



# Greening Energy Supply

Enabling transition for Oil &  
Gas Organizations



“In this new world, the only realistic option for the IOCs [international oil and gas companies] lies in restructuring and realizing many of their current assets to provide cash for their shareholders. Inevitably, this means that they must shrink into the remaining areas of operation, functionally and geographically, where they can earn an acceptable return. This would require a major change in the corporate culture of the IOCs. It remains to be seen whether their senior management could handle such a fundamental shift. If they can, the IOCs will be able to slip into a gentle decline but ultimately survive on a much smaller scale.”

The above quote from Paul Stevens, a distinguished fellow in the Energy, Environment and Resources department at Chatham House, paints the scenario very succinctly. The crisis of climate change has to be addressed, and everyone knows it – including every stakeholder in the oil and gas industry (O&G). Organisations see themselves as part of a greener future, but many are reluctant to take the leap of faith required to make this future a reality due to two significant challenges:



Uncertainty about how to transition from their core expertise and existing enormous capital investments in fossil fuels.



The need to maintain margins, which will in turn create the capital required to invest in more sustainable “New Energy” endeavors.

These challenges are exacerbated by a mix of uncertainties – economic, financial, technical, regulatory, and legislative – as well as substantial organizational and cultural barriers.

Organisations have delayed significant investments and decision making in the hope of the market maturing and just having the freedom to delay decisions. The logic being more towards “the second mouse gets the cheese,” as opposed to “the early bird gets the worm.”

That reality has however changed and there is no more time left to delay decisions for oil and gas companies that want to be successful in transitioning to renewables. This success of their strategies will rest on a few key fulcrums:

### 1. Dynamic portfolio balancing

The trajectory of “Green Energy” is yet to be writ in stone. New business models and innovations are being experimented with on a daily basis. Energy companies (or more generally any organization) keen on being a part of the green energy revolution are dipping their toes in varying initiatives and keeping a close eye on where the market is trending. This necessitates the need to manage their portfolio and revenue streams in a dynamic fashion: pump in capex as and when needed, exit with minimal losses if viability becomes a question.



## 2. Digital native solutions

Most industries go through a cycle of engineering-led solutions, which are then molded into more mainstream digital innovation cycles – a 5-10 year cycle (at the earliest) for the emerging business models Wipro is seeing. The transition to renewables will not be able to create an impact at this rate. Hence, it is imperative to adopt digital native solutions from the outset for accelerating the change and prevent burgeoning costs in later years. Simple steps such as adopting a platform-led approach for balancing the portfolio, utilizing open standards to ensure the widest compatible range possible with future solutions and partner vendors, and data-driven decision making imbedded into processes will ensure new revenue and business models (no matter which one scales up) will be viable early on. Finally, enterprises that adopt digital native solutions will spend minimal time on struggling ventures.

## 3. Hyper-collaboration

With carbon neutral ambitions in mind, it's not about Company A winning against Company B but rather about how every enterprise can hit the targets. Moreover, change needs the appropriate regulatory framework to be successful; otherwise, there's a risk of an uneven playing field that hurts every market participant. Collaboration on two fronts thus becomes key in this new phase:



Sharing data on aspects which don't give anyone competitive advantage (like emissions) will help accelerate the journey for everyone involved. This includes not just the organisations themselves, but regulatory bodies too, who can gain confidence in action on the ground alongside accelerating the regulatory support needed.



Invest into or acquire existing capabilities. Trying to create something from scratch (like a wind farm) without prior experience will only lengthen the break-even point and perhaps even prove to be nonviable initially. Tapping into the existing landscape and consolidating judiciously will be key.



# From Brown to Green – Viably

Global investments in renewable energy totaled \$303.5 bn in 2020 <sup>1</sup> – and, in general, investments in renewables have outpaced investments in fossil fuels every year during the past decade (and, for the sixth straight year, these investments have been higher in developing countries than in developed countries). In 2020, 82% of the total new electricity capacity came from renewables<sup>1</sup>, which are now enough to generate over 27% of the world’s electricity and forecasted to generate 62% by 2050 <sup>2</sup>.

The increasing importance of renewable energy is a testament to its increasing viability, reliability, and demand as well as improving perception. It’s not that renewables will someday make economic sense; they make economic sense today.

Electrification of most upstream operations has a viable net present value (NPV) and can in itself lead to the abatement of CO<sub>2</sub> at an estimated cost of around \$10/tCO<sub>2</sub>e, depending on local electricity costs <sup>3</sup>. Concentrated solar thermal technologies that concentrate energy from the sun for heat generation have been implemented at scale and offer tremendous growth potential by providing direct heat energy without having to electrify the system. Currently, there are two large-scale plants in Oman (producing 1,021 megawatts<sub>th</sub>) and one coming online in California (850 megawatts<sub>th</sub>).

Hydrogen fuel is also an emerging option to watch out for given its ability to cater to large energy loads and high deployment potential. It is expected to become commercially viable by the end of this decade <sup>4</sup>. The chart below paints a clearer picture.

## Proven Renewables for Oil & Gas Operations



### Wind

**Type:** Electricity  
**Cost:** ~3c/kWh; ~8c/kWh with storage  
**Reliability:** Intermediate; High with storage  
 Offshore implementation very viable for offshore rigs  
 Finance, scale and complexity of project puts O&G firms at an advantage

.....  
 DNV GL runs an offshore wind farm, WIN WIN where 6MW of floating turbines power the water injection process for EOR, resulting in a saving of USD 3/bl <sup>5</sup>



### Solar

**Type:** Electricity  
**Cost:** ~3c/kWh; ~8c/kWh with storage  
**Reliability:** Low; High with storage  
 Versatile, quick and easy to implement  
 Fastest Growing tech  
 Low Maintenance

.....  
 Occidental Petroleum leverages 16MW solar power for EOR in the permian basin and has entered into a PPA for another 109MW for its operations. These are expected to eliminate over 160,000 tonnes of CO2 emissions annually <sup>6</sup>.



### Concentrated Solar Thermal

**Type:** Direct Energy  
**Cost:** Commercially Viable  
**Reliability:** Low; High with storage  
 Great potential to meet heating requirements (more than electricity)  
 Large scale onshore implementation without need for electrification

.....  
 1021 MWt project Miraah, Oman to expectedly save upto 80% of the NG used for EOR; a techno-economic analysis in 2017 for the Israan oil field gave an IRR of 27.4% with a payback in 6 years <sup>7</sup>



### Hydrogen Fuel

**Type:** Stored Energy  
**Cost:** Relatively expensive but declining  
**Reliability:** High  
 High energy fuel suitable for more power requirements  
 Great potential for scale and viability

.....  
 Shell, ITM Power and Linde are as of March 2021 commissioning the World's largest, 10 MW green hydrogen electrolyzer for the Rheinland refinery, Germany; and have announced its expansion by 100 MW in 2022 <sup>8</sup>.

Figure 1: Solution overview

Renewables have a major role to play in today's oil and gas companies, if those companies are willing to really understand how renewables can fit into their existing operations and future plans. For example, current power generation in refining units accounts for 13% of its emissions<sup>9</sup>. Wind and solar power are now more commercially viable than fossil fuels in most scenarios. In fact, it does not take many modifications to an existing power-generation infrastructure to use renewable sources. And if renewables are integrated into the mid- and upstream sectors, that 13% will surely increase.

## Fulcrums to Realising Success

With the stage (and the business case) set for ushering in the era of renewables, a structured approach becomes key to realising success. This is where the fulcrums described earlier come into action:

### 1. Dynamic Portfolio Balancing

Cannibalization of existing revenue streams is an event waiting to happen. In spite of the fact that global energy needs are growing, it won't be long until there is an oversupply of energy, and renewable sources such as wind and solar, with their extremely low marginal operating costs, swamp the supply while drastically lowering wholesale prices to \$0 (or even negative). In such cases conventional energy sources entailing fuel costs cannot compete and will have to turn off operations. Britain's electricity has been coal-free for multiple months in 2020 as other forms of energy were able to meet the entire load and coal plants were hence closed.

As energy companies try to chart where the next big revenue streams lie, they need to continuously monitor and update their portfolio and its subsequent growth forecasts to reflect the daily changing reality. Manually tracking this will become unsustainable given the scale and scope of operations.

Dynamic portfolio balancing is all about creating command centers dedicated to analysing these diverse operations and assessing how the portfolio is performing (in turn enabling decisions) will be critical to navigating the oncoming changes. These command centers track investments and performance across the various initiatives in order to assess their relative viabilities. Dynamic portfolio balancing can be done in many ways – from simple to complex, and the right method depends on an organisation's needs.

In the short term these models will need to be nimble for accommodating changing needs and technologies. The ability to quickly pivot from one business model to another of varying technology stacks will prove key to success. Another area of reasonably safe investment in the short term is around batteries and energy storage given their proven need across the renewable energy mix and value chain. The Achilles' heel of renewables was their erratic generation and grid instability. The issue of reliability (critically important to power generation) has resulted in some skepticism about renewable adoption. However, revolutions in energy storage, particularly lithium-ion battery technology, have more than solved these problems on a commercial scale. The cost of storage further dropped by 87% between 2010 to 2019 to \$156/kWh.

Batteries also help in balancing by regulating the frequency and voltage of grids, an erstwhile advantage of thermal plants. They can also be used to provide short-run capacity at times of high demand, and in grid-constraint situations they can help defer upgrades required in transmission and distribution (T&D) capacities. In 2019, the Southern California Edison utility announced that it is replacing its 262 megawatt gas peaker plant with a portfolio of 192 megawatts of lithium-ion battery products <sup>10</sup>.

Investment in battery and storage capacities also enables a degree of grid independence. Organizations are not constrained by the need for generation at the location nor must they pay charges for the grid network. With a robust supply chain network these battery and storage units can be transported over short to long distances for use in various group facilities, commercial viability permitting.

Bloomberg New Energy Finance estimates that the cost of batteries will further fall 50% by 2030, leading to a 122-fold growth in capacity from 9 GWh/17 GWh in 2018 to 1095 GWh/2,850 GWh by 2040, at a total investment of \$662 billion. This will be compounded by technology improvements as well. Wood Mackenzie estimates, more near term, an addition of 12.66 GWh this year, a record-high growth, and a total capacity of 230GWh by 2025.

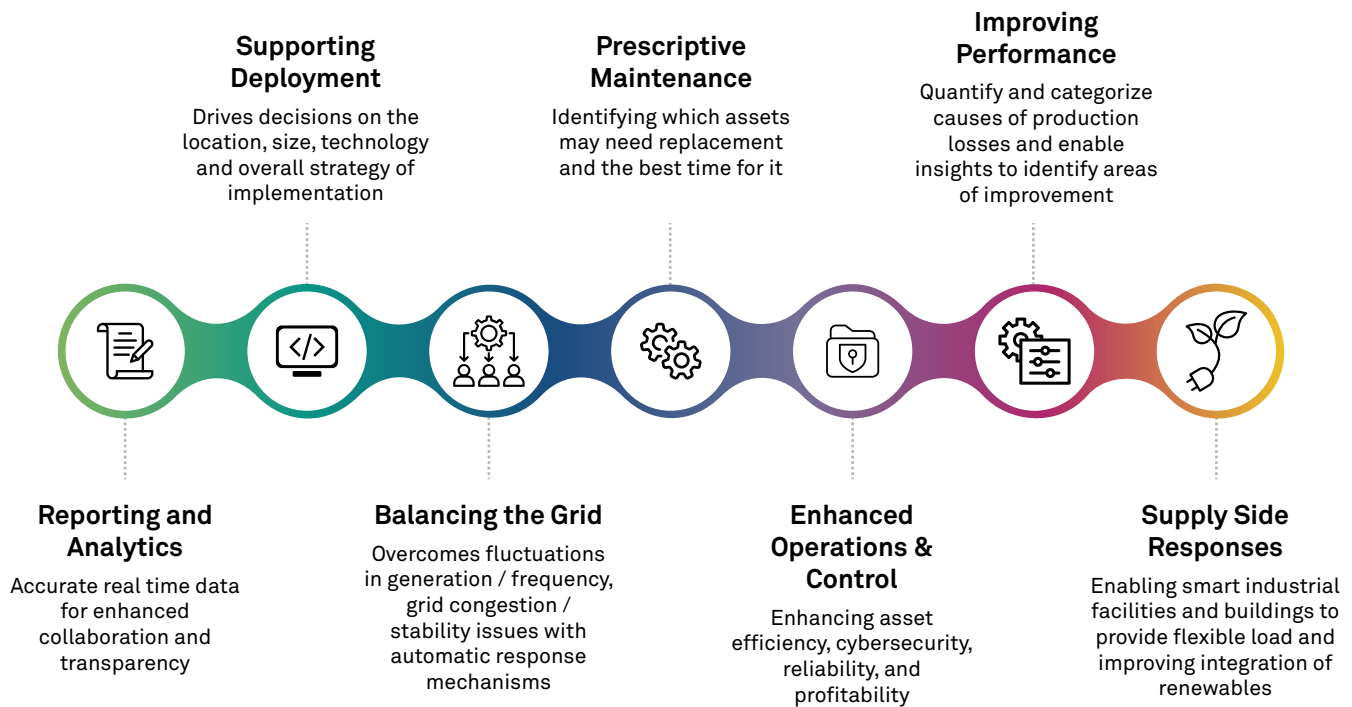
## 2. Digital Native Solutions

Cutting the innovation-to-scale cycle short is critical in the current phase of meeting decarbonisation targets and of protecting balance sheets/revenue streams. A platform-driven approach that uses open standards (as applicable) allows flexibility and ensures what is built today stays relevant for the next couple of decades.

Digital advances are forging the path to efficient transition to renewables by enabling increased productivity, cost advantages, risk reductions, improved reliability, operational efficiency, safety improvement, and resilience. Digitalisation supports asset life cycle management of renewables while also reducing dependencies on separate operation and maintenance (O&M) players.

For example, GE estimates that digitalisation in the current scenario for a 100 megawatt solar project can lead to a 40% reduction in power production losses, 30% increase in staff productivity, and 20% reduction in O&M expenses <sup>11</sup>. The main challenge is to deploy integrated, end-to-end solutions for maximizing benefits and leveraging economies of scale, rather than selective deployment. This will of course draw on each enterprise's strategic outlook.





### 3. Hyper Collaboration

Carbon neutrality is not about a “first past the post” competition, but rather about everyone adopting and adapting to the new reality of working with renewables and ensuring that demands are met adequately and profitably. Regulatory frameworks are necessarily a big part of this equation on two fronts – ensuring that regulations are up to speed for emerging business models and to comply with existing frameworks when stepping into new markets and/or ventures where you have traditionally not played a role

Driven by the Paris Agreement and local considerations, countries have adopted a mix of enablers to promote renewables, including the following:

- Strict regulations with financial incentives, including fines on carbon emissions, carbon taxes, and emissions reduction targets.

- Financial benefits such as subsidies for renewables, tax exemptions, accelerated depreciation options, and access to cheaper financing.
- Promoting renewable industries with low or no-cost electricity.
- Ensuring demand with guaranteed offtake of energy and government-backed power purchase agreements (PPAs).
- Facilitating increased investments by showcasing national targets, plans and commitment to invest in enabling infrastructure.

Several unilateral and multilateral organizations are exerting significant efforts to promote deployment by providing access to finance, expertise, supporting capacity development and funding innovative ideas.

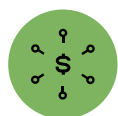
It's obvious that non-financial perspectives – environmental, social, and governance (ESG) perspectives - gained tremendous importance, and energy companies are striving to incorporate these viewpoints into decisions. Additional pressure on energy companies is being provided by investors:



About 2,300 signatories of the Principles for Responsible Investment (PRI), which represents probably half of the professionally managed assets in their global portfolio of over \$80 trillion, pledged to integrate ESG factors into their investment decisions. They believe this will reduce long-term risks and increase returns.



Similarly, the Climate Action 100+, an alliance with assets under management of more \$40 trillion, is asking companies to curb emissions, enhance governance, and improve climate-related disclosures. They are directly engaging with 161 companies to change their behavior.



Firms such as Allianz Global Investors are calling on companies to adopt the framework proposed by the Task Force on Climate-related Financial Disclosures (TCFD). This enables a common playing ground for firms that otherwise report different metrics and helps foster a change in the perspective of investors viewing ESG KPIs not as a metric of how well a firm is performing in this aspect but of how resilient a business is.

## The Impact of the New Energy Transition

The inevitable transition will come with its own set of challenges, enablers, and disruptions. Upfront capital investments in renewable infrastructure might see firms sacrificing investments on fossil businesses, adopting cost-cutting measures, and selling certain assets/businesses. Organisational restructuring across the sector to support transitions and bring about cultural changes is bound to take place. ESG and sustainability disclosures will attract increased attention and have a greater influence on shareholder perception. Adaptive firms with a comprehensive experience of renewables who time their actions right and can anticipate and react well to market transitions will emerge as leaders.





A marvelous example of this approach is Dong Energy's transformation to Ørsted, a transition from black energy to green over a 10-year period starting in 2008 (a time when renewable investments were relatively riskier). Along the way, Dong Energy had its fair share of challenges: the 2012 financial crisis, significant internal pressure to focus on fossil fuels, an S&P downgrade of its debt, whistleblowing about top executives' pay leading to their release, and a drop in coal prices that led to the closure of eight of its businesses. Despite these events, Dong has outperformed all European oil majors since its IPO in 2016. It also reduced CO<sub>2</sub> emissions intensity by 72% in the decade up to 2018 and expects this figure to be 99% by 2025. The company ranks #1 in Corporate Knights' 2020 index of the Global 100 most sustainable corporations.



## From Crisis to Opportunity

Global warming is indeed a crisis, and switching to “New Energy” and renewables, despite the impressive gains in terms of viability, requires taking the leap of faith. It also poses new challenges. But the reality is clear: Renewable energy will be a growing component of the energy landscape in the years and decades ahead – and it can offer major growth and profitability opportunities for oil and gas companies. The keys to success will be timing New Energy investments and adopting the right mix of digital technologies: being strategic about how and when to embrace renewables.

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