray Diffractometer and Chemi/Physisorption Analyzer

5 Instruments Received/Installed

Microtrac Sync, Particle Shape and Size Analyzer; Microtrac Wave (Dynamic Light Scattering and Zeta Potential); Microtrac Pycnometer; XPS hardware capability upgrades for bandgap analysis: Ultraviolet Photoelectron Spectroscopy (UPS); Low-Energy Inverse Photoelectron Spectroscopy (LEIPS); Aeris Powder XRD

3 Collaborative Publications

1 Book chapter accepted (Chemical Signals in Vertebrates, Volume 15)
2 articles (10.1021/acssuschemeng.1c08313) and (10.1021/acsnano.2c01706)

28 Outreach Activities and Tours

Indiana Conference on Energy Management, Core Facility Fair, ND Explores STEM, and more

CY2022

30 AWARDS

\$8,025,040

47 PROPOSALS

\$62,435,531

In 2022, 30 awards and 47 proposals indicated use of the MCF to achieve research goals, totaling over \$70M.

OUTREACH / BROADER IMPACTS



Junior– and senior-level students receive awards for outstanding research projects in energy-related topics judged by members of the Student Energy Board.
February 26, 2022



Students in the ND-MHS Internship Program present their research during the annual poster session at the end of spring semester for school officials, friends and family.
May 19, 2022



Slatt scholars and other undergraduate students conducting summer research present their projects during the annual Summer Undergraduate Research Symposium.
July 20, 2022



Faculty and their research groups conduct hands-on activities and demonstrations to teach families of all ages about energy-related concepts during the annual community-wide event hosted by the St. Joseph County Public Library.
May 21, 2022



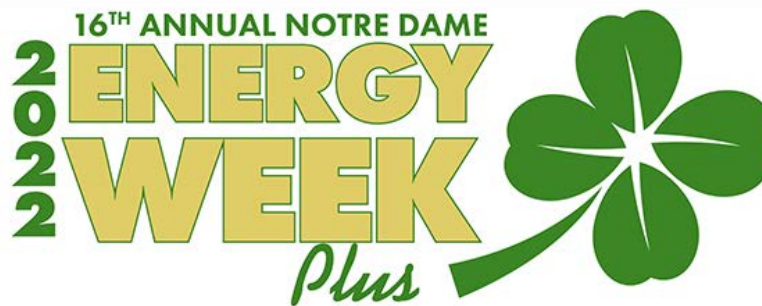
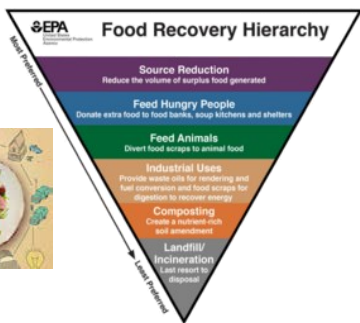
Students connect with employers on professional development opportunities in the areas of energy, the environment, and sustainability studies.
September 12, 2022



Alumni gain a deeper understanding of STEM related programs focused on research and education in energy.
June 3, 2022

The **16th annual Notre Dame Energy Week Plus — September 11-22** — offered a broad range of topics and activities to raise awareness about climate change and creating a cleaner, more sustainable energy future for generations to come.

The week started with a screening of the documentary *Wasted! The Story of Food Waste* followed by *Weigh the Waste Nights* in the North and South Dining Halls. Students attended the **Notre Dame Sustainability Expo** and spoke with **invited alumni** about successful careers in renewable energy. Other presentations for the broader community included topics on urban climate change mitigation strategies, carbon capture, and Notre Dame’s sustainability goals. There were guided tours to **Crossroads Solar**, the **Notre Dame Power Plant**, and **Notre Dame Turbomachinery Laboratory**. Energy Week Plus concluded with students participating in a traveling leadership training workshop by the founder of the Spirit of Football and former Notre Dame soccer player Andrew Aris ('00), titled *One Ball, One World: Football Under the Climate Microscope*.



The Energy Career Path of an Economics Major (and Energy Studies and Theology Minors) by Kylie Minor '19.



Careers in Renewable Energy by Bill Jordan '85, Luke Lewandowski '00, and John Moran '95.



Notre Dame’s Commitment to Carbon Neutrality by Paul Kempf '80, Assistant Vice President for Utilities and Maintenance at Notre Dame.



Architecture and Climate Change: Grand Visions in Urban Planning by

Dou Zhang, Director of the Sasaki Shanghai Office; Krupali Uplekar Krusche and John Onyango, Associate Professors of Architecture at Notre Dame.



From Carbon Capture to Artificial Food: The Complexities of Future Choices by Casey O'Brien, Assistant Professor of Chemical and Biomolecular Engineering; Jennifer Tank, Director of the Notre Dame Environmental Change Initiative (ND-ECI) and the Ludmilla F., Stephen J., and Robert T. Galla Professor of Biological Sciences at Notre Dame; Paul Winters, the Keough-Hesburgh Professor of Global Affairs at Notre Dame, and Peter C. Burns, Director of ND Energy and the Henry J. Massman Professor of Civil and Environmental Engineering and Earth Sciences.

View presentation recordings at <https://energy.nd.edu/outreach/energy-week/recordings/>

Distinguished Lectures

ND Energy welcomes the opportunity to host distinguished lecturers to campus or virtually. In 2022, the following speakers discussed important topics in sustainable energy.



Virtual: **"Open-Shell Molecules: A Radical Design for Organic Optoelectronic Materials"**

Mark S. Chen, Assistant Professor, Department of Chemistry at Lehigh University

Co-sponsored with the Department of Chemical and Biomolecular Engineering

February 16, 2022



EnergizeND! Offshore Energy

Erik Milito, President of the National Ocean Industries Association (NOIA)

Co-sponsored with the Notre Dame Alumni Association

February 24, 2022



Public Lecture: **"A Climate for All of Us"**

Katharine Hayhoe, Chief Scientist, The Nature Conservancy

Co-sponsored with the Notre Dame Environmental Change Initiative (ND-ECI)

March 5, 2022



"Is Federal Energy R & D Successful? A Fifteen Year Look at U.S. Nuclear Power"

Warren F. "Pete" Miller, Jr., former Assistant Secretary for Nuclear Energy in the Department of Energy

Co-sponsored with the College of Engineering's Charles Edison Fund and Department of Aerospace and Mechanical Engineering

March 29, 2022



"Unlocking Opportunity: New Opportunities for Collaboration Between Industry and Higher Ed in the Region"

David Go, Viola D. Hank Professor and Chair of Aerospace and Mechanical Engineering; Ian Lightcap, Research and Facilities Program Director, ND Energy and Materials Characterization Facility; John DeSalle, Executive Engineer-in-Residence, ND's iNDustry Labs; and Matthew Dotson, ND student



"Green Energy Opportunities in the Pacific Northwest: A Conversation with Michael Grady '77"

September 6, 2022

"The Renewable Energy Explosion - All Hands on Deck!"

Michael Grady '77

November 4, 2022



The **5th Annual ND Energy Research Symposium** was held **March 31** in support of energy-related research and scholarship at Notre Dame and the 2021-22 Notre Dame Forum on *Care for our Common Home: Just Transition to a Sustainable Future*. Invited talks were given by six faculty affiliates and the keynote was presented by members of the IDEA Center. In the afternoon, a poster session was held with over 20 postdoctoral research associates and graduate students presenting their research projects with the top three presenters receiving awards.

The invited talks and poster award winners are highlighted below.

Invited Lectures



"Formation and Redox Chemistry of Metal Polysulfanido Complexes for Sulfur Transfer Reactions" Emily Tsui, Assistant Professor, Chemistry and Biochemistry



"The Design and Optimization of Integrated Energy Systems" Alexander Dowling, Assistant Professor, Chemical and Biomolecular Engineering



"Catalytic Hollow-Fiber Membranes as an Efficient and Scalable Process in Water Treatment" Kyle Doudrick, Associate Professor, Civil and Environmental Engineering and Earth Sciences



"Navigating the Landscape of Advanced Materials" Yamil Colón, Assistant Professor, Chemical and Biomolecular Engineering



Luncheon Keynote: "Bringing Notre Dame's Best Ideas to Market"
James Thompson, Associate Vice President for Innovation, and Steven Asiala, Faculty Engagement Associate, IDEA Center



"Artificial Intelligence Optimizes Additive Manufacturing of Thermoelectrics"
Tengfei Luo, Professor, Aerospace and Mechanical Engineering



"Materials Engineering to Realize Innovative Technologies for Sustainability (MERITS) Fellow Development Program" Jennifer Schaefer, Associate Professor, Chemical and Biomolecular Engineering

Poster Session



Hanna Hlushko, Savannah Benjamin, Zoe Emory

Savannah Benjamin, **Transformations of a Uranyl Hydroxide Phase: Probing Alteration Behavior Through High Relative Humidity and Ionizing Radiation** (Burns lab)

Zoe Emory, **Investigating the Degradation of Uranyl Peroxide Clusters Under Ionizing Radiation** (Burns lab)

Hanna Hlushko, **Silicon and Zirconium Ceramic Material Irradiation in the Presence of Water** (LaVerne lab)

View Poster Session [Abstract Book](#)

View [Presentation Recordings](#)



On a sunny afternoon in June, ND Energy faculty affiliates, research associates, and Slatt scholars gathered on DeBartolo Quad for food, fun, and fellowship. After enjoying a picnic-style lunch, things started to heat up as research teams gathered for the *inaugural ND Energy Lab Olympics!*

Eighteen teams representing respective research groups competed for divisional medals and the overall Olympic championship. Teams warmed up with exhibition matches in **Cornhole Science Toss** and **Jumbo Jenga Lab-style**. All participants competed with dignity and honor and demonstrated excellence in teamwork, laboratory skills, and the grit, spirit, and determination of a true winner.

After several fierce competitions, the overall Olympic champions were announced with the divisional winners highlighted below.

OVERALL OLYMPIC CHAMPIONS!!!

Gold Medalists (\$60 each)

Extended Warranty: Ashley Hastings, Kyson Smith (Hixon lab)

Silver Medalists (\$40 each)

Low Expectation Value: Damian Agi, Montana Carlozo (Dowling lab)

Bronze Medalists (\$25 each)

Kuno Lab 3: Irina Gushchina, Kirill Kniazev (Kuno lab)



Newton's Tug-of-War

Winning four consecutive matches, Daniel Martin and Jinyu Yang, aptly-named the *Go Getters (Go group)* won gold, while silver went to Ashley Hastings and Kyson Smith of *Extended Warranty (Hixon lab)*, and bronze went to Daniel Felton and Justin Daniels of *Twinned Crystals (Burns lab)*.

H₂O Balloon Toss

Earning the gold was Jishnudas Chakkamalayath and Bo-An Chen of *Lab Rads (Kamat lab)*. Tom Monroe and Ian Lightcap of the *MCF* finished with silver, and Garam Lee and Jeffrey Secrist of the *Golympians (Go lab)* earned bronze.

Lab-on-a-Disc Throw

Ben Speybroeck of the *Polymer Pals (Guo lab)* won gold, Irina Gushchina of *Kuno Lab 3 (Kuno lab)* won silver, and James Carpenter of *Colón Lab 2 (Colón group)* earned bronze.

Tri-Cycle Lab Race (PPE, pipetting, and teamwork)

Winning gold was Damian Agi and Montana Carlozo of *Low Expectation Value (Dowling lab)*. Grace Arntz and Brodie Barth of *The Radio-nice-otopes (Burns lab)* finished second with silver, Irina Gushchina and Kirill Kniazev of *Kuno Lab 3 (Kuno lab)* finished with bronze.

Watermelon Consumption Test

Kyson Smith of *Extended Warranty (Hixon lab)* earned the gold medal, Irina Gushchina of *Kuno Lab 3 (Kuno lab)* finished for the silver, and Brodie Barth of *The Radio-nice-otopes (Burns lab)* earned bronze.

Musical Lab Stools

Juan Onyango, the younger son of Prof. John Onyango, claimed the gold. Kyson Smith of *Extended Warranty (Hixon lab)* and Montana Carlozo of *Low Expectation Value (Dowling lab)* were the top two finishers among the official contenders.

COMMUNICATIONS



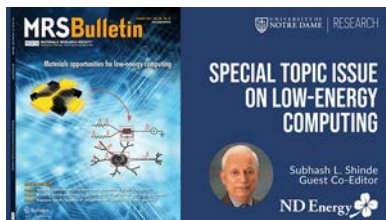
ND Energy promotes research and scholarly achievements to a broad energy-interested audience via the web, social media, digital advertisements, newsletters and reports. Many of the recognitions are highlighted in the news articles below and on the subsequent pages covering major breakthroughs in research, faculty and student awards, important milestones, and other key areas involving global partnerships, collaborations, and more.

News Articles

January 2022



[Notre Dame's Materials Characterization Facility supports researchers with state-of-the-art instrumentation, capabilities, and consulting services for over a decade](#)



[Notre Dame's Shinde serves as guest co-editor to MRS Bulletin Special Topic Issue on Low-Energy Computing](#)

February 2022



[ND Energy announces 2022 Eilers and Forgash fellows](#)



[Yamil Colón receives NSF CAREER Award to advance understanding of gas adsorption in porous materials](#)



[Notre Dame Hosts the Fighting Irish Science Olympiad](#)

March 2022



[ND Energy research symposium to focus on transitioning to a cleaner, more sustainable energy future](#)



[Hydrologist Marc Muller receives NSF CAREER Award for new methods to inform response to climate](#)



[Notre Dame to host talk by Climate Scientist Katharine Hayhoe](#)

April 2022



[Twenty-four undergraduate students receive Slatt Fellowships to advance energy-related research at Notre Dame](#)



[Edward Maginn appointed associate vice president for research at the University of Notre Dame](#)



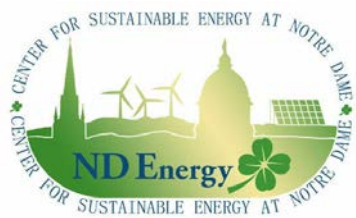
[Jennifer Schaefer awarded Notre Dame's Burns Award for outstanding mentorship of doctoral students](#)



Notre Dame joins EPA Green Power Partnership program



Acclaimed historian, former dean John McGreevy elected Notre Dame's provost



ND Energy completes its annual report of energy-related initiatives and accomplishments

May 2022



CCI and Dowling Receive Germination Grant

June 2022



Casey O'Brien receives NSF CAREER Award for chemical technology to reduce greenhouse gases



Research Story: The Grand Reprise - Notre Dame helps instrument manufacturer bridge legacy and future



Prashant Kamat wins 2022 Richard E. Smalley Research Award and Porter Medal

July 2022



Notre Dame receives record-breaking \$244 million in annual research



Notre Dame receives Green Roof Stormwater award

August 2022



Removing heavy metals from water with innovative 3D-printed filters

September 2022



Manukyan honored at the 1st Source Bank Commercialization Awards



ND Energy partners with ThinkND to connect with the alumni community on grand challenges in energy



Notre Dame dedicates new hydro facility along St. Joseph River in South Bend



ND Energy announces Energy Week Plus focusing on grand challenges in energy

October 2022



Chemical Physicist Hsing-Ta Chen develops theoretical tools to study



Researchers develop superfast new method to manufacture high-performance thermoelectric devices



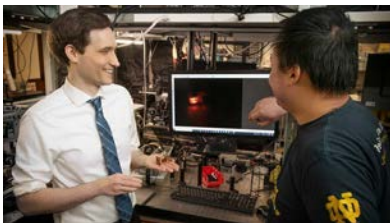
Patrick Fay named Stinson Professor of Nanotechnology



Prashant Kamat Ranked in Top 50 World Chemists



Jian-xun Wang receives Young Investigator award from Office of Naval Research



Electrical engineers devise first high-performance optical microresonator at long wavelengths



David Burghoff named 2022 Moore Inventor Fellow

November 2022



Paul Brenner: Building a career of service



Engineers use quantum computing to develop transparent window coating that blocks heat, saves energy



University of Notre Dame's iNdustry Labs Appoints Two Associate Faculty Directors



Notre Dame physicist Jay LaVerne selected as a member of the Radiation Research Society's inaugural class of Fellows



Notre Dame-Purdue symposium builds soft matter and polymer community

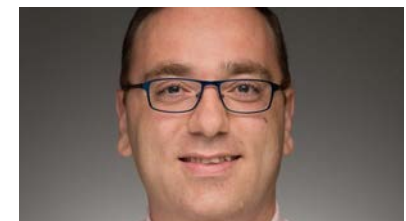


Designing climate-resilient cities in at-risk communities

December 2022



David Go appointed vice president and associate provost for strategic planning

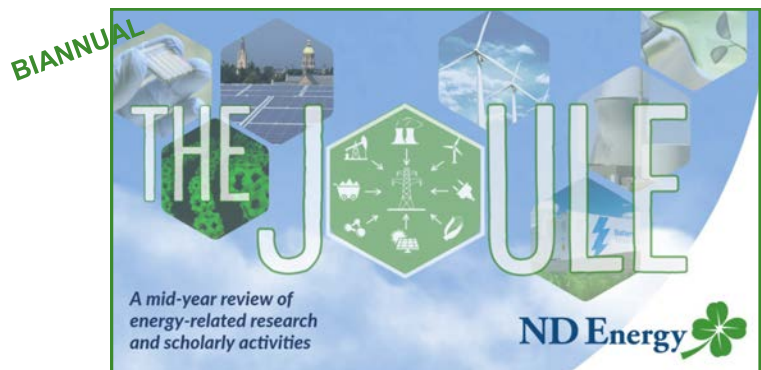
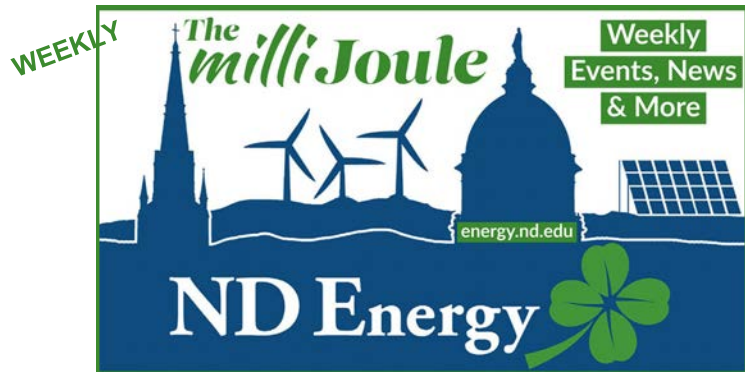


Manukyan receives Defense University Research Instrumentation Program (DURIP) award from Department of Defense

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