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OCEAN WARMING

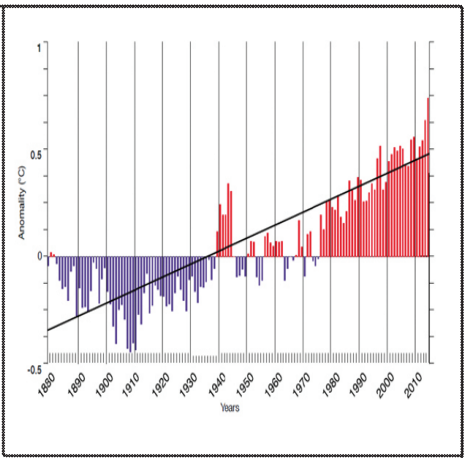
AKASH MUKHERJEE - B.TECH - IV

- The ocean absorbs most of the excess heat from greenhouse gas emissions, leading to ***rising ocean temperatures***.
- Increasing ocean temperatures ***affect marine species and ecosystems***. Rising temperatures cause coral bleaching and the loss of breeding grounds for marine fishes and mammals.
- Rising ocean temperatures also affect the benefits humans derive from the ocean – ***threatening food security, increasing the prevalence of diseases and causing more extreme weather events and the loss of coastal protection***.
- Achieving the mitigation targets set by the Paris Agreement on climate change and ***limiting the global average temperature increase to well below 2°C above pre-industrial levels*** is crucial to prevent the massive, irreversible impacts of ocean warming on marine ecosystems and their services.
- ***Establishing marine protected areas*** and ***putting in place adaptive measures***, such as precautionary catch limits to prevent overfishing, can protect ocean ecosystems and shield humans from the effects of ocean w

What is the issue?

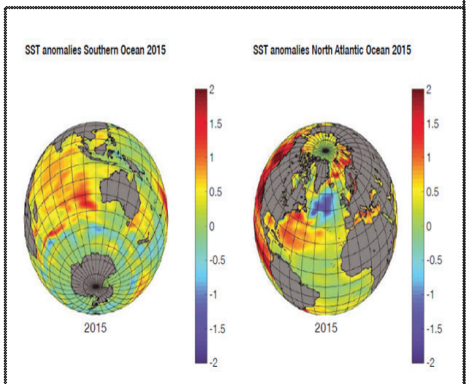
The ocean absorbs vast quantities of heat as a result of increased concentrations of greenhouse gases in the atmosphere, mainly from fossil fuel consumption. The Fifth Assessment Report published by the Intergovernmental Panel on Climate Change (IPCC) in 2013 revealed that the ocean had absorbed more than 93% of the excess heat from greenhouse gas emissions since the 1970s. This is causing ocean temperatures to rise.

Data from the US National Oceanic and Atmospheric Administration (NOAA) shows that the average global sea surface temperature – the temperature of the upper few metres of the ocean – has increased by approximately 0.13°C per decade over the past 100 years. A 2012 paper published in the journal Geophysical Research Letters revealed that the deep ocean is also affected, with one third of the excess heat absorbed 700 m below the sea surface. Modelling studies published in IPCC's 2013



ocean temperature of 1-4oC by 2100.

Report predict that there is likely to be an increase in mean global The distribution of excess heat in the ocean is not uniform, with the greatest ocean warming occurring in the Southern Hemisphere and contributing to the subsurface melting of Antarctic ice shelves.



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The ocean's ability to absorb excess heat has shielded humans from even more rapid changes in climate. Without this oceanic buffer, global temperatures would have risen much more than they have done to date. IPCC's Fourth Assessment Report published in 2007 estimated that the Earth had experienced a warming of 0.55°C since the 1970s. According to an analysis by the Grantham Institute, if the same amount of heat that has gone into the top 2,000 m of the ocean between 1955 and 2010 had gone into the lower 10 km of the atmosphere, the Earth would have seen a warming of 36°C.

back to top

Why is it important?

Ocean warming leads to deoxygenation – a reduction in the amount of oxygen dissolved in the ocean – and sea-level rise – resulting from the thermal expansion of sea water and continental ice melting. The rising temperatures, coupled with ocean acidification (the decrease in pH of the ocean due to its uptake of CO2), affect marine species and ecosystems and, consequently, the fundamental benefits humans derive from the ocean.

Impact on marine species and ecosystems

Marine fishes, seabirds and marine mammals all face very high risks from increasing temperatures, including high levels of mortalities, loss of breeding grounds and mass movements as species search for favourable environmental conditions. Coral reefs are also affected by increasing temperatures which cause coral bleaching and increase their risk of mortality.

Impact on humans

A 2012 report by the Food and griculture Organization of the United Nations estimates that marine and freshwater capture fisheries and aquaculture provide 4.3 billion people with about 15% of their animal protein. Fisheries and aquaculture are also a source of income for millions of people worldwide. By altering distributions of fish stocks and increasing the vulnerability of fish species to diseases, ocean warming is a serious risk to food security and people's livelihoods globally. Economic losses related to ocean warming are likely to run from tens to hundreds of millions of dollars. Rising temperatures also affect vegetation and reef-building species such as corals and mangroves, which protect coastlines from erosion and sea-level rise. Rising sea levels and erosion will particularly affect low-lying island countries in the Pacific Ocean, destroying housing and infrastructure and forcing people to relocate.

The rise in sea surface temperatures is causing more severe hurricanes and the intensification of El Niño events bringing droughts and floods. This can have significant

CONTENTS

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socio-economic and health effects in some regions of the world.

Warming ocean temperatures are linked to the increase and spread of diseases in marine species. Humans risk direct transmission of these diseases when consuming marine species, or from infections of wounds exposed in marine environments.

back to top

What can be done?

1. Limiting green house gas emissions

There is an urgent need to achieve the mitigation targets set by the Paris Agreement won climate change and hold the increase in the global average temperature to well below 2°C above pre-industrial levels. This will help prevent the massive and irreversible impacts of growing temperatures on ocean ecosystems and their services.

2. Protecting marine and coastal ecosystems

Well-managed protected areas can help conserve and protect ecologically and biologically significant marine habitats. This will regulate human activities in these habitats and prevent environmental degradation.

3. Restoring marine and coastal ecosystems

Elements of ecosystems that have already experienced damage can be restored. This can include building artificial structures such as rock pools that act as surrogate habitats for organisms, or boosting the resilience of species to warmer temperatures through assisted breeding techniques.

4. Improving human adaptation

Governments can introduce policies to keep fisheries production within sustainable limits, for example by setting precautionary catch limits and eliminating subsidies to prevent overfishing. Coastal setback zones which prohibit all or certain types of development along the shoreline can minimise the damage from coastal flooding and erosion. New monitoring tools can be developed to forecast and control marine disease outbreaks.

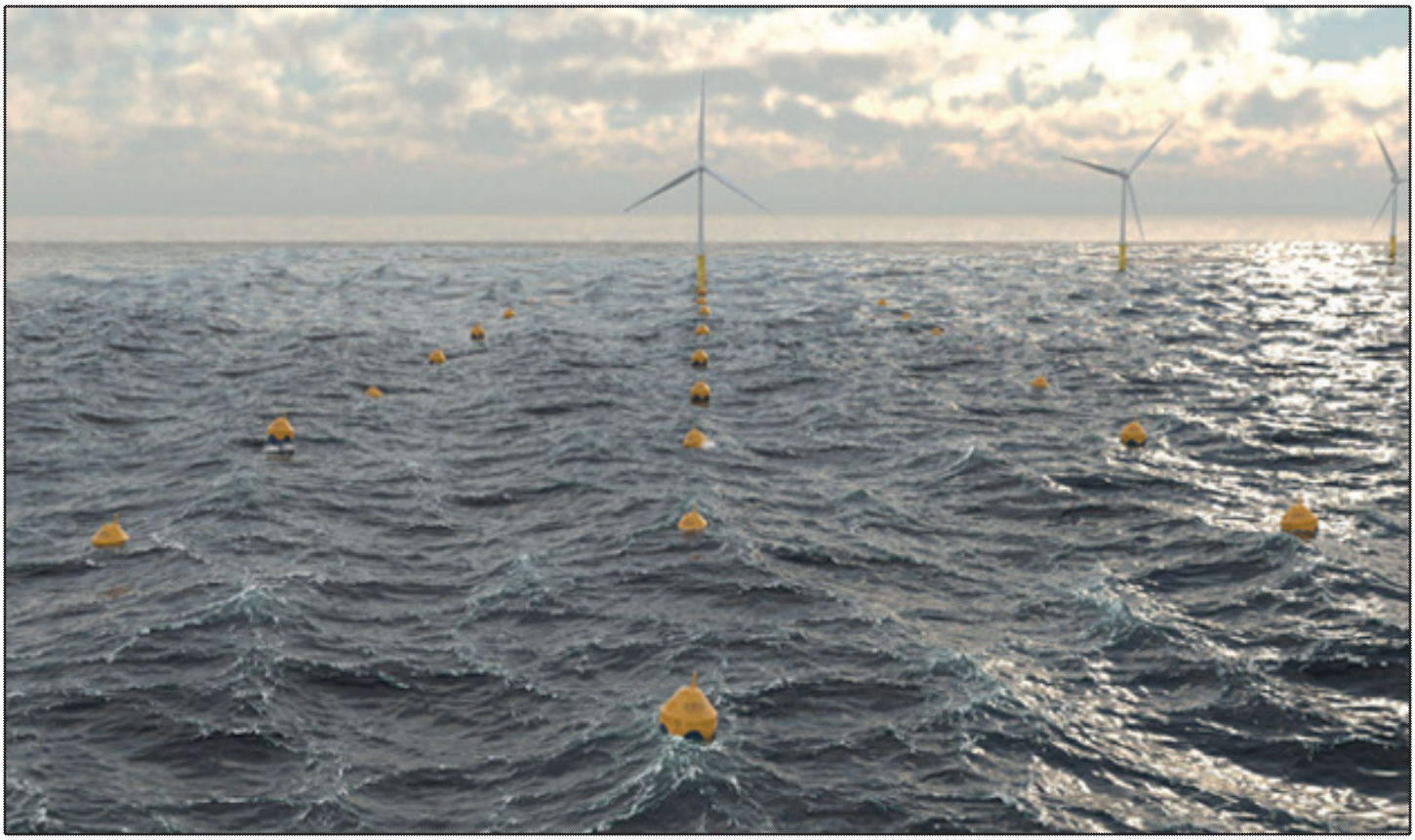
5. Strengthening scientific research

Governments can increase investments in scientific research to measure and monitor ocean warming and its effects. This will provide more precise data on the scale, nature and impacts of ocean warming, making it possible to design and implement adequate and appropriate mitigation and adaptation strategies.

Courtesy: www.iucn.org

Major UK project to unlock untapped potential of ocean renewable energy fuels

KARTHICK KUMAR - B.TECH - IV



An innovative £10 million research project, led by the University of Strathclyde, has been set up to investigate the potential of harnessing offshore wind and marine renewable energy to produce zero-carbon hydrogen and ammonia fuels.

Illustration/Co-located offshore wind and wave energy farm (Courtesy of CorPower Ocean) The multi-disciplinary ***Ocean-REFuel: Ocean Renewable Energy Fuels*** project will explore ways of converting ocean energy into fuels for use in heating, energy storage and difficult to decarbonise transport applications.

The news comes as the UK prepares to host COP26, the UN Climate Change Conference, in Glasgow and the consortium includes world-leading research teams from the Universities of Nottingham, Cardiff, Newcastle and Imperial College London.

The UK government has the ambition for **offshore wind to produce more than enough electricity to power every home in the country** by 2030, based on current electricity usage, but there remains extremely large ocean energy potential which can never be fully utilised by the electricity network.

The project is funded by the Engineering and Physical Sciences Research Council, industry, and the partner universities, who have also pledged a total of nine linked PhD studentships.

Decarbonisation challenge

Renewable electricity has been a remarkable success over the past 20 years, but the same cannot be said for other energy uses, in particular heat, heavy transport vehicles and aviation.

New technologies and systems need to be developed to avert the worst consequences of climate change and the Ocean-REFuel project will directly address challenges associated with energy storage, renewable heat and the **decarbonisation of transport** such as road, marine and aviation.

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Jim McDonald, principal and vice-chancellor of the University of Strathclyde and president of the Royal Academy of Engineering, said: "We are delighted to be awarded the Ocean-REFuel project and to bring together this formidable cross-UK team to lead the way for future hydrogen production from an almost boundless sustainable offshore resource.

"The University of Strathclyde is one of the country's leading energy research institutions and addresses the challenges of the energy transition. I believe this exciting opportunity will enable the UK to undertake vital research into ocean renewable energy and establish it as a pioneer in the field".

Renewable energy technologies such as wind are impacted by intermittency and production issues and this project will explore storage solutions, such as hydrogen and ammonia, that can help manage the issue of intermittent supply, according to the University of Strathclyde.

Like electricity, hydrogen is an energy carrier and can be produced from a variety of sources including seawater and used as a source of energy or fuel. It could also allow the stored energy to be fed back into the grid, and potentially channel renewable energy to difficult-to-decarbonise sectors such as renewable heat and transport, which account for more than 60% of UK energy demand.

A report in 2020 from the Offshore Renewable Energy Catapult claimed that even if only offshore wind-to-hydrogen is considered, the exports to Europe alone could reach an annual value of up to £48 billion.

UK Minister for Energy, Clean Growth and Climate Change, ***Anne-Marie Trevelyan***, said: "The waters around the UK offer abundant prospects for clean energy. Ensuring that we can tap the full potential of our natural resources will be vital in meeting our bold climate change commitments.

"As shown through our world-leading offshore wind sector, we are not only capitalising on the clean energy potential around our coastline but also the opportunities for investment, jobs creation and regional growth. Projects like Ocean-REFuel are helping us fulfil that potential as we build back greener".

First integrated ocean renewable fuel production facility

The five-year collaboration, which involves 28 industrial partners, including BP, Scottish Power, National Grid, ENI along with the UK Health & Safety Executive, will also produce a blueprint for the first integrated ocean renewable fuel production facility.

Feargal Brennan, Ocean-REFuel project lead from the University of Strathclyde, said: "The Ocean-REFuel project has come at precisely the right time to build on the successes of offshore wind and has the potential to create a step-change in how we consider our whole energy system.

"The team will aim to use their vast experience to provide international thought-leadership on how to best develop this enormous energy potential in a safe, environmentally sensitive and responsible manner to provide maximum benefit to local communities whilst contributing in a major way to net-zero.

"The challenges are immense, and we are acutely aware of the importance of getting this right, given the backdrop of the climate emergency and the global consequences unless step changes can be achieved".

The Ocean-REFuel project builds on EPSRC investment of more than £35 million into offshore wind power over the past decade, according to project partners.

Lucy Martin, deputy director for cross-council programmes at EPSRC, said: "The UK is the world's largest producer of offshore wind energy but there is vast potential yet to be tapped into, as outlined in the Prime Minister's plan to quadruple the amount we produce by 2030 including the opportunity to use offshore wind to help meet our green hydrogen production needs.

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"By addressing key research challenges to the wider use of offshore wind energy and integrating it into green hydrogen production, the Ocean-REFuel project will help us to engineer the radical energy transition needed to deliver on our Net Zero commitment and also enhance the sustainability and resilience of the UK energy system".

Courtesy: off shore energy.biz

IOG completes challenging Elgood well, but delays affect first gas timing

VAIBHAV SHUKLA - B.TECH - IV

UK gas company IOG plc has achieved successful flow test results at its Elgood development well in the UK North Sea. However, the company has experienced mechanical challenges during drilling operations, which resulted in an extended duration.

As a result, the first gas from IOG's Core project has been pushed to 4Q 2021.

IOG started drilling the Elgood development well, the first of five planned development wells in IOG's Phase 1 of the Core project, in April 2021, using the Noble Hans Deul jack-up rig.

In an update on Monday, IOG said that the well was drilled horizontally through the reservoir section to a total depth of 15,472ft Measured Depth (MD), intersecting 1,080 ft of high-quality Permian Leman Sandstone reservoir along a hole between 14,290 ft MD and 15,370 ft MD, with a net: gross ratio of 91 per cent, good porosity at 12.4 per cent and average log-derived permeability of 13.3 milliDarcies (mD) versus the P50 prediction of 5mD.

Over the recent days, the well was successfully cleaned up and flow tested. Test rates were ahead of expectations, with a maximum rate of 57.8 mmscf/d of gas and 959 bbl/d condensate through a 80/64th inch choke, constrained by surface facilities on the Noble Hans Deul jack-up rig.

The Elgood field is planned to be produced as a subsea tie-back, via the 6" pipeline laid in 4Q 2020, to the platform at the Blythe field once the single development well at the latter has also been drilled. The subsea tree will be controlled via the umbilical being installed over the coming weeks as part of the summer 2021 subsea installation campaign.

According to IOG, a number of mechanical issues were experienced on the Elgood well since it spudded on 9 April 2021, which extended it beyond the initially expected three-month duration. The company has collaborated closely with well operator Petrofac and its key drilling contractors, Noble Corporation and Schlumberger, to overcome these challenges and execute the well.

IOG and its contractors have investigated the root causes of these issues and are putting in place protocols and procedures to limit the potential for similar mechanical issues to occur in subsequent wells.

The Noble Hans Deul rig is expected to mobilise within the next week to the Blythe field where it will drill the development well through the Blythe platform, before moving on to Southwark. Due to the extended duration at Elgood, the Blythe well despite being shorter is now expected to be completed by October 2021, and Phase 1 first gas therefore to occur in 4Q 2021. The first gas was previously expected in 3Q 2021.

The Elgood reservoir was encountered 39ft deep to prognosis. Management's preliminary integration of the well data, prior to the well test, indicated that the range of ultimate recoverable gas may be less than the pre-well estimates. The company will undertake a full technical review to determine an updated range of ultimate recoverable gas from the reservoir, which will require further modelling and analysis of several months of production.

In the meantime, in light of the higher than expected clean-up flow rates combined with the high forward gas pricing environment for the coming year, management believes that near-term Elgood cash flows are likely to exceed the company's planning base case.

Andrew Hockey, CEO of IOG, commented: "We expected the Elgood well to be technically challenging, being the first development well drilled on the smallest Phase 1 field and the only subsea tie-back in the programme. The mechanical issues experienced have indeed tested my team, but thanks to their hard work, resourcefulness and diligent collaboration with our key contractors, Petrofac, Noble Corporation and Schlumberger, we have now completed it safely and successfully".

Hockey also added: "The Elgood volumetric range will be revised once we fully integrate well and production data. Initial field revenues look likely to be strong given the positive well test rates and the very buoyant gas market, with Winter 2021 prices currently over 90p/therm. We will shortly be spudding the Blythe well, which is expected to take under three months, after which we can provide a more comprehensive view of initial Phase 1 production rates".

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MANAGEMENT AND COMMUNICATION

CHAVAN VIKRAM - B.TECH - IV

Teamwork– communication

The Master should create a working environment on board that emphasises teamwork with his/her deck and engine officers on whom he/she will depend heavily in ensuring safety and security on board the vessel. Key elements of teamwork are good communication and clear allocation of responsibilities. Well informed officers are better motivated and able to carry out their duties effectively. Due to the composition of a crew with different nationalities and religions, the Master should be aware that thoughtfulness is required where crews of different religions and cultures are required to work in a team. When the Master allocates certain responsibilities to an officer, the Master should not only be confident that the officer is able to carry out such tasks, but should also ensure that the officer has clearly understood his/her allocated duties. Teamwork is not to be understood as a simple delegation of tasks and duties to exempt the Master from his/her own responsibilities. Teamwork involves leadership and its effect needs to be explained and relevant training be provided to ensure that every team member understands his/her individual role within the team. To ensure that the team works efficiently the Master must exercise leadership skills and encourage each crew member to take responsibility for their own safety as well as that of their shipmates and the vessel generally. The investigations of accidents have shown that in many cases crew members suspected that something was wrong but did not dare to tell the Master, pilot or duty officer. Comments or questions from crew members should therefore be listened to sympathetically and be taken seriously. Management and communication 2.5 49 The crew is, potentially, an important safety net for the officers if they at any point make the wrong decision or overlook important information. Regular shipboard management meetings will assist the Master in achieving the best use of the entire ship's team. Any remarks, observations and reported non-conformities should be taken seriously and duly recorded in the vessel's documents. Corrective action should be taken immediately to ensure that the validity of the vessel's Safety Management Certificate (SMC) is not jeopardised. Likewise, any remarks, observations, reasoned suspicions and reported non-conformities need to be rectified immediately under the vessel's Ship Security Plan to remain compliant with the requirements of the ISPS Code. People appreciate praise and rewards for good performance. Where possible and appropriate, the Master should praise individual crew members in the presence of other crew members. Such practice will help the Master maintain morale and motivate the crew! For more information about Bridge Resource Management please see section 2.13.4 Navigation in confined waters – Bridge Resource Management. 2.5.2 Routine is dangerous Day to day operations of a vessel are based

Courtesy: www.gard guidance to master

Chevron makes leadership changes in push for lower carbon strategy

NAGESHWARAN - B.TECH - IV

U.S. oil major Chevron Corporation is making leadership changes as the company is progressing its lower carbon strategy amid an ongoing energy transition sweeping across the sector.

Chevron said on ***Thursday*** it had named ***Jeff Gustavson*** president, New Energies, effective 2 August 2021. Gustavson will serve as a corporate officer and report to Chevron Chairman and CEO, ***Michael Wirth***.

Gustavson will lead a new, dedicated organization focused on low carbon business prospects that have the potential to scale. Chevron New Energies' initial focus will include commercialization opportunities in hydrogen, carbon capture, and offsets and support of ongoing growth in biofuels.

The oil major is planning to hold its Energy Transition Spotlight investor presentation on 14 September when more details about these efforts will be released.

"Chevron New Energies reflects our higher returns, lower carbon strategy", said Wirth. "We believe the dedication of resources in a new organization will accelerate growth in multiple business lines that we expect to be part of a lower-carbon energy system".

Gustavson is currently vice president of Chevron North America Exploration & Production Company and oversees its Mid-Continent Business Unit. He previously served as president of Chevron Canada Limited and has held positions in Investor Relations, Corporate Strategic Planning, Finance, Mergers & Acquisitions, and Supply & Trading.

In a separate appointment, ***Ryder Booth*** has been named vice president of Chevron North America Exploration & Production Company, leading the Mid-Continent Business Unit and succeeding Gustavson. Booth, currently vice president, Capital Projects, will be responsible for a large resource base of oil and liquids-rich assets in the mid-continent United States, including the company's Permian assets in Texas and New Mexico. His appointment is effective 2 August 2021.

Back in March 2021, Chevron reaffirmed its lower budget plans, doubled its savings estimate from the takeover of Noble Energy, and set new goals for reducing carbon emissions with expectations to invest about $3 billion in the coming years to further its energy transition efforts.

Courtesy : world maritime news/off-shore energy