



# ANNUAL REPORT

# 2020

Center for Energy Studies  
Minerals Processing  
Radiation Safety



# Center for Energy Studies Annual Report 2020

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# Center for Energy Studies

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David E. Dismukes, Executive Director | [lsu.edu/ces](http://lsu.edu/ces)

## Introduction

The year 2020 will leave a lasting memory for generations. The onset of one of the largest and broadest pandemics in modern times touched the entire world. As we closed out 2019 and prepared the *Gulf Coast Energy Outlook*, looking into our crystal balls for 2020, it seemed obvious that a moderation of global economic growth, and energy demand, was likely, given the slowdown in China and Asia at that time. But, even then, the economic slowdown seemed to be one that would likely be mild, particularly given what were then expectations that this new form of “influenza” might ultimately be contained and minimized. Little did anyone know that this flu would rapidly expand to levels that, by the early spring of 2020, would virtually shut down global economic activity.

The pandemic has changed all aspects of the energy industry in ways that are still not entirely appreciated or understood. The halt of economic activity, particularly in the transportation sector, had immediate impacts on refined product demand, particularly for jet fuel, that will likely last for several years. The stay-home provisions adopted across the country also resulted in changes in electricity and natural gas demand that not only impacted the overall levels of demand, but the hours of the day in which a new swath of “stay home” workers used energy. The shutdown also brought to a halt one the most dramatic oil and gas production revolutions ever seen in the United States. U.S. crude oil production fell by as much as two million barrels per day almost overnight. Equally sobering was the fact that this entire dislocation in energy supply and demand at one point resulted in a collapse of crude oil prices to levels that, at least on one day during the spring of 2020, resulted in negative prices.

The impacts that the pandemic had in Louisiana were equally unparalleled. Employment losses in traditional oil and gas activities, such as our drilling, services, and production sectors were considerable, at an over 14 percent deterioration in one quarter alone. While petrochemical employment remained solid, Louisiana’s refining sector took a considerable hit that has cost the state several thousand jobs lost. Most important was the announcement that the Convent refinery in South Louisiana would shut down, and its employment opportunities would be permanently discontinued.

The pandemic, however, underscored one of the most valued contributions that the Center makes to Louisiana—our service activities. During this time period, our entire faculty and staff were dedicated to researching and answering questions raised by a myriad of stakeholders that turn to the Center for answers during turbulent times. While conferences, workshops, and other meetings were forbidden during this time, the Center, like others, turned to alternative means for communicating that included the use of Zoom and Teams meetings, other video conferencing technologies, and just old fashion “writing” and talking on the phone.

As we close the book on 2020, we would like to think that perhaps Louisiana, and the rest of the world, is moving more toward some degree of normalcy. While mask bans are coming off, and social interactions are becoming more prevalent, there are other new challenges and concerns that have arisen toward the end of 2020, and into early 2021, that are making this year an equally challenging time as well. We look forward to working with our various stakeholder groups at trying to make equal sense of these changes as well.



David E. Dismukes, Ph.D.  
Professor & Executive Director





# Research Highlights

## Center Releases 2021 Gulf Coast Energy Outlook

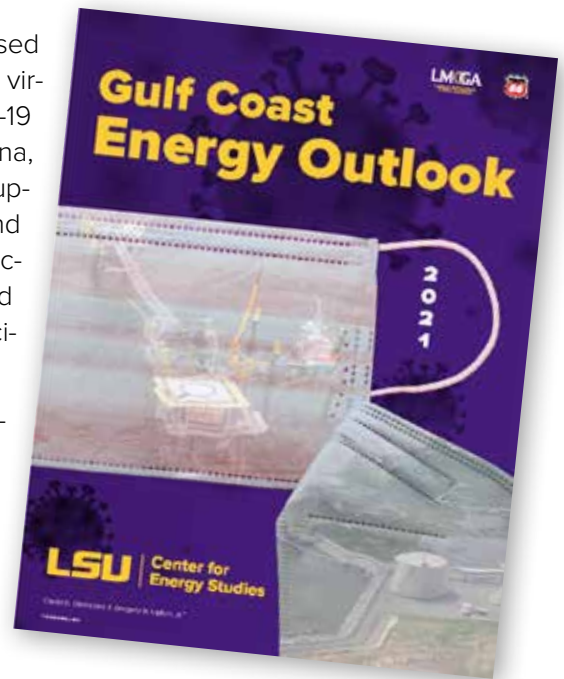
On November 18, 2020, the LSU Center for Energy Studies released the 2021 edition of the *Gulf Coast Energy Outlook (GCEO)* with a virtual kickoff. The 2021 *GCEO* examines the impacts of the COVID-19 pandemic, the 2020 hurricane season, trade negotiations with China, and potential policies of a Biden administration on the region's upstream oil and gas activity, downstream investments in refining and petrochemicals, energy exports, electricity demand, and energy sector-specific employment. David E. Dismukes, executive director and professor, LSU Center for Energy Studies, and Greg Upton, associate professor, LSU Center for Energy Studies, authored the report.

In March of 2020, the outlook for the energy industry changed rapidly when the COVID-19 pandemic essentially shut down the global economy. Oil markets were rocked by a historic decline in demand and a failed OPEC deal to curtail output and sustain prices. For its economic modeling, the *GCEO* assumes that COVID-19 attenuates globally and that the world will return to some level of normalcy over the next two years. The *GCEO* assumes that trade talks with China will not deteriorate, that new tariffs will not be implemented, and that export commitments on net do not impact demand for Gulf Coast energy products.

The *GCEO* also assumes that the Biden policy of banning permits offshore will not go into effect, at least over the forecast horizon. If some version of this proposed policy were to be enacted, it could have significant negative economic implications for the Gulf Coast region.

Findings include:

- ▶ By May of 2020, Gulf Coast oil production was down 13.7 percent from the prior May. Gulf Coast natural gas production declined by 71 percent in May of 2020 relative to May of 2019. On an annualized basis, both U.S. and Gulf Coast oil production are anticipated to decline over the next three years.
- ▶ Today, futures markets are anticipating that there will be enough supply to meet global demand at between \$40 and \$50 per barrel for the next decade.
- ▶ While natural gas prices are currently lower than markets predicted at this time last year, prices are expected to be higher in 2021 and 2022 than futures markets suggested over the past two years.
- ▶ The U.S. electricity load has been relatively flat over the past decade, while the Gulf Coast load has grown. As a result, the share of electricity usage from Gulf Coast states increased from 15 percent in 2007 (i.e. 2009 pre-recession) to 17 percent in 2019 (the most recent full year of data). Gulf Coast demand is down 4.3 percent relative to 2019, as compared to 3.8 percent for the U.S.



CES White Papers can be viewed or downloaded at [lsu.edu/ces/research/whitepapers.php](https://lsu.edu/ces/research/whitepapers.php)





- ▶ Since 2013, U.S. and Gulf Coast total CO2 emissions from power generation have been down 13.8 percent and 10.4 percent, respectively. The carbon dioxide emissions per MWh of electricity produced has declined by almost exactly 16 percent in both the U.S. and Gulf Coast region.
- ▶ Gulf Coast wind capacity has increased by more than 19 GW over the past decade. Another 18 GW of wind capacity are currently being planned. Solar capacity is anticipated to increase by 33GW in coming years.
- ▶ The 2021 *GCEO* energy manufacturing investment outlook, until the year 2029, totals \$105 billion. This investment is composed of \$58 billion in LNG investments (55 percent) and \$47 billion (45 percent) in energy manufacturing investments (non-LNG). Most of the total investment will be in Louisiana (\$63.5 billion or 60 percent), followed by Texas (\$41.5 billion or 40 percent).
- ▶ Model results suggest that Louisiana’s upstream employment “bottomed out” in September of 2020. The *GCEO* anticipates that the worst is over for the upstream oil and gas extraction and services sectors. By the end of 2021, Louisiana is expected to regain about 2,600 upstream jobs relative to the trough in September of 2020.
- ▶ Louisiana refining and chemical manufacturing employment is expected to increase by about 300 jobs by the end of 2021, or about a 0.8 percent increase.
- ▶ Louisiana continues to employ more workers in refining and chemicals manufacturing than in upstream oil and natural gas extraction.

The 2021 *GCEO* was made possible with sponsorship from Louisiana Mid-Continent Oil and Gas Association, Phillips 66, Entergy, Enverus, Koch, and Bristow.



## Upton, Richardson Provide La. Mineral Revenues Recommendations

Professors Gregory B. Upton, LSU Center for Energy Studies, and James A. Richardson, LSU Public Administration Institute, authored the report “Mineral Revenues in Louisiana,” prepared in response to Senate Concurrent Resolution 4 of the 2018 second extraordinary session. The report is a continuation of work from the Task Force on Structural Changes in Budget and Tax Policy created by House Concurrent Resolution 11 of the first extraordinary session of 2016.

In the report, Upton and Richardson take a broad and long-term look at Louisiana’s severance tax system. After having met with public and private stakeholders, reviewing the literature on the taxation of oil and gas, and analysis of statistical information, they have prepared recommendations on how the legislature might simplify the tax system, as well as general information and analysis to aid in policy decisions.

Their major recommendations are

- ▶ Institute an equivalent volumetric tax rate for oil and natural gas with rate to be established semi-annually;
- ▶ Remove exemptions associated with horizontal drilling, tertiary wells, and deep wells for new activity;
- ▶ Implement recommendations (1) and (2) simultaneously while maintaining revenue neutrality with respect to current severance tax projections;
- ▶ Implement the new severance tax rates for oil and gas production from new activity; activity originated before tax law change will comply with the current tax structure.



These recommendations are consistent with a broad base and low rate philosophy, revenue neutrality for severance tax collections, and administrative efficiency.

Alternative recommendations are

- ▶ Establish a volumetric tax rate for oil with the rate to be established semi-annually;
- ▶ Remove the verbiage “posted field price” from R.S. 47:633 (7);
- ▶ Review and simplify the calculation of the volumetric rate for natural gas and establish the rate semi-annually;
- ▶ Remove exemptions associated with horizontal drilling, tertiary wells, and deep wells while maintaining revenue neutrality with respect to current severance tax projections.

## **Nehiba Publishes Paper on Role of Diesel Fuel Taxes in Freight Trucking Collision Externalities**

In a paper published in the journal *Regional Science and Urban Economics*, CES Assistant Professor Cody Nehiba investigates how diesel fuel taxes for freight trucking may be contributing to traffic accidents, one of the leading causes of death in the U.S. Although any vehicle entering the roadway will increase the risk of accidents for other road users, freight trucks disproportionately generate these costs due to their high mileage and weight. Freight trucks can also jointly determine their mileage and weight—shipping firms are known to minimize fuel costs by reducing the number of shipments they make while simultaneously increasing the cargo on each shipment when fuel prices rise. Nehiba examines how truck weights and truck miles traveled affect truck-involved collisions to determine if increasing the federal diesel fuel tax—which leads to fewer but heavier trucks on the road—provides benefits for society.

Nehiba’s analysis uses 3.5 billion truck-weight observations to estimate how truck miles traveled and truck weight affect both the total number of collisions as well as the distribution of collision severity. Diesel fuel taxes reduce truck miles traveled, which is hypothesized to provide benefits in terms of reductions in pollution, congestion, and total collisions. The taxes lead the remaining trucks to be heavier, though, as firms optimize their dispatching decisions to minimize fuel costs. Increasing truck weight may lead to more severe accidents involving injury or death while also increasing the number of collisions if heavier trucks are more difficult to maneuver or have increased braking requirements.

Nehiba’s estimates reveal that both truck miles traveled and truck weight increase the total quantity of collisions, and heavier trucks skew the collision distribution toward fatal outcomes. A 1% increase in a truck’s cargo weight (about 300 lbs. on average) increases the probability that an individual is injured in the collision by 0.167% and the probability that the collision is fatal by 0.268%.

“A \$0.37 diesel fuel tax increase—equivalent to a carbon tax of \$36 per metric ton of CO<sub>2</sub>—significantly reduces pollution, congestion, and the total number of truck-involved collisions by over 4,100 crashes annually,” Nehiba said. “Unfortunately, these benefits are more than offset by an increase of 7,495 fatal collisions.”

Cumulatively, the diesel tax is shown to increase the external costs of trucking by \$55.7 billion annually in the U.S., while also creating deadweight loss in the trucking industry.

The results suggest that truck weight is a first-order policy concern, and that policies that directly price truck weight, like an axle-weight-mile tax, would dominate the currently used diesel taxes. By jointly pricing mileage



CES Assistant Professor Cody Nehiba





and weight, such a tax would be able to deliver pollution and congestion reductions similar to a diesel tax, while also saving lives and preserving roads by reducing truck weights.

## Taruffelli White Paper Examines Demand Response Potential in Louisiana

A 2020 white paper by LSU Center for Energy Studies Assistant Professor Brittany Taruffelli analyzes a method regional electrical utilities can use to better meet Louisiana’s surging industrial energy demands.

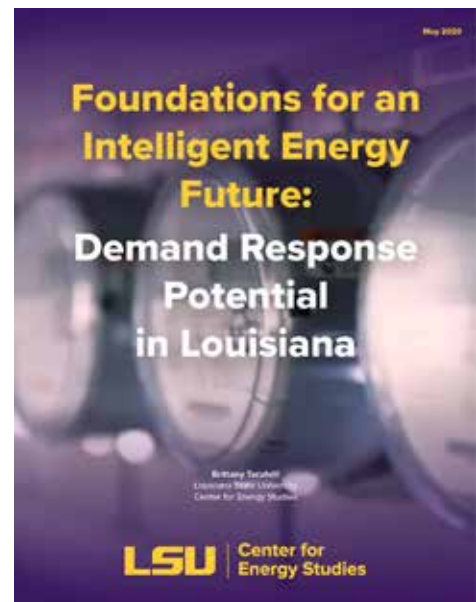
“As Louisiana’s largest industries grow, so do their energy needs, and Louisiana needs to find ways to make that energy as affordable and reliable as possible,” said Taruffelli. “Ultimately, expensive or disrupted energy could mean losing major economic opportunities to other states.”

In “Foundations for an Intelligent Energy Future: Demand Response Potential in Louisiana,” Taruffelli’s analysis focuses on how Louisiana can best apply demand response, a method for electricity utilities to communicate with and incentivize industrial customers to shift peak energy consumption away from utilities’ peak demand periods. The paper highlights numerous benefits Louisiana can reap by increasing participation in demand response programs. These include minimizing spikes in energy demand and corresponding prices, reducing the risk of blackouts and energy transmission congestion; and enabling utilities to leverage current energy production facilities rather than build new power plants.

“Effective demand response programs can lower electricity prices, system costs, and run the electricity grid more reliably in transmission-constrained regions,” said Taruffelli. “They can be a major tool to keep Louisiana’s economy competitive in the long haul.”

According to Taruffelli, Louisiana is uniquely poised to increase demand response participation among its industrial customers. Driven by energy-intensive chemical, petroleum, and natural gas industries, Louisiana is a top state in terms of total per-capita energy consumption. In addition, the state’s energy-intensive industrial sector is forecast to grow over the next three years, with 125 projects across 12 industries, valued at \$32 billion.

The paper highlights that the state could easily offer its largest energy users access to a variety of utility- or market-administered, incentive-based and price-based demand response programs; however, several barriers currently prevent Louisiana from achieving the benefits of demand response. The paper presents recommendations based on best practices that can be utilized by stakeholders, including the Louisiana Public Service Commission, to remove barriers to participation and design compensation mechanisms that would allow for increased participation in demand response programs.



## Sponsored Research

**Description of Helicopter Operations and Utilization in the U.S. Gulf of Mexico.** Gregory B. Upton, Principal Investigator. Cody S. Nehiba, Co-Principal Investigator. Bureau of Ocean Energy Management. Project funding: \$ 159,247.

**Electricity Market Restructuring in the United States.** Gregory B. Upton, Principal Investigator. Public Sector Consultants, Inc. Lansing, MI. November 2019 to October 2020. \$52,000.



**Overlooked Opportunity: Incentivizing Carbon Capture through Carbon Tax Revenues.** Brittany Tarufelli, Principal Investigator. Alliance for Market Solutions. Washington, D.C. August 2020 to December 2020. \$27,232.

**Preliminary Preparation for GHG Update.** David E. Dismukes, Principal Investigator. The Nature Conservancy of Louisiana. \$9,994.

**Southeast Regional Carbon Storage Partnership: Offshore Gulf of Mexico.** David E. Dismukes, Principal Investigator. Southern States Energy Board. \$545,875

**Updated Louisiana Greenhouse Gas Inventory and Emissions Analysis for the Governor's Office on Coastal Activities.** David E. Dismukes, Principal Investigator. Louisiana Office of the Governor. \$65,830

## Publications 2020

Dismukes, David E. (with B.F. Snyder and M. Layne). "A Cash Flow Model of an Integrated Industrial CCS-EOR Project in a Petrochemical Corridor: A Case Study in Louisiana." *International Journal of Greenhouse Gas Control* 93 (February).

Dismukes, David E. "Current Trends and Issues in Reforming State-level Solar Net Energy Metering Policies." *LSU Journal of Energy Law & Resources* 8(2):419-451.

Dismukes, David E. "Insight: Irreparable Changes Are Coming to the American Oil and Gas Industry." *10/12 Industry Report* 5(1):55.

Dismukes, David E. "Opportunities for Carbon Capture, Utilization and Storage in Louisiana." LOGA Industry Report. Summer: 18-21.

Dismukes, David E. and Sid Narra (with Brian Snyder and Valentine Gomez). "Use and Limits of Ecosystem Services Valuations in the Gulf of Mexico." New Orleans (LA): Department of the Interior, Bureau of Ocean Energy Management. Contract No.: M17AC00018, Report No.: OCS Study BOEM 2020-0xx. 80 pp.

Iledare, Omowumi O. (with O. Ogolo, P. Nzerem, I.S. Okafor, E. Iloegbunam, and I.P. Ekeoma). "Assessing the Impact of Deep Offshore and Inland Basin Production Sharing Contract Amendments on the Economics of Deep Offshore E&P Assets in Nigeria." Paper prepared for Nigeria Annual International Conference and Exhibition, August 11-13, 2020. Lagos, Nigeria. SPE # 203741-MS. (Due to COVID-19 the physical event was not held.)

Iledare, Omowumi O. (with A.S. Nwosi-Anele and O. Adeogun). "Implications of Petroleum Industry Fiscal Bill 2018 on Heavy Oil Field Economics." Paper prepared for Nigeria Annual International Conference and Exhibition, August 11-13, 2020. Lagos, Nigeria. SPE # 203740-MS. (Due to COVID-19 the physical event was not held.)

Iledare, Omowumi O. (with K.I. Ojukwu, J. Ajienka, A. Dosunmu, and C. Ibe). "Investigating the Nexus between Nigerian Rig Rates and Crude Oil Prices." Paper prepared for Nigeria Annual International Conference and Exhibition, August 11-13, 2020. Lagos, Nigeria. SPE # 203608-MS. (Due to COVID-19 the physical event was not held.)

Iledare, Omowumi O. (with L. Ojaraida and J. Ajienka). "Performance Evaluation of Natural Gas Value Chain in Nigeria." Paper prepared for Nigeria Annual International Conference and Exhibition, August 11-13, 2020. Lagos, Nigeria. SPE # 203725-MS. (Due to COVID-19 the physical event was not held.)

Kaiser, Mark J. "Evaluation of Changes in Expected Ultimate Recovery for U.S. Gulf of Mexico Oil and Gas Fields, 1975-2016." *Natural Resources Research* (November).



- Kaiser, Mark J. "Offshore Oil and Gas Records circa 2020." *Ships and Offshore Structures* (October).
- Kaiser, Mark J. *The Offshore Pipeline Construction Industry: Activity Modeling and Cost Estimation in the U.S. Gulf of Mexico*. Cambridge (MA): Gulf Professional Publishing. 502 pp.
- Kaiser, Mark J. (with J.D. Shively and J.B. Shipley). "An Update on the Louisiana and Texas Rigs-to-Reefs Programs in the Gulf of Mexico." *Ocean Development and International Law* 51(1):73-93.
- Nehiba, Cody. "Taxed to Death? Freight Truck Collision Externalities and Diesel Taxes." *Regional Science and Urban Economics* 85(November).
- Nehiba, Cody. "Transportation and Energy Policy in Louisiana." LSU Center for Energy Studies White Paper. June 2020.
- Nehiba, Cody. (with A. Luttmann). "The Effects of Employee Hours-of-Service Regulations on the U.S. Airline Industry." *Journal of Policy Analysis and Management* 39(4):1043-1075.
- Pike, Ralph W. *Continuous Renewable Energy Generation with Lithium Ion Battery Storage on the Micro Grid*. Seattle (WA): Kindle Direct Publishing. 185 pp.
- Tarufelli, Brittany. "Foundations for an Intelligent Energy Future: Demand Response Potential in Louisiana." LSU Center for Energy Studies White Paper. May 2020.
- Tarufelli, Brittany. "Overlooked Opportunity: Incentivizing Carbon Capture through Carbon Tax Revenues." LSU Center for Energy Studies White Paper. December 2020.
- Upton, Gregory B. (with M. Agerton and B. Gilbert). "The Economics of Natural Gas Flaring: An Agenda for Research and Policy." 54 p. USAEE Working Paper No. 20-460.
- Upton, Gregory B. (with R.A. Decker and M. McCollum). "Boom Town Business Dynamics: Finance and Economics Discussion Series 2020-081." Washington: Board of Governors of the Federal Reserve System. September 2020.
- Upton, Gregory B. and David E. Dismukes. 2021 "Gulf Coast Energy Outlook." LSU Center for Energy Studies and the E.J. Ourso College of Business. LSU White Paper. Fall 2020.
- Upton, Gregory B. (with F. Ferdowsi and S. Mehraeen). "Assessing Distribution Network Sensitivity to Voltage Rise and Flicker under High Penetration of Behind-the-Meter Solar." *Renewable Energy* 152(June): 1227-1240.
- Upton, Gregory B. (with M. Oliver). "Are Energy Endowed Countries Responsible for Conditional Convergence?" 39 p. USAEE Working Paper No. 19-414, 2019.
- Upton, Gregory B. (with J.A. Richardson). Mineral Revenues in Louisiana. LSU Center for Energy Studies White Paper. March 2020.
- Upton, Gregory B. (with L.C. Scott). *Louisiana Economic Outlook: 2021-2022*. Economics & Policy Research Group, E. J. Ourso College of Business, Louisiana State University. Baton Rouge, LA. September 2020.
- Upton, Gregory B. and Brittany Tarufelli (with K. Rose). "Electricity Market Restructuring and Retail Rates." 45 p. USAEE Working Paper No. 20-462.
- Upton, Gregory B. (with B. Unel). "Effects of the Shale Boom on Entrepreneurship in the U.S." 42 p. USAEE Working Paper No. 20-461.



# Speaking Engagements

## David E. Dismukes

Baton Rouge Advocate 2020 Economic Outlook Summit. Panelist. Baton Rouge, LA. January 8.

“Opportunities for carbon capture, utilization, and storage in the Louisiana chemical corridor.” Air and Waste Management Association, Louisiana Section Luncheon. Gonzales, LA. January 16.

“The 2020 Gulf Coast Energy Outlook.” University of Louisiana Lafayette, Southern Unconventional Resources Center for Excellence. Lafayette, LA. February 16.

“Pipeline industry: economic trends and outlook.” Joint Industry Association Annual Meeting. Louisiana Mid-Continent Oil and Gas Association and the Louisiana Oil and Gas Association. Lake Charles, LA. March 5.

“Ratepayer benefits of reforming PURPA.” Harvard Electricity Policy Group Webinar “PURPA: A time to reform or reduce its role?” March 26.

“The 2020 Gulf Coast Energy Outlook: COVID-19 update.” Baton Rouge Area Chamber of Commerce Business Webinar: COVID-19 and Global Supply Impacts on the Capital Region and Louisiana Economies. Baton Rouge, LA. June 3.

“Evaluation of Louisiana’s Depleted Gas Reservoirs for Geological Carbon Sequestration.” Louisiana Mid-Continent Oil and Gas Association Carbon Capture and Underground Storage Committee Meeting. August 25.

“Consumer Perspectives on the Rate Design of the Future.” National Association of State Utility Consumer Advocates (“NASUCA”). Annual Conference. November 10.

## Cody S. Nehiba

“The Time-of-Day Travel Demand Elasticity Paradox.” Association of Environmental and Resource Economists Summer Conference. Virtual Event. June 4.

## Brittany Tarufelli

“Strategic Behavior and Market Design in Regional Climate Policy.” Western Economic Association International Webinar. June 27.

## Gregory B. Upton, Jr.

“Firm Dynamics and Local Economic Shocks: Evidence from the Shale Oil and Gas Boom.” Allied Social Sciences Association. Society of Government Economists. San Diego, CA. January 4. (coauthor's presentation).

“Gulf Coast Energy Outlook.” Desk and Derrick Club of Lafayette. Lafayette, LA. January 15.

“Gulf Coast Energy Outlook.” Society of Independent Professional Earth Scientists (SIPES). New Orleans, LA. February 18, 2020.

“Gulf Coast Energy Outlook.” Women's Energy Network Virtual Luncheon. Webinar. May 4.

“Mineral Revenues in Louisiana.” Louisiana State Legislature. Senate Committee on Revenue & Fiscal Affairs. Baton Rouge, LA. May 28.

“Mineral Revenues in Louisiana.” Legislative Task Force Working Group on Long-Term Recovery. Webinar. June 8.

“Gulf Coast Energy Outlook.” National Association of Royalty Owners (NARO) Louisiana Chapter. Webinar. September 8.



- “Gulf Coast Energy Outlook.” Southeastern Geophysical Society of New Orleans (SGS). Webinar. September 10.
- “Gulf Coast Energy Outlook.” Professional Landmen's Association of New Orleans (PLANO). Webinar. September 16.
- “Gulf Coast Energy Outlook.” Louisiana Government Finance Officers Association. Webinar. October 7.
- “Mineral Revenues in Louisiana.” Southern Energy Conference. Webinar. October 21.
- “Gulf Coast Energy Outlook.” LSU Center for Energy Studies GCEO Kickoff. November 18.
- “Gulf Coast Energy Outlook.” Society of Louisiana Certified Public Accountants. Webinar. November 20.
- “Electricity Market Restructuring and Retail Rates.” Southern Economic Association. Webinar. November 23.

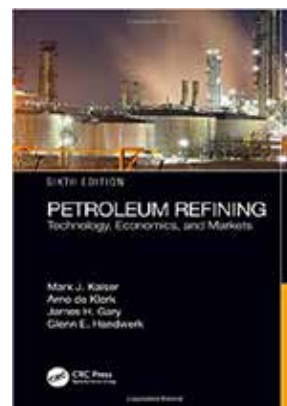
## Faculty Highlights

### Kaiser Coauthors New Edition of Petroleum Refining Text

CES Professor Mark Kaiser coauthored a new edition of the book *Petroleum Refining: Technology, Economics, and Markets* (CRC Press, 2020). Written for refining professionals, as well a general audience, the text examines the primary economic and market characteristics of the industry and describes the inputs and outputs of refining.

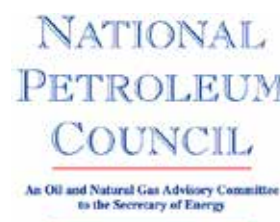
The text explains that, due to technological advances, the many products of modern refineries—fuels for heating and transportation, chemicals, lubricants, and other products—while vastly different from the products of the past, remain relatively inexpensive because of continued technological advances and the efficiency of transportation systems and supply chains. Markets for refined products have developed globally because fuel specifications throughout the world are fairly uniform. And the fact that the refined products are in liquid form makes them cheaper to ship overseas—only a few dollars per barrel—far less than the sales price of the products.

This sixth edition of *Petroleum Refining: Technology, Economics, and Markets* updates and expands the previous edition to reflect new technologies, methods, and topics. Significant changes include a new discussion on the business and economics of refining, cost estimation and complexity, crude origins and properties, fuel specifications, and updates on technology, process units, and catalysts.



### Dismukes Invited to Serve Fourth Term on NPC

In the summer of 2020, then U.S. Secretary of Energy Dan Brouillette invited CES Executive Director and Professor David Dismukes to continue serving as a member of the National Petroleum Council. The new term spans 2020-2021. Dismukes is one of several members invited to represent the views of academic institutions with energy and environmental curricula. Dismukes has served on the NPC since 2017. Prior to Dismukes' appointment, former Executive Director Allan Pulsipher represented the Center on the Council for several years.



Created by President Truman in 1946 to continue industry and government cooperation that began during World War II, the NPC is a self-funded advisory body whose members represent all sectors of the oil and gas industries and related interests. Members provide the Secretary of Energy advice, information,





and recommendations on oil and natural gas industry issues. Recent studies undertaken by the NPC include “Meeting the Dual Challenge: A Roadmap to At-Scale Deployment of Carbon Capture, Use, and Storage” and “Dynamic Delivery: America’s Evolving Oil and Natural Gas Transportation Infrastructure.”

### Tarufelli on Advisory Board for Roosevelt Project Gulf Coast Case Study

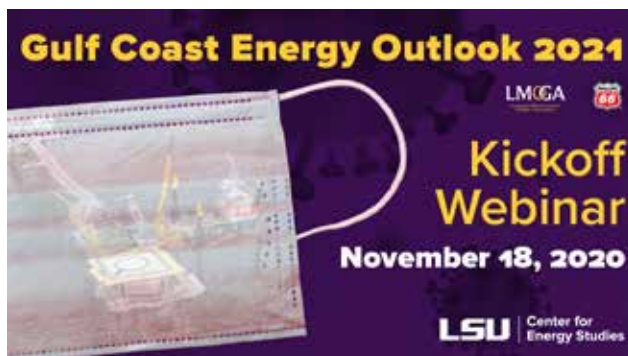
CES Assistant Professor Brittany Tarufelli was chosen to serve on the study advisory board for the MIT Energy Initiative’s Roosevelt Project Gulf Study. The Roosevelt Project is a multidisciplinary effort considering the transition of the U.S. economy toward decarbonization, with a focus on minimizing worker and community dislocation and sustaining employment levels within at-risk communities. The Gulf case study considers parts of Texas and Louisiana that contribute substantially to U.S. oil and gas production, as well as its petrochemical industry. As the region is expected to experience adverse natural and economic effects due to climate change, the economic resilience of the region must be carefully considered with any decarbonization plan.

In addition to the Gulf region, the Roosevelt Project will develop implementation plans for Michigan, Ohio, and Indiana (industrial heartland), southwestern Pennsylvania, and New Mexico. Team members will work with representatives from those communities to develop transition plans specific to those regions. That phase of the project should be complete in 2021. In 2020, the Roosevelt Project commissioned nine working papers on topics related to the transition.

## Events & Outreach

The Center’s event calendar for the year 2020 was like no other, as the COVID-19 pandemic shut down all in-person events on campus as of March 17. Before the shutdown, on February 10-11, the Center hosted the Carbon Capture, Utilization and Storage (CCUS) Industry Workshop at the Cook Conference Center, at which more than 60 representatives from oil and gas companies received instruction on the fundamentals of CCUS. The meeting also served as an opportunity for industry engagement on the topic.

The annual Gulf Coast Energy Outlook Kickoff took place via Zoom on November 18. More than 200 attendees logged in to view the GCEO presentation, which was recorded and is available for viewing at <https://www.lsu.edu/ces/conferences/gceo2021/>.







Throughout 2020, faculty responded to nearly **70 requests for interviews** from local, regional, and national outlets.

## CES in the News 2020

In the tumultuous year 2020, CES faculty were sought by news media for commentary and expert input regarding several energy-related topics, including the dual hits of the coronavirus and an oil price war between Saudi Arabia and Russia, resulting in historic oil production cuts and a severe drop in oil prices in the spring. Also in the news were potential impacts of the Biden administration's energy policies, the hurricanes that devastated southwest Louisiana, and the shutting down of Shell's Convent refinery.

Both CES Executive Director Professor David Dismukes and Associate Professor Greg Upton were interviewed on the findings of the annual *Gulf Coast Energy Outlook*, which was covered by more than one dozen outlets, including *The Advocate*, *The Greater Baton Rouge Business Report*, *Daily Advertiser*, and *The Houma Courier*, as well as WWL radio's First News with Tommy Tucker, and the Moon Griffon and Brian Haldane radio programs.

Faculty also provided professional commentary in the form of op-ed columns. For the April 7 *10/12 Industry Report*, Dismukes discusses the fundamental changes experienced to that point in the year 2020, resulting from the pandemic and the Saudi Arabia-Russia oil price war, "dual crises that are an existential threat to American oil and natural gas producers and their service and support company counterparts." He concludes on a positive note, predicting that the oil and gas industry would rebound as a result of retooling and that its unconventional resources and intellectual capital would sustain it through this challenging period.

In an August 24 guest column for *The Advocate*, Upton writes about then presidential candidate Joe Biden's plan to ban new oil and gas permitting on federal lands and waters as part of his plan for climate change. Upton states that such a ban would not likely have the intended effects on an energy transition, as the policy would create price increases as global markets would adjust to the news, thereby increasing energy costs for consumers and businesses. In the long run, supply and demand would balance at approximately the same level, with or without the ban. And ultimately, some of the supply would come from countries with weaker environmental regulations. Regarding the U.S.'s efforts at decarbonization, he notes the fact that 30 states have passed renewable portfolio standards requiring some share of electricity from renewables. Since 1992, the federal government has subsidized renewables through production tax credits programs, with a cost of over \$5.1 billion in 2019. During that year, an estimated 37% of U.S. electricity came from low-carbon sources.

The Center's "In the News" webpage includes a full list of articles and appearances, by year.

<https://www.lsu.edu/ces/inthenewsarchive.php#2020>



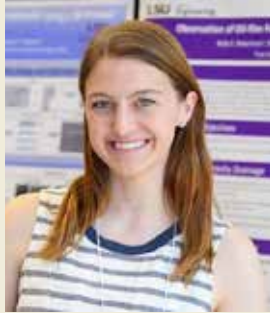
## Scholarships

### 2020-2021 Scholarships Awarded

The Center for Energy Studies awarded scholarships for the 2020-2021 academic year to three LSU students pursuing energy-related fields of study and careers.

#### LMOGA/Brooksher Scholarship

**Kelly Robertson**, a senior majoring in chemical engineering, from Alexandria, La.



#### F. Malcolm Hood Scholarship

**Felix Rodrigue**, a junior majoring in electrical engineering, from Slidell, La.



#### GCPA emPOWERing Women Scholarship

**Tiffany Aucoin**, a junior majoring in coastal environmental science, from Berwick, La.



*The Center congratulates our scholarship recipients and wishes them well as they continue their studies.*

## Personnel

### Administration

**David E. Dismukes**, Ph.D., executive director, director of the Policy Analysis Division, and professor

**Diana Reynolds**, assistant to the executive director

**Marybeth Pinsonneault**, communications manager

### Division of Policy Analysis

**Gregory B. Upton, Jr.**, Ph.D., assistant professor

**Mike McDaniel**, Ph.D., professional-in-residence (retired) and an adjunct professor of environmental sciences in the School of the Coast and Environment

**Don Goddard**, Ph.D., associate professor (retired)

**Cody S. Nehiba**, Ph.D., assistant professor

**Brittany L. Taruffelli**, Ph.D., assistant professor

### Division of Research & Development

**Mark J. Kaiser**, Ph.D., director of the Research & Development Division and professor

**Siddhartha Narra**, Ph.D., research associate

### Division of Energy Information & Data

**Omowumi (Wumi) Iledare**, Ph.D., Professor Emeritus, director of the CES Energy Information and Data Division, professor of petroleum economics and policy research, adjunct professor of petroleum economics at the Craft & Hawkins Department of Petroleum Engineering at LSU, and director of the Emerald Energy Institute, University of Port Harcourt, Nigeria.

**Ric Pincomb**, research associate

**Stacy Retherford**, computer analyst

**Mike Surman**, computer analyst





# Minerals Processing

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## Minerals Processing Research Division

Ralph Pike, Director | F. Carl Knopf, Co-Director | [lsu.edu/mpri](http://lsu.edu/mpri)

The Minerals Processing Research Division (MPRD) of the Center for Energy Studies was established in 1979 by federal legislation as one of 31 State Mineral Institutes associated with the U.S. Department of the Interior. The mission includes facilitating research and public service programs in process research and technology transfer, sustainable development, energy management, and inherently safer design. This minerals processing research and public service complements and benefits from the energy research and geological research performed by other groups in the Center for Energy Studies and the Louisiana Geological Survey.

## Current Research

### MPRD Continues Research on Continuous Renewable Energy Generation with Lithium-Ion Batteries in the Micro-Grid

The MPRD research program is continuing to determine the potential of lithium-ion batteries and renewable energy use in chemical plants and refineries in the Gulf Coast. A disruptive technology is arising from the combination of solar and wind power with lithium ion battery energy storage in combination with micro-grids. A book has been published giving a detailed review and a summary of future projection for lithium-ion batteries, renewable power and micro grid technologies: *Continuous Renewable Energy Generation with Lithium-Ion Battery Storage on the Micro Grid*, ISBN-10: 9798670042307, Kindle Direct Publishing ASIN: B08DSZ2YTH print edition, ASIN: B08P3X7KVM electronic edition (2020).

This disruptive technology will advance rapidly as the electricity generation mix continues to experience a rapid rate of change. Renewables are the fastest-growing source of electricity generation through 2050 because of continuing declines in the capital costs for solar and wind. Renewable sources now provide 23



percent of total electricity generation compared to coal's 20 percent. Record generation from wind and near-record generation from solar contributed to the overall rise in renewable electricity generation. Wind generation reached a record monthly high in April 2019 of 30.2 million megawatt hours (MWh). Solar generation—including utility-scale solar photovoltaics and utility-scale solar thermal—reached a record monthly high in June 2018 of 7.8 million MWh and will likely surpass that level in the summer of 2021.

Using energy storage with lithium-ion battery technology from wind farms and solar arrays, these sites can now provide continuous power to the grid. With battery storage, power generated by renewable resources is stored when it is produced, and then used when demand is high.

Applications of lithium ion battery technology have gone from replacing primary (non-recharge) batteries with secondary (recharge) batteries that are being used: in appliances and cell phones, in vehicles such as cars and large industrial manufacturing and mining prime movers, in microgrids in combination with solar energy and wind power, and replacing natural gas peaker plants for regulating the frequency of the electric grid.

Lithium ion batteries have advantages of high energy density, light weight, no memory effect and better environmental performance and are used for powering all types of electric vehicles (EVs). EVs produce zero tailpipe emissions, operate quietly and smoothly, have stronger acceleration, and require less maintenance.

Lithium ion battery demand is forecast to grow about tenfold between 2018 and 2030, mostly due to the electric vehicle (EV) boom. The top five lithium-ion manufacturers by capacity (2018) are Korea's LG Chem, China's CATL, China's BYD, Japan's Panasonic, and USA's Tesla. A number of companies and miners are attempting to position themselves for potential supply deficit in Li-ion batteries and its materials including FMC Corp, Albemarle Corp., Elcora Advanced Materials, and eCobalt Solutions.



**Renewable sources** now provide **23 percent of total electricity generation** compared to coal's 20 percent. Record generation from wind and near-record generation from solar contributed to the overall rise in renewable electricity generation.

## Energy Sustainability Remote Laboratory

The Energy Sustainability Remote Laboratory (ESRL), [www.esrl.lsu.edu](http://www.esrl.lsu.edu) is undergoing revisions to comply with Title II of the Americans with Disabilities Act of 1990 as is required for all LSU web sites. Dr. Kerry Dooley is in the process of performing the remediation of ESRL in collaboration with the OU Campus program staff.

ESRL allows partner universities to implement authentic experiences by providing data from actual operating energy or energy-intensive manufacturing systems – a natural gas-based cogeneration unit, a nuclear power plant, a coal-fired plant, a photovoltaic solar facility, and bench-scale units for biomass processing to chemicals, and biomass gasification. The ESRL site also provides pre-tested background materials and suggested inquiry-based assignments. Currently ESRL is used by engineering programs at LSU, Auburn, University of Alabama, University of South Alabama, University of Nevada, Las Vegas, Florida State University, and several other schools.



**ESRL allows partner universities to implement authentic experiences by providing data from actual operating energy or energy-intensive manufacturing systems.**

## Researchers Examine Use of CO<sub>2</sub> in Production Processes

Research on chemical processes for carbon dioxide has identified 14 new energy-efficient and environmentally acceptable catalytic processes that can use excess high purity carbon dioxide as a raw material available in a chemical production complex. As described below, the optimum configuration of plants was determined based on the triple bottom line that includes sales, economic, environmental and sustainable costs using the Chemical Complex Analysis System.

MPRD researchers reviewed 86 published articles of laboratory and pilot plant experiments that describe new methods and catalysts to use carbon dioxide for producing commercially important products. Carbon dioxide is a stable molecule. Generally, reactions involving carbon dioxide are endothermic and often require high temperature, active catalysts, electricity or the energy from photons. Energy requirements can be reduced using a co-reactant. Also, reactions with carbon dioxide as a co-reactant can be thermodynamically more feasible. Carbon dioxide can be used as a reactant in heterogeneous or homogeneous catalytic and non-catalytic processes. Also, it can be used in photochemical, photo-catalytic reduction, bio-chemical, and electro-catalytic conversions.

A methodology for selecting the 14 new energy-efficient processes was developed. The selection criteria included: process operating conditions, energy requirement for reactions, thermodynamic feasibility and equilibrium conversion of the reactions based on Gibbs free energy change, catalyst conversion, selectivity, cost and life (time on stream to deactivation); and methods to regenerate catalysts. Also included were demand and potential sales of products and market penetration. In addition, cost of raw materials, energy, environmental and sustainable costs were evaluated along with hydrogen consumption for hydrogenation reactions.

Based on the methodology for selecting new processes, 20 were identified as candidates for new energy efficient and environmentally acceptable plants. These processes were simulated using HYSYS, and a value-added economic analysis was evaluated for each process. From these, 14 of the most promising were integrated in a superstructure that included plants in the existing chemical production complex in the lower Mississippi River corridor (base case) using the Chemical Complex Analysis System. These processes include production of methanol, ethanol, dimethyl ether, propylene, formic acid, acetic acid, styrene, methylamines, graphite, and synthesis gas. The base case of existing plants in the chemical production complex in the lower Mississippi River corridor included 13 multiple plant production units plus associated utilities for power, steam and cooling water and facilities for waste treatment.

The optimum configuration of plants in the complex was determined based on the triple bottom line that includes sales, economic, environmental and sustainable costs using the Chemical Complex Analysis System. From 18 new processes in the superstructure, the optimum structure had seven potentially new processes, including acetic acid, graphite, formic acid, methylamines, propylene and synthesis gas production. With the additional plants in the optimal structure the triple bottom line increased from \$412 to \$574 million per year and energy increased from 4,030 to 7,660 TJ/year.

The Chemical Complex Analysis System was used for multicriteria optimization to find optimal solutions that maximize companies' profits and minimize costs to society, called efficient or Pareto optimal solutions. These are optimal points in which attempting to improve the value of one objective would cause another objective to decrease. Companies' profits are sales minus economic and environmental costs. Economic costs include raw material, utilities, labor, and other manufacturing costs. Environmental costs include permits, monitoring of emissions, fines, etc. The costs to society are measured by sustainable costs. These costs are from dam-





age to the environment by emissions discharged within permitted regulations. When only maximizing companies' profits, the optimal solution was \$550 million per year for companies' profit and sustainable credits/costs were -\$12 million per year. When only maximizing sustainable credits/costs the optimal solution was \$41.1 million per year for companies' profit and sustainable credits were +\$21.1 million per year. One of the intermediate optimal values was a profit of \$411 million per year and sustainable credits of +\$4.5 million. per year. It is another decision to determine the specific value of the weight that is acceptable to all concerned.

The methodology presented here can be applied to other sources of carbon dioxide. For example, flue gases from gas-fired turbines have 3.0 mol percent CO<sub>2</sub> and coal-fired plants have 10 percent-12 percent CO<sub>2</sub>. The standard process of amine scrubbing gives essentially pure CO<sub>2</sub> from flue gases, and costs range from \$50-\$60 per ton of CO<sub>2</sub> captured. Research is continuing for new, more efficient methods to remove carbon dioxide from combustion gases.

## On-Line Research, Publications and Programs

*Continuous Renewable Energy Generation with Lithium-Ion Battery Storage on the Micro Grid*, 180 pages, (2020), ISBN-10: 9798670042307, The book is available both in print and e-book. Kindle Direct Publishing ASIN: B08DSZ2YTH print edition, ASIN: B08P3X7KVM electronic edition for \$39.00.

*Essentials of Optimization for Chemical Engineering*, 500 pages (2019), now available on Amazon/Kindle, has chapters on analytical methods, LP, SVS, NLP, MILP, MINLP, GO, On-Line (Real-Time) Optimization, GP, DP and CofV. The book is available both in print and e-book, ASIN: 1645700968 print editions, ASIN: B07ZWNFMWC e-book edition for \$29.00.

A companion book, *Essentials of Economic Decision Analysis for Chemical Engineering*, 200 pages (2015) is also available on Amazon Kindle in print (\$8.95) and e-book (\$2.99).

With the MPRD web site [www.mpri.lsu.edu](http://www.mpri.lsu.edu) now on the LSU web server, its content has been expanded, revised and extended with new research results including journal articles, conference proceeding, technical reports, theses, dissertations and computer programs. These programs were developed with industry assistance for Gulf Coast plants and the process models can be applied to comparable plants.

Two programs that can give immediate and substantial energy savings for chemical plants and refineries are "pinch technology" and "on-line optimization." Large companies have corporate level groups that routinely apply pinch technology and on-line optimization. Small to medium sized chemical companies in Louisiana do not have the trained personnel needed to apply this technology. Two short courses on these topics are available by request by contacting the Division at [www.mpri.lsu.edu](http://www.mpri.lsu.edu).

The MPRD web site also includes professional development, self-study courses for professional engineers' PDH requirements. These courses and computer program are part of the web site materials that are continually being revised and extended.

## MPRD Personnel

**Ralph W. Pike**, Ph. D., director, Horton Professor of Chemical Engineering

**F. Carl Knopf**, Ph. D., associate director, Professor Emeritus

**Kerry Dooley**, Ph.D., research collaborator, BASF Professor of Chemical Engineering







# Radiation Safety

**Wei-Hsung Wang, Director** | [lsu.edu/radiation-safety](http://lsu.edu/radiation-safety)

The LSU Radiation Safety Office (RSO), which reports through the Center for Energy Studies to the Office of Research and Economic Development, is a unique, independent, and vital academic unit. The RSO directly supports and also actively engages in research, teaching, and clinical activities involving the use of sources of ionizing and non-ionizing radiation at LSU. Under the direction of the interdepartmental University Radiation Safety Committee (RSC), the RSO is responsible for developing and implementing radiological control policies and procedures as well as ensuring sound safe practice to not only comply with federal and state regulations and license/registration conditions but also assure adequate protection of people, the environment, and the integrity of the University. The LSU System's broad-scope Radioactive Material License issued by the Louisiana Department of Environmental Quality (LDEQ) allows the University maximum flexibility to accomplish legitimate and realistic education objectives through the effective and efficient operation of a regulatory-mandated radiation protection program carried out by the RSO. Administrative authorization for the radiation protection program from the University is stipulated in the LSU System's Permanent Memorandum No. 30 (PM-30): *Radiation Protection*



RSO lead technical assistant Adam Curet prepares swipe samples to quantify radioisotopes using a liquid scintillation counter.



*Program.* Enforcement actions for radiation safety violations are authorized under the LSU Policy Statement 99 (PS-99): *Radiation Safety Violations*. In addition, the LSU System's *Safety Procedures for Non-Ionizing Radiation* governs the non-ionizing radiation safety program.

In fiscal year 2019-2020, the RSO reviewed and approved 62 grant proposals involving the use of radioactive materials, radiation producing equipment, or Class 3B and Class 4 laser systems. Funds requested by these proposals were \$52,264,890. Actual funds granted to LSU were \$25,015,087. Seventeen out of the 62 grant proposals are still under review by the funding agencies. Currently, there are 953 approved radiation workers (including 87 radiation principal investigators) in 178 radiation laboratories with 6,833 annual radiation monitoring devices issued under the LSU's radiation protection program. The program covers the Agricultural Center and its research stations, the Pennington Biomedical Research Center (PBRC), and associated facilities under LSU, such as the Center for Advanced Microstructures and Devices (CAMD), the National Center for Biomedical Research and Training, and the School of Veterinary Medicine (SVM). The RSO provides training and monitoring for radiation workers and performs routine surveys, inspections, survey meter calibrations (85 meters of different types), leak tests, and radioactive waste management to fully meet regulatory requirements and license/registration specifications. The RSO also evaluates and inspects inventoried Class 3B and Class 4 laser systems for laser intrabeam hazards and provides laser safety training. There are 84 active Class 3B and Class 4 laser systems, 66 approved laser users (including 15 laser principal investigators), and 41 laser laboratories.

## Louisiana Department of Environmental Quality Conducts Inspections

LDEQ's Emergency and Radiological Services Division/Radiation Section conducted three compliance and enforcement inspections in 2020. In February, two inspectors visited the RSO and carried out inspections of the broad-scope radioactive material license, the physical protection of category 1 and category 2 quantities of radioactive material (PPQRM), and the analytical radiation producing equipment at LSU. The inspectors reviewed the records of designated Reviewing Officials, individuals granted unescorted access, policy, program, and procedure requirements under PPQRM regulations [e.g., maintenance/service/repair as well as alarm drill/testing of surveillance equipment, review of security and access authorization programs, refresher training, protection of physical and sensitive information, and pre-arranged plan with local law enforcement agency (LLEA)], the National Source Tracking System, membership and meeting minutes of the Radiation Safety Committee, preparation, disposal, and shipment of radioactive waste, inventory and leak tests of sealed radioactive sources, personnel and environmental radiation monitoring, ordering, receiving, and delivering of sources of radiation, review/approval/renewal/deactivation of authorization to use sources of radiation, quarterly radiation laboratory contamination surveys, and semi-annual radiation laboratory audits. They also inquired about the point of contact at the LLEA, the annual radiation protection and ALARA programs review, the administrative limits for occupational radiation exposure, the release of liquid radioactive waste, the current status of approved radiation principal investigators and radiation laboratories, the in-laboratory radiation surveys and action levels, the annual refresher training, the investigation of elevated personal exposure, the quality assurance/quality control and operation of radioanalytical equipment, the functions and applications of the Health Physics Assistant database management software, the authority of LSU's radiological control program and enforcement (i.e., PM-30 and PS-99), and the standard operating procedures for survey meter calibration and leak tests. In addition, the inspectors looked over LSU's radioactive material license, the *Radiation Safety Manual*, the radioactive waste management process, and the emergency procedures for radiation spills.

The inspectors walked through the radioactive package receiving area, the survey meter calibration station, the radioactive material storage area, a radioanalytical laboratory, the radioactive waste storage facilities, and the PPQRM security zones of the RSO. They also visited additional 19 radiation laboratories under LSU's radiation protection pro-



gram. During the laboratory visits, they checked the inventoried source location, radiation levels, the function and calibration of in-laboratory survey meters, the posting and barrier requirements, the storage of radioactive waste, and the Radiation Safety Manual. They also reviewed the source inventory and disbursement logs, the in-laboratory training records, the in-laboratory radiation surveys, and the functions of the fume hoods. In addition, the lead inspector questioned the approved radiation workers (e.g., faculty member, laboratory manager, and clinical technologist) about the research/clinical protocols involving uses of radiation sources, the designated radiation areas, the patient workload and release limits, the operation and quality assurance/quality control of radioanalytical equipment, the physical operational parameters and safety features of analytical and diagnostic radiation producing equipment, wearing of personal radiation monitoring devices, the procedures of ordering and receiving radioactive materials, and the practice for radioactive waste labeling/storage/disposal. After the walk-through, an exit interview was held, and no areas of concern were listed on the LDEQ's Field Interview Form.

## Impact on Operations by COVID-19

Because of the implementation of remote working plans by LSU in response to Governor Edwards' declaration of a statewide public health emergency, all LSU employees, except those who had been considered essential personnel, were asked not to report to campus effective March 17, 2020. All campus buildings were locked and could be accessed by only essential personnel beginning March 19, 2020. Due to the nature and operation of the RSO, remote working was not feasible to fully meet the compliance requirements. Therefore, all staff of the RSO reported to campus to perform their duties, with prevention control measures (e.g., close monitoring of common signs of COVID-19, COVID-19 testing, personal protection equipment, social distancing, and sound personal hygiene practice). Although tasks regarding physical protection for sensitive radioactive materials were completed in a timely manner, certain routine compliance activities (e.g., diagnostic X-ray inspections, semi-annual radiation laboratory audits, survey meter calibrations, exchange of radiation monitoring devices, and in-laboratory training) could not be completed due to the campus closure. The LDEQ acknowledged the difficulties for the licensees to maintain compliance during these trying times and consequently issued a guidance protocol to mitigate regulatory requirements. The RSO followed the compliance relief as well as documented and caught up all unfinished compliance tasks by the end of 2020.

## Professional Contributions and Recognitions

### Wang Named Chair of American Board of Health Physics

Wei-Hsung Wang, RSO director and Center for Energy Studies professor, was appointed chair of the American Board of Health Physics (ABHP) for 2021. Wang was installed as a board member of the ABHP in 2019 and served as vice chair in 2020. The ABHP grants professional certification in the field of health physics. The certification process is accredited by the Council of Engineering and Scientific Specialty Boards.

The ABHP board includes representatives from Mirion Technologies, Inc., the U.S. Environmental Protection Agency, the U.S. Nuclear Regulatory Commission, Worcester Polytechnic Institute, and Y-12 National Security Complex. Wang's term as a board member ends in 2023.



American Board of Health Physics



Health Physics is the area of public health and environmental health engineering that deals with the safe use of ionizing and non-ionizing radiation in order to prevent harmful effects of the radiation to individuals, population groups, and the biosphere via the application of diverse scientific principles. Health physicists are responsible for the safety and security aspects in the design of processes, equipment, and facilities utilizing radiation sources as well as for the adequate disposal of radioactive waste, ensuring that radiation exposure to personnel is minimized and is at all times within regulatory limits.

## Wang Invited to the U.S. Environmental Protection Agency Review Panel

Wei-Hsung Wang, RSO director and Center for Energy Studies professor, was invited to serve as a member of the U.S. Environmental Protection Agency Science Advisory Board Radiation Advisory Committee augmented for the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) Revision 2 review panel. MARSSIM was developed collaboratively by four federal agencies that have authority and control over radioactive materials: Department of Defense, Department of Energy, Environmental Protection Agency, and Nuclear Regulatory Commission. MARSSIM provides information on planning, conducting, evaluating, and documenting the building surface and surface soil radiological surveys used for demonstrating compliance with regulatory requirements. The review panel provided comments on the concepts, methodologies, implementation, presentation, and understandability of the document.



RSO Director Wei-Hsung Wang

Wang was one of 20 panelists, who represented academia (others included Clemson University, Columbia University, LSU, University of Florida, University of North Carolina, and University of Southern California), government agencies (Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, U.S. Geological Survey, and Washington Department of Health), medical and research institutes (Memorial Sloan-Kettering Cancer Center, Radiation Effects Research Foundation, and University of California Irvine Medical Center), and private industry (DAQ, Inc., Goldin & Associates, M.H. Chew & Associates, Renaissance Code Development, and independent consultants).

## Scholarly Activities

### Grant Submitted

By Wei-Hsung Wang

- ▶ Microphysical behavior and transport of hygroscopic radioactive aerosol. Principal Investigator, U.S. Nuclear Regulatory Commission; requested amount: \$423,240 (2021-2024).
- ▶ Decarbonizing a historically fossil-fuel based economy: Empowering entrepreneurship and workforce development in Louisiana. Investigator, U.S. Department of Energy; requested amount: \$787,318 (2022-2024).

### Publication and Presentation

- ▶ Wang, W-H. Health physics education and certification in the United States (invited). The 6th International Symposium on Radiation Education, June 19-20, Taipei, Taiwan, 2021.





- ▶ Li C-Y, Chu C-J, Lin K-H, Huang W-S, Matthews II KL, Wang W-H. Assessment of radiation exposure of health-care workers from patients receiving nuclear medicine procedures. Proc. of the 15th International Congress of the International Radiation Protection Association, January 18-19, Seoul, Korea, 2021.
- ▶ Kim Y-H, Yiaccoumi S, Ladshaw A, Wang W-H, Tsouris C. Radioactivity-induced charging: Theory and measurements. Proc. of the 15th International Congress of the International Radiation Protection Association, January 18-19, Seoul, Korea, 2021.
- ▶ Ellwood BB, Nestell GP, Lan LTP, Nestell MK, Tomkin JH, Ratcliffe KT, Wang W-H, Rowe H, Nguyen TD, Nguyen CT, Dang TH. The Permian–Triassic boundary Lung Cam expanded section, Vietnam, as a high-resolution proxy for the GSSP at Meishan, China. *Geol Mag* 157:65-79, 2020.

## Journal Manuscript Reviewed

By Wei-Hsung Wang

Paper HPJ-D-20-00076 “Analysis of environmental data to support quantification of historical releases from a former uranium processing facility in Apollo, Pennsylvania.” Reviewed for *Health Phys*, 2020 (Ronald E. Goans, Associate Editor).

## Personnel News

- ▶ Mr. Amin M. Hamideh was promoted to the position of Manager-Operations at the RSO in March 2020. Hamideh was hired as Radiation Specialist by the RSO in 2013. Besides his outstanding contribution to the RSO, Hamideh earned his master’s degree in Health Physics from the LSU Department of Physics and Astronomy, passed Part I of the Certified Health Physicist examination, and became a Certified Laser Safety Office during his employment at the RSO.
- ▶ Dr. Charles A. Wilson IV, Radiation Safety Officer at the CAMD, accepted a job offer as Deputy Radiation Safety Officer at The University of Missouri in June 2020. Wilson had been employed by the RSO for four years and became a valuable asset for the RSO. During his tenure at the RSO, Wilson completed his doctoral degree in Environmental Sciences from LSU and became a Certified Laser Safety Officer and a Certified Safety Professional. Congratulations, Charlie! We wish you the best in your future endeavors.
- ▶ Mr. Andrew D. Hastings, a former graduate intern at the RSO, received his master’s degree in Health Physics from the LSU Department of Physics and Astronomy in August 2020. Currently, Hastings is a health physicist/radiological engineer at the Sandia National Laboratory.
- ▶ Mr. Nicholas T. Desselles has assumed the Radiation Safety Coordinator position at the RSO since August 2020. Desselles received his bachelor’s degrees in Electrical Engineering and Physics and Astronomy as well as master’s degree in Environmental Sciences, all from LSU. He also passed Part I of the Certified Health Physicist examination. Desselles previously worked for the Mississippi Department of Health and the LDEQ as an inspector. He possesses a desirable working knowledge of radiation protection and regulations. Welcome aboard, Nick!



RSO Manager Amin M. Hamideh



RSO Radiation Safety Coordinator  
Nicholas T. Desselles



- ▶ Ms. Ji Young Wiley was hired as the CAMD Radiation Safety Officer in October 2020. Wiley received her bachelor's degree in Chemistry from Chung-Ang University in Korea and master's degree in Nuclear Science with a major in Health Physics from LSU. She had been employed by the LDEQ since 2000. Wiley's operational experience and regulatory knowledge in radioanalytical instrumentation, licensing and registration review, and emergency planning and preparedness are highly recognized by the radiation protection community. Ji, welcome to the team!
- ▶ Dr. Wei-Hsung Wang, RSO director and Center for Energy Studies professor, was appointed LSU System Radiation Safety Office in October 2020, to maintain and oversee a system-wide radiological control program per LSU System's PM-30.



CAMD Radiation Safety  
Officer Ji Young Wiley

## RSO Personnel

### Administration

**Wei-Hsung Wang**, Ph.D., CHP, CSP, CLSO, director & professor

**Amin M. Hamideh**, M.S., CLSO, manager-operations & laser safety officer

**Nicholas T. Desselles**, M.S., radiation safety coordinator & laser safety officer

**Ji Young Wiley**, M.S., CAMD radiation safety officer

**Melissa H. Esnault**, administrative coordinator

**Lorrie E. Gaschen**, D.V.M., Ph.D., LSU SVM liaison

**Christy L. White**, D.V.M., PBRC liaison

### Technical Assistants

**Margaret Blouin**

**Adam Curet**

**Yang Yang Xu**

### Graduate Intern

**Andrew D. Hastings**







Send correspondence to Marybeth Pinsonneault, Communications Manager, at [mpinsonn@lsu.edu](mailto:mpinsonn@lsu.edu) or 1077 Energy, Coast & Environment Building, Louisiana State University, Baton Rouge, LA 70803

Designed by Stephen W. Radcliffe.

LSU is an equal opportunity/access university.



## CES Scholarships

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