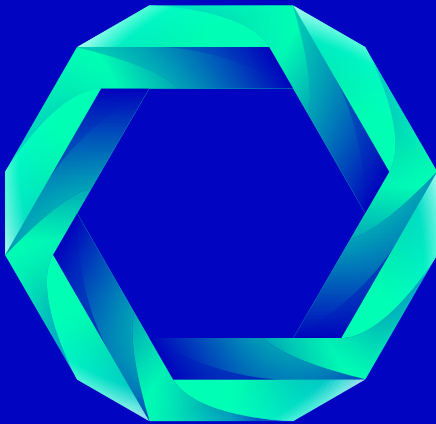




Australian Government



**THE SYDNEY
ENERGY
FORUM**

Securing Clean Energy
Supply Chains for the Indo-Pacific

Fullerton Hotel
Sydney
July 2022



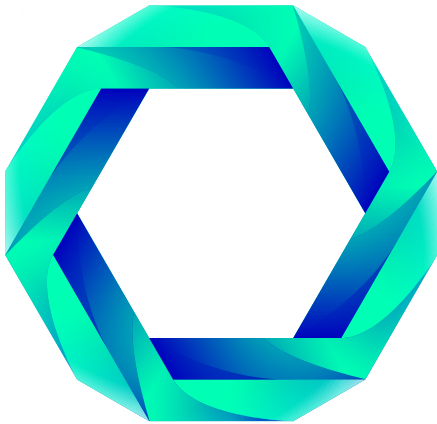
BCA

Business Council of Australia

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Australian Government



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BCA

Business Council of Australia

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FOREWORD FROM DR ALAN FINKEL AC



All of us are participating in the biggest challenge deliberately undertaken by humanity since the dawn of civilisation. A challenge that also presents an enormous opportunity to foster closer international cooperation, strive for a safer future, and share in improved economic prosperity.

Ultimately, it will signal the shift from the Industrial Age to the Electric Age.

This is the goal of the Sydney Energy Forum – to facilitate the clean energy transition.

By deploying clean energy at the huge scale required to replace fossil fuel energy sources, we will eliminate nearly three quarters of global emissions and enhance global energy security. To achieve this goal at the pace required to avoid the most severe impacts of climate change, we must optimise the supply chain.

The Indo-Pacific is at the centre of the transition. This rapidly growing region represents more than 60% of total global energy consumption and almost 60% of global carbon emissions. It represents over 65% of global rare earth metal reserves, over 89% of global solar PV module manufacturing, and over 86% of global lithium battery production.

The Forum brings together world-leading businesses, technologists, financiers, government leaders, and innovators and thought leaders to share their experience and knowledge. In doing so, we aim to identify opportunities to facilitate the resilience and diversity of clean energy supply chains across the Indo-Pacific region and beyond.

The outcomes of these deliberations will inform a number of discussions across international fora including those led by the International Energy Agency, the International Renewable Energy Agency, Association of Southeast Asian Nations, the G7, Indonesian G20 presidency, and at COP27 in Egypt.

I gratefully acknowledge the Australian Government for hosting this Forum. I also sincerely thank Dr Fatih Birol and the IEA, which as co-host has provided rigorous analysis and important support for the Forum. I similarly thank the Business Council of Australia, which as Forum Partner has provided extensive assistance in the planning and delivery of the Forum.

I take this opportunity to express my appreciation to my learned and enthusiastic fellow members of the Steering Committee. Your guidance and networks helped to shape the topics and bring together the participants.

- Dr Fatih Birol, Executive Director, International Energy Agency
- Dr Alan Bye, Managing Director, Imvelo
- Ms Barbara Humpton, President and CEO, Siemens Corporation
- Dr Tae Won Lim, Senior Vice President, Hyundai Motor Company
- Ms Rachel Lord, Senior Managing Director and Head of Asia Pacific, BlackRock
- Mr Sampe Purba, Adviser to Indonesian Minister for Energy and Mineral Resources
- Ms Vaishali Sinha, Chief Sustainability Officer, ReNew Power
- Mr Tatsuya Terazawa, Chairman and CEO, Institute of Energy Economics Japan
- Ms Jennifer Westacott AO, CEO, Business Council of Australia

It is my special pleasure to thank the Australian public servants who have supported every aspect of this Forum, from briefing notes and logistics, through to ensuring the best opportunity for the conference participants to advance the clean energy transition.

Finally, I extend my appreciation to each of you participating in the Forum, for setting aside the time and giving your attention to addressing these important issues.

Let us enter the Electric Age together.

Dr Alan Finkel AC

Chair of the Sydney Energy Forum Steering Committee

Special Adviser to the Australian Government on Low Emissions Technology



FOREWORD FROM DR FATIH BIROL



As a result of Russia's unprovoked invasion of Ukraine, we are in a new energy world. It is becoming increasingly evident by the day that this new energy world brings with it multiple perils and risks, but I also firmly believe that there is a chance to make this a historic turning point towards a cleaner and more secure energy system. This is because the momentum behind change in the energy sector is now coming not just from economic factors and climate commitments, but also from national security priorities. And if you look back at history, then you will see that this can be a very powerful combination.

The world must act urgently to make this change a reality. This requires immediate and massive expansion of clean energy technologies and the global supply chains that deliver them. Yet we must ensure the path out of the current energy security crisis and the race to net zero emissions does not simply replace one set of concerns with another. Establishing secure, resilient and sustainable supply chains for these technologies is essential. The IEA's *Securing Clean Energy Technology Supply Chains* report, prepared for the Sydney Energy Forum, makes this case very clear. The report assesses future supply chain needs for key technologies, including solar PV, batteries for electric vehicles and low-emissions hydrogen, and provides a framework for governments and industry to identify, assess and respond to emerging opportunities and vulnerabilities.

As the report highlights, the Indo-Pacific has an important role to play in the clean energy transition. The region is the home of significant emerging economies with fast-growing energy demand, as well as the vast majority of the world's solar PV module and battery manufacturing and assembly. The region is also a major resource holder and producer of the critical minerals that clean energy transitions will rely on – including lithium, nickel, cobalt, graphite and copper. If critical minerals are to be an enabler, and not a bottleneck, to energy transitions, governments in the Indo-Pacific must work together with producers and consumers to ensure supply chains are able to expand to meet growing demand, consistent with net zero ambitions.

While the level of engagement to fight climate change has never been higher, the gap between our climate ambitions and what is happening in the real world is growing. Now is the time to turn pledges into actions. This is what the Sydney Energy Forum will deliver. It will bring together government and industry leaders, energy experts, researchers and investors to identify practical and near-term actions for secure, resilient and sustainable clean energy supply chains.

The IEA is proud to co-host the Sydney Energy Forum with the Australian Government, in partnership with the Business Council of Australia. I would especially like to thank

Prime Minister Anthony Albanese, Climate Change and Energy Minister Chris Bowen and Dr Alan Finkel for recognising the challenges associated with clean energy supply chains and deciding to take actions that will bring about real change. I am confident that through the Sydney Energy Forum we can give ourselves the best possible chance of ensuring that energy transitions are as rapid as they need to be, while remaining as secure as they must be.

Dr Fatih Birol

Executive Director,
International Energy Agency



SYDNEY ENERGY FORUM AGENDA

SECURING CLEAN ENERGY SUPPLY CHAINS FOR THE INDO-PACIFIC

The scale and pace of the clean energy transition is unprecedented. The path to net-zero emissions requires a complete transformation of the energy systems that underpin global economies. Recent global events, including the COVID-19 pandemic and Russia's invasion of Ukraine, highlight the need to ensure secure energy access and the importance of diverse and resilient energy supply chains.

Co-hosted by the Australian Government and the International Energy Agency (IEA), in partnership with the Business Council of Australia (BCA), the Sydney Energy Forum brings together leaders from industry, academia and government across the Indo-Pacific to ask: how can we scale up clean energy supply chains without compromising on secure and reliable energy access?

To consider this question holistically, the Forum is structured around four themes:

1. Decarbonisation, energy security and the scale and pace of the transition
2. The transformative role of clean energy technologies
3. Diverse and resilient clean energy supply chains
4. Enabling markets, capabilities and systems to support the transition.

The Forum will explore these issues and identify practical actions for governments and the private sector to overcome barriers and realise the benefits of creating secure and diverse supply chains for clean energy technologies in the region.

Forum speakers are experts in their fields from across the Indo-Pacific and beyond, bringing diverse perspectives to the subject of clean energy supply chains.

Clean energy technologies will play a central role in achieving the broad decarbonisation needed to meet global climate objectives. Developing these technologies at the pace and scale needed will depend on access to clean energy supply chains and the critical minerals, materials and components they include.

Supply chains are global by nature, requiring cooperation and partnerships between key players across geographic divides. A coordinated approach is needed to establish global clean energy technology supply chains that are secure, resilient and sustainable.

Clean energy supply chains are already highly concentrated, with reliance on a limited number of producers giving rise to supply risks. If this concentration of critical clean energy inputs persists as our reliance on clean energy increases, localised disruptions could have significant implications for energy security and our economies.

The Indo-Pacific is at the centre of the clean energy transition, and already plays a key role in clean energy supply chains. It represents over 65% of global rare earth metal reserves, over 89% of global solar PV module manufacturing, and over 86% of global lithium battery production.

The Indo-Pacific is home to over 60% of the global population and is one of the world's fastest growing regions, representing more than 60% of total global energy consumption and almost 60% of global carbon emissions. Achieving the goals of the Paris Agreement will require global action and the Indo-Pacific has an important role to play.

AGENDA

Monday 11 July

All day	Registration at Forum venue, the Fullerton Hotel
5.00pm – 7.00pm The Fullerton Hotel	Welcome reception at the Fullerton Lobby Bar Welcome remarks at 5:45pm followed by performance by Gondwana Children’s Choir
7.00pm – 9.00pm The Fullerton Hotel	Optional Buffet Dinner available on Level 1, the Fullerton Hotel

Tuesday 12 July

7.00am - 8.45am	Registration and seating Guests seated from 8.30am - 8:45am
9.00am - 9.35am The Fullerton Hotel	OPENING OF FORUM Forum MC Beverley O’Connor Welcome to Country Keynote speech Prime Minister of Australia, the Hon Anthony Albanese MP
9.35am - 10.50am The Fullerton Hotel	PLENARY SESSION ONE: DECARBONISATION, ENERGY SECURITY AND THE SCALE AND PACE OF THE TRANSITION Dr Fatih Birol, Executive Director, International Energy Agency Secretary Jennifer M. Granholm, US Secretary of Energy Masatsugu Asakawa, Asian Development Bank President Q&A facilitated by Dr Andrew Forrest AO
10.50am - 11.10am The Fullerton Hotel	Break and morning tea
11.10am - 12.15pm The Fullerton Hotel	PLENARY SESSION TWO: TRANSFORMATIVE ROLE OF CLEAN ENERGY TECHNOLOGIES Panel Session: Dr Alan Finkel AC (Chair) 1. Claudio Facchin, Hitachi Energy 2. Sumant Sinha, ReNew Power 3. Audrey Zibelman, Google’s Moonshot Factory X 4. Dr Larry Marshall, CSIRO

12.15pm - 1.35pm The Fullerton Hotel	<p>Lunch</p> <p>The Hon Chris Bowen MP, Minister for Climate Change and Energy, Australia</p> <p>H.E. Arifin Tasrif, Minister of Energy and Mineral Resources, Republic of Indonesia</p>
1.35pm - 4.50pm The Fullerton Hotel	<p>PLENARY SESSION THREE: DIVERSE AND RESILIENT CLEAN ENERGY SUPPLY CHAINS</p> <p>Scene setter</p> <p>Tatsuya Terazawa, Institute of Energy Economics Japan</p> <p>Panel 1: Low cost renewables</p> <p>Gauri Singh, IRENA (Chair)</p> <ol style="list-style-type: none"> 1. Naiwen Marina Hsu, CIP Taiwan 2. Professor Martin Green, UNSW <p>Panel 2: Batteries and critical minerals</p> <p>Dr Alan Bye (Chair)</p> <ol style="list-style-type: none"> 1. Dr Shoichiro Watanabe, Panasonic Energy 2. Amanda Lacaze, Lynas 3. Simon Moores, Benchmark Minerals <p><i>15 min comfort break, and afternoon tea</i></p> <p>Panel 3: Hydrogen and ammonia</p> <p>Shaun Gregory, Woodside (Chair)</p> <ol style="list-style-type: none"> 1. Yoshinori Kanehana, Kawasaki Heavy Industries 2. Toshifumi Watanabe, J-Power 3. Gretta Stephens, Bluescope <p>Wrap up and insights</p> <p>William Lin, bp</p>
4.50pm - 5.00pm	MC and Dr Alan Finkel AC wrap up of day
5.00pm	Day 1 Forum close
5.00pm - 5.40pm	Personal time
5.40pm - 6.15pm From Fullerton Hotel	Transport to Shangri-la Hotel
6.15pm - 7.15pm Shangri-la Hotel	<p>Pre-dinner drinks</p> <p>Dinner MC: Professor Veena Sahajwalla FAA FTSE</p> <p>Barbara Humpton, Siemens</p> <p>Vaishali Nigam Sinha, ReNew Power</p>
7.15pm - 9.30pm Shangri-la Hotel	<p>OFFICIAL DINNER</p> <p>Dr Andrew Forrest AO</p>
9.30pm	Finish, travel back to the Fullerton Hotel

Wednesday 13 July

7.30am - 8.50am

The Fullerton Hotel

BREAKFAST ON TRADITIONAL LAND OWNERSHIP, ETHICAL MINING AND POWERING COMMUNITIES

Keynote address

Toeolesulusulu Cedric P S Schuster, Minister of Natural Resources and Environment, Samoa

Panel discussion

1. Toeolesulusulu Cedric P S Schuster, Minister of Natural Resources and Environment, Samoa
2. Karrina Nolan, Original Power
3. Dr Tarcisius Kabutaulaka, University of Hawaii
4. Tony McAvoy SC, Federick Jordan Chambers

8.50am - 9.10am

Break

9.10am - 10.20am

The Fullerton Hotel

REVISITING PLENARY SESSION ONE: DECARBONISATION, ENERGY SECURITY AND THE SCALE AND PACE OF THE TRANSITION

Kōichi Hagiuda, Minister of Economy, Trade and Industry, Japan

Raj Kumar Singh, Minister of Power and Minister of New and Renewable Energy, India

Dr Daniel Yergin, S&P Global

Closing remarks: Claudio Facchin

10.20am - 10.35am

Break and morning tea

10.35am - 12.30pm

The Fullerton Hotel

PLENARY SESSION FOUR: ENABLING MARKETS, CAPABILITIES AND SYSTEMS TO SUPPORT THE TRANSITION

Scene setter

Ulrika Francke, International Organization for Standardization

Panel 1: Finance and investment

Ian Learmonth, CEFC (Chair)

1. Nobuyuki Kawabata, SMBC
2. Hasmukh Patel, Energy Fiji
3. Dr Danielle Merfeld, GE Renewables

Panel 2: Open and competitive markets

Rich Lesser BCG (Chair)

1. Tatsuo Yasunaga, Mitsui & Co
2. Vaishali Nigam Sinha, ReNew Power
3. Dr Huw McKay, BHP

12.30pm – 1.40pm

Lunch

The Fullerton Hotel

Dr Mahmoud Mohieldin, UN Climate Change High-Level Champion for Egypt

Dr Jörg Kukies, State Secretary at the German Federal Chancellery and G7 and G20 Sherpa of German Chancellor Olaf Scholz

1.40pm – 3.20pm

The Fullerton Hotel

**PLENARY SESSION FOUR:
ENABLING MARKETS, CAPABILITIES AND SYSTEMS TO SUPPORT THE
TRANSITION CONTINUES – panel sessions**

Panel 3: Transport and Infrastructure

Dr David Finn, Tritium (Chair)

1. Tomohide Miyata, ENEOS
2. Professor Lynn Loo, Global Centre for Maritime Decarbonisation
3. Marika Calfas, NSW Ports

Panel 4: Workforce and skills

Barbara Humpton (Chair)

1. Gurdeep Singh, NTPC Limited
2. Professor Datuk Ahmad Fauzi Ismail, Universiti Teknologi Malaysia
3. Jennifer Westacott AO, BCA

3.20pm – 3.30pm

FORUM CLOSE

Dr Alan Finkel AC

3.40pm – 7.00pm

Break and optional sight seeing

Optional harbour cruise

7.00pm – 9.30pm

THEMED DINNERS

Topic 1: Innovation in solar technology

Topic 2: Critical minerals

Topic 3: Hydrogen

Thursday 14 July

7.15am - 8.45am

The Fullerton Hotel

BREAKFAST MEETING

**Topic: Sustainable aviation fuel –
Boeing Australia and Bioenergy Australia**

Themed site visits in greater Sydney region and Melbourne

ACKNOWLEDGEMENT OF COUNTRY

In the spirit of reconciliation the Sydney Energy Forum acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past and present and extend that respect to all Aboriginal and Torres Strait Islander peoples today.



THE HON ANTHONY ALBANESE MP

PRIME MINISTER OF AUSTRALIA



The Hon Anthony Albanese MP was sworn in as Australia's 31st Prime Minister on 23 May 2022.

Anthony Albanese previously served as Deputy Prime Minister and Leader of the House of Representatives.

As Infrastructure Minister and Communications Minister, he delivered nation-building projects, connecting the country through thousands of kilometres of roads and rail, and rolling out the high-speed fibre National Broadband Network.

He was widely recognised for his ability to bring stakeholders, businesses, and communities together to deliver projects that boosted the economy, enhanced productivity, and improved Australia's quality of life.

Anthony was first elected to the Australian Parliament as the member for the Sydney seat of Grayndler in 1996.

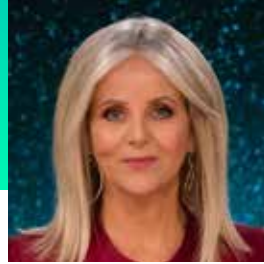
In 2019, he was unanimously elected as the Leader of the Australian Labor Party.

Anthony grew up with his mother, Maryanne, in a council house in Sydney.

As he watched his mum juggling the challenges of life on a disability pension, Anthony came to understand the power of a parent's love in the face of hardship – and the power of government to change lives for the better.

This knowledge still drives him today – both as Prime Minister and as a father – as he works to building a stronger Australia to hand to his son Nathan's generation.





FORUM MC: BEVERLEY O'CONNOR

**Australian Journalist and host of
The World ABC News 24**

Beverley O'Connor brings over twenty years experience working in the media across both radio and television as a presenter and journalist for the ABC where she has recently been a presenter on Australia Network, ABC News Breakfast and News 24.

She specialised in economics and politics and was a presenter on 774 ABC Radio in Melbourne for 5 years. Her move to television included hosting Stateline, now 7.30 Victoria, State Election coverage, news and sport as host of ABC Weekend Sport.

She was an inaugural Asia Pacific Journalism Fellow and travelled and reported from China in 2013. Other radio and television work included a stint at Channel Seven and on commercial ration as breakfast presenter for Vega 915 from 2005 – 2007.

Beverley was the first female director of the Melbourne Football Club, where she served for nine years, seven of those as Vice-President, the only woman to hold this role with an AFL club.

Beverley is a Life Governor of the Drug and Alcohol Foundation, having served six years on the Board and is an Australia Day ambassador, campaigner for breast cancer awareness, and ambassador for children's charities Variety and Ozchild.



PLENARY SESSION ONE

DECARBONISATION, ENERGY SECURITY, AND

THE SCALE AND PACE OF THE TRANSITION

Session One considers the scale and pace of the clean energy transition needed to achieve global decarbonisation goals.

It will reflect on the history of energy, the changing geopolitical order and subsequent implications for energy security, access, reliability and affordability, both globally and in the Indo-Pacific region.

SPEAKERS



DR FATIH BIROL

**Executive Director,
International Energy Agency**

Dr Fatih Birol has served as Executive Director of the International Energy Agency since 2015. After taking office, Dr Birol led the IEA in its first comprehensive modernisation programme since its creation in 1974.

These efforts focused on “opening the doors” of the IEA to major emerging economies; making the IEA the global hub for clean energy transitions; and broadening the IEA’s energy security mandate beyond oil to also cover electricity, natural gas, renewables and the critical minerals needed in many of today’s clean energy technologies.

Dr Birol has been named in the TIME100, TIME’s annual list of the world’s most influential people. He is the recipient of numerous state decorations, including the French Legion of Honour, the Japanese Emperor’s Order of the Rising Sun, the Order of the Polar Star from the King of Sweden and the highest Presidential decorations from Austria, Germany and Italy.



SECRETARY JENNIFER M. GRANHOLM

Secretary of Energy, United States of America

Jennifer Granholm was sworn in as the 16th Secretary of Energy on February 25, 2021, becoming the second woman to lead the US Department of Energy.

Secretary Granholm leads the US Department of Energy in helping America achieve President Biden’s goal of net-zero carbon emissions by 2050 by advancing cutting-edge clean energy technologies, creating millions of good-paying union clean energy jobs, and building an equitable clean energy future.

Prior to her nomination as Secretary of Energy, Secretary Granholm was the first woman elected Governor of Michigan, serving two terms from 2003 to 2011. Secretary Granholm was also the first woman elected Attorney General of Michigan and served as the state’s top law enforcement officer from 1998 to 2002.

After two terms as governor, Secretary Granholm joined the faculty of the University of California, Berkeley as a Distinguished Professor of Practice in the Goldman School of Public Policy, focusing on the intersection of law, clean energy, manufacturing, policy, and industry. She also served as an advisor to the Clean Energy Program of the Pew Charitable Trusts.

Secretary Granholm began her career in public service as a judicial clerk for Michigan’s 6th Circuit Court of Appeals. She became a federal prosecutor in Detroit in 1990, and in 1994, she was appointed Wayne County Corporation Counsel.

Secretary Granholm, an immigrant from Canada, is an honors graduate of both the University of California, Berkeley and Harvard Law School. She and her husband, Daniel G. Mulhern, have three children.



MASATSUGU ASAKAWA

President, Asian Development Bank (ADB)

Masatsugu Asakawa is the President of the ADB and the Chairperson of ADB's Board of Directors. He was elected President by ADB's Board of Governors and assumed office on 17 January 2020. In August 2021, he was reelected for a 5-year term starting on 24 November 2021.

Under Mr. Asakawa's leadership, ADB made significant contributions to the region's COVID-19 pandemic response and recovery planning. He also guided the roll of a series of new and innovative financing initiatives—including an Energy Transition Mechanism — to spur the region's low-carbon development and elevated ADB's 2030 cumulative climate financing ambition to \$100 billion.

Prior to joining ADB, he served as Special Advisor to Japan's Prime Minister and Minister of Finance, and has a close-to-four decades' career at the Ministry of Finance with diverse professional experiences that cut across both domestic and international fronts.

Mr. Asakawa also worked for international organizations as the Chief Advisor to ADB President between 1989 and 1992, senior staff at the Fiscal Affairs Department of the IMF (1996–2000), and Chair for the Committee on Fiscal Affairs at Organisation for Economic Co-operation and Development (2011–2016).



Q&A FACILITATED BY DR ANDREW FORREST AO

**Chairman and Founder of
Fortescue Metals Group,
Fortescue Future Industries,
Munderoo Foundation and Tattarang**

As Founder and Chairman, Dr Andrew Forrest has led Fortescue Metals Group (Fortescue) from inception to a US\$60 billion listed natural resources company that's invested US\$50+ billion developing some of the world's most efficient infrastructure.

Fortescue has committed to become zero-emissions by 2030. Key to enabling that is Fortescue Future Industries (FFI), established in 2020, a developer, financier, and operator of a global portfolio of renewable energy resources to produce green energy at a scale equal to the oil and gas super-majors.

FFI is leading the green industrial revolution, developing technology solutions for hard-to-decarbonise industries, while building a global portfolio of renewable green hydrogen and green ammonia projects to produce 15 million tonnes per year of green hydrogen by 2030, rising to 50 million tonnes per year in the decade thereafter.

In 2001, Dr Forrest co-founded Munderoo Foundation with his wife Nicola, and to date they've donated more than US\$3 billion supporting 300+ initiatives addressing modern slavery, ocean health, cancer, indigenous disparity, childhood development, artificial intelligence, disaster resilience, and plastic waste.

Dr Forrest's commercial business, Tattarang, is backing new renewable green energy projects including WindLab wind power and SunCable solar power and expanding sustainable and carbon-neutral practices within agri-food business Harvest Road.

Dr Forrest has a PhD in Marine Ecology from the University of Western Australia.

In 2017, Dr Forrest was appointed an Officer of the Order of Australia (AO) for distinguished service to philanthropy, mining, employment, and sustainable foreign investment.

EXPLAINER

THE GLOBAL NEED FOR AFFORDABLE, RELIABLE AND SECURE CLEAN ENERGY

Accelerating access to affordable, reliable and secure clean energy is critical to meeting global net zero objectives. The Russian invasion of Ukraine highlights the need to secure access to reliable energy.

The IEA notes that the clean energy transition is fundamentally changing the nature of energy security, shifting concerns away from fossil fuels and towards clean energy supply chains. In the IEA's Net Zero

Emissions by 2050 Scenario, renewables meet two-thirds of global energy needs by mid-century and energy security will increasingly hinge on adequate, affordable and reliable access to the equipment, minerals, materials and components needed to utilise clean energy technologies. Ensuring clean energy supply chains are secure, resilient and sustainable is a priority.



Almost all global manufacturing capacity for solar PV is located in the Indo-Pacific region.

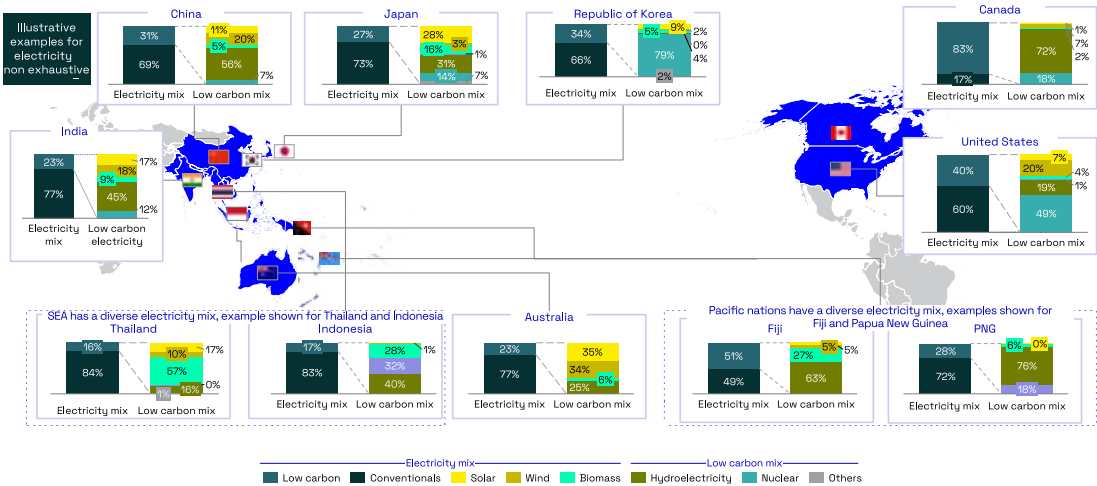
THE INDO-PACIFIC WILL PLAY A CRITICAL ROLE IN THE CLEAN ENERGY TRANSITION

The Indo-Pacific is critical to achieving the world's climate goals. The region is home to around one quarter of the world's countries, over 60% of the global population, and has a GDP growth rate of 1.5 times the rest of the world.¹

The region also accounts for more than half of global energy consumption and emissions,

and is a key source of the raw materials, technologies and products that will be critical to net zero success. The development and deployment of reliable and low cost clean energy technologies and their supply chains is essential to secure the region's clean energy transition.

The Indo-Pacific has a range of different starting points in clean energy



Note: Example shown here for electricity, select country examples only; Other sources includes generation from chemical heat and other sources; 'Biomass' includes biofuels and waste energy; 'Conventionals' include emissions-intensive generation technologies, such as coal and gas-fired power. All data is electricity generation (GWh) 2020 except for Fiji and Papua New Guinea (installed capacity MW, 2020)
 Source: BCG Analysis, drawing on US EIA and IEA data

¹ This GDP growth rate figure is forecast GDP growth to 2050, not the current GDP growth rate.

MEETING CLEAN ENERGY DEMAND REQUIRES DIVERSE, COMPETITIVE AND RESILIENT SUPPLY CHAINS

The scale and pace of this transition is unprecedented. Diverse, competitive and resilient supply chains will be critical to meeting the growing demand for clean energy and decarbonising at the scale and pace necessary to keep climate goals within reach.

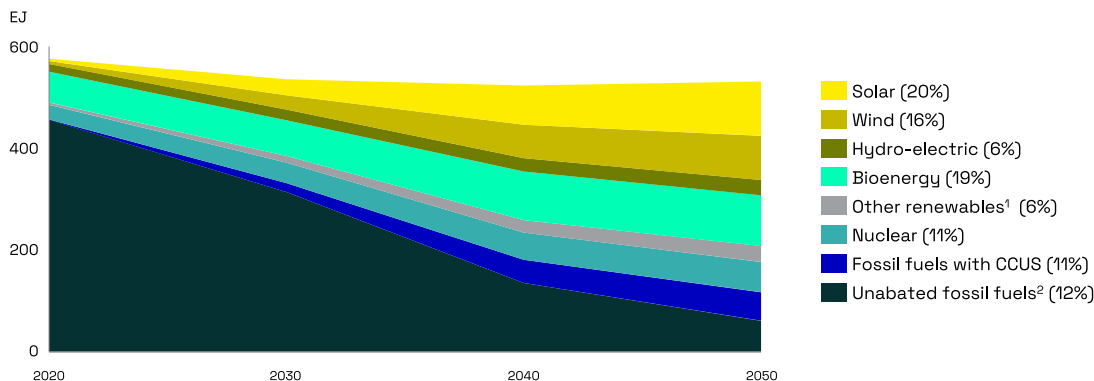
In the IEA's net zero scenario, unabated fossil fuel energy supply needs to fall from 86% to 11% of the total energy mix by 2050 (from 2020). This will require a rapid increase in renewable capacity to replace fossil-fuel

generation, significant technological innovation, and the ability to deploy and connect this new energy to end uses.

Diverse, resilient and reliable supply chains are required to enable the secure end use of clean energy. Many challenges to resilience are unique to individual technologies, but there are common challenges across clean energy technologies, including reliance on expensive and highly concentrated raw materials, lack of supplier diversity and a lack of immediate demand.

The clean energy transition requires a rapid scale-up of renewables

Total energy supply EJ; IEA's Net Zero by 2050 Roadmap



1. 'Other renewables' in IEA data include marine and geothermal. IEA published data set in World Energy Outlook projections shows other renewables dropping to 0 in 2045 (not explained) and returning to 32 EJ by 2050. 2. Unabated fossil fuels are distinct from fossil fuels using carbon capture, use and storage (CCUS) – these unabated fossil fuels will need to be balanced, for example by offsets and direct air capture, to reach net zero
 Note: Projection data is drawn from the World Energy Outlook's Net Zero Emissions scenario
 Source: IEA 'Net Zero by 2050: A Roadmap for the Global Energy Sector' (2021)



PLENARY SESSION TWO

TRANSFORMATIVE ROLE OF

CLEAN ENERGY TECHNOLOGIES

Session Two will explore the role of clean energy technologies in unlocking access, reliability, security and affordability of energy.

Speakers will provide their perspectives on where we are now and what is needed to scale and accelerate the development and deployment of clean energy technologies.

SPEAKERS



DR ALAN FINKEL AC

Special Adviser to the Australian Government on Low Emissions Technology

Dr Finkel is a neuroscientist, engineer and entrepreneur. He was appointed Special Adviser to the Australian Government on Low Emissions Technology in December 2020, having previously served as Australia's Chief Scientist from 2016 to 2020.

As Chief Scientist, Dr Finkel led the development of the:

- 2019 National Hydrogen Strategy
- 2018 STEM Industry Partnership Forum report
- 2017 Review into the National Electricity Market (Finkel Review)
- 2016 National Research Infrastructure Roadmap

In October 2020, at the request of National Cabinet, he led a review of the systems and operations in all states and territories for effective COVID-19 testing, contact tracing and outbreak management, and to exchange case and outbreak management data between states and territories.

As Special Adviser, Dr Finkel is spearheading the Australian Government's efforts to accelerate development and commercialisation of the next generation of low emissions technologies. Dr Finkel is also Chair of the Australian Government's Technology Investment Advisory Council.

Prior to becoming Chief Scientist, he was the Chancellor of Monash University and President of the Australian Academy of Technology and Engineering. He holds a PhD in electrical engineering from Monash University.



CLAUDIO FACCHIN

CEO Hitachi Energy Senior Vice President and Executive Officer, Hitachi Ltd.

Claudio Facchin is Senior Vice President and Executive Officer of Hitachi, Ltd. since April 2021. He is also the CEO of Hitachi Energy since July 2020. Prior to this he was global President of the Power Grids business between 2016 and 2020 and the President of the Power Systems division from December 2013 to the end of 2015.

Before taking up this position he was Chairman and President of ABB China and responsible for the company's North Asia region since January 2010. He joined ABB Italy in 1995.

In 2002 he moved to Zurich, Switzerland to head the global Service business for the erstwhile Utilities division. He was subsequently appointed as global Business manager for Substations within the Power Systems division. Claudio has a degree in Industrial Engineering from Politecnico di Milano, Milan, Italy.



SUMANT SINHA

**Chairman and CEO,
ReNew Power**

Sumant Sinha is the Chairman and CEO of ReNew Power – one of India’s leading clean energy companies with an aggregate portfolio of ~12 GW spread across 135+ sites. Sumant is Co-Chair of the Electricity Governor’s Group and member of the Stewardship Board on Shaping the Future of Energy and Alliance of CEO Climate Leaders, at the World Economic Forum. Sumant also serves as the President of the Associated Chambers of Commerce and Industry of India (ASSOCHAM). He serves on the Board of Directors of the US India Strategic Partnership Forum (USISPF). He is a member of the Board of Trustees, for The Climate Group and chairs their India Advisory Group.

Sumant has also been instrumental in ReNew joining as a founding member of the First Movers Coalition (The First Movers Coalition is a public-private partnership between the US State Department, through Special Presidential Envoy for Climate John Kerry, and the World Economic Forum). In 2021, Sumant was recognized as a UNGC SDG Pioneer in 2021. Recently, he was also recognised as ‘Trailblazer of the Year 2021’ by S&P Global Platts & conferred with ‘Distinguished Alumni Award 2022’ by Columbia SIPA.

Sumant has previously worked as an investment banker with Citicorp and ING Barings in the US and UK and as CFO of the Aditya Birla Group and COO at Suzlon. Sumant has a Master’s degree in International Affairs from Columbia University, a diploma in business management from IIM, Calcutta and a B. Tech from IIT, Delhi.



AUDREY ZIBELMAN

**Vice President of X,
Google’s Moonshot Factory**

Audrey Zibelman leads Tapestry, X’s moonshot for the electric grid. Her team at X, (formerly Google X), is developing digital tools to accelerate the decarbonization of the electricity sector.

Audrey is an international expert in power system transformation, regulation, markets and operations. She has spent more than three decades leading energy organizations with the goal of making power cleaner, more affordable and more reliable. She was previously Managing Director and CEO of the Australian Energy Market Operator, and Chair of the New York Public Service Commission. While in New York, Audrey oversaw massive regulatory reform of the electric industry to support a decarbonised grid, known as Reforming the Energy Vision, or REV.

Audrey was previously Executive Vice President and COO at PJM, an executive at Xcel Energy, and founder and CEO of Viridity Energy. She currently serves on the Board of EOS Energy, Advanced Energy Economy, the GridWise Alliance and the Monash University (Australia) Energy Advisors Committee.



DR LARRY MARSHALL

Chief Executive, Commonwealth Scientific and Industrial Research Organisation (CSIRO)

Dr Larry Marshall is Chief Executive of CSIRO, Australia's national science agency. CSIRO solves the greatest challenges through innovative science and technology, and has played a pivotal role in Australia's response to recent challenges including catastrophic flooding and bushfires, and the COVID-19 pandemic.

Larry was appointed Chief Executive of CSIRO in 2015. Under his leadership, CSIRO has delivered the highest industry revenue ever, a 70 per cent increase in CSIRO's customer base, the largest increase in diversity, a more than ten-fold increase in CSIRO's equity portfolio, the largest increase in appropriation, and high collaboration rates with universities and industry.

Larry is a scientist, technology innovator and business leader with a wealth of experience in creating new value and impact with science. He has a PhD in Physics and has been honoured as a Federation Fellow, an AIP (Australian Institute of Physics) Fellow, and an ATSE (Australian Academy of Technology and Engineering) Fellow, and is a Fellow of the Australian Institute of Company Directors (FAICD).

He has led six companies in biotechnology, telecommunications, semiconductors, and venture capital. He has 100 publications and conference papers, holds 20 patents, and has served on 20 boards of high-tech companies operating in the US, Australia and China.

Larry is a Champion of Change committed to tackling gender equality. He is a passionate supporter of Australian innovation, and the power of science and technology to drive Australia's economic recovery and resilience to future challenges.

EXPLAINER

Deployment of clean energy technologies must be scaled up rapidly to achieve net zero emissions. While behavioural change and improved energy efficiency will play an important part in achieving a net zero energy system, clean energy technologies are expected to drive more than 75% of the decarbonisation required by 2050.

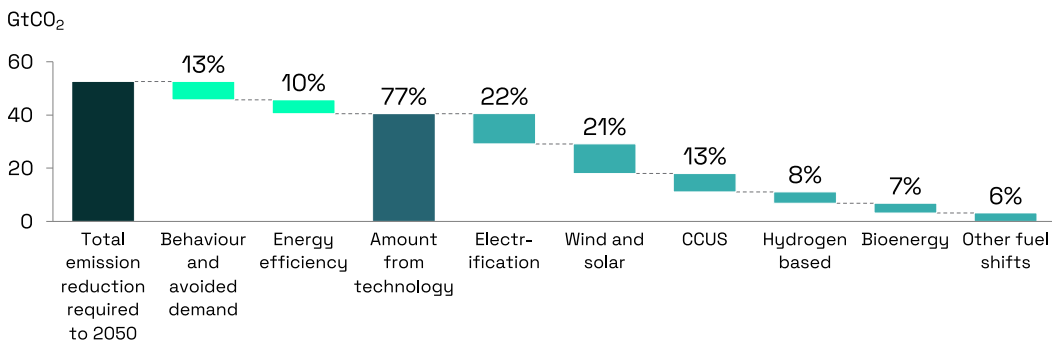
Today, solar and wind electricity constitutes just 2% of the world's energy mix. The IEA's Net Zero Emissions by 2050 Scenario sees solar and wind and other renewables such as hydroelectricity, biomass and geothermal meeting two-thirds of global energy needs by mid-century. A transition of this scale will depend on an unprecedented acceleration in the scaling up of related supply chains.

Many of the technologies needed to achieve net zero by 2050 are not yet on the market. While existing mature renewables – including solar and wind – will play a significant role in achieving this transition, new technologies will be critical, including hydrogen and alternative fuels.

Innovation will be important to both accelerate the cost efficiency of mature renewables and to deliver the breakthroughs needed to take new technologies to commercial levels. Leveraging innovations in technology along the broader supply chain will be important to improve cost efficiency and assist the rapid scaling of resilient clean energy supply chains.

Tech Innovation will be critical to achieve net zero emissions

Emissions reduction required to achieve net zero in 2050



Source: Note: Total emissions reduction required to 2050 includes reduction required from emissions growth between 2020 to 2050 (inc., energy service demand changes from economic and population growth)
 Source: IEA 'Net Zero by 2050: A Roadmap for the Global Energy Sector' (2021); BCG analysis

The scale of global investment required may range from US\$100–150 trillion, including US\$3–\$5 trillion per annum. An 8-fold increase of private investment is required to meet net zero ambitions. This ecosystem of private capital helps support start-ups and growth-stage companies which play a critical role in developing and deploying the innovative technologies needed to meet net-zero goals.

The Indo-Pacific is home to world-leading innovations and technologies critical to decarbonisation. Almost all manufacturing capacity for solar PV is located in the Indo-Pacific region, most notably in China, while the region is also home to over 86% of global lithium battery production.

Several key clean energy technologies are expected to make or break success, and are likely to face rapid scale-up and supply chain challenges over the coming decades:

- **Solar and wind** are expected to account for over a third of the energy supply in 2050 – a dramatic increase from roughly 2% of total energy supply in 2020. Firmed costs will have to reduce for this rapid uptake to occur.
- **Batteries** will play an important role in energy storage and the large-scale uptake of renewables. They will also be critical to decarbonising the transport sector, with demand for electric vehicles expected to increase almost ten-fold to 2030. Advancements in battery technologies, including long duration energy storage and new chemistries, will be important for wide scale battery application and uptake.
- **Hydrogen** is expected to play a key role in decarbonising hard to abate sectors, such as steelmaking, and as an energy carrier for low-cost renewables in times of excess supply. Low-carbon hydrogen is at an early stage of development, but is forecast to constitute nearly 70% of total hydrogen production by 2030.

KEY QUESTIONS

1. What are the key opportunities to accelerate uptake of mature clean energy technologies?
2. How can the cost efficiency of mature clean energy technologies be improved?
3. How can the cost of firmed solar and wind generation be reduced?
4. What is the role of digital technologies in supporting the uptake of clean energy technologies?
5. How can industry, government and academia in the Indo-Pacific partner to identify and fund critical clean technology research?



DAY ONE

LUNCH

Keynote lunch speakers will be the Hon Chris Bowen MP, Minister for Climate Change and Energy, Australia and H.E. Arifin Tasrif, Minister for Energy and Mineral Resources, Indonesia.

SPEAKERS



THE HON CHRIS BOWEN MP

Minister for Climate Change and Energy, Australia

The Hon Chris Bowen MP is Minister for Climate Change and Energy. He is also the Federal Member for McMahon, NSW.

Minister Bowen entered the Federal Parliament in 2004 and has held a wide range of portfolios including serving as Treasurer, Minister for Human Services, Minister for Immigration, and Minister for Small Business.

He grew up in Smithfield in Western Sydney, attending Smithfield Public School and St Johns Park High School. He graduated from the University of Sydney with a Bachelor of Economics. He has also a Master's Degree in International Relations and a Diploma in Modern Languages (Bahasa Indonesia).

He joined the Labor Party in 1988 and was elected to Fairfield Council in 1995, serving as Mayor of Fairfield for 1998 and 1999. He also served as President of the Western Sydney Regional Organisation of Councils from 2000 to 2002.

Minister Bowen lives in Smithfield with his wife Rebecca, children Grace and Max and his labradors Ollie and Toby.



H.E. ARIFIN TASRIF

Minister for Energy and Mineral Resources, Indonesia

Arifin Tasrif is an Indonesian executive who is the current Minister for Energy and Mineral Resources in Joko Widodo's Developed Indonesia Cabinet.

Previously, he was assigned as Indonesia's Ambassador to Japan in March 2017 until October 2019. During this period, he was involved in the negotiations for a \$20bn contract for a natural gas block with Japanese firm Inpex. Minister Tasrif had previously worked in Japan for two years starting in 1986 as an engineer.

Minister Tasrif has broad experience in the fertilizer industry. Prior to his assignment as Ambassador, he held positions as Chief Executive Officer in three different state-owned companies in the fertilizer industry, namely PT. Pupuk Indonesia, PT. Pupuk Sriwidjaja, and also PT. Petrokimia Gresik.

Minister Arifin studied chemical engineering at the Bandung Institute of Technology.



PLENARY SESSION THREE

DIVERSE AND RESILIENT

CLEAN ENERGY SUPPLY CHAINS

Session Three sets the scene on what is happening to global and regional clean energy supply chains, and how we can overcome barriers and realise opportunities to achieve our economic and net zero goals.

Speakers will consider key drivers, challenges and opportunities for renewables, critical minerals and batteries, and hydrogen and ammonia supply chains – sharing perspectives on what can be done to increase diversity and ensure resilience.

Speakers will discuss inputs, production, deployment, disposal, reuse and opportunities for substitution in three key supply chains – renewables, batteries and critical minerals and hydrogen and ammonia.

KEYNOTE SPEAKERS



TATSUYA TERAZAWA

**Chairman & Chief Executive Officer,
Institute of Energy Economics, Japan (IEEJ)**

Terazawa was appointed as Chairman and CEO of the Institute of Energy Economics, Japan (IEEJ) in July 2021.

Before joining IEEJ, he supported the then Minister Yasutoshi NISHIMURA as the Senior Advisor of the Cabinet Office between January and June 2021 to assist the Government's response to the Covid-19 pandemic and the formulation of the Growth Strategy including the Japanese "Green New Deal".

Earlier, he served at the Ministry of Economy, Trade and Industry (METI) of Japan where he held leading positions including the Vice-Minister for International Affairs. In this role, he assisted the then Prime Minister Shinzo ABE, participating in many of the meetings with the leaders of the world. He also played a crucial role in the coordination for the 2019 G20 Osaka Summit. Through June 2011 to December 2012, he served as the Executive Secretary to the then Prime Minister Yoshihiko NODA. During this period, he assisted the Prime Minister on the Government's multiple challenges to deal with the aftermath of the Great East Japan Earthquake.

He has been the Senior Specially Appointed Professor at the Tokyo University of Science, teaching international negotiations since January 2020. He is a graduate of the University of Tokyo's Faculty of Law. He also studied at Harvard University in the United States, where he earned an MBA in 1990. He was born in January 1961 in Osaka, Japan.

Affiliations:

- Senior Research Fellow, the Canon Institute for Global Studies
- Member, Advisory Committee for Natural Resources and Energy of Agency for Natural Resources and Energy (ANRE), the Ministry of Economy, Trade and Industry (METI) of Japan
- Member, Board of Governors, the Oxford Institute for Energy Studies
- Member of Delegation, Japan Society of Energy and Resources



WILLIAM LIN

**Executive Vice President for Regions,
Cities & Solutions, bp**

As a member of bp's executive leadership team, William leads the organization that brings together the best of bp to build enduring relationships with corporates, cities and countries to provide integrated energy and mobility solutions at scale to help the world reach net zero.

He also has accountability for business integration and stakeholder management; intelligence, security, crisis management and geopolitics; for managing joint-venture excellence across bp; and for corporate communications and external affairs. William has also led many of the most recent complex corporate development deals for bp.

William has worked in bp for 27 years where he held senior management roles across the globe. Most recently, he was the chief operating officer for upstream regions, chief of staff for the group CEO, regional president for Asia Pacific and vice president for gas development and operations for Egypt.

William is a non-executive director for Pan American Energy Group and a member of the supervisory board for Corbion.

PANEL ONE: LOW COST RENEWABLES SPEAKERS



GAURI SINGH

Deputy Director-General, International Renewable Energy Agency (IRENA)

Gauri Singh is the Deputy Director-General of the International Renewable Energy Agency. Singh brings more than 30 years of experience in policy, advocacy and project implementation within the field of renewable energy and sustainable development from India and the international system. Prior to joining IRENA, Singh worked within India's federal government and at the apex level within provincial government. Federally, she was responsible for leading the development of the National Solar Mission of India policy in 2010, an early policy framework designed to drive solar power development across the country.

At the Madhya Pradesh provincial Government, Singh steered rural development providing strategic planning and implementation guidance across the state for large initiatives. Her work involved poverty reduction and sustainable development within rural communities. She was also responsible for spearheading initiatives aimed at improving livelihoods for nearly two million poor women across the state.

In Madhya Pradesh, Singh led livelihood projects based on decentralised renewable energy solutions to support rural artisans and ran an ambitious intervention to restore the flow of 40 rivers across the state, based on the use of remote sensing maps. She also played a key role in drafting the framework for the state Right to Water Act.

Prior to that, Singh was Director, Country support and Partnerships at IRENA where she was responsible for regional and country level initiatives and for spearheading partnerships with regional energy and economic organisations.



NAIWEN MARINA HSU

Managing Director, Copenhagen Infrastructure Service

Naiwen Marina Hsu has more than 14 years of experience in offshore wind development, government relations, stakeholder management, supply chain engagement, and communications.

Hsu started off as a local offshore windfarm developer 14 years ago in Taiwan where the industry was non-existing and the talk of offshore wind was constantly ridiculed. Then she was recruited by the Danish Ministry of Foreign Affairs' Trade Council of Denmark as a senior commercial advisor for green energy. During her 6+ years of service, she managed to introduce more than 200 Danish companies in the renewable and environment sector into Taiwan, facilitated multiple bilateral government dialogues in the field of energy and environment and consummated several bilateral public private partnership collaborations.

Back in 2017 she opened Copenhagen Infrastructure Partners (CIP)'s Taiwan office as the first local employee on the ground. In 2018, CIP was awarded 2 offshore windfarm projects in Taiwan, the 600 MW Changfang Xidao Project and 300MW Zhong Neng Project. Together the two windfarms could power 1 million households with clean energy. These two offshore windfarm projects are tasked by Taiwan government to localize numerous wind turbine components, foundations, various marine construction activities. It was a grand challenge to take on with rather nascent supply chain locally, and a true demonstration to CIP's wealth of experience and our dedication towards the new markets we are in.

As managing director for Copenhagen Infrastructure Service Co., Hsu is responsible for the management and operation of the assets owned by CIP managed funds. She is responsible for stakeholder management across government, industry, academia, NGOs, local fishermen and media. She is instrumental in providing multi-faceted support to the offshore windfarm assets from development, financial close, onto construction.



PROFESSOR MARTIN GREEN AM FRS FAA

**Director, Australian Centre for Advanced
Photovoltaic, UNSW**

Martin Green is Scientia Professor at the University of New South Wales, Sydney and Director of the Australian Centre for Advanced Photovoltaics, involving five other Australian Universities and research groups.

His group's contributions to photovoltaics include inventing the PERC cell, now accounting for 90% of global production, and holding the silicon solar cell efficiency record for 30 of the last 39 years, regarded as a "Top Ten" milestone in solar photovoltaics history.

Major international awards include the 1999 Australia Prize, the 2002 Right Livelihood Award, also known as the Alternative Nobel Prize, and most recently, the 2021 Japan Prize.

EXPLAINER

Access to renewable energy that is secure, reliable and affordable will underpin the clean energy transition in the Indo-Pacific and globally.

Low-cost renewables will play a central role in driving global decarbonisation – and capacity needs to scale by around 15 times.

Solar and wind must scale at pace to replace fossil fuels in the electricity sector, provide the energy needed for important future industries such as green hydrogen, and support clean energy in small and remote communities through distributed generation. In the IEA's Net Zero pathway to 2050, solar and wind will account for roughly 35% of the global energy supply mix.

Bringing down the cost of solar and wind is critical to the enormous scale-up required.

Cost-competitive renewables incentivise markets and firms to displace fossil-fuels in key sectors and bring new technologies down the cost curve sooner. While the cost to produce energy from renewable sources such as solar and wind versus fossil fuels vary across countries and regions, and they are already competitive in many countries, some estimates put the broad global cost reduction required at up to 50% for solar PV and 60% for onshore wind to achieve 2050 net zero goals.

Supply chains for renewables are complex and globally interconnected. While solar and wind have more mature supply chains than emerging clean energy technologies, they remain highly complex and rely on a variety of individual supply chains for different raw material inputs and intermediate components.

The Indo-Pacific is a critical supplier and consumer of upstream inputs in renewable energy supply chains. This includes raw and intermediate materials such as aluminium and steel, where the region and particular countries such as China account for a significant share of global production. It is a similar story in manufacturing for solar PV, including polysilicon and PV cells, which is highly concentrated in the Indo-Pacific largely due to lower costs of production, especially in China. The wind turbine supply chain is more distributed, especially across Europe, driven by Europe's relatively early adoption of wind power, but the Indo-Pacific plays a key role here, too, including supplying raw materials and manufacturing wind turbines.

The transition to renewables will require the Indo-Pacific and the world to address major challenges across most stages of the supply chain – upstream inputs such as raw materials, intermediate components such as PV modules and rotor blades, and installation and connection.

Meeting net zero will require a major expansion in manufacturing of key renewables products.

Current and forecast production capacities for key solar PV inputs including polysilicon, ingots and wafers, cells and modules are not sufficient to meet net zero demand. Polysilicon production, for instance, must quadruple from today's levels by 2030 to support a net zero trajectory.

Certain parts of renewable manufacturing supply chains are highly geographically concentrated.

As demand scales, more diversity is needed to ensure resilience. Solar PV manufacturing processes, for example, are capital intensive and benefit from economies of scale. Without deliberately diversifying production, concentration may risk supply chain flexibility and resilience. Current manufacturing concentration is highlighted in solar PV supply chains:

- Wafer production is particularly concentrated, with China accounting for 94% of capacity.
- Cells and modules are concentrated in China (84% and 74% of capacity respectively), as well as Taiwan, Vietnam and Malaysia, with relatively small-scale manufacturing in other countries.
- Polysilicon production is also becoming increasingly concentrated, with China now accounting for around 78% of capacity, though significant capacity remains in Germany and the US.

It is critical to have the supporting infrastructure needed to deploy the scale of renewables required effectively.

This requires major grid infrastructure investments, including expansion of existing infrastructure and replacement capacity. Connecting grid infrastructure presents an opportunity to transport renewable energy within and across country borders.



KEY QUESTIONS

1. How can industry invest in innovations to bring down costs of renewables?
2. How do we accelerate supply increases of critical minerals to meet growing demand from renewables, including through more diverse sources of production?
3. How can investment in industry partnerships support new, diversified manufacturing capacity, for example, PV manufacturing?
4. How can we take advantage of opportunities to increase grid connections to support scaling of renewables?



PANEL TWO: BATTERIES AND CRITICAL MINERALS SPEAKERS



DR ALAN BYE

**Co-Founder and Director,
Imvelo**

Dr Bye is the co-founder of Imvelo Pty Ltd. and the Professor & Director of Digital Value Chains at Curtin University. He has more than 20 years' experience in senior operational and strategic roles in the resources industry working in 15 countries covering 9 commodities.

Dr Bye is the Chairman of Oreplore Ltd and a Non-executive Director at Swick Mining Services. He is a member of the CSIRO's Minerals Resources Advisory Council and the SmartSat CRC Industry Advisory Board – Mining and Energy.

Dr Bye was previously the Vice President Technology at BHP, in his global role he was accountable for the execution of major innovation programs across 5 commodity value chains. Designing and de-risking BHP's future mining operations, establishing strategic partnerships and implementing digital and extractive technologies.

Prior to this Dr Bye founded the Cooperative Research Centre for Optimising Resource Extraction (CRC ORE) as Chief Executive. CRC ORE is a \$150m venture involving 34 partners with the purpose of 'Transforming Mining to an Advanced Manufacturing Industry'.

Dr Bye has also spent 10 years with Anglo American where he held senior operational and executive roles in underground and open pit mines. He has a PhD in mining engineering, a BSc in geology and is a fellow of the Australian Academy of Technology Science and Engineering.



DR SHOICHIRO WATANABE

**Chief Technology Officer,
Panasonic Energy**

Dr. Shoichiro Watanabe joined Matsushita Electric Industrial Co., Ltd. on 1990 and started his career as Lithium-ion battery researcher. On 2014 he obtained Ph.D. from University of Osaka prefecture.

After he led Lithium-ion battery development for automotive use as a Director of Tesla Business Unit in Sanyo Electric Co., Ltd., he became a President of Panasonic Energy of North America on 2017 and contributed to expansion of High-Nickel type cylindrical Lithium-ion battery for Electric Vehicle.

From April 2022, he has been Executive Vice President and CTO of Panasonic Energy Corporation.



AMANDA LACAZE

CEO and Managing Director, Lynas Rare Earths

Amanda Lacaze is the CEO and Managing Director of Lynas Rare Earths, the world's only scale producer of separated Rare Earth materials outside China.

Lynas is an environmentally responsible producer of Rare Earth materials which are essential to future facing and green technologies, including electric vehicles, electronics and wind turbines.

Lynas operates the high-grade, Tier 1 Mt Weld resource in Western Australia and a proven processing facility in Malaysia. The company is building a \$500m Rare Earth Processing Facility in Kalgoorlie, Western Australia, and has proposed a separation facility in the US.

Amanda was appointed CEO in June 2014 and successfully led the company through a challenging turnaround. Early in her career, Amanda developed deep management and marketing experience which led to positions across many industries, including telecommunications, agriculture and FMCG.

Amanda was recognized as CEO of the Year in the 2018 MiningNews.Net Awards and in 2021 and 2019, she was named in the Australian Financial Review Magazine's 'Power List' as one of the 10 most powerful corporate leaders.

Amanda is a board member of the Minerals Council of Australia and a member of Chief Executive Women and the AICD.



SIMON MOORES

CEO, Benchmark Mineral Intelligence

Simon Moores is CEO of Benchmark Mineral Intelligence, the world's leading data and analytics provider for the lithium ion battery and electric vehicle supply chain.

An independent organisation, Benchmark enables the biggest decisions in the energy storage revolution, from raw material contract price negotiations, building gigafactories, planning EV production and government policy.

Benchmark is also well known for setting the lithium industry's reference and benchmark pricing.

Simon founded Benchmark in 2014 but has been specialising in commercial world of lithium ion batteries and critical minerals since 2006.

EXPLAINER

Batteries play a crucial role in several different elements of the clean energy transition. Batteries are critical to improving the resilience of electricity networks, and in decarbonising sectors such as transport through their use in electric vehicles (EVs).

GROWING DEMAND

Demand for batteries is expected to grow at a phenomenal scale and pace – at least 80 times for EV battery uses and roughly 172 times for energy storage uses from 2020 to 2050, according to IEA estimates.

Lithium-ion batteries are expected to remain as the dominant battery technology, currently accounting for roughly 90% of the battery storage technology mix, driven by use in EVs, grid energy storage and consumer electronics.

This growth in demand for batteries will also drive growth in demand for critical minerals. Copper, cobalt, nickel, lithium, rare earth

elements and aluminium are all critical for batteries used in both stationary energy storage and electric vehicles.

To reach net zero globally by 2050, around six times more mineral inputs will be required in 2040 than today. Mineral demand for EVs and battery storage will be a major contributor, growing roughly six times to 2040 and accounting for roughly 50% of mineral demand. To meet this increased battery demand, manufacturing capabilities will need to scale significantly, requiring a 30-fold increase to 2030, according to IEA estimates.

KEY MINERALS AND INPUTS

It will be crucial to ensure supply and drive innovation to reduce dependency on key minerals and inputs. Several key inputs face future supply shortages or other risks:

- Cobalt demand is expected to triple by 2030. Both production, with approximately 70% in Democratic Republic of Congo, and refining are highly concentrated, while cobalt accounts for around 15% of battery cell costs.

- Nickel demand is projected to increase by around 20 times today's levels by 2040. Battery technology innovation to reduce cobalt reliance may further increase nickel demand.
- Rare earth elements demand is expected to increase 3-7 times by 2040, driven by growth in EVs as well as demand from other sectors.
- Lithium and cathodes are a large cost driver, with cathodes representing the largest single contributor to battery costs – in the range of 25-30% – and are a concentrated market, with over 70% from China, Japan and Korea.
- Materials processing and refining is highly concentrated, with over 50% of processed materials in battery supply chains in China.

CHALLENGES AND OPPORTUNITIES

The lack of recycling infrastructure for EV batteries limits re-use of critical minerals as batteries scale and is a significant sustainability issue. Lack of recycling and disposal infrastructure is likely to present an increasing concern as battery use and disposal grows. Component recycling will also be key to reducing raw material supply constraints, with potential to ease the demand on raw materials by providing a secondary supply.

Grid infrastructure and connections are key to utility-scale battery uptake. Investments will be needed in areas such as grid data and expansion of grid infrastructure. Investment will also be required across a broader set of enablers. This will include investment in workforce, research and development and regulations and standards.

KEY QUESTIONS

1. How can we work together to accelerate innovations that reduce intensity of critical minerals, for example, cobalt and lithium?
2. What further opportunities exist for cross-country partnerships to expand and diversify minerals and refined products?
3. How can multilateral mechanisms help mitigate and respond to disruptions in the supply of clean energy technology inputs?
4. How can industry use partnerships to support investment in new diversified manufacturing capacity for batteries?

PANEL THREE: HYDROGEN AND AMMONIA SPEAKERS



SHAUN GREGORY

Executive Vice President New Energy Growth and Operations, Woodside

Shaun Gregory has a Bachelor of Science (Hons) from the University of Western Australia in Mathematical Geophysics and a Master of Business and Technology from the University of New South Wales.

Shaun has over 30 years industry experience covering Exploration, Geoscience, Technology, Digital and Sustainability. He currently leads Woodside's New Energy Division and is passionate about delivering lower carbon energy to the World.

Shaun is a Board member of Scitech WA.



YOSHINORI KANEHANA

**Chairman of the Board,
Kawasaki Heavy Industries**

Yoshinori Kanehana has been Chairman of the Board of Kawasaki Heavy Industries (Kawasaki) since June 2020. He joined Kawasaki in 1976 and was engaged in the Rolling Stock Group. He was appointed as Senior Executive Vice President of Kawasaki and President of the Rolling Stock Company in 2013. Then he became President of Kawasaki in 2016.

He has more than 28 years of experience in senior operational and executive roles in heavy industry, including railcar manufacturing, having worked in Japan, the UK and the US. Under his leadership, Kawasaki and its project partners successfully completed the Hydrogen Energy Supply Chain (HESC) Pilot Project in February 2022. The project pioneered shipping of liquefied hydrogen, through the operation of the world-first liquefied hydrogen carrier, the SUISSO FRONTIER, between Japan and Australia.

Kanehana has been a co-chair of the Hydrogen Council, a global CEO-led initiative with the goal of promoting hydrogen to enable a transition to clean energy, since January 2022. Kawasaki is one of the founding members of the Council and a key player in the hydrogen sector advocating its role in accelerating global decarbonisation.



TOSHIFUMI WATANABE

President and CEO, J-POWER

Mr. Toshifumi Watanabe is President and Chief Executive Officer of Electric Power Development Co., Ltd (communication name: J-POWER). He became President in 2016.

The company was established by the Government of Japan in 1952 as an electric power company whose mission was to provide enough energy to meet increasing demand, with collaboration with regional utilities.

After joining, he had been mainly engaged in corporate planning and played a leading role to realize privatization and IPO in 2004.

As a private firm, the company has expanded its overseas operations and planned to diversify energy source from conventional hydro and thermal to various fields such as renewable and nuclear, and Mr. Watanabe has always taken the lead in those efforts.

Currently he is spearheading the company's endeavor toward carbon neutral as President and CEO.

Mr. Watanabe is a graduate of the University of Tokyo, (LL.B). He was also visiting researcher, Center for Energy and Environmental Policy Research, Massachusetts Institute of Technology (1988-1990).

He is married and has one son.



GRETTA STEPHENS

Chief Executive Climate Change and Sustainability, BlueScope

Gretta Stephens joined BlueScope as Chief Executive New Zealand & Pacific Islands in 2018. Gretta led the mining, manufacturing and downstream businesses in New Zealand and the Lysaght and Acier manufacturing and distribution businesses in the Pacific Islands.

In early 2021 Gretta was appointed Chief Executive Climate Change for BlueScope globally. In this role, Gretta leads the development and implementation of BlueScope's Climate Strategy and decarbonisation pathway towards the goal of net zero greenhouse gas emissions by 2050. From early 2022 Gretta has taken on an expanded role as Chief Executive Climate Change & Sustainability.

EXPLAINER

Hydrogen is expected to play a key role in the clean energy transition, in the Indo-Pacific and globally. While forecasts vary on the precise scale and pace of the transition, achieving net zero by mid-century is expected to involve an increase of around 70-fold in low-carbon hydrogen production.

AN EMERGING INDUSTRY WITH GROWING DEMAND

Growth in demand will be driven by hydrogen's potential role in decarbonising hard-to-abate sectors, such as steelmaking, supported by improving technologies and economics of low-carbon hydrogen production.

While low-emissions hydrogen currently represents only around 10% of total hydrogen production, the IEA Net Zero Emissions by 2050 Scenario requires production of low-emissions hydrogen to reach nearly 70% by 2030, with global electrolyser capacity needing to increase to close to 850 GW.

Renewable energy will play a critical role in hydrogen production. For the Indo-Pacific, meeting annual demand for green hydrogen in 2050 could require a dedicated renewable energy supply roughly six times greater than the region's current total annual solar and wind energy generation.

HYDROGEN IN THE INDO-PACIFIC

The low-carbon hydrogen supply chain is complex and still evolving given the state of supporting technology and innovation. It is comprised of multiple different supply chains across green and blue hydrogen and various carriers during the conversion process, for example, ammonia or methylcyclohexane (MCH).

Countries in the Indo-Pacific have already made major announcements, commitments and investments regarding future hydrogen supply and demand. For example, Japan and South Korea's national hydrogen strategies include total demand targets of 3 million and nearly 2 million tonnes of hydrogen per year respectively.

CHALLENGES AND OPPORTUNITIES

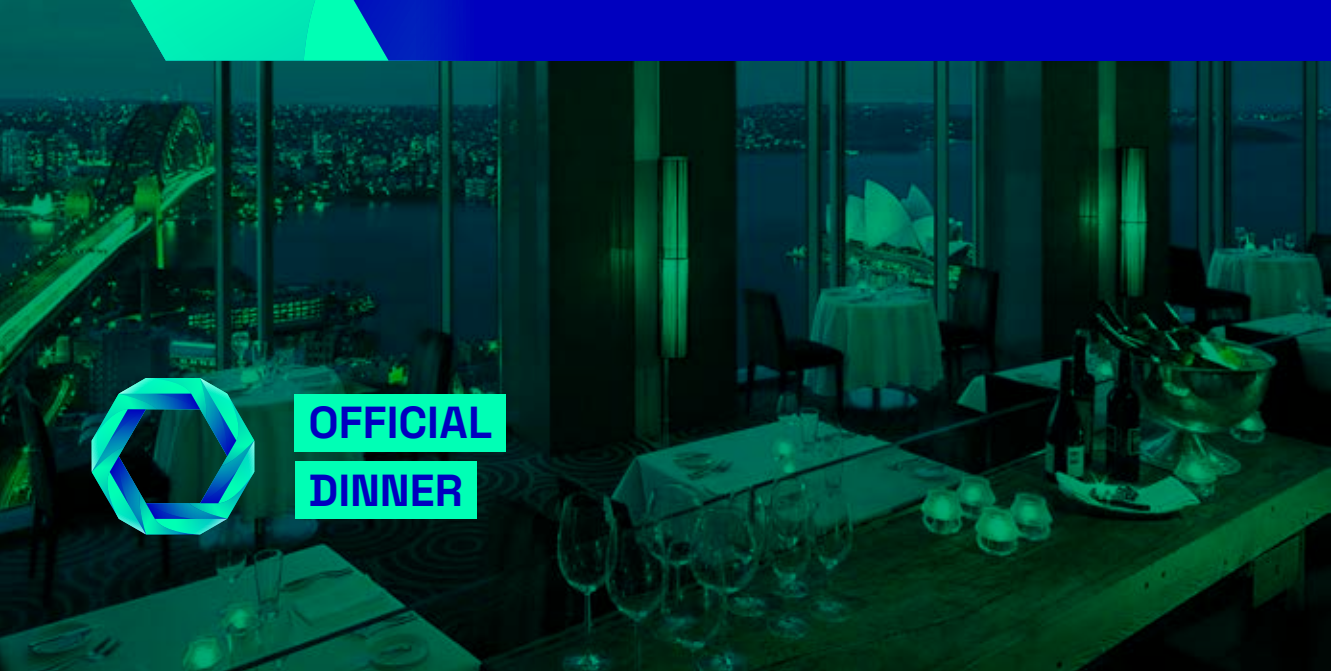
Scaling a resilient hydrogen supply chain will require the Indo-Pacific to mobilise significant resources, workforces, technologies and financing. Key challenges and opportunities include:

- Achieving sufficient scale in demand and production for hydrogen to reduce cost and de-risk investments needed
- Ensuring sufficient and reliable access to key upstream inputs, like critical minerals
- Establishing the infrastructure needed for conversion, transport and storage



KEY QUESTIONS

1. How can we encourage or co-invest in long-term offtake agreements to incentivise large-scale hydrogen investments?
2. How can we support demand through innovation and collaboration in industry applications for low-carbon hydrogen, like green steel, and foster substitution for current uses of 'grey' hydrogen?
3. How can we coordinate co-investment in hydrogen infrastructure for export and import markets, for example, encouraging new and retrofitted infrastructure?
4. How can we support increased capacity and supplier diversification for upstream manufacturing of inputs, for example, electrolyzers and their components?



OFFICIAL DINNER

OFFICIAL DINNER WITH PRE-DINNER DRINKS

Drinks will be held at the Altitude Restaurant in the Shangri-la Hotel. Barbara Humpton, President and CEO of Siemens Corporation, and Vaishali Nigam Sinha, Chief Sustainability Officer of ReNew Power will provide their reflections on the role of leadership in the clean energy sector, and how diverse leadership – and workforces – can help shape and drive the transition.

Dinner will be held at the Shangri-la Hotel, with Dr Andrew Forrest AO as the keynote speaker.



DINNER MC: PROFESSOR VEENA SAHAJWALLA FAA FTSE

**Director of the Centre for Sustainable
Materials Research & Technology,
UNSW**

Professor Veena Sahajwalla is an internationally recognised materials scientist, engineer, and inventor revolutionising recycling science.

She is renowned for pioneering the high temperature transformation of waste in the production of a new generation of 'green materials' at the UNSW Sustainable Materials Research and Technology (SMaRT) Centre, where she is Founding Director.

Professor Sahajwalla is the inventor of polymer injection technology, known as green steel, an eco-friendly process for using recycled tyres in steel production. In 2018, she launched the world's first e-waste MICROfactorie™ and in 2019 she launched her plastics and Green Ceramics MICROfactories™, a recycling technology breakthrough.

Professor Sahajwalla is the director of the ARC Industrial Transformation Research Hub for 'microrecycling', a leading national research centre that works in collaboration with industry to ensure new recycling science is translated into real world environmental and economic benefits. She has also been appointed hub leader of the national NESP Sustainable Communities and Waste Hub.

In 2021, Professor Sahajwalla featured in the ABC's Australian Story and named the 2022 NSW Australian of the Year.



DR ANDREW FORREST AO

**Chairman and Founder of
Fortescue Metals Group,
Fortescue Future Industries,
Munderoo Foundation and Tattarang**

As Founder and Chairman, Dr Andrew Forrest has led Fortescue Metals Group (Fortescue) from inception to a US\$60 billion listed natural resources company that's invested US\$50+ billion developing some of the world's most efficient infrastructure.

Fortescue has committed to become zero-emissions by 2030. Key to enabling that is Fortescue Future Industries (FFI), established in 2020, a developer, financier, and operator of a global portfolio of renewable energy resources to produce green energy at a scale equal to the oil and gas super-majors.

FFI is leading the green industrial revolution, developing technology solutions for hard-to-decarbonise industries, while building a global portfolio of renewable green hydrogen and green ammonia projects to produce 15 million tonnes per year of green hydrogen by 2030, rising to 50 million tonnes per year in the decade thereafter.

In 2001, Andrew co-founded Munderoo Foundation with his wife Nicola, and to date they've donated more than US\$3 billion supporting 300+ initiatives addressing modern slavery, ocean health, cancer, indigenous disparity, childhood development, artificial intelligence, disaster resilience, and plastic waste.

Dr Forrest's commercial business, Tattarang, is backing new renewable green energy projects including WindLab wind power and SunCable solar power and expanding sustainable and carbon-neutral practices within agri-food business Harvest Road.

Dr Forrest has a PhD in Marine Ecology from the University of Western Australia.

In 2017, Dr Forrest was appointed an Officer of the Order of Australia (AO) for distinguished service to philanthropy, mining, employment, and sustainable foreign investment.





BARBARA HUMPTON

President & CEO, Siemens Corporation

Barbara Humpton is President and CEO of Siemens Corporation, where she guides the company's strategy and engagement in serving the company's largest market. Siemens USA employs approximately 40,000 people serving customers in all 50 states and Puerto Rico and generated \$17 billion in revenue in fiscal year 2020.

Most recently, Humpton served as president and CEO of Siemens Government Technologies, Inc. (SGT), a leading integrator of Siemens' products and services for federal government agencies and departments. In this role, Humpton also served as an officer/director member of the board of directors of SGT.

Prior to joining Siemens in 2011, Humpton served as a vice president at Booz Allen Hamilton where she was responsible for program performance and new business development for technology consulting in the Department of Justice and Department of Homeland Security. Earlier, Humpton was a vice president at Lockheed Martin Corporation with responsibility for Biometrics Programs, Border and Transportation Security and Critical Infrastructure Protection, including such critical programs as the FBI's Next Generation Identification and the TSA's Transportation Workers' Identification Credential.

Humpton is a graduate of Wake Forest University with a bachelor's degree in mathematics. Barbara is Chairman of the Siemens Corporation Board, the Siemens Foundation and of the Center for Strategic and Budgetary Assessments (CSBA). She serves on the board of directors of the American Heart Association Greater Washington Region, Triumph Group, National Association of Manufacturers (NAM), Chief Executives for Corporate Purpose (CECP), Economic Club of Washington, D.C. and the Seabee Memorial Scholarship Association. She resides in Washington, D.C., with her husband David.



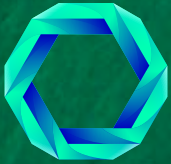
VAISHALI NIGAM SINHA

Chief Sustainability Officer, ReNew Power

Vaishali Nigam Sinha is the Chief Sustainability Officer at ReNew Power, one of India's largest renewable energy IPPs (Independent Power Producer) and the first Indian RE firm to list on NASDAQ (NASDAQ: RNW). Sinha drives the company's ESG and sustainability initiatives and is also Founding Chair, ReNew Foundation, the company's philanthropic arm working to solve critical climate change issues for a just and fair transition.

Sinha has a strong track record in integrating corporate sustainability, ESG and responsible investing within business strategy. At ReNew, she drives ESG strategy, implementation (including governance, defining reporting frameworks, metrics setting, monitoring and capacity building) and disclosures. Through several leadership roles, Sinha strategically advances causes such as climate action, sustainable development and equal participation of women in the economy. She is a President's invitee to Columbia World Projects – a high-level forum at Columbia University created to tackle major global challenges and serves on the President's Advisory Council at Wellesley College and the Columbia Global Centre's Mumbai Advisory Board. She is a member of the World Economic Forum's South Asia Regional Action Group for post Covid recovery and the Economic Times SDG Leadership Council on Climate Action. Sinha is a member of the Greening Working Group of the Energy Transition Taskforce of Sustainable Markets Initiative, which has launched the Terra Carta and is also one of the founding members of the Global Alliance for Sustainable Energy.

Sinha has completed the Owners and Presidents Management Program from Harvard Business School and has a Master's degree in Public Policy from Columbia University's School of International and Public Affairs, where she was an American Association of University Women (AAUW) scholar. Prior to ReNew, Sinha had worked as an investment banker for over 15 years in the US, UK and India.



DAY TWO

BREAKFAST

TRADITIONAL LAND OWNERSHIP, ETHICAL MINING AND POWERING COMMUNITIES

This session will consider the challenges and opportunities that ethical, sustainable and best-practice engagement and agreement making present for Indigenous peoples and renewable energy companies across the Indo-Pacific.

In considering clean energy supply chains, panellists will cover issues relating to native land use, ethical and sustainable mining, best practices in traditional owner consultation and agreement making, engagement of traditional land owners through equity holdings and other interests, skills and broader economic opportunities for Indigenous communities, and Indigenous energy independence.

TRADITIONAL LAND OWNERSHIP SPEAKERS



MINISTER TOEOLESULUSULU CEDRIC P S SCHUSTER

Minister of Natural Resources and Environment and Minister of Tourism, Samoa

Entered Parliament firstly in the XV Parliament from 2011-2016 as Opposition MP as shadow Minister for Environment. Lost his seat in the 2016-2021 Parliament but returned for the XVII Parliament 2021-2026 as a member of new FAST Party government that won the 2021 general election.

Minister is married with 4 children, a traditional chief from the village of Satapuala from the Aana Alofi 4 constituency.

Minister has a background in environment, and sustainable development including climate change, where he has worked extensively over the past 30 years, in government, in the civil society, and in the private sector. The Minister's work experience covered areas of biodiversity and climate change research, policy development, advocacy, regional and international multilateral environmental agreement as well as capacity building and evaluations for projects and agencies.

The Minister has extensive experience in community development work, having assisted with sports including the rugby and swimming, and worked with with community-based and civil society organisations such as traditional village councils, church, youth addressing human rights and environmental concerns.

As the Minister for Natural Resources and Environment, his aspirations as well as the that of the present government is the complete transformation of the economy into sustainable energy programs with a full conversion of the electricity to renewable energy, transforming the transport and shipping industry, as well as making energy efficient products affordable for all Samoans and by extension, the Blue Pacific.



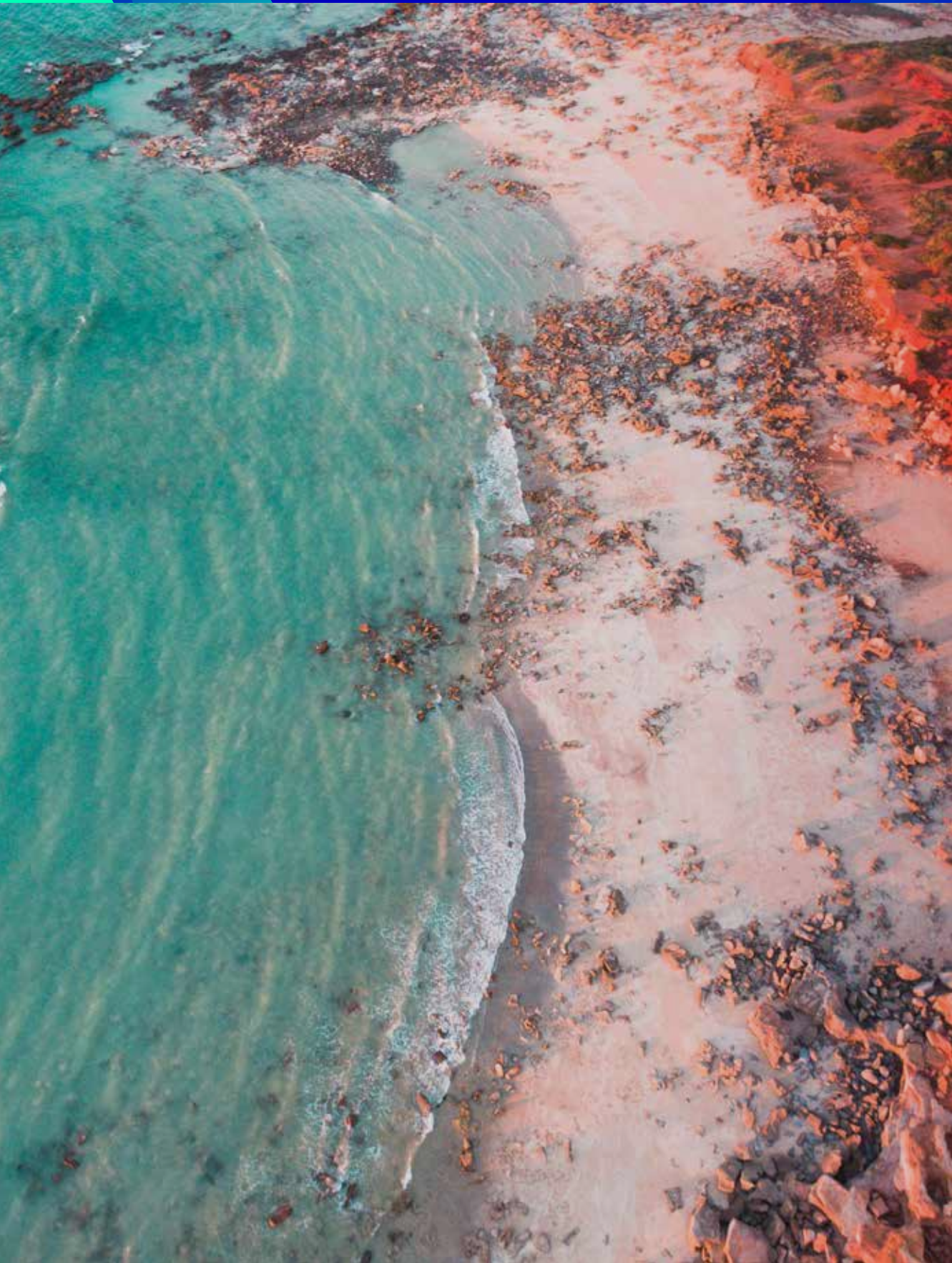
KARRINA NOLAN

**Executive Director,
Original Power**

Karrina Nolan is a descendant of the Yorta Yorta people and the Executive Director of Original Power. She is an experienced manager and organiser of complex programs and initiatives in Aboriginal communities and has worked as a facilitator, trainer, researcher and strategist alongside Aboriginal and Torres Strait Islander women, young people and communities for over 25 years.

Most recently, Karrina has been building the capacity for self-determination in the context of economic development, climate change and clean energy. She supports communities' capacity to organise, act decisively, share knowledge and make informed decisions which take into account long-term community needs as well as country and culture.

As a Churchill Fellow, Karrina worked with First Nations women in Canada, the USA and Australia collating lessons to grow women's leadership capacity and engagement in community and civic life. She dedicated an Atlantic Fellowship to determining how to best build clean energy projects by and for First Nations people.





DR TARCISIUS KABUTAULAKA

**Associate Professor,
University of Hawai'i**

Tarcisius Kabutaulaka is a political scientist with a PhD from the Australian National University and undergraduate and MA degrees from the University of the South Pacific (USP). He joined the Center for Pacific Islands Studies in 2009 and served as director from August 2018 to July 2021. Prior to that, he worked for six years as a Research Fellow at the East-West Center's Pacific Islands Development Program.

Before moving to Hawai'i in 2003, he taught history and political science at USP. Over the years, Kabutaulaka has also done consultancy work for governments, regional and international organizations and NGOs in the Pacific Islands.

He is the editor of the Pacific Islands Monograph Series (PIMS), the founding editor of *Oceania Currents*, and a member of the editorial board of *The Contemporary Pacific*. He has published extensively on the Solomon Islands civil unrest and the Australian-led regional intervention, the forestry industry in Solomon Islands, China in Oceania, and on governance issues in the Pacific Islands. He is the co-editor (with Greg Fry) of *Intervention and State-building in the Pacific: the Legitimacy of 'Cooperative Intervention'* (Manchester University Press, 2008).

In 2000, following two years of conflicts in Solomon Islands, he participated in the peace talks in Townsville, Australia, as one of the chief negotiators. He is a regular commentator on Radio Australia. Kabutaulaka comes from the Weather Coast of Guadalcanal in Solomon Islands.



TONY MCAVOY SC

**Senior Counsel,
Frederick Jordan Chambers**

Tony McAvoy is a Wiridi man from the central Queensland area around Clermont and he is also a native title holder in his grandmother's country around Thargomindah in southwest Queensland. Tony recently finished a period as Acting Treaty Commissioner in the Northern Territory, and is co-Senior Counsel Assisting the Yoorrook Justice Commission in Victoria.

Tony is a barrister and was appointed Senior Counsel in 2015. He has developed a strong native title practice and has successfully appeared for claimants in several land claims. He has also acquired significant experience in the areas of environmental law, administrative law, human rights and discrimination law, coronial inquests and criminal law.

Between 2011 and 2013, Tony was an Acting Part-Time Commissioner of the NSW Land and Environment Court.



REVISITING PLENARY SESSION ONE

DECARBONISATION, ENERGY SECURITY, AND

THE SCALE AND PACE OF THE TRANSITION

Session One considers the scale and pace of the clean energy transition needed to achieve global decarbonisation goals.

It will reflect on the history of energy, the changing geopolitical order and subsequent implications for energy security, access, reliability and affordability, both globally and in the Indo-Pacific region.

KEYNOTE SPEAKERS



MINISTER KŌICHI HAGIUDA

Minister of Economy, Trade and Industry, Japan

Minister Hagiuda Kōichi was appointed Minister of Economy, Trade and Industry (METI) on October 4, 2021. He also assumed the roles of Minister in charge of Industrial Competitiveness, Minister for Economic Cooperation with Russia, Minister in charge of the Response to the Economic Impact caused by the Nuclear Accident and Minister of State for the Nuclear Damage Compensation and Decommissioning Facilitation Corporation.

Immediately prior to his current appointments, Minister Hagiuda served as Minister of Education, Culture, Sports, Science and Technology (MEXT) and Minister in charge of Education Rebuilding, positions he held since September 2019. Previously, Minister Hagiuda held several senior posts in the Liberal Democratic Party (LDP). Earlier in his career, Minister Hagiuda served as Parliamentary Vice-Minister of Education, Culture, Sports, Science and Technology.

Minister Hagiuda has served as member of Japan's House of Representatives since 2003. He is currently serving his 6th term in the House of Representatives, representing Tokyo's 24th district. Previously, he served as an elected official on the Metropolitan Assembly of Tokyo and Hachioji City Council.

A graduate of Meiji University's School of Commerce, Minister Hagiuda was born on August 31, 1963, in Tokyo.



MINISTER RAJ KUMAR SINGH

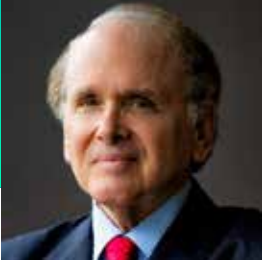
Minister of Power and Minister of New and Renewable Energy, India

Minister RK Singh was born in the Supaul district in the state of Bihar. He has a Bachelor of Arts (Hons.) in English Literature, Bachelor of Law and Diploma in Management. After joining the Indian Administrative Service (IAS - India's premier civil service), he became a District Magistrate, then joined Bihar's Home Department in 1997. He also became Principal Secretary in the Road Construction Department and played an important role in improving road conditions in Bihar.

Minister Singh moved into national government in 2009 to take over as Secretary, Defence Production for two years and then became Home Secretary of India for two years to 2013. He was elected to 16th Lok Sabha in 2014 and was appointed to lead the two Ministries of Power and New and Renewable Energy in 2017. He was re-elected to the Lok Sabha for the 2nd term in 2019, and was given the charge of the Ministry of Skill Development and Entrepreneurship, in addition to the Ministry of Power and New and Renewable Energy. He was also promoted from the rank of Minister of State to Union Cabinet Minister in 2021 and is currently holding the portfolios as Union Cabinet Minister, Ministry of Power, and Ministry of New and Renewable Energy.

He is married to Shiela Singh and has a son and a daughter.





DR DANIEL YERGIN

**Vice Chairman,
S&P Global**

Dr Daniel Yergin is a globally respected authority on energy, international politics, and economics. He is Vice Chairman of IHS, Chairman of CERAWEEK and Founder of IHS Cambridge Energy Research Associates.

A Pulitzer Prize winner, Dr Yergin is the author of the bestseller *The Quest: Energy, Security, and the Remaking of the Modern World*. The New York Times said it is "necessary reading for C.E.O.'s, conservationists, lawmakers, generals, spies, tech geeks, thriller writers," among many others. He is known around the world for his number one New York Times best-seller: *The Prize: the Epic Quest for Oil Money and Power*, which was awarded the Pulitzer Prize.

Dr Yergin is also a business leader, as Vice Chairman of IHS, one of the world's largest research and information companies, with 9000 employees, and founder of Cambridge Energy Research Associates, which became part of IHS in 2004.

Dr Yergin serves on the US Secretary of Energy Advisory Board and chaired the US Department of Energy's Task Force on Strategic Energy Research and Development. He is a director of the Council on Foreign Relations and a trustee of the Brookings Institution. He is a member of the National Petroleum Council, a director of the United States Energy Association, the New America Foundation, and of the US-Russia Business Council.



CLOSING REMARKS: CLAUDIO FACCHIN

**CEO Hitachi Energy Senior Vice President
and Executive Officer, Hitachi Ltd.**

Claudio Facchin is Senior Vice President and Executive Officer of Hitachi, Ltd. since April 2021. He is also the CEO of Hitachi Energy since July 2020. Prior to this he was global President of the Power Grids business between 2016 and 2020 and the President of the Power Systems division from December 2013 to the end of 2015.

Before taking up this position he was Chairman and President of ABB China and responsible for the company's North Asia region since January 2010. He joined ABB Italy in 1995.

In 2002 he moved to Zurich, Switzerland to head the global Service business for the erstwhile Utilities division. He was subsequently appointed as global Business manager for Substations within the Power Systems division. Claudio has a degree in Industrial Engineering from Politecnico di Milano, Milan, Italy.



PLENARY SESSION FOUR

ENABLING MARKETS, CAPABILITIES AND SYSTEMS TO SUPPORT THE TRANSITION

Session Four will consider cross cutting issues and actions for clean energy supply chains.

Speakers will identify what is needed to enable well-functioning markets in the Indo-Pacific – which may include standards, certification, transparency, finance, investment, environmental, social, and corporate governance (ESG), use of digital tools, effective engagement with and recognition of communities, and building ethical and equitable workforces at scale.

KEYNOTE SPEAKER



ULRIKA FRANCKE

President, International Organization for Standardization (ISO)

Ulrika Francke was elected ISO President for a two-year term starting from January 2022 and served as President-elect in 2021. She is the Vice-President of SIS (Sweden) since 2018 and has focused on increasing engagement of the real estate and construction sector in standardization. Her broad management experience, as executive leader, chairperson and board member covers both the private and public sectors, with an emphasis on building and infrastructure.

She participated in standards development activities for the real estate and building sector as Chair of the Building Information Model (BIM) Alliance and was also the CEO of Tyréns. Under her leadership, Tyréns evolved from a domestic to an international operation.

She left politics in 1988 when she was Vice Mayor of Stockholm, responsible for city planning, to become the CEO of Brommastaden AB. During her career she served on many boards such as those of Skanska, Swedbank, Hexagon, Vasakronan and Knightec, Södersjukhuset (the South Hospital) in Stockholm and the City of Stockholm Theatre.

She has been involved in research and education, as a member of the board of the Stockholm University, the board for Building Research Council and was one of the creators of the Swedish Centre for Innovation and Quality in the Built Environment. She now chairs the government's research program for sustainable cities and communities, and is a member of the Volvo Research and Education Foundations.

Francke was educated at the University of Stockholm and is a fellow of the Royal Swedish Academy of Engineering and Sciences.

PANEL ONE: FINANCE AND INVESTMENT SPEAKERS



IAN LEARMONTH

**CEO,
Clean Energy Finance Corporation**

Learmonth has more than 30 years' experience as a financier and investor, having worked in Australia, Asia and Europe across asset finance, clean energy and major infrastructure projects, as well as pioneering Australian social impact investing.

Prior to his appointment as CEO for the CEFC, Learmonth established the Social Ventures Australia Impact Investing business, which included raising venture capital and affordable housing funds as well as launching Australia's first Social Impact Bond in 2013.

Previously an Executive Director of Macquarie Group for 12 years, Learmonth has extensive global investment banking experience. Learmonth established and led various Macquarie businesses, notably European renewable energy and carbon credit investments, cross-border asset and structured finance and securitisation in Asia and Europe.

As the CEO of the CEFC, Learmonth has overseen the organisation's growth, where cumulative investment commitments exceed \$10 billion and have expanded into grid augmentation, large scale battery storage, green hydrogen, electric vehicles and recharging infrastructure.

Learmonth has degrees in Law and Commerce from the University of Queensland. He is a director of venture capital firm Virescent Ventures and has been a long-standing director of Sydney's Belvoir St. theatre company.



NOBUYUKI KAWABATA

**Senior Managing Executive Officer and
Deputy Head of Global Banking Unit, SMBC**

Nobuyuki Kawabata was appointed Senior Managing Executive Officer and Deputy Head of the Global Banking Unit of Sumitomo Mitsui Banking Corporation (SMBC) on April 1, 2022. His recent engagement includes overseeing ESG initiatives and clean energy projects of Global Banking Unit. He had been CEO of the Americas Division and Managing Executive Officer of SMBC since April 1, 2016, and was appointed Managing Executive Officer of Sumitomo Mitsui Financial Group (SMFG) on April 1, 2018.

Prior to his recent appointment, Kawabata was Director and General Manager, Planning Department, with responsibility for corporate planning for SMBC's Americas Division, a position he held since April 2014. He was promoted to General Manager of the Planning Department, Americas Division, in April 2010. During 9 years, the Americas Division has tripled its revenue and expanded new business including full scale of Broker Dealer (Nikko America), acquired Aircraft Leasing from RBS and Railcar Leasing from Perella Weinberg Partners.

Kawabata was previously Joint General Manager of Planning for International Banking Unit in Tokyo where he focused on SMBC's international strategic direction including alternative investment (and introduced Hedge Fund / PE Fund to start in Tokyo) and investment to Bank of East Asia in Hong Kong and Kookmin Bank in South Korea, for alliance. Kawabata came to New York in June 2000. As Senior Vice President of Planning for the Americas Division, he planned business strategy and headed Tax Department of the Americas Division. His achievements include US tax exempt merger of Sakura Bank and Sumitomo Bank to form SMBC; the establishment of Sumitomo Mitsui Financial Group (SMFG), a holding company of which SMBC is a wholly-owned subsidiary; the merger of Wakashio Bank, and an advanced pricing agreement with the New York Branch and Tokyo head office, which made 25mil refunds from IRS.



HASMUKH PATEL

Chief Executive Officer, Energy Fiji Limited (EFL)

Hasmukh Patel joined the Fiji Electricity Authority (FEA) in 1976 as a Graduate Electrical Engineer and served in numerous positions and capacity till 2005.

Mr. Patel left FEA at the end of 2005 and became the Joint Managing Director of a private sector retail company for just over two years before being appointed the CEO of FEA. He still remains the CEO and Director of the corporatized entity, Energy Fiji Limited.

He has a First Class Bachelor of Technology degree in Electrical Engineering from the Indian Institute of Technology, Madras, India and a Graduate Certificate in Management from Monash in Australia.

Mr. Patel is a Chartered Electrical Engineer and is a retired Member of the Institute of Electrical Engineers, UK and Australia to name a few.

Mr Patel serves on the Board of Fiji Ports Terminal Limited as its Chairman since 2013. Furthermore, he also serves on the Board of Airports Fiji Limited as its Chairman.

He also serves as Chairman of the Pacific Power Association (PPA). The PPA is an inter-government agency and member of the Council of Regional Organizations in the Pacific (CROP) to promote the direct cooperation amongst the Pacific Island electricity utilities.



DR DANIELLE MERFELD

Vice President and Chief Technology Officer, GE Renewable Energy

As Chief Technology Officer of GE Renewable Energy, Danielle leads technical efforts to develop differentiated products and services across the broadest renewable energy and grid portfolio in the industry. She also champions sustainability efforts across the business and is on the leadership team for the GE Women's Network. She was elected to the National Academy of Engineering in 2021.

Danielle received her B.S. degree in Electrical Engineering from the University of Notre Dame, and Ph.D. in Electrical Engineering from Northwestern University. Danielle is on the Board of Trustees at the University of Notre Dame and serves on the advisory board of Texas A&M University's Smart Grid Center. Danielle is also an Ambassador to the Equality in Energy Transitions initiative representing the United States, she serves on the Export Import Bank of the United States Council on Climate, is a member of the National Academy of Engineering's Energy Working Group, and is on the National Science Foundation's Engineering Advisory Council.

EXPLAINER

THE SURGE IN CLEAN ENERGY INVESTMENT NEEDED

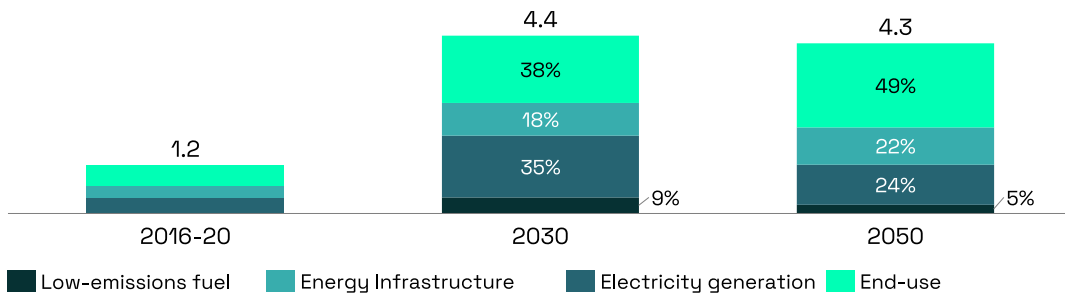
To be on track for net zero emissions by 2050, investment in clean energy will need to increase significantly. The scale of global investment required may range from US\$100–150 trillion, including US\$3–\$5 trillion per annum. The US\$750 billion spent on clean energy technologies and efficiency worldwide in 2021 remains far below what is required.

The increase in funding for clean energy projects will largely have to be carried out by the private sector. While a lot of capital is already available, it is often not able to be

deployed. Despite investor commitments and interest, deploying available capital is challenged by various issues including a lack of ‘commercial’ projects, subpar investment scale and insufficient information. Governments will need to play an important role in enabling private investment, facilitating private access to public infrastructure projects and de-risking investments, for example, by providing policy certainty and regulatory barriers. Public finance institutions will also have a role in catalysing private capital.

To reach net zero emissions by 2050, the IEA estimates annual clean energy investment will need to be around US\$4 trillion

Clean energy investment in the net zero pathway, US\$T per annum



Source: IEA Net Zero by 2050 Roadmap (2021)

FINANCING FOR EMERGING TECHNOLOGIES

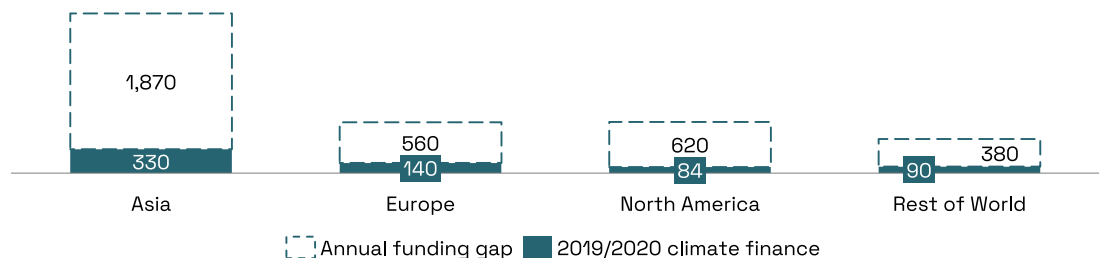
Approximately 30–40% of the reductions in greenhouse gases is expected to come from emerging technologies, which can provide solutions in ‘hard to abate’ sectors. The scale of funding relative to the expectation of emerging technologies in driving global decarbonisation is fundamentally disproportionate (e.g., only 6% of private investment in 2021 was allocated towards emerging technologies). Emerging technologies such as hydrogen lack private investment due to a range of factors, including high upfront capital costs, unproven feasibility and uncertainty surrounding commerciality.

ENSURING EQUITABLE ACCESS TO FINANCE ACROSS THE INDO-PACIFIC

The Indo-Pacific region includes a diverse range of countries with economies varying in size and economic maturity. A global effort is required to allocate capital without leaving countries behind. Asian countries, including China, India and Indonesia (which combined account for ~37% of global emissions), received only 15% of the climate funding required in 2019–20 compared to what is required to achieve the Paris Agreement goals. Similarly, emerging and developing countries (excluding China) received only ~20% of total clean energy investment in 2019, despite accounting for ~40% of global emissions.

There is a significant gap in spend across all geographies, especially in Asia and North America, 2019-20

2019/20 US\$B



Sources: NOTE: funding relative to what required to meet Paris
Source: CPI - Global Landscape of Climate Finance 2019. CFLI Financing the Low-Carbon Future (2019), BNEF, BCG analysis

KEY QUESTIONS

1. How do we encourage coordinated investment between the public and private sectors in priority areas of research, development and commercialisation?
2. How do we ensure available investment capital is mobilised and deployed in smaller and emerging markets?
3. How can we encourage long-term offtake agreements to incentivise large-scale and bankable clean energy projects?
4. How can industry and government partner in the near term to derisk projects with transformative potential, but which lack proven commercial viability?
5. What are the key information gaps for investors and how can industry collaborate to increase transparency?

PANEL TWO: OPEN AND COMPETITIVE MARKETS SPEAKERS



RICH LESSER

Global Chair, BCG

Rich Lesser is the Global Chair of Boston Consulting Group (BCG). He previously served as BCG's CEO from 2013–2021, a period of exceptional growth for the firm across all regions and practice areas. During his tenure as CEO, Rich oversaw the launch of BCG Digital Ventures, a builder and accelerator of digital businesses; BCG GAMMA, a cutting-edge advanced analytics, machine-learning and AI team; BCG TURN, a rapid performance acceleration unit; and the BCG Center for Climate & Sustainability. As CEO, Rich initiated BCG's pledge to reach net zero climate impact by 2030.

Rich currently serves as chief advisor to the World Economic Forum's Alliance of CEO Climate Leaders, as co-chair of the Council for Inclusive Capitalism, on the board of directors of the Centre for Public Impact, and is a member of several leading organizations, such as the WEF's Community of Chairpersons, the EDISON Alliance, Southern Communities Initiative, among others. He previously served on the Business Roundtable board of directors and WEF's International Business Council. He accelerated BCG's strong investments in social impact through its long-standing partnerships, including the World Food Programme, Save the Children, and the World Wide Fund for Nature (WWF), along with many global health and environment initiatives.

Rich served as BCG's chairman for North and South America from 2009 to 2012 and as head of the New York Metro office system from 2000 to 2009. Prior to joining BCG in 1988, Rich worked in product development at Procter & Gamble. He received an MBA from Harvard Business School and a BSE in chemical engineering from the University of Michigan College of Engineering, where he now serves on the Leadership Advisory Board.



TATSUO YASUNAGA

Chair, Mitsui & Co

Yasunaga was appointed as Chair of Mitsui & Co., Ltd. in April 2021. Before that, he had served as President & Chief Executive Officer of Mitsui since June 2015.

He is keen on pursuing the right balance of energy security, which has been impacted by recent developments in the Ukraine crisis, and the mid-to-long term initiatives toward an energy transition. Under his leadership, leveraging on its existing business platforms with accelerated trends in decarbonization, Mitsui has advanced dynamic shift to a more sustainable and greener business by setting Energy Solution as one of its strategic focuses.

Yasunaga also takes his role as a Vice Chair of Japan Business Federation, "Keidanren".

Yasunaga joined Mitsui & Co. in 1983 and has held responsibilities in China, Southeast Asia, the US, Latin America, Russia and the Middle East, with a focus on plant engineering projects. Over the course of his career he has gained diverse and deep business experience, with periods spent assigned to the World Bank.

From 2010 he served as General Manager of Corporate Planning & Strategy Division, leading formulation of the company's medium-term management strategy and the business plan. He became Chief Operating Officer of the Integrated Transportation Systems Business Unit in 2013, spearheading projects across various fields including automotive, construction machinery, shipping, aerospace and railway. Through many endeavours, including railway infrastructure projects and truck-leasing projects, he set this unit on the road to growth.

Yasunaga's motto in business is, "Know and respect your partners." He made a point of studying the language, history and culture of each nation where he was assigned responsibility. By personally visiting countries where Mitsui does business, he hopes to set an example, showing the importance of dialogue with customers and partners with the aim of realizing Mitsui's corporate vision, "360° business innovators".



VAISHALI NIGAM SINHA

Chief Sustainability Officer, ReNew Power

Vaishali Nigam Sinha is the Chief Sustainability Officer at ReNew Power, one of India's largest renewable energy IPPs (Independent Power Producer) and the first Indian RE firm to list on NASDAQ (NASDAQ: RNW). Sinha drives the company's ESG and sustainability initiatives and is also Founding Chair, ReNew Foundation, the company's philanthropic arm working to solve critical climate change issues for a just and fair transition.

Sinha has a strong track record in integrating corporate sustainability, ESG and responsible investing within business strategy. At ReNew, she drives ESG strategy, implementation (including governance, defining reporting frameworks, metrics setting, monitoring and capacity building) and disclosures. Through several leadership roles, Sinha strategically advances causes such as climate action, sustainable development and equal participation of women in the economy. She is a President's invitee to Columbia World Projects – a high-level forum at Columbia University created to tackle major global challenges and serves on the President's Advisory Council at Wellesley College and the Columbia Global Centre's Mumbai Advisory Board. She is a member of the World Economic Forum's South Asia Regional Action Group for post Covid recovery and the Economic Times SDG Leadership Council on Climate Action. Sinha is a member of the Greening Working Group of the Energy Transition Taskforce of Sustainable Markets Initiative, which has launched the Terra Carta and is also one of the founding members of the Global Alliance for Sustainable Energy.

Sinha has completed the Owners and Presidents Management Program from Harvard Business School and has a Master's degree in Public Policy from Columbia University's School of International and Public Affairs, where she was an American Association of University Women (AAUW) scholar. Prior to ReNew, Sinha had worked as an investment banker for over 15 years in the US, UK and India.



DR HUW MCKAY

Chief Economist, BHP

Huw McKay joined BHP in 2016. He reports to the Chief Commercial Officer. Huw has an exceptional track record in research, forecasting and scenario analysis, built across a career spanning the resources, finance, public and academic sectors.

Prior to BHP, he was Executive Director and Senior International Economist at the Westpac Bank, and Principal Advisor in the Macroeconomic Group of the Australian Federal Treasury.

Huw's team is tasked with developing the Group's view on the global economy and financial markets, as well as the long term demand and price views for our diversified portfolio of energy and mineral commodities. In addition, his mandate includes technology forecasting, carbon, maritime and procurement costs.

Huw's published work and research interests cover a wide array of issues, including long run resource demand, economic development strategies, exchange rates, scenario analysis, stress-testing, pro-cyclicality in decision making, macro-finance, productivity and technology, as well as BHP's major customer markets of China, Japan and India.

Huw has a Bachelor of Economics (Honours 1, University Medal) from Sydney University and a Ph.D. in Economics from the Australian National University.

He lives in Singapore with his wife Dr Yolande Kyngdon-McKay, daughter Sansa and son Huxley.

EXPLAINER

TRANSPARENCY

Transparency plays a vital role in well-functioning competitive markets. This can include transparency on market prices, volumes traded between sellers and buyers and the quality of products. Availability of up-to-date market data and access to open shared marketplaces and exchanges can support this transparency.

Most conventional energy supply chains, unlike clean energy, have long been supported by high levels of transparency over prices and volumes traded. For example, oil markets are underpinned by common price and quality benchmarks, with the spot market setting prices for most of the market. Deregulation of electricity markets in many countries has also been supported by transparent pricing, with data and digital innovations in short-term markets to support evolutions from daily balancing to intra-day pricing in 15 or 5-minute increments.

STANDARDS AND TRACEABILITY

Common standards can drive competition and scale in markets by increasing interoperability of products across markets and the substitutability of suppliers. For suppliers, this increases addressable market size and access to international markets by fulfilling market entry conditions and providing confidence to new buyers in the quality of products. Commonalities in standards across countries can also help reduce frictions in the trade of goods.

Traceability of the provenance and environmental, social and governance (ESG) impacts of a product is of growing importance to the functioning of markets. Consumers and investors are placing increasing value on ESG considerations (such as environmental and climate impacts, or ethical labour standards) in purchasing and investment decisions. For example, the number of investment companies pledging to consider ESG has grown 48-fold in the past 14 years. Thus it is crucial investors can credibly distinguish between products with better or worse ESG impacts, for example through industry-wide certifications or supply chain tracking initiatives. This provides confidence to pay premiums for better ESG performance, encourage suppliers to improve sustainability, avoid suppliers with worse impact and reduce 'greenwashing' of unsustainable firms.

LIQUIDITY AND FLEXIBILITY

Greater liquidity and flexibility in markets supports more resilient supply chains by:

- offering avenues for market participants to meet shortfalls and sell surpluses (e.g., through spot markets)
- allowing better pricing and sharing of supply chain risks (e.g., through derivatives such as futures)
- reducing barriers to entry and facilitating participation in the market by more buyers and sellers.

Markets, particularly for more standardised commodities, typically increase in liquidity as standardisation and the transparency of information rise. As clean energy markets mature, such as export markets for low-carbon hydrogen, industry and policymakers can draw lessons from the evolution of other markets. Shifts in the global liquefied natural gas (LNG) market over the past two decades provides some insights on how increasing scale and diversity of supply could drive development of more liquid and flexible markets.

KEY QUESTIONS

1. How can governments and industry across the region collaborate on building alignment and consensus in certifications and standards, for example to support greater competition, market entry, cost reduction and sustainable or ethical practices?
2. How could industry leaders collaborate to support initiatives and digital tools for end-to-end traceability and verification for provenance and ethical sourcing of clean energy products?
3. What decisions or enablers do governments and industry need to undertake now to allow development of more vibrant and liquid markets for clean energy products over the coming decades?
4. How can we encourage cooperative actions to increase transparency and reduce trade barriers across markets in clean energy supply chains?



DAY TWO

LUNCH

The keynote lunch speakers are Dr Mahmoud Mohieldin, UN Climate Change High-Level Champion for Egypt, host of COP27, and Dr Jörg Kukies, State Secretary at the German Federal Chancellery and G7 and G20 Sherpa of German Chancellor Olaf Scholz.



DR MAHMOUD MOHIELDIN

UN Climate Change High-Level Champion for Egypt

Dr Mahmoud Mohieldin is the UN Climate Change High-Level Champion for Egypt. He is an economist with more than 30 years of experience in international finance and development. He is an Executive Director at the International Monetary Fund and has been the United Nations Special Envoy on Financing the 2030 Sustainable Development Agenda since February 2020.

He was the former Minister of Investment of Egypt from 2004–2010, and most recently, served as the World Bank Group Senior Vice President for the 2030 Development Agenda, United Nations Relations and Partnerships.

His roles at the World Bank also included Managing Director, responsible for Human Development, Sustainable Development, Poverty Reduction and Economic Management, Finance and Private Sector Development, and the World Bank Institute; World Bank President's Special Envoy on the Millennium Development Goals (MDGs), the Post-2015 Development Agenda (later, the Sustainable Development Goals (SDGs)), and Financing for Development; and Corporate Secretary and Executive Secretary to the Development Committee of the World Bank Group's Board of Governors.

Dr Mohieldin also served on several Boards of Directors in the Central Bank of Egypt and the corporate sector. He was a member of the Commission on Growth and Development and selected a Young Global Leader of the World Economic Forum in 2005. His professional experience extends into the academic arena as a Professor of Economics and Finance at the Faculty of Economics and Political Science, Cairo University and as a Visiting Professor at several renowned Universities in Egypt, Korea, the UAE, the UK and the USA.



DR JÖRG KUKIES

State Secretary at the German Federal Chancellery and G7 and G20 Sherpa of German Chancellor Olaf Scholz

Dr Jörg Kukies is since December 2021 State Secretary at the German Federal Chancellery and G7 and G20 Sherpa of German Chancellor Olaf Scholz.

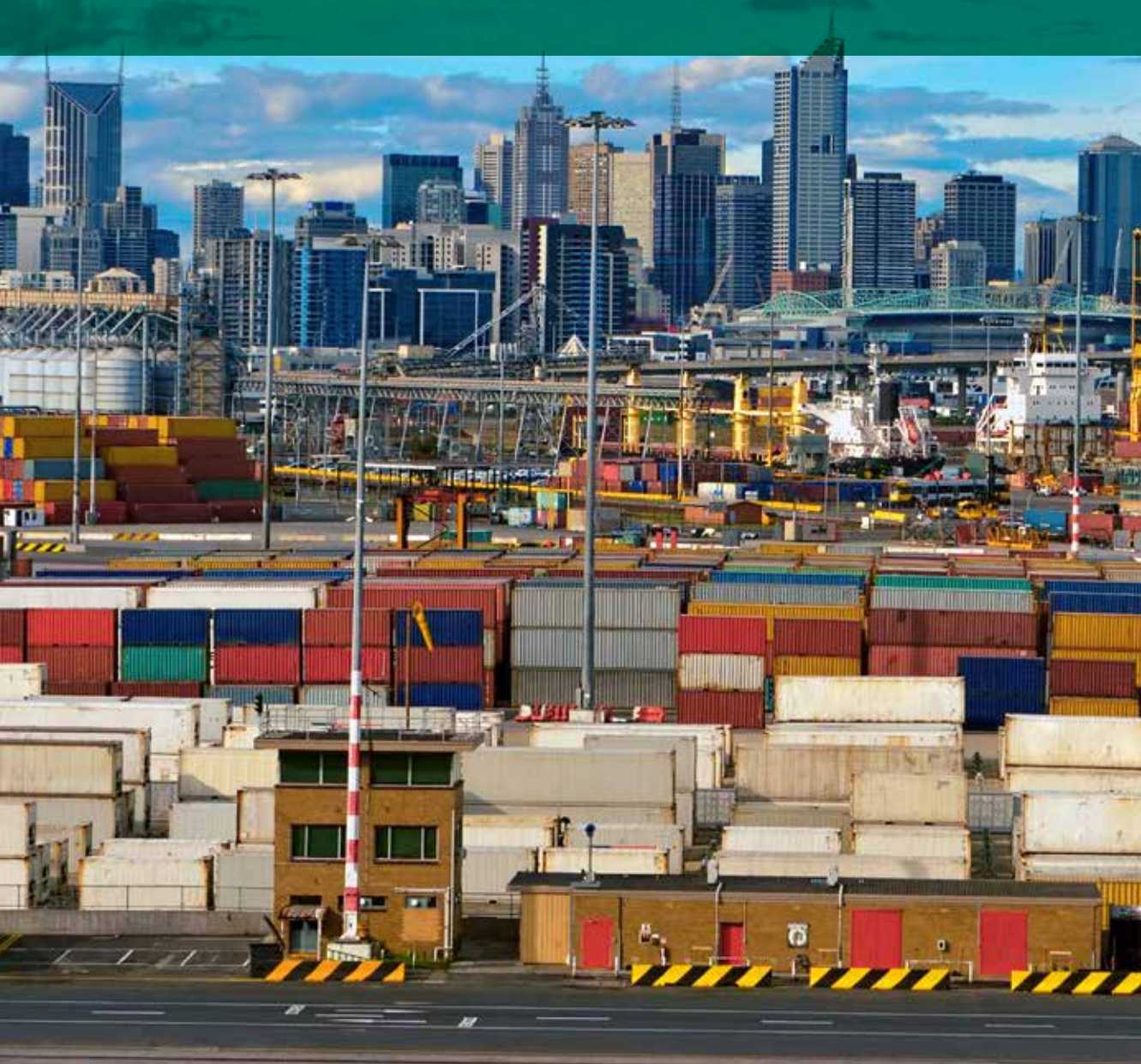
Before that, he was State Secretary for financial market policy and European policy at the Federal Ministry of Finance and co-chief executive officer of Goldman Sachs AG and managing director of the Frankfurt branch of Goldman Sachs International from 2014 to 2018.

He has previously held positions in the product development team of Goldman Sachs International in London, in the equities division for Germany and Austria in Frankfurt, and as head of equity derivatives for Europe, the Middle East and Africa at Goldman Sachs International from 2011 to 2014.

Dr Kukies studied economic sciences at Pantheon-Sorbonne University in Paris. He has a master in public administration from John F. Kennedy School of Government, Harvard University, and a PhD in finance from the University of Chicago, Graduate School of Business.



PLENARY SESSION FOUR CONTINUED
ENABLING MARKETS, CAPABILITIES AND
SYSTEMS TO SUPPORT THE TRANSITION



PANEL THREE: TRANSPORT AND INFRASTRUCTURE SPEAKERS



DR DAVID FINN

**Founder and Chief Growth Officer,
Tritium**

David is one of Tritium's co-founders and a former member of the Sunshark solar racing team, whose technology sparked the company's formation. He led Tritium's expansion from 10 employees to more than 300 from 2014 to 2020 — a time when the electric vehicle market was still nascent. The company now has three global locations with products installed in 32 countries.

As Tritium's Chief Growth Officer, David aligns the company's new products and engineering development with emerging market needs, to drive growth of the entire electric vehicle market. At the core of Tritium's offer is delivering an exceptional customer experience. To achieve this David is committed to close market liaison to deeply understand driver and station owner needs. He regularly visits stakeholders around the world to learn firsthand the opportunities and challenges of all parties in the e-mobility lifecycle.

An internal focus for David is to lead the Tritium team culture of delivering on promises; inspiring employees at Tritium's global offices to work with integrity, creativity and respect. David believes success is driven from a foundation of great people who can help the company scale while remaining true to its vision: enabling everyone to enjoy clean, healthy and convenient cities.

An engineer by trade, David was a key architect of Tritium's DC fast charging technology and is a frequent speaker and lecturer at international engineering and electric vehicle events. He holds a PhD in electrical engineering from the University of Queensland in Brisbane, Australia.



TOMOhide MIYATA

**Director, Executive Vice President
ENEOS Holdings, Inc. ENEOS Corporation**

After graduating from the Tokyo Institute of Technology with a master's degree in nuclear engineering in 1990, Tomohide joined Tonen Corporation (currently ENEOS Corporation), one of the leading oil companies in Japan, as a researcher involved in research and development in fuel cells. In 2000, at the time Tonen Corporation became a subsidiary of ExxonMobil, Tomohide was appointed Project Services Manager of Asia Pacific Area Engineering Office of ExxonMobil Research and Engineering.

Taking advantage of the experience and knowledge gained at two major refineries as Refinery Manager and manufacturing operations as Managing Director, Tomohide took charge of the Electric Power Business when deregulation of the electricity market began in Japan.

Since 2020, Tomohide has been covering Hydrogen Business, and is currently in charge of Manufacturing, Research and Development, Lube business and the Hydrogen Business of ENEOS as Executive Vice President.

Tomohide holds a Master of Nuclear Engineering from the Tokyo Institute of Technology, Japan.



PROFESSOR LYNN LOO

**CEO,
Global Centre for Maritime Decarbonisation**

Prof. Lynn Loo is the chief executive officer of the Global Centre for Maritime Decarbonisation (GCMD), a not-for-profit organization based in Singapore. Established by six founding partners from the maritime industry and supported by the Maritime & Port Authority of Singapore, GCMD's mission is to help the sector accelerate its decarbonisation efforts through shaping standards, deploying solutions, financing projects and fostering collaboration across sectors.

Lynn is also the Theodora D. '78 and William H. Walton III '74 Professor in Engineering, and Professor of Chemical and Biological Engineering, currently on leave from Princeton University. Before GCMD, she was Director of the Andlinger Center for Energy and the Environment, where she commissioned the Rapid Switch Initiative and the Net-Zero America Study that has provided unprecedented temporal and geographic granularity on transition pathways. This report has been socialized extensively among senior members of the Biden administration and has influenced the thinking of investors and key decision makers. She also founded Princeton E-affiliates Partnership, a flagship corporate partner program to engage industry and she launched Princeton's first executive program in partnership with the World Economic Forum to contextualize the complexities of the energy transition for business leaders.



MARIKA CALFAS

**CEO,
NSW Ports**

Marika Calfas is the Chief Executive Officer of NSW Ports, the private sector organisation responsible for managing Port Botany, Port Kembla and the intermodal terminals at Cooks River and Enfield.

Marika is passionate about driving sustainable port supply chains, informing the wider community and decision makers of the importance and value of ports to our lives and the economy, and identifying new opportunities to build supply chain system productivity and resilience.

Marika represents the sector advising government on industry reform agendas. She is on the Board of government and industry organisations including Infrastructure NSW, Ports Australia (Deputy Chair), Australian Logistics Council and Infrastructure Partnerships Australia. She is also a member of the University of Wollongong's SMART Advisory Council and Australia's representative to PIANC's (International Waterborne Transport Association's) International Environmental Commission.

Marika holds an Engineering Degree (Environmental), Masters of Engineering Management and Masters of Environmental Law.

EXPLAINER

Transport and supporting infrastructure is needed to move and deploy new clean energy sources across the Indo-Pacific and beyond. Rapid scaling of clean energy supply to meet the region's ambitions will need to be matched by development of enabling infrastructure; clean energy technologies cannot be produced and distributed if the underlying transport and supporting infrastructure are not in the right place at the right time.

We also need clean energy transport and supporting infrastructure to be green enough to support our overall efforts to decarbonise. Transport accounts for ~16% of global carbon dioxide equivalent emissions. Decarbonising the transport of clean energy technologies will be increasingly important, due to the increased scale of transport and supporting infrastructure needed to transport clean energy technology inputs and distribute end products.

Different clean energy technologies have different transport infrastructure needs. For example:

- Hydrogen may require a range of transport and supporting infrastructure options, depending on the technology pathways the industry aligns on (e.g., technology type and design such as centralised or decentralised production). This could include long-distance pipelines for hydrogen transport, specialised shipping transport including port infrastructure for shipping and handling liquefied hydrogen, ammonia or liquid organic hydrogen carriers such as MCH, through to supporting infrastructure for last mile and end-use, such as refuelling stations for hydrogen powered vehicles
- Renewables require electricity network infrastructure and connections to distribute the clean energy they produce, specialty shipping for wind turbine distribution and for off-shore construction
- Batteries require dangerous goods and temperature-controlled shipping (for lithium-ion); grid infrastructure including connections for utility and distributed uses and EV charging infrastructure
- Carbon capture requires new pipelines to transport captured carbon emissions and storage facilities.

KEY QUESTIONS

1. How can downstream users collaborate to create sufficient offtake to justify investment in new facilities and infrastructure?
2. How can investment along the value chain, including encouraging shared infrastructure, be coordinated to align infrastructure across upstream and downstream uses, while optimising location and geography choices to shorten value chains?
3. How can collaboration, including on regulation, standards, funding and governance models, across governments create the enablers for connected infrastructure like transmission, pipelines, and shipping in the region?
4. How can governments, industry and academia collaborate to identify priority RD&D to address challenges in transport of clean energy, for example, hydrogen carrier technologies and sustainable fuels, and direct funding to address research gaps?



PANEL FOUR: WORKFORCE AND SKILLS SPEAKERS



BARBARA HUMPTON

**President and CEO,
Siemens Corporation**

Barbara Humpton is President and CEO of Siemens Corporation, where she guides the company's strategy and engagement in serving the company's largest market. Siemens USA employs approximately 40,000 people serving customers in all 50 states and Puerto Rico and generated \$17 billion in revenue in fiscal year 2020.

Most recently, Humpton served as president and CEO of Siemens Government Technologies, Inc. (SGT), a leading integrator of Siemens' products and services for federal government agencies and departments. In this role, Humpton also served as an officer/director member of the board of directors of SGT.

Prior to joining Siemens in 2011, Humpton served as a vice president at Booz Allen Hamilton where she was responsible for program performance and new business development for technology consulting in the Department of Justice and Department of Homeland Security. Earlier, Humpton was a vice president at Lockheed Martin Corporation with responsibility for Biometrics Programs, Border and Transportation Security and Critical Infrastructure Protection, including such critical programs as the FBI's Next Generation Identification and the TSA's Transportation Workers' Identification Credential.

Humpton is a graduate of Wake Forest University with a bachelor's degree in mathematics. Barbara is Chairman of the Siemens Corporation Board, the Siemens Foundation and of the Center for Strategic and Budgetary Assessments (CSBA). She serves on the board of directors of the American Heart Association Greater Washington Region, Triumph Group, National Association of Manufacturers (NAM), Chief Executives for Corporate Purpose (CECP), Economic Club of Washington, D.C. and the Seabee Memorial Scholarship Association. She resides in Washington, D.C., with her husband David.



GURDEEP SINGH

**Chairman and Managing Director,
NTPC Limited**

Mr. Gurdeep Singh is the Chairman & Managing Director of NTPC Limited, India's largest integrated power utility and a global energy major.

In an illustrious career spanning more than three and a half decades, he has held leadership positions with several national and multinational companies like PowerGen, CESC, AES, IDFC, GSECL & DVC among others.

Mr. Singh is an alumnus of NIT Kurukshetra and IIM Ahmedabad and has undergone management and leadership training from Harvard and Oxford business schools.

An accomplished business leader with expertise in building and managing businesses across the power sector value chain, Mr. Singh is leading NTPC's transformational journey into a sustainable integrated energy company.

Mr. Singh embraces innovation and a people-centric sustainable approach to business. Under his leadership, NTPC has been consistently ranked as a 'best employer' internationally and also received awards and recognitions for its community oriented innovative CSR initiatives and business sustainability.



PROFESSOR DATUK AHMAD FAUZI ISMAIL

**Vice-Chancellor,
Universiti Teknologi Malaysia**

Professor Datuk Dr Ahmad Fauzi Ismail is the seventh Vice-Chancellor of Universiti Teknologi Malaysia. Prior to this, he was the Deputy Vice Chancellor of Research and Innovation. As one of the early pioneers of membrane technology in Malaysia, he is the Founding Director of Advanced Membrane Technology Research Centre (AMTEC).

Ahmad Fauzi Ismail graduated with a B.Eng. (Petroleum Engineering) and M.Sc. in (Chemical Engineering) from Universiti Teknologi Malaysia (UTM), and Ph.D. in Chemical and Process Engineering at the University of Strathclyde, Glasgow, UK, specializing in Membrane Technology.

He is a Member of the Malaysia Science Council, Member of Higher Education Advisory Committee, Ministry of Higher Education, Chairman of Malaysia Membrane Society (MyMembrane), Chairman for Selection Committee of the 14th National Academic Award and Chairman of Malaysia Research University Network (MRUN).

His current Scopus h-index is 93 (40, 932 citations) and Web of Science h-index stands at 86 (31, 477 citations). Among the prestigious awards won are The World Academy of Sciences (TWAS) Award in Engineering Sciences for 2019, Merdeka Award for the Outstanding Scholastic Achievement Category on 4th September 2014, Malaysia's Rising Star Award (2016) and Highly Cited Researcher (2018, 2019, 2020, and 2021) by Clarivate Analytics.



JENNIFER WESTACOTT AO

**CEO,
Business Council of Australia**

Jennifer Westacott AO has been chief executive of the Business Council of Australia since 2011, bringing a unique combination of extensive policy experience in both the public and private sectors.

She has served as the Director General of the NSW Department of Infrastructure, Planning and Natural Resources; the Secretary of the Victorian Department of Education and Training; and the Director of Housing in Victoria.

As a senior partner at KPMG, Jennifer advised businesses on climate change and sustainability and advised governments across Australia on significant reform priorities.

Since 2013, Jennifer has served as a Non-Executive Director of Wesfarmers Limited.

She is the Chair of the Western Parkland City Authority, which is overseeing the design and delivery of the Western Sydney Aerotropolis, as well as integrated delivery across the Western Parkland City.

Jennifer is an Adjunct Professor at the City Futures Research Centre of the University of NSW and also serves as a member of the UNSW Council.

She is the inaugural Chair of the Board of Studio Schools of Australia, a patron of Mental Health Australia, the Co-Patron of Pride in Diversity, and a patron of the Pinnacle Foundation.

Jennifer has a Bachelor of Arts (Honours) from the University of New South Wales and in 2017 received an Honorary Degree (Doctor of Letters) from her alma mater. She was a Chevening Scholar at the London School of Economics.

EXPLAINER

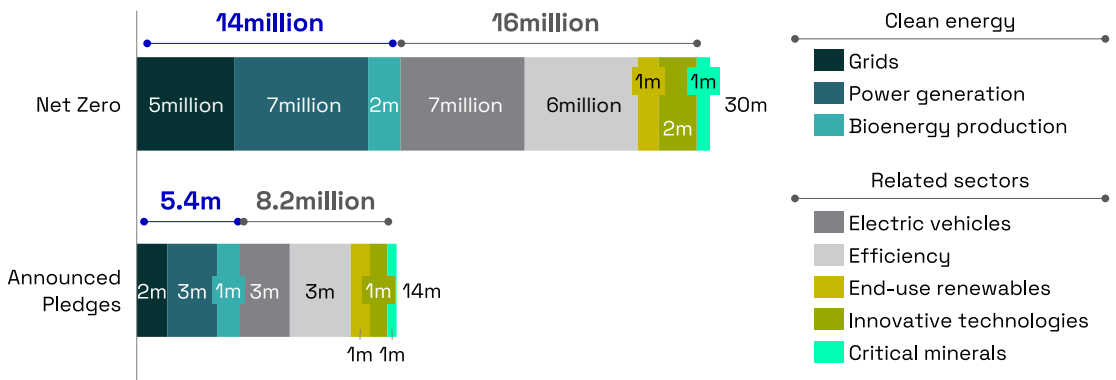
RAPID GROWTH OF CLEAN ENERGY WORKFORCE REQUIRED

Scaling clean energy supply chains across the region will be highly dependent on the availability of a trained workforce to manufacture, transport, deploy and operate clean energy technologies and projects on an immense scale. To achieve net zero by 2050, the IEA estimates 14 million new

clean energy roles will need to be created globally in next decade, compared to roughly 40 million energy sector workers today. Education and training will need to meet the evolving needs of industry for new and emerging technologies and their commercial deployment.

Employment growth in clean energy and related areas to 2030, under Announced Pledges and Net Zero Scenarios

Clean energy jobs will be created across technologies at different speeds and scale



¹ e.g., solar thermal water heaters
 Sources: IEA 'Net Zero by 2050: A Roadmap for the Global Energy Sector'; BCG analysis

Source: IEA 'World Energy Outlook 2021 – People centred transitions', October 2021

DIFFERING WORKFORCE CHALLENGES ACROSS THE INDO-PACIFIC REGION

Indo-Pacific nations are facing this challenge from different starting points. Some nations have larger (relative to their total population) and more established clean energy workforces than other nations within the region. Further, many nations' existing clean energy workforces are undersized in the technologies that are expected to drive the bulk of the energy transition (such as solar and wind and battery technologies) and are weighted more towards technologies such as biofuels and hydroelectricity. However, this also presents great opportunities for the region, with enormous pools of untapped potential in countries with large populations but low rates of clean energy sector employment today.

CAPACITY GAPS WILL NEED TO BE FILLED

The roles that must be filled across the supply chain span numerous occupation types – including jobs in manufacturing of clean energy technologies (e.g. PV modules, wind turbines and batteries) through to construction and professional roles in design, deployment and operation of clean energy projects. The clean energy transition will require bridging capacity gaps across roles of all skill types. Most of the roles to be filled will be high or medium skill level roles that will require both formal training provided by the education and training sector, and on-the-job training provided by industry.

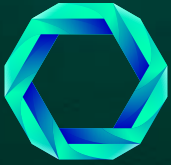
Meeting clean energy workforce demands will also require unlocking women's participation.

Women are expected to only hold 10% of renewable energy jobs in 2030. In developing recruiting and training programs to meet demand for clean energy roles, Indo-Pacific industry and governments can work together to ensure equity in green economy jobs.



KEY QUESTIONS

1. What roles can governments and industry play in strategic workforce planning across the clean energy sector? How can industry and governments collect and share data and forecasts that enhance regional understanding of capacity gaps in the clean energy workforce?
2. How can we ensure clean energy training programs are widely available across the region and encouraged to potential workers? What roles can industry play in the design and delivery of clean energy workforce training programs?
3. How can industry and government support stronger levels of workforce participation for women in clean energy roles?
4. How could we support the mobility of students, trainees and professionals – and their capabilities and skills – in clean energy fields across countries, firms and institutions, including for small island developing states?
5. How can we ensure ethical labour practices are verified and traced throughout the end-to-end supply chain, within our region and beyond?



CONCLUSION

FORUM CLOSE

SPEAKER

Dr Alan Finkel AC, Special Adviser to the Australian Government on Low Emissions Technology, and Chair of the Sydney Energy Forum Steering Committee

EXPLAINER

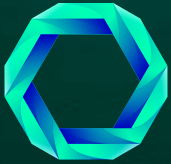
Successfully meeting global net zero emissions targets will depend on decarbonising energy systems at an unprecedented pace, while still ensuring reliable access to energy. Secure, resilient and sustainable clean energy supply chains will underpin the technologies needed to achieve this, and will need to be scaled rapidly to meet the demand of the clean energy future.

Countries within the Indo-Pacific are starting from vastly different points in the transition, and should be front of mind when considering the establishment of clean energy supply chains. This includes recognising the different energy objectives across the region, including the fact that for some countries, reliable access to sufficient energy of any type remains a pressing challenge and is critical for economic development.

The Sydney Energy Forum seeks to start a dialogue between industry, governments and international organisations on the crucial role of the Indo-Pacific in securing clean energy supply chains, and key actions needed going forward.

The outcomes of these discussions will be summarised in an Evidence-base Report and a summary report, which will include a suite of practical actions, focusing on key opportunities to drive the development of secure, resilient and sustainable clean energy supply chains. Key themes have also already been picked up in the IEA's Securing Clean Energy Technology Supply Chains report, and will go on to inform the IEA's flagship Energy Technology Perspectives publication, due to be released in early 2023.

The conversation started at the Forum will not stop in Sydney. The Forum report, including its practical actions, and the IEA's Energy Technology Perspectives Report will be tools to inform a number of discussions across upcoming international fora, including Indonesia's G20 presidency, the G7 and at COP27 in Egypt.



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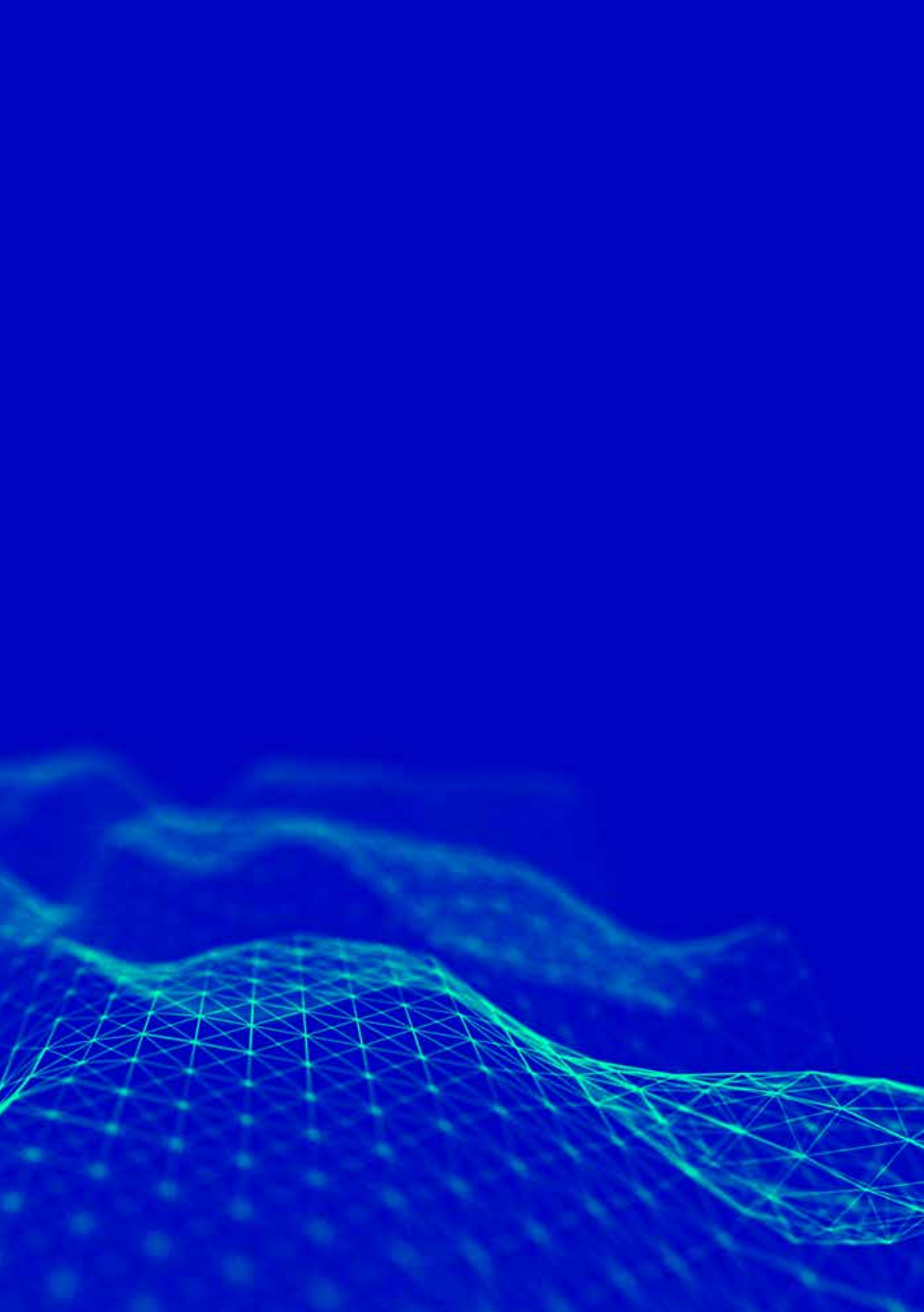
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**SECURING CLEAN ENERGY
SUPPLY CHAINS FOR THE
INDO-PACIFIC**

