

OIES

Annual Report 2022

About the Oxford Institute for Energy Studies

The Oxford Institute for Energy Studies (OIES) was founded in 1982 as an independent centre for advanced research into the social science aspects of international energy.

In addition to conducting leading-edge research on a wide range of current energy questions, the Institute is committed to exploring these through dialogue – between consumers and producers, government and industry, and academics and decision makers. This is reflected in the membership of the Institute and in the diversity of its research team, drawn from different national, academic, and professional backgrounds. Our aim is that co-operation between researchers and interaction with benefactors and external stakeholders will lead to a more informed and balanced understanding of the behaviour, motivations, and objectives of the various economic forces, agents, and policy makers that operate in or influence the performance of international energy markets.

Research carried out at the OIES is designed to encompass the following disciplines:

- The economics and geopolitics of the energy transition, decarbonization, and international energy across oil, gas and electricity markets with regional and national focus.
- The economics and politics of the environment in its relationship with energy.
- The regulation and business models for decarbonization and low carbon fuels.
- The economics of electricity market design and regulation of electricity networks.
- The economics and forecasting of oil and gas price formation, market structures, and trading flows.
- The economics and politics of international relations of producing, consuming, and transit countries.

As a general policy, the Institute concentrates on research in energy issues of international significance.



**THE OXFORD
INSTITUTE
FOR ENERGY
STUDIES**

57 Woodstock Road
Oxford OX2 6FA
United Kingdom

Tel: +44 (0)1865 311377
Fax: +44 (0)1865 310527
E-mail: information@oxfordenergy.org
www.oxfordenergy.org

Registered Charity No. 286084

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MESSAGE FROM THE CHAIRMAN

2022 was yet another year of turbulence and intellectual challenge in the global energy sector. It is therefore very pleasing to report that the Oxford Institute for Energy Studies rose to the occasion once more, managing to deliver an impressive research output both in qualitative and in quantitative terms. Its commentary and analysis serve to shape the policy agenda and to inform the public debate by providing original and critical insights into the energy transition, the energy trilemma, and other energy issues covering production, consumption, markets, policy, regulation across the entire global energy economy including oil, gas, and electricity markets.

Special mention must be made of the Institute's commentary on the effects of the Russia-Ukraine war on energy markets, energy policies, energy trade flows and energy prices; the relevance of its commentary and the public attention it has received are to be commended.

The Institute has expanded its research and remains unique in conducting independent and evidence based research at the highest standard focused on contributing to a more coherent and balanced global understanding of the energy transition, decarbonization paths, and international energy markets and issues.

There were over 100 pieces of research published last year in the form of papers, insights, comments, podcasts, the Oil Monthly and the quarterly Oxford Energy Forum and Gas Review. Unique visits to the website remained steady at 200,000 unique visits. The Institute's social media following has almost doubled from 2021 to nearly 52,000 followers across all platforms.

2022 saw the successful launch of two Energy Transition Research programmes. The first, the Hydrogen Research programme focuses on 'creating a business case for a hydrogen economy' and builds on existing work already completed by the Institute with the goal of understanding the key building blocks for a successful business model for investments in a hydrogen economy. The focus is on the economic, commercial and regulatory aspects of the business case, while understanding the main technical issues, and involves a broad evaluation of regional developments, corporate activity and specific project examples

The second, the Carbon Management Research programme, is dedicated to the advanced study and exploration of business models for deploying breakthrough low-carbon technologies that enable a smooth transition to a net-zero world. In particular, these technologies include carbon capture, utilization and storage (CCUS) and carbon dioxide removal (CDR) solutions, both tech- and nature-based. This Programme investigates key issues relevant to the future development of these solutions, including enabling policy and regulatory frameworks, in the context of different sectors and regions. The Programme also investigates the role that carbon markets, both voluntary and compliance, play in mobilizing investments into these technologies.

The Institute continues to build its research capacity and expand its research team. The quality, breadth, depth, and number of publications it has produced this year, as well as its increasing presence online and in the media, is evidence of the hard work and dedication of the Institute team. I thank them for their continued hard work and dedication in 2022.

On behalf of the Board of Governors I want to convey our appreciation to Mr Mikael Toll, representing the Swedish Energy Agency, and Dr Ahmed Attiga, representing Arab Petroleum Investments Corporation, on their resignation from the Board, and to welcome, Ms Rebecka Bergholtz, representing the Swedish Energy Agency, and Mr Khalid Al-Ruwaigh, representing Arab Petroleum Investments Corporation, to the Board.

The Institute's capacity to continue with its research activities depends heavily on the continued generosity and support of its funders. We were therefore very pleased to welcome as new sponsors of

the Institute: Conrad Energy, Element Capital, E.ON, Johnson Matthey, Ministry of Defence, UK, Petrobras, Reventus Power Ltd and Seplat Energy.

Mr Laurence Whitehead – March 2023

DIRECTOR'S NOTE

The main objectives of the Oxford Institute for Energy Studies (OIES) are to undertake advanced research on issues currently affecting the world's energy sector, and to help inform the public debate and improve understanding of the political economy of energy, energy policy and the energy transition. As an educational charity, the OIES is committed to the dissemination of the results of its research as widely as possible, both in academia and in the world at large, through its website, attendance at seminars and conferences around the world by its fellows, its own seminars and events, and its interaction with the media. OIES work is detailed in this report.

Programmes

The Oil Research Programme and the Gas Research Programme are well established and continue to produce high-quality research of international significance, as well as work with a more regional and national focus.

The Electricity Research Programme, whose body of research and publications continues to expand is involved with a number of collaborative research projects both with institute colleagues and external collaborators.

The China Energy Research Programme, is expanding its body of work and collaboration with the institute's more established research programmes.

The Institute's Energy Transition Research Initiative grew in 2022, with a focus on the trends shaping energy systems, transformations in behaviours and business models, and the implications of shifting from the existing hydrocarbon-dominated energy economy to a system in which renewables, low-carbon energy sources and abated use of hydrocarbons will play a much greater role.

Two stand-alone Energy Transition Research modules were successfully launched in 2022.

The Hydrogen Research module conducts research under the broad objective of "building business cases for a hydrogen economy". It focuses on how the clean hydrogen industry can move from its current small scale, largely government funded projects to a scale where it is significant in the global energy system. Areas covered include: Policy and regulation to promote use of clean hydrogen, comparative analysis across sectors and regions, identifying priority end uses and how to service them, steps to enable downstream hydrogen investments, policy and regulatory support mechanisms to drive infrastructure investments, viable business models/investment case studies for investments along the value chain, appropriate contractual models and financing, comparison of approaches to hydrogen transport and storage, how to justify investments in GW scale production, integration of production in specific supply chain and comparison of alternative production approaches for clean hydrogen and derivatives.

The Carbon Management Module is dedicated to the advanced study and exploration of business models for deploying breakthrough low-carbon technologies that enable a smooth transition to a net-zero world. In particular, these technologies include carbon capture, utilization and storage (CCUS) and carbon dioxide removal (CDR) solutions, both tech- and nature-based. This Programme investigates key issues pertinent to the future development of these solutions, including enabling policy and regulatory frameworks, in the context of different sectors and regions. The Programme also investigates the role that carbon markets, both voluntary and compliance, play in mobilizing investments into these technologies.

Research and dissemination

The Institute publishes a range of research publications and commentaries, all of which are made freely available on its website, with the exception of published books and the OIES *Oil Monthly*. This report highlights a selection of the Institute's 2022 publications. In addition to research papers, Insights and Comments the Institute publishes the *Quarterly Gas Review* and *Oil Monthly* reports – as well as the now well established *Oxford Energy Podcast* series, which covers a variety of topics and provides in-depth interviews with some of our authors. The Institute continues to publish its quarterly magazine, the *Oxford Energy Forum*, now in its 33rd year.

Staffing

Priorities for recruitment include further appointments relating to the economics and regulation of electricity, and commercial hydrogen development.

Our team of Fellows expanded in 2022 and we were pleased to welcome; Ali Abdelshafy, OIES-KAPSARC Fellow, Anders Hove, Senior Research Fellow, Andrea Maino, Research Fellow, Jazmin Mota, OIES-KAPSARC Fellow, Hasan Muslemani, OIES-KAPSARC Senior Research Fellow & Head of Carbon Management Research and Aliaksei Patonia, Research Fellow.

We were also pleased to welcome Brendan A'Hearn, Stephen Craen, Rolando Fuentes, Andrew Goddard, Ross McVey and Alexander Scheibe as Visiting Research Fellows.

We have been fortunate to work with a number of contributing authors throughout the year, and we extend our thanks for their contribution to the work of the Institute

Activities and events in 2022

We were delighted to return to a full programme of in-person events in 2022. These are detailed later in this report. All our events were well attended reflecting the quality, depth, and breadth of the programme for each event and the calibre of speaker the Institute's events attract.

General

I wish to extend special thanks to the entire OIES team for their continued hard work and dedication.

As shown in this report, the research productivity of the OIES is extraordinary, and its reputation and influence continue to increase.

Finally, we must acknowledge and thank our benefactors, sponsors, and friends for their kind support, without which the research conducted at the institute would not be possible.

Dr Bassam Fattouh - March 2023

RESEARCH

The Institute publishes a range of research publications and commentaries, all of which are made freely available on its website, with the exception of published books. This report highlights a selection of the papers published by the Institute in 2022 and provides an overview of ongoing research. For a list of published research in 2022, visit the OIES website, where all published research can be accessed.

Energy Transition Research at OIES focuses on the trends shaping energy systems, transformations in behaviours and business models, and the implications of shifting from the existing hydrocarbon-dominated energy economy to a system in which renewables, low-carbon energy sources and abated use of hydrocarbons will play a much greater role. OIES Energy Transition Research identifies and analyses the key themes shaping the energy system and combines and coordinates transition research themes from across all other OIES Research Programmes.

In 2022, the Energy Transition Initiative expanded the scope of research into new areas including global climate negotiations, evolution of carbon markets, the role of green finance and project finance in the energy transition, decarbonization of buildings, in addition to the research undertaken under the Carbon Management, Hydrogen, and Electricity Research programmes. The geographical scope has also widened to include few research streams on China's and India's transition paths. In 2022, OIES also organised its first OIES Annual Energy Transition Event which covered a wide range of issues including GHG emissions measurement and accounting, electricity market design, the role of consumers in the transition, and the future of networks in the era of decarbonization. Also, few issues of the Oxford Energy Forums were devoted to transition themes including climate change negotiations and COP27, the evolution of carbon markets, and the future of energy networks in a decarbonized area.

2022 has set the ground for more in-depth research of transition themes and further expansion of the scope of the Energy Transition Research to address key questions including:

- How will the current energy crisis impact the energy transition?
- What role will oil and gas play in the energy transition?
- Which technologies will be critical for the energy transition?
- How can these technologies be financed and scaled up?
- How should governments incentivize investments in low carbon technologies?
- What role should consumers be playing in the energy transition and how can their behaviours best be shaped?
- How can renewables best be integrated into the power sector / energy system?
- How should energy systems develop in the energy transition?
- What are the potential geopolitical consequences of the energy transition?
- How should private sector energy companies adapt their strategies to the energy transition?

The **Oil Research Programme**, established in 2009, has cemented its reputation as a leading source of academic research on oil market issues. The Programme's research group continues to produce high-quality empirical oil market research of international significance based on its core understanding of oil market dynamics and price cycles, the behaviour of oil market participants and strong background on the policy and economics of the resource-rich economies. The programme's research activities in 2022

continued to centre around its three main thematic branches: global oil market dynamics; oil price outlook and balance of risks; and long-term global oil market research.

The programme continued to publish its flagship *OIES Oil Monthly* publication, introduced first in January 2021, featuring its short-term oil market outlook up to two years ahead for oil supply and demand, global balances and stocks, as well as for oil price dynamics and risks, and in-depth analysis of the key trends affecting the global oil markets, refining activity and trade flows. The underlying high-quality analysis continued to build on state-of-the-art econometric forecasting models which are being reviewed and updated on a frequent basis, a rich data library compiled by the programme's research group including a long history of high frequency oil market and price data, as well as data of the various drivers influencing the performance of global oil markets, and the joint-collaboration of the oil research group with varied backgrounds (i.e. academic, industry) and strong expertise covering both the crude and products markets. In 2022, we also developed and applied Machine Learning models for our data analysis and to enhance our forecasting procedures. Apart from the dedicated monthly reports, the *Oil Monthly* analysis supported several presentations published over the year providing a timely and comprehensive understanding of key oil market issues that arose in the year and offering an empirical assessment of the prevailing risks involved.

The programme also published several *Comments* throughout the year dominated by the Russia-Ukraine War and the short- and long-term implications on the dynamics of oil markets. They included: the potential impact on Russia's oil supplies and the wider implications on the global oil market in terms of security of supplies and supply responses, an empirical assessment of the impacts on global oil demand via pricing, the reshuffling in crude and products trade flows, the emerging trading patterns and practices, other impacts on the structure of the oil market and its functioning, government interventions, producers' behaviour and the evolution of OPEC+ output policy, and the empirical assessment of price volatility and risks via forecast scenarios, among others. From an energy policy perspective and the long-term implications, other publications assessed how Russia's invasion of Ukraine impacted the key drivers of the energy transition, whether it removes the barriers for an accelerated energy transition or it can actually slow or delay the energy transition plans, and whether new energy policies integrating sustainability, security, affordability and economic development/competitiveness could emerge to help drive the energy transition in the years to come.

Other papers published by the oil research group, beyond the thematic related to the Russia-Ukraine war, examined the GHG-verified mechanisms for internationally traded crude oil and provided a critical assessment of the possible impact on oil benchmarks, reviewed the reasons driving the then proposed inclusion of WTI Midland in the Brent benchmark and discussed the possible consequences for the oil market and the industry, and looked at the history and strategy of the US Strategic Petroleum Reserve (SPR) from the perspective of the commercial storage manager, distinguishing between SPR loans and SPR sales, and assessing the success of the SPR sales program in 2022 with some thoughts on the optimal management of a buy-back program looking ahead in 2023.

In addition to its written output, the Oil Programme also continued its podcast series in which research fellows were interviewed on their latest papers. The podcast series covered all the aforementioned topics and hosted a special session on the Indian oil market and more specifically the purchase by Indian refiners of discounted Russian crude following the Western sanctions on Russian oil, discussing the opportunity and risks for the country's refiners and oil sector.

While the program will continue to ensure the high-quality of its flagship *Oil Monthly* report by further developing its underlying methodological procedures in line with academic advancements and expand its short-term analysis and forecasting to cover more regions/countries and oil products, in 2023 we also plan to expand our research in two main areas. First, we plan to expand our analysis to the very near-term oil market dynamics by developing AI and Machine Learning techniques to analyse the oil market sentiment based on news and high frequency information signals based on a unique oil market library

that decomposes the oil market sentiment to its distinct signals (covering supply, geopolitics, demand, inventories, expectations and other exogenous factors), and quantify the impact of each distinct signal on daily price changes and by extension the relative importance of the oil market sentiment on market prices and price volatility (*ongoing research*). This will also allow us to produce real-time daily price forecasts and improve our understanding and empirical assessment of the main drivers and underlying risks influencing oil price dynamics and shaping forward expectations. Second, we aim to expand to the long-term analysis, with particular focus on the analysis of the long-term oil demand and products outlook, long-run oil prices and the energy transition and oil exporters' strategies.

The focus of the **Gas Programme** in 2022 was inevitably, and unfortunately, on the impact of the Russian invasion of Ukraine on the European and global gas market. The dramatic reduction of Russian gas exports to Europe which resulted from the reaction to the war in Ukraine caused a huge disruption both to overall supply, trade flows and demand for gas across the world, and much of our written and spoken output was devoted to this topic.

From a written perspective, our Gas Quarterly provided regular updates on the decreasing flows of Russian gas to Europe and on the impact which this had on prices, which rose very sharply. We also produced analysis on the EU regulatory response to the energy crisis, including analysis of demand patterns and the introduction of price caps and other market interventions. We also produced reports on alternative supplies of gas to Europe, including from Norway, North Africa, Central Asia and most importantly from the global LNG market.

The impact of the war was felt in all gas consuming countries, and as a result we also produced analysis on supply and demand in Asia, the Middle East and Africa as these regions were forced to deal with high gas prices and the fact that a significant amount of LNG was now being taken to Europe to replace lost Russian volumes. For most of the year we also produced a weekly podcast updating the situation in Europe and Asia, with a particular focus on security of supply issues such as the levels of gas in storage and the availability of infrastructure to move gas to countries where shortages were threatening to emerge.

As the year progressed, we also started to consider the possibility of a gas crisis in the winter of 2022/23, analysing the potential consequences of a cold winter in Europe or Asia, and also discussing the potential impact on gas demand from the ending of COVID restrictions in China. The future of the Indian gas market was also analysed in some depth, as a fast growing and densely populated country with a need to switch away from coal but also with a sensitivity to high gas prices. Similarly other markets in South Asia such as Pakistan and Bangladesh were also covered in our research as further examples of developing countries who were struggling to afford gas at high prices.

We have also continued our regular modelling of the global gas market to assess the short-, medium- and long-term outlook for gas demand, supply and prices. The output from our Global Gas Model is a topic of regular discussion with sponsors as it can provide useful insights into the major sensitivities created not only by movements in price (as seen in 2022) but also caused by the energy transition, where the role of gas remains uncertain. Analysing and assessing the longer-term policies of countries across the globe with regard to gas has allowed us to produce various scenarios which are presented on a regular basis to our sponsors and also provide a foundation for the rest of our research output.

The Gas Programme has continued to offer webinars and podcasts during the year to bring our research to a wide audience. The webinars, which are generally focussed on an audience of our sponsors, have covered topics such as the short-term outlook for gas markets, the future of the Chinese gas market and the prospects for decarbonised gases. Meanwhile, our podcasts have provided short 25-30 minute summaries of all our research output as well as topical commentary on specific gas market issues.

The **Electricity Research Programme** seeks to inform public and private sector decision-making by improving understanding of the electricity supply chain. The Programme studies the role of public policy, regulation, and markets to support the energy transition, along with implications for end-users, companies and their business strategies. The Programme's research focus is structured into three themes to cover a spectrum of relevant issues. These themes are:

- Market design and integration of renewable energy resources
- Electricity networks and decarbonisation of economy
- Distributed energy resources (DERs), demand side flexibility and consumer participation in the electricity market

In 2022, the Programme published multiple works -some of which we highlight here - while continuing to expand its scope and depth. An important work was a paper on producing hydrogen from electricity using electrolyzers and the ways which its costs can be reduced. The primary obstacle hindering the wider use of green hydrogen is its higher cost compared to competing sources. While the expense of renewable electricity is often cited as the main issue, difficulties related to electrolyzers also play a significant role in reducing the cost of green hydrogen. The work examined the electrolysis process from various angles, including technological, economic, and policy perspectives.

Another important paper published in 2022 analysed energy networks during the energy transition era. Energy networks are a vital component of both national and global energy systems as they serve as the connecting infrastructure between energy sources and consumers. They also play a crucial role in balancing energy supply and demand, ensuring that energy is available at the right place and time. To achieve net-zero carbon objectives, it is crucial to understand the implications of the energy transition on energy networks and how these infrastructures should adapt to the challenges of decarbonization. This article examines the key issues faced by electricity transmission and distribution networks, natural gas networks, and future hydrogen, heating, and cooling networks during the energy system transition.

Another key paper that was published in 2022 focused on current energy crises, the energy transition and the design of electricity markets. Beginning with increasing gas and electricity prices in 2021, the European energy price crisis worsened with the Russian invasion of Ukraine, leading to a fossil-fuel supply crisis. The convergence of these two crises has added to the urgency of the climate crisis, which has been the primary driver of the energy transition thus far. The European Union (EU) and the United Kingdom (UK) are working urgently to address these crises, while also using them as a compelling reason to expedite the transition to renewable energy sources. This article argues that due to energy transition, electricity will play a central role in the decarbonized energy system, and energy security will depend increasingly on it. To avoid or mitigate potential future problems regarding the reliability of electric power supply, a thorough reassessment of current electricity markets will be necessary.

Electricity programme also published a book on electricity distribution networks in the decentralisation era: re-thinking economics and regulation. The book delves into some of the significant concerns that impact electricity distribution grids during the decentralization era. These include emerging approaches for coordinating and operating Distributed Energy Resources (DERs), the creation of regulated charges for network access, the implementation of differentiated and tradable network access rights, the development of local markets for flexibility services, an evaluation of how decentralization fits within the broader context of energy systems integration, a reconsideration of the unbundling model of distribution grids, and a review of the economic regulation of distribution networks. The book presents a concise yet comprehensive analysis of these topics, making it accessible to a wide range of readers, including students, academics, policymakers, industry experts, and anyone with an interest in the subject matter.

Other publications in 2022 include contribution to the paper on Key Themes for the Global Energy Economy in 2022. This paper examined many important energy themes with milestones in 2022 including an article on the UK government's response to electricity price volatility.

The Electricity Programme also contributed several podcasts on multiple topics. One was on India's renewable energy targets and the role of distributed energy resources (DERs). The Indian power system will need increased flexibility due to its ambitious renewable energy targets, requiring an effective transformation of the power sector to enable flexible operation of existing power plants and incentivize new sources of flexibility. Distributed energy resources (DERs) can provide control and choice to consumers about their electricity usage and costs, while also lowering peak demand and providing flexibility to the power system. However, there are still key challenges to the uptake of DERs in India.

Other podcast topics include the role of energy networks during the energy transition and a podcast on key themes and messages from the OIES Electricity Energy Transition event in June 2022. The later podcast discusses the need for a fundamental structural reform of electricity markets and new approaches to energy networks due to the penetration of intermittent renewables. The current market design reflects 20th Century conditions with a small number of large dispatchable plants, while the reality is an energy system with millions of competing sources of decarbonised energy resources, including intermittent renewables with zero short-run marginal costs, and multiple energy networks that need to act as a system. A different market design and a new approach to networks are required to accommodate these changes.

The programme also held a public webinar to discuss key insights from the book, published by research fellows of the programme entitled "Electricity distribution networks in the decentralisation era: re-thinking economics and regulation". The authors were joined by two eminent external discussants from University of Melbourne and University of Cambridge.

Going forward, the Programme will continue to expand its research on future of energy networks as well as electricity markets reform, looking at issues such as risk-based assessment of electricity market, competition between energy networks, government intervention in the electricity markets, demand response flexibility and implications of extreme electricity price movements for market design. The programme also supports energy transition initiative as well as hydrogen research.

The **China Energy Research Programme**, established in July 2019, continued to offer insight into the factors informing China's energy policies and choices and their pivotal role in global energy markets.

In 2022, the programme published eight research papers, spanning oil, gas, and the energy transition. Papers looked at social justice issues related to phasing out the use of coal in China and the effectiveness of energy efficiency policies. The programme contributed to the Institute's research on the market implications of Russia's invasion of Ukraine, to the Oxford Energy Forum, on COP 27 and CCUS, while also editing an issue of the OEF on the energy outages in 2021 and their implications for energy markets and policies. Importantly, in 2022, we published the *Guide to Chinese Climate Policy 2022*, an update and expansion of David Sandalow's authoritative guide on China's climate policies. The book, available on Amazon and online (on a dedicated website <https://chineseclimatepolicy.oxfordenergy.org/>) reviews Chinese emissions data, the impacts of climate change in China, the history of China's climate change policies and China's response to climate change today. Several book launch events took place in London, at Chatham House, supported by the Hewlett Foundation, and at the Conduit Club, with the support of Energy Foundation China.

Some of the key themes and takeaways from these papers were also discussed at the China Day which was held in person in Oxford, and disseminated in podcasts, with contributing authors recording nine podcasts. The programme also continued to publish the China Energy Brief, a periodic report highlighting some of the latest regulatory developments in China and their relevance to energy markets.

In 2022, while monitoring policy and market developments, the programme also expanded its research into power markets, renewables and critical materials, which will increasingly be areas of focus in 2023. The programme welcomed a new Senior Research Fellow, Anders Hove, who will focus on power markets, EVs and work on innovation in China and how this could shape the energy transition. Going forward, questions around the energy trilemma, and how China balances short term energy security needs with affordability and sustainability will remain topics of research. With increasing geopolitical tensions between China and the West, the question of China's quest for technological innovation and for global leadership in the energy transition, as well as the geopolitical implications of the energy transition, will be areas of research for the Programme.

JOURNAL AND WEBSITE

Oxford Energy Forum

The Institute's discussion journal, now in its 33rd year, continues to tackle topical issues facing the energy world. Issues covered in 2022 included: Carbon Capture, Utilization and Storage (CCUS): barriers, enabling frameworks and prospects for climate change, CO27: Refocusing the world on the energy transition agenda, The Future of Energy Networks in a Decarbonized World, The Evolution of Carbon Markets and their Role in Climate Mitigation and Sustainable Development and The 2021 energy crisis: Implications for China's energy market and policies. Our thanks to the authors of all articles that appeared in *OEF* in 2022, to the editor, Bassam Fattouh, and to our guest editors.

Website: www.oxfordenergy.org

The website contains full information on OIES publications, research in progress, and dedicated sections for the OIES Gas Research Programme, Oil Research Programme, Electricity Research Programme, and China Energy Research Programme and the Energy Transition Research Initiative.

The catalogue of papers and comment pieces on the OIES website continued to grow during 2022, with over 75 new publications and 70 podcasts added.

There are over 7,500 subscribers to the Institute's publication notification email service. Visitor numbers to the website remained steady in 2022. The Institute's Twitter following increased in 2022 to nearly 13,000 followers, and the Institute's LinkedIn page has over 30,000 followers.

In 2022 the institute was regularly mentioned in the press by, amongst others: *ABC Radio News*, *Aftenposten*, *Al Jazeera*, *Argus Media*, *Bloomberg*, *BBC News*, *BBC Radio 5 Live*, *BBC Radio Humberside*, *BBC Radio Scotland*, *BBC Radio Ulster*, *BBC South East*, *BBC World TV*, *BBC World Service*, *Bild*, *Channel 4 News*, *China National Business Daily*, the *Daily Telegraph*, the *Economist*, *Economic Times Now*, *E&E News (Politico)*, *El Confidencial*, *Energy Voice*, *Euronews*, *Euronews TV*, the *Financial Times*, *Gas Strategies*, the *Globe and Mail*, *Heart Radio News*, *Inventiva*, the *iPaper*, *ITV News*, *LBC Radio*, *Natural Gas World*, the *New York Times*, *NBC News*, *Radio Canada*, *Reuters*, *Sky News*, *S&P Global*, *Times Radio*, *Vietnam Express*, *Wall St Journal*, *ZDF Heute*.

LECTURES AND SEMINARS

As part of its commitment to education and its mandate, the OIES strives to disseminate the results of its research as widely, and in as many ways, as possible. Lectures and seminars enable the Institute's researchers to present the findings of completed projects and to expose work in progress to the criticism of colleagues in industry, government, and academia. In 2022 the Institute's team gave numerous virtual presentations and talks at many conferences, workshops and seminars across the globe.

2022 Annual Brainstorming Meeting

Since 1990 the Institute has held an annual 'Brainstorming Meeting', which draws together people from energy companies, financial institutions, governments, think tanks, and international organisations, and other research organizations. The 2022 meeting was held in London, in May, topics discussed included; Net Zero will be the primary driver of decisions related to energy, Energy Security and Energy Policy, Hydrocarbons and Net Zero Ambitions, The Challenge of Accelerated Energy Transition, Balance between production and consumption, Climate Negotiations and COP26, Developments in Gas Markets, Developments in Oil Markets, Technology innovation is key to Net Zero, but challenges are plentiful, Immense capital investment will be needed to make the transition to Net Zero, How can energy companies position themselves now to survive and thrive in the longer run?

2022 Energy Transition event

2022 saw the Inaugural Energy Transition event for the Institute. It took place in Oxford on 21 & 22 June. The event was well attended over the two day by both in-person participants and a virtual audience, topics discussed included: Global Environmental Policy and Geopolitics: Current priorities and the impact of the Russian invasion of Ukraine, Carbon Allowance and Offset Markets: prospects for development and integration, GHG Emissions Measurement and Accounting: what real progress is being made?, The Critical Role of Green Finance in the Energy Transition: a developed and developing world issue, Electricity Market Design: determining consumer prices in a decarbonising electricity system, Electricity networks in a net zero carbon economy, The Evolution of Hydrogen in the Energy Transition: is there a business case?

2022 Oil Day event

This year's event took place in December, on *Short-Term Oil Market Prospects and Risks* and focused on three main themes: Global Oil Demand: Is oil demand heading for back-to-back shocks?, Global Oil Supply: Are policy and external factors taking over oil supply? and Shifts in Trade Flows: How are transformations in trade flows impacting refining? The event was well attended by key oil industry figures, representatives from national and international oil companies, financial institutions, price assessment agencies, the energy business community, and OIES Fellows.

2022 Gas Day

The Gas Day, held in December, allowed sponsors and invited guests to debate many of these topics in an informal setting at Worcester College, Oxford. We held three panel discussions covering the outlook for Russian gas exports, the future of the global LNG market and the conflict between energy security and environmental issues in Europe and the consequences for gas. The event was attended by around 100 people and offered a lively and interesting debate.

2022 Gas Programme Sponsors' Meetings

The Gas Programme also held two Sponsor Meetings during the year, one in April and one in October. Both were dominated by the continuing energy crisis, looking at topics such as the impact on gas demand in Europe, the interaction between gas and electricity markets, the changing perceptions of gas in Asia, the growth in US LNG exports, the changing regulatory landscape in Europe, the potential

for North African gas to grow, the outlook for new LNG projects and the likelihood of gas shortages in the winters of 2022/23 and 2023/24. We also considered energy transition issues such as the potential for the development of a hydrogen economy in Europe, the future role of biogas and the potential role of carbon capture and storage in supporting the role of gas in future. In covering these topics the Gas Programme worked closely with the Hydrogen and Carbon Management Programmes in an example of the close collaboration between research areas at OIES.

2022 China Day

The 2022 ‘China’ Day on the topic of *China’s energy policies amidst growing global uncertainties*, was held in Oxford, in October. Four main topics were discussed during the day; *Zero-COVID and the Party Congress: what does it mean for energy? The 14th FYP: what does it mean for China’s domestic energy markets? What does this mean for China’s 2030 – 2060 targets? Thinking through the energy market implications of an international crisis.*

RESEARCH TEAM AND STAFF

Ali Abdelshafy, OIES-KAPSARC Research Fellow, is the head of research group “Climate-neutral industries” at the chair of Operations Management – RWTH Aachen University. He holds a master’s degree in management of resources and environment and a B.Sc. in petroleum engineering. He worked in the field of energy transition in the industrial sector before joining the chair of operations management to pursue his PhD. His main research areas are energy-intensive industries, sustainable supply chains, energy transition & structural changes and alternative resources & fuels.

Philip Andrews-Speed is a Senior Research Fellow with OIES’ China Energy Research Programme. He is also Senior Principal Fellow at the Energy Studies Institute, National University of Singapore. He started his career as a mineral and oil exploration geologist before moving into the field of energy and resource governance. His main research interest has been the political economy of the low-carbon energy transition. China has been a particular focus for his research, but in recent years he has been more deeply engaged with energy challenges in Southeast Asia. Philip has published extensively on China’s energy governance in academic and policy fora. His latest book, with Sufang Zhang, is *China as a Global Clean Energy Champion: Lifting the Veil* (Palgrave, 2019).

Klaus-Dieter Borchardt, Senior Research Fellow. Since 2020 Prof. Dr. Klaus-Dieter Borchardt is a Senior Energy Advisor at the European & Competition Law Practice in the Baker McKenzie Brussels office. Before, Klaus-Dieter worked for 33 years at the European Commission, including four years at the European Court of Justice. During his 33 years at the European Commission, Klaus-Dieter Borchardt was instrumental in many major developments in EU Law and EU Energy Law and Policy. He spent inter alia 12 years in the Commissions’ Legal Service where he was responsible for state aid, internal market and agriculture and 9 years in the Commissions Directorate for Energy. He played a key role in the evolution of the legal framework of the European state aid control, notably the establishment of private market investor tests. He was the central EU official in the recent reform of the European electricity market design as part of the ‘Clean Energy for all Europeans’ package. He chaired the Connecting Europe Facility’s evaluation committee as well as the European gas, electricity and infrastructure fora. When he left the European Commission, he was Deputy Director-General for Energy responsible for the coordination of all three energy directorates (Policy Development, Internal Energy Markets, Renewable Energy and Energy Efficiency) as well as for the energy dialogues with third countries. Klaus-Dieter Borchardt is a Teaching Professor at the Bavarian Julius-Maximilians-University – Würzburg, Germany (since 2001), and Adjunct Professor at the Copenhagen Business School (since 2022).

Andreas Economou, Senior Research Fellow, joined the Institute in July 2015. His research interests lie in natural resource and energy economics with a particular focus on the empirical analysis of crude oil markets, the dynamics of oil prices and OPEC behaviour. The central topic of his research is largely the causes and consequences of oil price shocks, using advanced econometric techniques to model the world oil market. Other aspects of his research focus on OPEC’s behaviour and pricing power in the oil market, the relationship between oil prices and the global economy, and the real-time analysis of oil price risks using forecast scenarios. Previously he was an OIES-Saudi Aramco Fellow. Andreas is currently completing his PhD in Energy Economics at UCL Energy Institute. He holds an MSc (Hons) in Oil and Gas Enterprise Management from the University of Aberdeen with specialization in petroleum economics and international fiscal systems analysis, and a BSc in Business Administration from the University of Macedonia, Greece.

Bassam Fattouh is the Director of the Oxford Institute for Energy Studies (OIES) and Professor at the School of Oriental and African Studies (SOAS). He has published a variety of articles on energy policy, the international oil pricing system, OPEC behavior, the energy transition, and the economies of oil producing countries. Dr Fattouh served as a member of an independent expert group established to

provide recommendations to the 12th International Energy Forum (IEF) Ministerial Meeting in Cancun (29-31 March 2010) for strengthening the architecture of the producer-consumer dialogue through the IEF and reducing energy market volatility. He is the recipient of the 2018 OPEC Award for Research. He acts as an advisor to a number of governments and companies. He is a regular speaker at international conferences.

Mike Fulwood, Senior Research Fellow. Mike Fulwood joined the OIES in October 2017. Mike has over 40 years of experience in the gas industry. Before joining the OIES, Mike worked as a consultant, with Energy Markets between 1997 and 2008 and then with NexantECA as Director, Global Gas & LNG. Before working as consultant, Mike worked for British Gas from 1979, latterly as a Director at British Gas Transco, in charge of the price control review, and prior to that President of British Gas Americas during which time he oversaw many successful acquisitions and projects including the acquisitions of Metrogas (Argentina), NGC (now Dynegy), the Bolivia – Brazil pipeline and Trinidad LNG project. While working as a consultant Mike undertook a wide range of projects in all areas of the gas chain, covering regulatory matters, gas pricing and tariffs, gas sales and transportation contracts, market studies and price forecasting, as well as helping develop NexantECA's *World Gas Model*. Between 2009 and 2018, Mike was Chairman of the International Gas Union's Gas Pricing Group, and still undertakes the IGU's Wholesale Gas Price Survey. He also speaks widely at gas conferences all over the world, particularly on gas markets, gas trading matters and gas pricing.

Marshall Hall, Senior Research Fellow, spent 35 years working in and around the European oil and gas industry between 1981 and 2016. He began his career in oil trading and refining at BP and worked as an oil analyst at the IEA, an equity and commodity analyst at SG Warburg/UBS in the financial sector, and in gas and LNG markets analysis at BG Group until 2013. He then moved to Oil & Gas UK as Energy Policy Manager, dealing principally with EU energy and climate policy and gas market regulation until late 2016. He joined the Natural Gas Research Programme of the OIES in 2017 as a Visiting Research Fellow and published a paper on the prospects for Norwegian gas production and export in March 2018. He is currently preparing a second paper on the outlook for gas production from the UK continental shelf and the potential impact on future gas output of the regulatory and fiscal reforms introduced in 2015–16. Since joining the OIES Gas Research Programme, he has contributed to research papers on the UKCS, Norwegian gas, emission reduction in the upstream industry and energy-related methane emissions.

Patrick Heather, Senior Research Fellow, joined the institute in June 2006. His works include: 'The Evolution and Functioning of the Traded Gas Market in Britain' (August 2010); a co-authored comment with Jim Henderson, 'Lessons from the February 2012 European gas crisis' (April 2012); and the paper 'Continental European Gas Hubs: are they fit for purpose?' (June 2012). His paper, 'The evolution of European traded gas hubs' (December 2015) focused on the evolution of the gas markets across the continent in the context of the European Commission's vision of a Single Energy Market (in gas); the paper described the 'path to maturity' of traded gas hubs and analysed their stages of development using both objective and subjective measures; he brought the results of that research up to date in a co-authored Insight with Beatrice Petrovitch, 'European traded gas hubs: an updated analysis on liquidity, maturity and barriers to market integration' (May 2017); 'The SPIMEX Gas Exchange: Russian Gas Trading Possibilities' a paper co-authored with James Henderson and Tatiana Mitrova (Jan 2018) exposed the path that Russia is taking in developing a traded gas market; the comment co-authored with Thierry Bros 'French gas customers face a real risk from a No Deal Brexit' examined the risk that a No Deal Brexit could have very serious and immediate consequences for the French economy (February 2019); his paper 'A Hub for Europe: the Iberian Promise?' (March 2019) focused on whether the Iberian Peninsula could be a 'gateway' for more diverse supplies of gas to Europe; the Insight 'European Gas Hubs: a decade of change' (July 2019) reviewed the progress of European hubs' development over the whole decade, including the smaller and emerging hubs; there followed a Comment 'European Traded Gas Hubs: the supremacy of TTF' (May 2020), which detailed how the Dutch TTF has become the

European hub as well as a global price marker; and another comment ‘European Traded Gas Hubs: German hubs about to merge’ (July 2021), not only gave an update on the status of all the European gas hubs but focused on the imminent merger of the two German hubs as well as analysing the relative liquidity of the three main global gas price benchmarks; the initial performance of the new German hub was reviewed in the comment ‘European Traded Gas Hubs: German THE fails to impress’ (December 2021); his latest Insight is part of a trilogy of papers published by the Institute, ‘A series of unfortunate events: the role of the traded gas hubs’ (March 2022) reviews the possible trading reasons behind the unprecedented gas prices and market volatility during 2021. Since 2004, Patrick has been an independent consultant focusing on the gas market evolution in Europe, supply and demand dynamics, the impact of regulation on market outcomes, contracting strategy, and marketing strategies to take advantage of new market opportunities. Patrick has advised and given presentations to many different organizations, including the European Commission, the EBRD, the IEF, the IOGP, the APX, CQPGX, GME, ICE, Henex, SHPGX and Spimex exchanges, and various producer and end user companies, financial institutions, regulators, and governments in Australia, Austria, Belgium, Brazil, Britain, China, Estonia, France, Greece, Holland, India, Italy, Japan, Malaysia, Norway, the Philippines, Poland, Romania, Russia, Sweden, Switzerland, Turkey and Ukraine. In 2006, he was appointed commercial adviser to South Hook Gas to assist them through the long commissioning phase of their world-leading LNG import facility in South Wales, which was successfully achieved in 2009. Prior to 2004, Patrick established PowerGen’s (now E.ON UK) gas trading capabilities and later set-up their electricity trading desk; he later joined BG Group as Trading Manager to set-up their trading capability from scratch. Patrick has 40 years’ experience of broking, trading, and risk management in the natural gas, power, oil, and oil products markets, and working as a gas market expert for European utilities and gas suppliers, British investment banks, and international oil majors.

James Henderson, Director, Gas Research Programme, has been writing for and working with the Institute since 2010. He produces research for both the Gas and Oil Programmes covering Russia and CIS issues as well as global energy matters that affect the region. He is a Visiting Professor at Masaryk University in the Czech Republic and has lectured on energy economics and security of supply at a number of universities in Europe and the US. He has worked in the oil sector for US company Amerada Hess, as well as spending time as a consultant and investment banker. He obtained a PhD in Social Sciences from London University in 2010. With OIES he initially published a monograph on “Non-Gazprom Gas Producers in Russia” before contributing numerous working papers on the Russia oil and gas sectors and their connection with the global energy economy. In particular he co-edited the 2014 book entitled “The Russian Gas Matrix: How Markets are Driving Change” and has more recently published papers on the future of Russian oil production, tight oil in Russia, Arctic oil, East Siberia’s hydrocarbon export potential, Russia’s gas export strategy and Russia’s energy relations with China. He has also published a book on “International Partnership in Russia” (Palgrave Macmillan) and is currently writing a book on the history of Rosneft for Columbia University Press.

Anouk Honoré, Senior Research Fellow, is a Senior Research Fellow in the Gas Research Programme. Her research at the OIES focuses on gas issues in the EU and in individual countries in Europe and South America, with particular emphasis on energy policies, decarbonisation of the heating sector, decarbonisation of road transport, gas market fundamentals and power generation. Before joining the Institute, she worked at the International Energy Agency in Paris. Her work focused mainly on natural gas issues in the member countries but also in China and in Latin America. Dr Honoré holds a PhD in Economics, a MA in Environmental and Natural Resources Economics and a LLM in International Administration (Public Law). Dr Honoré is author of *European Natural Gas Demand, Supply & Pricing, cycles, seasons and the impact of LNG price arbitrage* (Oxford University Press 2011), and the author and co-author of chapters in other books, including OIES books such as *Pricing of Pipeline Gas and LNG in Latin America and the Caribbean*, with D. Ledesma in J. Stern (ed.) *The Pricing of Internationally Traded Gas* (Oxford University Press 2012), *The Gas Exporting Countries’*

Forum: Global or Regional Cartelization?, with L. El-Katiri in J. Stern (ed.) *The Pricing of Internationally Traded Gas* (Oxford University Press 2012), LNG Demand Potential, with H. Rogers, S. D'Apote and A-S Corbeau in A-S. Corbeau and D. Ledesma (eds.) *LNG Markets in Transition, The Great Reconfiguration*. She is also the author of several working papers on natural gas demand in Europe and in South America, decarbonization of heat and implications for natural gas demand, decarbonization of the industrial sector, and some country-specific analysis of their gas market. A selection of the latest publications in this series includes *Natural gas demand in Europe: The impacts of COVID-19 and other influences in 2020* (2020), *Decarbonization and industrial demand for gas in Europe* (2019), *Decarbonisation of heat in Europe: implications for natural gas demand* (2018). At present, Dr Honoré's main area of research is on decarbonization policies in the EU and individual European countries; interaction between gas and renewables in electricity generation, decarbonization of heat and road transport, all with a focus on potential impact on future gas demand (both natural gas and decarbonized gases).

Anders Hove, Senior Research Fellow. Anders Hove joined the OIES China Energy Research Programme in October 2022. Previously, he was Project Director for the Sino-German Energy Transition project at GIZ, a German federal enterprise providing services in the field of international development cooperation, while also serving as a non-resident fellow at the Columbia University Center on Global Energy Policy. He worked in Beijing from 2010-2022 and has more than 20 years of public and private sector experience related to energy policy and markets, including 9 years on Wall Street and 12 years in China. He has bachelor's and master's degrees in political science from MIT and is a Chartered Financial Analyst.

Adi Imsirovic, Senior Research Fellow. Adi Imsirovic has over 30 years of experience in oil trading. He held a number of senior positions, including Global Head of Oil at Gazprom Marketing & Trading, Director of Petraco and the Head of their Singapore office and The Regional Manager of Texaco Oil Trading for Asia. He was a Fulbright Scholar and he studied at the Graduate School of Arts and Sciences, Harvard University. Adi also taught economics at Surrey University for several years: Energy Economics as well as Resource and Environmental Economics. He has a PhD in Economics and a Masters degree in Energy Economics. He has written a number of papers and articles on the topic of oil and gas prices, benchmarks, and energy security. He is the author of the book: 'Trading and Price Discovery for Crude Oils: Growth and Development of International Oil Markets', published by Palgrave in August 2021.

Malcolm Keay, Senior Research Fellow, joined the OIES in January 2005. His career has ranged widely across the energy scene, including roles in: the public sector, as director of energy policy at the UK Department of Trade and Industry (1996–9) and division head at the IEA; the private sector, as senior managing consultant at Oxera; and the non-profit sector, working at Chatham House and the World Coal Institute. He has acted as an adviser for many energy studies, including as special adviser to a House of Lords committee inquiry into energy security in Europe, and director of the energy and climate change study for the World Energy Council. His research focuses on the implications of electricity market liberalization for the achievement of key energy policy objectives, particularly in relation to the environment. He contributed the chapter entitled 'Can the market deliver security and environmental protection in electricity generation?' to *UK Energy Policy and the End of Market Fundamentalism*, edited by Ian Rutledge and Philip Wright (OIES/OUP, 2011). This updated the analysis and conclusions of his 2006 monograph for the OIES, *The Dynamics of Power*, to argue that governments have failed to develop policies which will enable them to meet their environmental targets in the context of liberalized markets, and that more interventionist approaches would be needed. His research interests also include EU energy policy; with David Buchan, he co-authored a book published by OUP in 2016 entitled *Europe's Long Energy Journey: Towards an Energy Union?* Recently his research has focused on electricity market design and the decarbonization of heat, with an emphasis on a whole system approach.

Recently, he has published a number of papers on electricity market reform for a decarbonised system, and on the decarbonisation of heat in the UK.

Martin Lambert, Head of Hydrogen Research. Martin Lambert is an independent consultant and joined the Oxford Institute for Energy Studies in 2017 where he is Head of Hydrogen Research, specialising in renewable gas and hydrogen. He also writes occasionally on global LNG. His areas of expertise include commercial strategy, project development and structuring, economics, gas and LNG marketing and trading. Martin's 34 year career with Shell included several senior leadership positions in the gas and LNG businesses. His overseas assignments included Japan, where he was responsible for marketing Shell's LNG to gas and power companies, the Philippines where he was commercial manager during the development of the Malampaya gas field, and Australia where he was seconded to North West Shelf Australia LNG as Senior Vice President Marketing. From his UK base, his career also included frequent international travel, and he was a key member of the team which closed a major LNG project in the Middle East. Martin's career also included several years in related areas outside the core gas business: managing research teams developing products from Gas to Liquids and leadership roles in Shell's biofuels business. Martin holds an MA in economics and engineering from the University of Cambridge.

David Ledesma, Chairman, Gas Research Programme & Senior Research Fellow. David Ledesma is an independent gas and LNG consultant focusing on gas and LNG strategy along the value chain, including the structuring of commercial arrangements, financing, and markets for pipeline gas and LNG projects. Since joining the institute in November 2007, he has contributed chapters to several of the institute's books, namely: *Natural Gas in Asia* (2008), *Natural Gas in the Middle East and North Africa* (2011), *The Pricing of Internationally Traded Gas* (2012) and was Co-Editor of the institute's book *LNG Markets in Transition, The Great Reconfiguration* (2016). He has also published a number of papers, including: 'The Changing Relationship between NOCs and IOCs in the LNG Chain' (July 2009); 'East Africa Gas – Potential for Export' (March 2013); 'The Future of Australian LNG Exports: Will Domestic Challenges Limit the Development of Future LNG Export Capacity?' (September 2014) and *New Players New, Models* a research think piece (March 2019). David also manages the OIES Podcast series and is a regular presenter. David also contributed the book chapter 'Project Financing LNG Projects' to *The Principles of Project Finance* (Gower Publishing, 2012). David also writes on gas and LNG, and presents regularly at conferences. During over 40 years in the energy and utilities sector, David has worked on the development of complex integrated energy projects, negotiations at government level, and in the management of joint ventures. With Shell, he worked in Malaysia and the Netherlands, travelled extensively to Oman and Asia, and was a key member of the team that closed a major LNG project in the Middle East. He is an experienced commercial manager with hands-on experience of developing and closing commercial gas transactions as well as developing business strategy. From 2000 to 2005, as director of consulting then managing director of the Gas Strategies Group (formally EconoMatters Ltd), David worked on and managed LNG and gas consulting assignments around the world. In May 2013 David was appointed a non-executive Director of Pavilion Energy, a subsidiary of the Singapore investment firm Temasek Holdings in 2013. He has a degree in economics and geography from the University of Exeter.

Andrea Maino, Research Fellow. Andrea Giulio Maino is a Financial Economist with research interests in energy markets and the energy transition. He conducts also academic research in Asset Pricing, ESG Investing and venture capital. He joined the OIES as an OIES-Aramco Research Fellow in 2021. With the Institute, he focuses on the financing of the energy transition and on carbon markets. He is also a Doctoral Fellow at the Swiss Finance Institute and at the Geneva Finance Research Institute (University of Geneva). Previously, Andrea has been a Senior Associate at Moody's Investor Services, working on EMEA Securitizations with focus on Non-Performing transactions, and an Analyst at the European Central Bank, working on market and risk analysis. Andrea holds a Bachelor's degree in physics from the University of Rome and a Post-Graduate Diploma in mathematical finance from the University of Bologna.

Michal Median, Head of China Energy Research. Before joining OIES in July 2019, she headed cross-commodity China research at Energy Aspects. Prior to that, she headed China Matters, an independent research consultancy providing analysis on the politics of energy in China. Michal also held senior analytical roles at Eurasia Group in New York and London, and at Asia Centre-Sciences Po, Paris. She taught undergraduate courses on China's political economy at the Hebrew University in Jerusalem and has authored numerous academic articles. Michal also regularly provides comments for a wide variety of media outlets and is featured as a speaker at industry conferences. Michal holds a PhD in Political Science and East Asian studies from Sciences Po, Paris. She is fluent in Mandarin and French.

Tatiana Mitrova, Senior Research Fellow, is Professor and Research Director at the Energy Centre, Moscow School of Management, SKOLKOVO, Scientific advisor at the Energy Research Institute of the Russian Academy of Sciences (ERI RAS), Research Scholar at the Center on Global Energy Policy at Columbia University, Distinguished Research Fellow at Institute of Energy Economics, Japan (IEEJ). She has more than twenty years of experience in the analyses of the Russian and global energy markets, including production, transportation, demand, energy policy, pricing and market restructuring. She is Head of the annual "Global and Russian Energy Outlook up to 2040" project and a Board Member of Schlumberger and NOVATEK. Tatiana is a Visiting Professor at the Institut d'Etudes Politiques de Paris (Sciences Po) Paris School of International Affairs. She has more than 200 publications in scientific and business journals and eight books.

Jazmin Mota, OIES-KAPSARC Research Fellow. Jazmin Mota is a geological engineer graduated from the National Autonomous University of Mexico (UNAM). She is a PhD researcher at the University of Edinburgh and a visiting fellow at the National Laboratory of Sustainability Sciences (LANCIS) of UNAM. Her academic interests focus on the environment and energy, extractive industries, energy transition and sustainability sectors. In the professional field, she was director of Clean Technologies in the Ministry of Energy of Mexico (SENER); she worked as a consultant for the World Bank and as a project engineer at the Federal Electricity Commission (CFE). She was a representative of Mexico in the Carbon Sequestration Leadership Forum and the North American Energy Ministerial Trilateral, and other multilateral forums on CCS / CCUS. She has participated in public consultations for energy projects, teaching, training and scientific dissemination activities. Jazmin is the leader of the Mexican Carbon Capture and Storage Platform "MeCCS" and co-editor of the newsletter "Critical Point", a communication project on CCS and Sustainability for Mexico and the Latin American region.

Mohua Mukherjee, Senior Research Fellow. Mohua Mukherjee has worked as a senior development economics professional and team leader for over twenty-five years at the World Bank headquarters in Washington DC. Her most recent work has centred on financial issues related to renewable energy, energy access, distribution utility reform, and energy policy, apart from serving as the Program Manager of a \$3 million donor trust fund for India and Nepal on renewable energy. Mohua was responsible for leading the World Bank's US\$1 billion Solar Energy Program in India. She served as India Energy Head, looking after both the solar program as well as the distribution utility reform program, as well as the Green Energy Corridor construction (of new extra high voltage transmission lines to evacuate solar energy from remote, large utility scale solar parks). Mohua led all the World Bank's energy policy dialogue with the Government of India from mid-2014 to end-2016. Apart from energy, she has led World Bank projects in urban water supply, agricultural value chains, public sector debt management and macroeconomics, microfinance, microenterprise development, export promotion/trade facilitation, telecom sector, toll roads and other public-private participation, as well as health and education. Her policy dialogue and public investment project formulation experience spans 44 countries. Apart from the World Bank, Mohua has worked as the Vice President of Corporate Finance at two international investment banks in Nairobi, Kenya (while on a three-year sabbatical from the World Bank). She took an early retirement from the World Bank in 2017 and moved to India, where she initially served as a Program Ambassador of the International Solar Alliance from 2017-2019. She has subsequently spoken

at many conferences and diverse training events, including most recently, the Center for Advanced Financial Research and Learning (CAFRAL), of the Reserve Bank of India. She also consults regularly for the World Bank in Washington DC, and offers pro-bono advisory services to solar mini-grid developers on structured finance. Mohua is also an Independent Director on two corporate boards, and is formally registered as such with the Indian Ministry of Corporate Affairs. On February 1st, 2022 Mohua joined the Oxford Institute for Energy Studies as a Senior Research Fellow.

Hasan Muslemani, Head of Carbon Management Research and OIES-KAPSARC Senior Research Fellow. Hasan has a multinational background and a career spanning multiple disciplines, including carbon markets, natural sciences and climate and energy policy. He holds a PhD in Carbon Finance from the University of Edinburgh Business School, where his research focused on designing business models for breakthrough low-carbon technologies in steelmaking, in particular carbon capture, utilization and storage (CCUS) technology, to bring ‘green steel’ products to the market. He also holds an MSc in Carbon Finance and an MSc in Oceanography, on the back of a BSc in Biology with focus on marine sciences. At OIES, Hasan leads the Carbon Management research module within the Energy Transition Research Initiative (ETRI), where the module appraises business cases and the potential for CCUS in the power and industrial sectors (e.g. cement, steel and energy-from-waste) and explores topics and case studies relevant to the most promising carbon removal and negative emission technologies including tech-based ones (e.g. Direct Air Capture) and nature-based solutions. Hasan had previously taken up several roles in climate and energy consultancy and academic and industry research. In academia, He served as a lecturer and module lead at University College London (UCL) and the University of Edinburgh, delivering postgraduate courses on energy finance and policy, and energy and environmental markets. He has also taken up EU-funded research fellowships at ESADE Business School in Barcelona and at Edinburgh. He has played a key part in securing a number of partnership grants with international institutions focused on CCUS research, including BHP Billiton, the UK Foreign and Commonwealth Office (FCO), Peking University and Shanghai Jiao Tong University in China, and the University of Waterloo, Canada. Hasan also served as a consultant to overseas governments and organisations, particularly in China and Southeast Asia, including delivering reports on the financial viability of CCUS to the World Bank and Asian Development Bank. Most recently, he served as a carbon removals scientist at BeZero Carbon, focusing on developing and implementing a carbon credits rating framework to provide transparency over the quality of carbon offsets in the voluntary carbon market. Along his OIES publications, Hasan has published a number of journal articles on CCS and green steel, and is a member of various associations including the British Institute of Energy Economics (BIEE), the International Association for Energy Economics (IAEE), and the European Association of Environmental and Resource Economists (EARE).

Mostefa Ouki, Senior Research Fellow, Dr Mostefa Ouki is an independent energy consultant and has over thirty years of experience in developing, executing, and managing gas and energy-related technoeconomic projects throughout the world. He led numerous consulting and advisory assignments commissioned by governments; national and international energy companies; and, international financial institutions. He also executed and led a number of consulting assignments on the planning and implementation of oil, gas and petrochemical infrastructure projects in key hydrocarbon producing countries in the Middle East and North Africa (MENA) region. Dr Ouki worked closely with government and private sector policy decision makers in a number of countries on the formulation, funding and implementation of energy and infrastructure projects and policies. He advised project lenders and financial advisors on the development of energy and infrastructure projects. Dr Ouki is presently involved in research work on plans and developments in the MENA region to reduce greenhouse gas emissions and achieve carbon neutrality targets. He is also undertaking work on the preparedness of MENA hydrocarbon producing countries to address potential international decarbonisation measures. Dr Ouki started his career with the gas exports division of Algeria’s national oil and gas company, Sonatrach, in Algiers, and worked in Washington, D.C. as a consultant on gas

development projects for the World Bank. He was Vice President in Nexant's Energy & Chemicals Advisory division based in London. Prior to Nexant, he was with the US engineering, procurement, construction and project management company Bechtel and worked for the international pipeline engineering and project management company Penspen. Dr Ouki holds a diplôme d'ingénieur d'état in petroleum engineering economics from Algeria's Institut National des Hydrocarbures and MSc in Energy Resources, MA and PhD in Economics from the University of Pittsburgh, Pennsylvania, USA. He is a member of the American Economic Association; Association of International Petroleum Negotiators; and the International Association of Energy Economics.

Aliaksei Patonia Research Fellow, joined the Hydrogen Podule at the Oxford Institute for Energy Studies after being a Visiting Research Fellow and working primarily with the Institute's Electricity Programme. As a key part of the ETRI, the hydrogen module aims to develop objective, realistic and unique insights into the challenges and opportunities of the evolving hydrogen economy. Alex started his research at OIES as an OIES-Aramco Fellow in 2019 when he investigated the use of ammonia as a storage solution for future decarbonized energy systems. In his later research, he focused on power-to-hydrogen technologies and the possibilities to reduce the cost of electrolyzers – the key technology involved in the generation of 'green' hydrogen. Apart from his work at OIES, Alex has cooperated with a number of research institutions and think tanks such as the IASS of Potsdam, the GMFUS of Washington, DC, and the EPG of Bucharest. His commentaries and op-eds appeared, among others, in the Diplomat, EU Observer, Geopolitical Monitor, Natural Gas World, Apolitical, and Petroleum Review of the Energy Institute. He holds Master's degrees in energy management, sustainable development, and public policy from the Universities of Liverpool, St Andrews, and Oxford.

Rahmatallah Poudineh, Head of Electricity Research. Rahmat joined the institute in November 2014 to design and setup the electricity research programme. He is Senior Research Fellow and, since 2019, Director of Research. Rahmat is an economist and engineer by training, with several years of experience in the economics and regulation of the electricity sector. He has published numerous peer-reviewed academic articles on a number of key issues relating to the energy sector, including: network regulation, electricity market design, power system flexibility, renewable support schemes, gas and power interdependence, power sector reform in developing countries, and the implications of the energy transition for oil companies. He has also co-authored a book on 'The Economics of Offshore Wind Power: Challenges and Policy Considerations'. Rahmat's main research interest lies in the design of markets and regulation for future decarbonised energy systems. Rahmat has been involved in a number of policy oriented projects, including a European Commission funded project on developing a regulatory framework to ensure the security of the European power grid against natural, accidental and malicious damage. He also led a project on sustainable electricity pricing for Tanzania funded by International Growth Centre (IGC). Rahmat holds a BSc in aerospace engineering from Amirkabir University of Technology (Tehran Polytechnic), a graduate diploma in economics from Queen Mary University of London, MSc in energy economics and policy from University of Surrey, and PhD in energy economics from Durham University, where he received the best thesis prize for his doctoral dissertation on economic regulation of electricity distribution networks.

David Robinson, Senior Research Fellow. David Robinson is an economist who advises on public policy and corporate strategy, especially in relation to energy and climate change. His recent research includes analysis of the following issues, among others: policies to replace coal with decarbonized energy resources in China; the impact of Covid-19 on the global energy transition; the integration of intermittent renewable electricity; the lessons of the Texas and California electricity blackouts for reform of the energy sector; and future energy market design for a decarbonised energy sector. David runs his own consulting company, is an academic adviser to The Brattle Group, and was previously a director of NERA, where he was the co-chair of European Operations and of the Global Energy and Telecom Practices. He also worked at the International Energy Agency (IEA), and wrote his doctoral

dissertation at the University of Oxford on the vertical disintegration of the international petroleum industry.

Jack Sharples, Senior Research Fellow. Jack joined the Institute in January 2018. He holds a PhD and MSc in Russian and East European Studies from the University of Glasgow, and a BA in Politics from the University of York. Prior to joining the Institute, he spent four years as a Lecturer in Energy Politics and International Relations at the European University in St Petersburg. Outside OIES, he has been the author of the ‘Gazprom Monitor’ monthly analytical reports for the European Geopolitical Forum (Brussels) since June 2012. Beyond his OIES publications, he is also the author of several academic journal articles and book chapters, including: ‘The international political economy of Eastern European energy security: Russia, Ukraine, and the European Union’ (2018); ‘Europe’s largest natural gas producer in an era of climate change: Gazprom’ (2017) ‘Energy transitions in carbon-producing countries: Russia’ (2016); ‘Building the Energy Union: the problem of cross-border gas pipeline interconnections in Baltic, Central, and South-Eastern Europe’ (2016); ‘The importance of gas storage facilities in the European gas and power markets’ (2016); ‘The shifting geopolitics of Russia’s gas exports and the impact on EU Russia gas relations’ (2016); and ‘Russian gas supplies to Europe: the likelihood, and potential impact, of an interruption in gas transit via Ukraine’ (2016).

Jonathan Stern, Distinguished Research Fellow, founded the OIES Gas Research Programme in 2003 and was its Director until October 2011 when he became its Chairman and a Senior Research Fellow, he became a Distinguished Fellow in October 2016. He is honorary professor at the Centre for Energy, Petroleum & Mineral Law & Policy, University of Dundee; visiting professor at the Centre for Environmental Policy, Imperial College London; fellow of the Energy Delta Institute and a Distinguished Research Fellow of the Institute of Energy Economics, Japan (in Tokyo). From 2011-16 he was the EU Speaker, and remains a member of the EU–Russia Gas Advisory Council. He is the author and editor of several books, including: *Natural Gas in Asia: The Challenges of Growth in China, India, Japan and Korea*, the second edition of which was published by OUP in 2008; co-editor with Bassam Fattouh of *Natural Gas Markets in the Middle East and North Africa* (OUP, 2011); and editor of, *The Pricing of Internationally Traded Gas* (OUP, 2012), editor of *The Future of Gas in the Gulf: continuity and change* (OIES, 2019). He is author of two chapters in: eds. Anne-Sophie Corbeau and David Ledesma, *LNG Markets in Transition: the Great Reconfiguration*, published by OIES and KAPSARC in 2016. His most recent papers published by the Institute in 2019 and 2020 are: *Narratives for Gas in Decarbonising European Energy Markets*, *Challenges to the Future of LNG: decarbonisation, affordability and profitability*, and *Methane Emissions from Natural Gas and LNG Imports: an increasingly urgent issue for the future of gas in Europe*.

Katja Yafimava, Senior Research Fellow, on the Oxford Institute for Energy Studies Gas Research Programme, holds a D.Phil. in Geography and an M.Phil. in Russian and East European Studies from Oxford University. She has been an expert at the UNECE Group of Experts on Gas since January 2015 and was an expert at the EU-Russia Gas Advisory Council during 2012-16. Her main research areas include EU pipeline gas and LNG regulation, regulation of decarbonisation, transit security of Russian gas exports to Europe. Dr Yafimava is the author of *The Transit Dimension of EU Energy Security: Russian Gas Transit Across Ukraine, Belarus, and Moldova* (OUP 2011) and the author and co-author of chapters in other books, including *The Russian Gas Matrix: how markets are driving change* (OUP 2014), *Research Handbook on International Energy Law* (Edward Elgar 2014), *The Pricing of Internationally Traded Gas* (OUP 2012), *Russian and CIS Gas Markets and their Impact on Europe* (OUP 2009). She is also the author and co-author of several working papers on Russia-Ukraine, Russia-Belarus, and Russia-Moldova gas transit disputes, the latest in this series is a co-authored OIES paper ‘Implications of the Russia-Ukraine gas transit deal for alternative pipeline routes and the Ukrainian and European markets’ (2020). At present, Dr Yafimava’s main area of research is EU regulation, including regulation of pipeline gas and LNG as well as regulation of decarbonisation, reflected in many OIES publications, including ‘Nord Stream 2: on the verge of sending gas to Europe’ (2021), ‘The

OPAL Exemption Decision: a comment on the Advocate General's Opinion on its annulment and its implications for the Court of Justice judgement and OPAL regulatory treatment' (2021), 'Finding a home' for global LNG in Europe: understanding the complexity of access rules for EU import terminals' (2020), 'EU hydrogen strategy: regulatory opportunities and challenges' (2020), 'Gas Directive Amendment: implications for Nord Stream 2' (2019), 'Building New Gas Transportation Infrastructure in the EU – what are the rules of the game?' (2018), 'The EU Competition Investigation into Gazprom's sales to central and eastern Europe: a detailed analysis of the commitments and the way forward' (co-authored) (2017), 'German regulator's decision to suspend certification of Nord Stream 2 AG: F.A.Q.' (co-authored) (2021), 'The potential impact on the UK of a disruption in Russian gas supplies to Europe' (co-authored) (2022). Her most recent paper is 'The EC guidance on the Russian 'gas for rubles' decree: all things to all people?' (2022).

Vitaly Yermakov, Senior Research Fellow. Vitaly's research focus is on oil and gas in Russia and CIS. Before joining OIES in 2019 he worked for over 20 years in the industry holding positions of Commodity Strategist for Sberbank CIB, Visiting Researcher at KAPSARC, Saudi Arabia, Director of Research at Cambridge Energy Research Associates (CERA) and IHS CERA and a manager at TNK-BP, an oil company. Vitaly's recent publications include papers for Oxford Institute of Energy Studies on the issues of Russia-OPEC cooperation, Russian refining, Russia's LNG and pipeline strategy, Russian gas spare productive capacity, gas demand flexibility, and gas taxation. He also published a paper for KAPSARC, Saudi Arabia on price competitiveness of US LNG and Russian pipeline gas in Europe. Mr. Yermakov is also the author of over 50 CERA and IHS CERA analytical private reports, including analysis of gas demand issues and gas price regulation in Russia and Ukraine, analysis of tax changes for Russian oil and gas industries, regulatory reform in the Russian energy sector and comparative analysis of oil and gas transportation tariffs in Russia and North America. He also led numerous consulting projects for the CERA and IHS CERA clients, including Russian tax reform for the oil sector, developing gas strategy and developing strategy of marketing LPG for major Russian companies, analysing gas transportation in Russia for a major Western company. Vitaly has been lecturing for Energy Delta Institute's executive MBA program on a wide range of topics, including natural gas and LNG developments and pricing, China's gas demand, and Russian gas developments. He also works with Higher School of Economics in Russia and is a frequent speaker at major industry conferences in Russia and abroad. Mr. Yermakov holds a master's degree from Duke University and a PhD from Samara State University.

The following staff contributed to the work of the OIES in 2022. Their dedication and professionalism are essential to its smooth running.

- **Karen Clark** is responsible for the Institute's accounts.
- **Jo Ilott** provides administrative support for the Gas Research Programme.
- **Hannah Shipton** provides administrative support.
- **Kate Teasdale** is administrator and Company Secretary.

VISITING RESEARCH FELLOWS

Brendan A'Hearn, Visiting Research Fellow, is a Central and Eastern European gas market specialist for energy and commodity intelligence service Argus Media. Brendan has a Masters' degree in Russian Studies from University College London's School for Slavonic and Eastern European Studies. Brendan took a particular interest in Russia's use of energy as a geopolitical tool, and the connection between Russian politics and energy. His areas of research included the role of energy in Russo-Chinese relations, Russian climate change policy, and the relationship between gas and Russia's social contract with its citizens. Following completion of his MA, Brendan joined Argus as a reporter on the Central and Eastern European region. Brendan particularly focuses on pipeline supply and dependence on Russia in the CEE region, and leads Argus' coverage of Russian gas supplies to Europe and analysis of Gazprom's production and sales.

Agnieszka Ason, Senior Visiting Research Fellow. Agnieszka Ason is an independent energy lawyer and a Visiting Research Fellow at the Oxford Institute for Energy Studies. Agnieszka has extensive experience (as counsel and expert) in international energy disputes, including major pipeline gas and LNG price review negotiations and arbitrations in European and Asian markets. She is an Honorary Lecturer at the Queen Mary University of London and frequently guest lectures on energy law and international dispute resolution, most recently at the Humboldt University of Berlin and the London School of Economics. Agnieszka has published, conducted workshops, and provided press comments on various aspects of international energy contracts. She is the editor of the Oil, Gas and Energy Law (OGEL) Special Issue on Changing LNG Markets and Contracts (2020) and co-editor of the OGEL Special Issue on Carbon Neutral Energy (2022). Her recent speaking engagements include presentations for the International Group of Liquefied Natural Gas Importers (GIIGNL), the United States Energy Association (USEA), the Institute of Energy Economics Japan (IEEJ), Global Arbitration Review (GAR), S&P Global Platts, and the European Commission's Scientific Advice Mechanism. Her current research is focused on the impact of decarbonisation on long-term energy contracts and new models for LNG and hydrogen contracting.

Robin Baker, Visiting Research Fellow, has over 35 years' experience in energy finance; with the Chase Manhattan Bank where he headed the Oil & Gas Group's Asia Pacific region and subsequently with Société Générale, heading their Global Energy Finance Group. He is currently a Managing Consultant with Gas Strategies. He has been particularly active in advising and lending project finance to the energy sector and has provided financial advice to many projects throughout the energy chain; from upstream oil and gas to power generation. He has been actively involved in LNG since leading the first international LNG project finance (for Woodside's share of the first Northwest Shelf LNG project) in 1987 and has advised LNG projects in Qatar, Egypt, Indonesia, Russia, Australia, PNG, the USA and Mozambique. Prior to energy finance he worked in various refining and supply planning positions in the UK and Asia with the Royal Dutch/Shell Group. He has a B.Sc. in Chemical Engineering from Imperial College and an MBA from Cranfield School of Management, and is a Fellow of the Energy Institute.

Alex Barnes, Visiting Research Fellow, is an independent consultant specialising in energy market design and regulation. He has nearly thirty years' experience in the oil and gas sector, most of it spent in the liberalisation of gas and electricity markets. He has worked for a range of companies including Total, BG Group and Gazprom, helping them manage the impacts of energy liberalisation, both exploiting new opportunities and defending existing positions. At BG Group he led the team which secured an exemption from third party access regulation for the Dragon LNG terminal, enabling investment to go ahead. He established the Regulatory Affairs function for Gazprom Marketing & Trading in 2009, supporting its rapid expansion in gas and power trading in Europe, and also advised Gazprom on gas market liberalisation related issues. He has helped draft gas market rules as an industry

representative on expert panels for the European Network of Transmission Operators for gas (ENTSO-G) and the European energy market regulator ACER. He has also represented the European Federation of Energy Traders at the Madrid Forum organised by the EU Commission. He is a regular speaker at conferences and seminars, and on the advisory board for the European Annual Gas Conference and the European Gas Conference. He has a degree in Politics, Philosophy and Economics from Oxford University, and an MBA from Henley Management College.

Farhad Billimoria, Visiting Research Fellow, is an energy professional with over 14 years of global energy experience. He has covered electricity (renewable and conventional) and gas markets across Australia, New York, and California. He is currently with the Australian Energy Market Operator (AEMO) responsible for the design and analysis of electricity and gas markets in Australia, focusing on decarbonized market design for reliability and security. Prior to AEMO, Farhad was an active energy investor in US and international markets, as an energy and infrastructure specialist at the State of California (CalPERS) managing a \$5 billion portfolio of energy and infrastructure assets, and as Vice President at AMP Capital in New York. Farhad has Bachelor's degrees in Electrical Engineering and Laws (both with Honours), and holds a Masters in Energy Systems from the University of Melbourne with a focus on energy market modelling, forecasting, and system design.

Julian Bowden, Senior Visiting Research Fellow, worked for BP for four decades in a variety of mainly planning, strategy and business development roles in downstream oil and international gas. His international roles included postings to BP's offices in Moscow and Brussels. He was involved in the planning for Caspian crude oil exports (culminating in the BTC pipeline) and latterly in the development of the southern gas corridor. Publications include chapters on Azerbaijan and Georgia in an OIES book on CIS gas, a chapter on SE Europe's gas markets in an European Commission sponsored book on gas in the EU's energy union and research papers on gas pricing for the IGU. He has also published an academic journal article on Soviet oil marketing in the UK in the 1930s. Principle interests remain in gas and broader energy issues in Eurasia.

Michael Bradshaw, Senior Visiting Research Fellow, joined the OIES in August 2008 and is also Professor of Global Energy in the Strategy and International Business Group at Warwick Business School, teaching on their MBA programme. In addition to his involvement with the OIES, he is an honorary senior research fellow at the Centre for Russian, European and Eurasian Studies at the University of Birmingham and visiting Professor of Human Geography at the University of Leicester. He works at the interface between economic and political geography, business and management and international relations. He is a Fellow of the Royal Geographical Society (and past Vice President) and a Fellow of the Academy of Social Sciences. His research on the geopolitical economy of global energy has examined the role of foreign investment in Russia's oil and gas industry (with a focus on Sakhalin); global energy dilemmas and the interrelationship between energy security climate change and economic globalization; and the challenges to the UK's gas security. He is the academic lead for the University's Global Research Priority on Energy. He is the author of *Global Energy Dilemmas* (2014), co-editor of *Global Energy: Issues, Potentials and Policy Implications* (2015), and co-author of *Energy and Society: A Critical Perspective* (2018) and *Natural Gas* (2020, Polity Press). He is currently involved in a 5-year programme of research on the UK's energy transition in global context for the UK Energy Research Centre (UKERC 4) and is monitoring and assessing the UK shale gas landscape as part of a 4-year NERC/ESRC research programme on Unconventional Hydrocarbons in the UK Energy System.

Toby Chancellor-Weale, Senior Visiting Research Fellow, is an independent consultant specialising in Natural Gas Processing and Liquefied Natural Gas (LNG) facilities. He has 30 years' experience working for a range of oil & gas contractors and consultants including Bechtel, Granherne, KBR and Wood. He has worked with client teams including ADNOC, BP, Chevron, Eni, Equinor, NOC, NLNG and Shell on the design and operation of both on and offshore hydrocarbon processing facilities in Africa, Australia, the Caspian region, the Middle East, Norway and Russia. Toby is currently Chair of

the Institution of Chemical Engineers (IChemE) Oil and Natural Gas Special Interest Group (SONG). Toby is a Fellow of the IChemE, he holds an MBA from Imperial College and a BEng in Chemical Engineering from Bradford University.

Michael Xiaobao Chen, Senior Visiting Research Fellow, is a leader at Equinor's marketing and trading division, after having previously worked with Equinor's global upstream strategy and business development. Before joining Equinor, Michael worked as a senior energy economist in the Chief Economist's Office of the IEA, leading on the Asian/China energy outlook, G20 global fossil fuel subsidy initiatives, global oilfield decline rate analysis, and energy poverty. Michael is an editorial board member of the prestigious journal *International Petroleum Economics* of the China Petroleum Society and a senior advisor of the China Energy Research Society. Michael is also an advisor to Enrupt Energy Startup Accelerator in Singapore. His areas of expertise include: the Chinese gas markets and origination; energy reforms and economic transition; national oil company strategy; ASEAN energy markets; offshore wind partnerships; and oil industry upstream trends. Since joining the Institute in 2011, he has contributed a chapter to *The Pricing of Internationally Traded Gas* (OIES/OUP, 2012) and published a paper entitled 'The development of Chinese gas pricing: drivers, challenges and implications for demand' (July 2014). Michael holds an MSc in Economics from University College London and an MSc in Development from the London School of Economics.

Gabriel Collins, Senior Visiting Research Fellow, is the Baker Botts Fellow in Energy & Environmental Regulatory Affairs at Rice University's Baker Institute. He was previously an associate attorney at Baker Hostetler, LLP, and is the co-founder of the China SignPost™ (洞察中国) analysis portal. Collins has worked in the Department of Defense as a China analyst and as a private sector global commodity researcher, authoring more than 100 commodity analysis reports, both for private clients and for publication. Collins' research portfolio is global. His work currently focuses on legal, environmental and economic issues relating to water — including the food-water-energy nexus — as well as unconventional oil and gas development, and the intersection between global commodity markets and a range of environmental, legal and national security issues. His analysis draws from a broad swath of geospatial and other data streams, and often incorporates insights from sources in Chinese, Russian and Spanish. Collins received his B.A. from Princeton University and a J.D. from the University of Michigan Law School. He is licensed to practice law in Texas.

Stephen Craen, Visiting Research Fellow, joined OIES in 2022 and specialises in financing of energy projects and hydrogen. He also works as an independent consultant. His areas of expertise include: project development, structuring and financing. After seven years working as an engineer in the oil industry, Stephen moved into energy finance and spent over 30 years with Chase Manhattan Bank and Societe Generale focussing on advising most of the super-majors and NOCs on some of the largest international gas pipeline and LNG projects. Latterly, in Australia, Stephen contributed to Societe Generale's hydrogen strategy and spent a year at a solar developer, commercialising grid scale hydrogen storage technology. Stephen holds an BA in Physics from the University of Oxford.

Ralf Dickel, Senior Visiting Research Fellow, has worked as an independent expert on international energy trade since leaving the Energy Charter Secretariat in October 2010. In October 2004 he joined the Energy Charter Secretariat as Director for Transit and Trade, after heading the Energy Diversification Division at the IEA from 2001, being responsible for policy analysis of energy markets and energy market reform. Before joining the IEA, he worked as Senior Specialist for Oil and Gas Policy at the World Bank, after a long career with Ruhrgas from 1980 to 1998, where he held various management positions both in the gas purchase and the gas sales departments. He managed and co-authored several publications at the IEA and the Energy Charter, amongst them: *Security of Gas Supply in Open Markets* (IEA, 2004) and *Putting a Price on Energy* (Energy Charter, 2007).

Nikolai Drahos, Visiting Research Fellow, is a senior researcher at the Australian Climate Change Authority. He previously worked as a senior economist at the Office of the Chief Economist at the Department of Industry, Science, Energy and Resources, where his work focused on Australia's domestic gas market, global LNG markets and gas market forecasting. Nikolai holds a Bachelor of Arts (Honours) and a Master of Environmental and Resource Economics from the Australian National University, for which he was awarded the Helen Hughes prize. Nikolai is the author of a number of OIES papers and numerous reports, including the Department of Industry's *Resources and Energy Quarterly*.

Barbara Finamore, Senior Visiting Research Fellow, is a senior leader and environmental advocate with over 40 years of experience in environmental law and China climate and clean energy policy. In 1996, she founded the Natural Resources Defense Council (NRDC) China Program in Beijing, the first clean energy program to be launched by an international NGO. She helped to develop China's first energy codes for residential and commercial buildings, first research and development program for fuel cell vehicles, first utility-based initiative for energy conservation, and first nationwide emission control regulations for the shipping industry. She served as the Senior Strategic Director for Asia at NRDC, the President and Chair of the Professional Association for China's Environment (PACE), and the co-founder and President of the China-U.S. Energy Innovation Alliance. Ms. Finamore also worked for the U.S. Departments of Justice and Interior, the United Nations Development Programme, and the Center for International Environmental Law. In 2017, she was named a member of Foreign Policy's "The U.S.-China 50", a group of 50 individuals who are powering the world's most complex and consequential relationship. She holds a J.D. degree with honors from Harvard Law School, and is the author of "*Will China Save the Planet?*" (Polity Press).

Rolando Fuentes, Senior Visiting Research Fellow, is a Research-Professor of Finance at EGADE Business School - Tec de Monterrey in Mexico. Before joining EGADE, he was a Senior Economist (Research Fellow II) at the King Abdullah Petroleum Studies and Research Center (KAPSARC). His research interest has focused on developing new business and regulatory models for future electricity markets. He received the best paper award at the 8th Conference of the Regulation of Network Industries 2019, organized by the Florence School of Regulation. Rolando has experience in the public sector, where he served as Director of International Negotiations and Director at the Undersecretary of Hydrocarbons at Mexico's Ministry of Energy. Dr. Fuentes is an economist from Tecnológico de Monterrey (graduated with honours) and holds a PhD from the London School of Economics (LSE) for research into the environmental outcome of liberalizing the power sector in Mexico and an Msc in Environmental Economics from University College London (UCL). He was recipient of the British Chevening Scholarship in 2001, and was an LSE Fellow in 2008-2009.

Andrew Goddard, Visiting Research Fellow. Andrew's work focuses on carbon capture, utilization and storage (CCUS) and policy developments in the United States, including the Inflation Reduction Act and 45Q tax credit. Andrew has particular interest in heavy-emitting industrial sectors and their pathways to net-zero by 2050. Andrew holds a MA in International Affairs from the Norman Paterson School of International Affairs at Carleton University in Ottawa, Canada. During his studies, Andrew focused on Global Public Policy, International Organizations, and International Environmental Governance. Andrew works in the Canadian public sector.

Ieda Gomes, Senior Visiting Research Fellow, is a non-executive director of international companies in the energy and infrastructure sectors. She is also an independent consultant specializing in energy strategy, natural gas and LNG supply, pricing, contracts, and market fundamentals. In a career spanning 30 years in the gas and energy industry, Ieda has spent more than 13 years with BP, where she held senior executive positions, such as: vice president of new ventures for South Asia and Middle East, president of BP Brasil, and vice president of regulatory affairs for BP Gas and Power. Prior to BP, Ieda was the CEO of the S. Paulo Gas Company (Comgas), the largest gas distribution company in Brazil.

Ieda is currently a councillor at the Brazilian Chamber of Commerce in Great Britain, a director at the Department of Infrastructure of the S. Paulo Federation of Industries, and sits on the board of directors of Bureau Veritas, Saint Gobain, Exterran Corporation, and Prumo Logistica as an independent director. Ieda is a senior adviser and member of the Advisory Board of the Brazilian think tank FGV Energia and is an active member of International Gas Union (IGU), having served in the executive committee for two terms. She has presented at several energy conferences and training courses, and she is a member of the programme committee of LNG 2023. Ieda is on the advisory board of the consultancy Crystol Energy, co-chairs Access for Women in Energy and is a member of the board of WILL-Women in Leadership in Latin America. She is a regular columnist for the specialized magazine *Brasil Energia*. Ieda has a degree in chemical engineering from Universidade Federal da Bahia, an MSc in energy from Universidade de S.Paulo, and an MSc in Environmental Engineering from Ecole Polytechnique Fédérale de Lausanne.

Michael Hochberg, Visiting Research Fellow, is an energy industry professional with expertise in power project development, electricity markets, and regulation. Michael began collaborating with the Institute as the OIES-Saudi Aramco fellow in 2017, when he led a study evaluating auctions as policy tool for renewable energy procurement. His experience includes renewable project origination & development at Hecate Energy, management consulting in the Global Energy & Utilities practice of PA Consulting Group, and research related to the economics and regulation of the power sector. He holds a master's degree focused on energy economics from Universidad Pontificia Comillas where he was an Iberdrola Scholar, and graduated summa cum laude with a BA in Political Science from Tulane University. His academic experience also includes a Fulbright Scholarship in Spain, and a fellowship with the Clean Energy Leadership Institute in the United States.

Ross McVey, Visiting Research Fellow, is an independent consultant with nearly 20 years analysing and forecasting the evolution of the global energy markets to support trading or market investments for Centrica and Gazprom. Following the completion of his Physical Geography PhD from the University of Hull, he joined Centrica under a graduate scheme and quickly moved into Centrica Energy, supporting their (then) expansion into European markets by undertaking market analysis in addition to power assets, contract, and retail company valuations to support successful acquisition. His 15 years at Gazprom Marketing & Trading expanded on this commercially orientated market analysis through various roles of increasing seniority leading and directing large, global analytical teams. These roles focussed on different parts of the energy system, from short term trading analytics to deriving and generating medium to longer term fundamental energy scenarios and covered majority of the energy linked commodities, but with expertise in global gas/LNG and power and working knowledge in oil, coal and carbon markets. Increasingly, he has been expanding into the main facets of energy transition, the implications on the traditional hydrocarbons markets, the interrelationship of energy transition on the macro environment and the impacts/interrelationship with the traded markets.

Ahmed Mehdi, Senior Visiting Research Fellow. Ahmed Mehdi's work focuses on oil market fundamentals, Middle East oil and product pricing, and the geopolitics of energy markets. He was co-editor of the Oxford Energy Forum (OEF) issue(s) *Middle East Oil Pricing Systems in Flux* and *The Geopolitics of Energy: Out with the Old and in with the New?* Alongside his role at OIES, Ahmed serves as an advisor to a number of US and Middle East oil companies and trading houses. He also serves as a Distinguished Associate at Facts Global Energy (FGE) and Principal at Benchmark Mineral Intelligence, the world's leading pricing agency dedicated to battery metals. Ahmed previously acted as an advisor to BHP Petroleum and has worked in the deals advisory team for PricewaterhouseCoopers (PwC) in London. Ahmed regularly writes and comments for the media, including the New York Times, Financial Times, Bloomberg, Foreign Affairs, Petroleum Economist, S&P Global Platts and Middle East Economic Survey (MEES). Ahmed was educated at the University of Oxford and University College London.

Stephen O’Sullivan, Senior Visiting Research Fellow, began his oil and gas career with several years’ experience as an oil trader, economist and corporate planner in the downstream and trading divisions of BP, as well as the North Sea upstream and gas divisions of Total. In 1989 he joined Coopers & Lybrand as a strategy consultant in the oil and gas consulting business, working on the privatization and restructuring of the energy sectors across emerging markets, as well as in the nuclear power and transport sectors. He lived and worked in China, Russia, Central Asia, Eastern Europe, Southern Africa and the Middle East. In 1995 he was appointed Head of Research and Oil & Gas Analyst at MC Securities in London, where the team was ranked number one in EMEA oil and gas. Following the sale of that business to JP Morgan in 1998, he moved to Moscow as a Partner and Head of Research at United Financial Group, where he and his team were ranked the number one oil and gas research team and the number one Russia country team for seven years in a row. After the sale of UFG to Deutsche Bank in 2005, Stephen became Head of EMEA and Latin American Research where his research team was ranked number one across all sectors, in Russia and South Africa and across the broader EMEA region in 2006 and 2007. In 2007 he moved to Hong Kong as Head of Asian Research for the Australian bank Macquarie. In 2009 he joined Barclays to lead the build-out of its Asia ex-Japan equity research business. In 2013 he joined Trusted Sources, focusing on China energy based in Hong Kong. His major research themes include China’s gas sector reform and nuclear renaissance. In 2016, following the merger between Trusted Sources and Lombard Street Research to form TS Lombard, he took on an additional role as CEO of TS Lombard Research Partners, TS Lombard’s market-facing independent analyst platform.

Gulmira Rzaeva, Senior Visiting Research Fellow, is a founder and managing director of the London-based Eurasia Analytics Ltd consulting company. She was a senior research fellow at the Center for Strategic Studies (SAM) under the President of the Republic of Azerbaijan for the last ten years until January 2019. Her area of expertise includes energy security covering issues such as the energy policy of Azerbaijan and East Europe/Caspian region, Turkish domestic natural gas market, SEE gas market. Ms. Rzaeva has published several scholarly publications focusing on her area of expertise.

Alexander Scheibe, Visiting Research Fellow, is Senior Advisor for Energy and Climate Policy at VNG AG, a German gas company. His current research emphasises the role and significance of hydrogen for the EU’s energy policy, and it specifically focuses on how a future hydrogen regulatory framework could be designed given the present conflicting energy policy priorities of liberalization and sustainability. In 2018, Dr Scheibe was a Visiting Doctoral Fellow at OIES where he investigated the utilisation of scenarios as a decision-making tool in EU energy policy, focusing on the Ten-Year Network Development Plan. Alexander holds a PhD in European Energy Policy from the University of Luxembourg, and an MPP from the Willy Brandt School of Public Policy at Erfurt University.

Simon Schulte, Senior Visiting Research Fellow, analyses the economics and regulation of hydrogen and hydrogen-based products. He is Business Development Manager at Uniper, a German energy major, where he leads the development of large scale hydrogen projects. Before joining in Uniper, Simon Schulte was Manager and Head of Gas Markets at the Institute of Energy Economics (EWI) at the University of Cologne. He built up the institutes hydrogen activities and advised, among others, the German Federal Foreign Office, the German Ministry for Economic Affairs and Energy (BMWi) and the European Commission. Furthermore, he worked as a consultant in the Energy Market and Security Directorate at the International Energy Agency (IEA) in Paris. Simon Schulte holds a PhD in energy economics from the University of Cologne. Before, he studied industrial engineering with a major in chemical and energy engineering at the Münster University of Applied Sciences, the University of California in Los Angeles, the Norwegian School of Economics and the Dresden University of Technology.

Adnan Shihab-Eldin, Senior Visiting Research Fellow, is a member of the Board of Directors of Kearney Energy Transition Institute (Nederland) and Gulf Bank. Dr. Adnan Shihab-Eldin is former

Director General of the Kuwait Foundation for the Advancement of Sciences (2011-2021) and former Acting Secretary General and Director of Research at OPEC. He held earlier senior Director positions at both UNESCO and the International Atomic Energy Agency (IAEA). In Kuwait, he served as Director General of the Kuwait Institute for Scientific Research (KISR) and Vice President, academic Affairs, and faculty member at Kuwait University. He continues to teach, and publish research papers and articles in the physical and engineering sciences, as well as energy policy, technology and economics. He is a member of many International Boards of Directors and intern Advisory Councils (IAC), including, recently, the IAC of the King Abdullah Petroleum Studies and Research Center (KASPARC), the American University of Beirut (AUB) and Georgetown University, Qatar (GU-Q) as well as a member of the Standing Advisory Group on Nuclear Applications (SAGNA), IAEA. He is a recipient of many prestigious international awards and honors.

ACCOUNTS

STATEMENT OF FINANCIAL ACTIVITIES (INCORPORATING AN INCOME AND EXPENDITURE ACCOUNT)

Independent Auditors' Statement to the Members of the Oxford Institute for Energy Studies

For the Year Ended 31 December 2022

| | Notes | Unrestricted funds 2022 £ | Endowment funds 2022 £ | Total 2022 £ | Unrestricted funds 2021 £ | Endowment funds 2021 £ | Total 2021 £ |
|---|-------|---------------------------------|------------------------------|--------------------|---------------------------------|------------------------------|--------------------|
| <u>Income from:</u> | | | | | | | |
| Voluntary income | 3 | 775,683 | - | 775,683 | 701,230 | - | 701,230 |
| Incoming resources from charitable activities | 4 | 1,308,347 | - | 1,308,347 | 1,453,507 | - | 1,453,507 |
| Incoming resources from investments | 5 | 272,419 | - | 272,419 | 243,299 | - | 243,299 |
| Total income | | 2,356,449 | - | 2,356,449 | 2,398,036 | - | 2,398,036 |
| <u>Expenditure on:</u> | | | | | | | |
| Raising funds | 6 | 51,154 | - | 51,154 | 48,851 | - | 48,851 |
| <u>Charitable activities</u> | | | | | | | |
| Projects and publications | 7 | 1,445,887 | - | 1,445,887 | 1,226,692 | - | 1,226,692 |
| Support costs | 7 | 300,982 | - | 300,982 | 279,809 | - | 279,809 |
| Total charitable expenditure | | 1,746,869 | - | 1,746,869 | 1,506,501 | - | 1,506,501 |
| Other expenditure | 12 | 57,777 | - | 57,777 | 59,399 | - | 59,399 |
| Total expenditure | | 1,855,800 | - | 1,855,800 | 1,614,751 | - | 1,614,751 |
| Net gains/(losses) on investments | 11 | (702,309) | (922,672) | (1,624,981) | 1,257,383 | (58,097) | 1,199,286 |
| Net movement in funds | | (201,660) | (922,672) | (1,124,332) | 2,040,668 | (58,097) | 1,982,571 |
| Fund balances at 1 January 2022 | | 8,282,760 | 4,363,353 | 12,646,113 | 6,242,092 | 4,421,450 | 10,663,542 |
| Fund balances at 31 December 2022 | | 8,081,100 | 3,440,681 | 11,521,781 | 8,282,760 | 4,363,353 | 12,646,113 |

The statement of financial activities includes all gains and losses recognised in the year.

All income and expenditure derive from continuing activities.

OXFORD INSTITUTE FOR ENERGY STUDIES (REGISTERED NUMBER: 01676971)

Summary Income and Expenditure Account

At 31 December 2022

| | All income funds | |
|--|-------------------------|-------------|
| | 2022 | 2021 |
| | £ | £ |
| Gross income | 2,356,449 | 2,398,036 |
| (Losses)/gains on investments | (702,309) | 1,257,383 |
| | <hr/> | <hr/> |
| Total income in the reporting period | 1,654,140 | 3,655,419 |
| | <hr/> | <hr/> |
| Total expenditure from income funds | 1,855,800 | 1,614,751 |
| | <hr/> | <hr/> |
| Net (expenditure)/income for the year | (201,660) | 2,040,668 |
| | <hr/> | <hr/> |

OXFORD INSTITUTE FOR ENERGY STUDIES (REGISTERED NUMBER: 01676971)

Statement of Financial Position

At 31 December 2022

| | Notes | 2022 £ | £ | 2021 £ | £ |
|---|-------|-----------|------------|-----------|------------|
| Fixed assets | | | | | |
| Tangible assets | 13 | | 295 | | 2,925 |
| Investments | 14 | | 10,103,550 | | 11,208,514 |
| | | | <hr/> | | <hr/> |
| | | | 10,103,845 | | 11,211,439 |
| Current assets | | | | | |
| Debtors | 16 | 348,688 | | 514,118 | |
| Cash at bank and in hand | | 1,227,587 | | 1,059,122 | |
| | | <hr/> | | <hr/> | |
| | | 1,576,275 | | 1,573,240 | |
| Creditors: amounts falling due within one year | | | | | |
| Taxation and social security | | 42,028 | | 32,952 | |
| Other creditors | | 116,311 | | 105,614 | |
| | | <hr/> | | <hr/> | |
| | | 158,339 | | 138,566 | |
| Net current assets | | | 1,417,936 | | 1,434,674 |
| Total assets less current liabilities | | | <hr/> | | <hr/> |
| | | | 11,521,781 | | 12,646,113 |
| Capital funds | | | | | |
| Endowment funds - general | | | 3,440,681 | | 4,363,353 |
| Income funds | | | | | |
| Unrestricted funds | | | 8,081,100 | | 8,282,760 |
| | | | <hr/> | | <hr/> |
| | | | 11,521,781 | | 12,646,113 |
| | | | <hr/> | | <hr/> |

Statement of Cash Flows

At 31 December 2022

| | Notes | 2022 £ | £ | 2021 £ | £ |
|---|-------|-------------|-----------|-------------|-----------|
| Cash flows from operating activities | | | | | |
| Cash generated from operations | 23 | | 416,063 | | 241,657 |
| Investing activities | | | | | |
| Decrease/(Increase) in cash within investment portfolio | | 691,498 | | (570,762) | |
| Purchase of other investments | | (4,165,406) | | (2,674,897) | |
| Proceeds on disposal of other investments | | 2,953,891 | | 2,671,341 | |
| Investment income received | | 272,419 | | 243,299 | |
| Net cash used in investing activities | | | (247,598) | | (331,019) |
| Net cash used in financing activities | | | - | | - |
| Net increase/(decrease) in cash and cash equivalents | | | 168,465 | | (89,362) |
| Cash and cash equivalents at beginning of year | | | 1,059,122 | | 1,148,484 |
| Cash and cash equivalents at end of year | | | 1,227,587 | | 1,059,122 |

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