

THE ENERGY TRANSITION DILEMMA FOR NATIONAL OIL COMPANIES

What is the role of the NOC in the global energy transition?

The COVID-19 pandemic and the subsequent crisis in the oil and gas (O&G) industry have presented national oil companies (NOCs) and their governments with an apparent dilemma: (1) become early adopters of decarbonization initiatives, or (2) take a slower, “wait and see” approach until outside pressure forces them to commit to a decarbonization path. In fact, the solution can instead be a strategy that embraces sustainability as an element of the NOC’s core business, creating value for stakeholders.

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NOC OPPORTUNITY IN THE ENERGY TRANSITION

Every O&G company must address decarbonization eventually, especially as the *COP26* conference raised critical questions for heavy emitters about what actions would be undertaken globally. The timing, extent, and form of their decarbonization commitments will depend on each NOC's particular conditions and stakeholders. Despite the apparent lack of incentives and difficulty in quantifying financial and societal long-term gains from decarbonization, NOCs could explore several different paths that would eventually become a feasible roadmap for their role in the energy transition.

The process of creating an inventory of emissions, auditing it, and building a prioritized portfolio must occur regardless of decarbonization commitments. Some high-value, low-cost initiatives will become apparent as these portfolios take shape. In addition, as the COVID-19 crisis subsides, a window of opportunity will open for NOCs to begin their transformation. Those with an early start will reap the benefits of cooperation with the global energy ecosystem.

"Energy transition" is a phrase that has spurred much debate among regulators, national and private players, and the public. Recently, and perhaps accelerated by the pandemic, commitments from several nations for net-zero carbon by 2050–2060 have sparked leading energy companies to announce their roadmaps for such ambitions. While the path is clear for many of the leading O&G players due to public and investor sentiment for cleaner and greener fuel sources, NOCs are still grappling with the apparent dilemma whether to become an early adopter or to wait until outside pressure forces the company to commit to decarbonization.

The role of the NOC will have to enter the national agenda discussions to address questions such as:

- What should the NOC's role be in the global energy transition?

- Should NOCs become early adopters or should they wait until the value is more evident?
- Should NOCs be restrained to producing hydrocarbons or become diversified energy holdings?
- As the world shifts to electric mobility, will those energy players that fail to adapt face a declining demand for their production?
- What decarbonization pace is affordable in developing countries? And if there is no such affordable pace, what role should NOCs play?

PRESSURE TO ADDRESS A NEW ENERGY PATH

Developing nations have faced financial pressure since oil prices fell from over US \$100 per barrel in November 2014 to \$27 in February 2016, especially in nations where government budgets are heavily dependent on hydrocarbon-related revenues. As the price started to recover, the COVID-19 crisis brought about a crash in demand volume as well as in prices. Countries subject to OPEC production quotas suffered even deeper cuts in O&G sales. In this scenario, decarbonization initiatives with long-horizon benefits fell off the priority list despite pressure from financial markets, activists, international cooperation organizations, and even governments of developed countries. To meet decarbonization goals, some countries would have to replace cheap coal, fuel oil, and even natural gas at the power-generation level, and that would have an associated cost that most nations are not willing to commit to pay during this time of crisis.

More than two years into the pandemic, most NOCs today are coming out of survival mode, and their main argument against fully embracing the energy transition is cost, or the fact that decarbonization projects are not profitable in the short run. Without immediate pressure from shareholders and/or national policies, NOCs have little incentive to show an accelerated interest in reducing their greenhouse gas (GHG)

emissions (see carbon emissions by selected NOCs, shown in Figure 1). Despite announcements that demonstrate an ambition to change, few leading NOCs have taken bold steps to develop a long-term strategy to decarbonize. In fact, while international oil companies (IOCs) streamline their portfolios to focus on more profitable assets and low-carbon developments, NOCs will most likely increase their portfolios as they incorporate some divested assets into their books. This will put pressure on NOCs to continue to support their national agenda (including security of natural resources and economic growth) while supporting the ever-growing push for net-zero ambitions in their respective countries.

In this Viewpoint, we outline three areas where NOCs can embed a sense of urgency into accelerating the energy transition:

1. Revenue sustainability.
2. Sustainable funding.
3. Domestic priorities over international pressure.

1. Revenue sustainability

Oil demand is expected to peak within the next decade, affecting the monetization of natural resources in the market and the production of high-cost resources. As the market becomes more conscious about sustainability and carbon emissions, Scope 1 to Scope 3 emissions targets have reduced the revenue pool for NOCs, and

demand has diminished among customers seeking sustainability.

While some NOCs still have significant low-cost reserves, most will suffer cost pressures as resources in shallow water and conventional fields continue to deplete. Shifts to higher-cost production in deepwater, shale, and enhanced oil recovery (EOR) will require higher CAPEX and strain the finances of those O&G-producing countries most dependent on hydrocarbon extraction revenues. And as IOCs rebalance their exploration portfolios with carbon-intensity criteria, some carbon-intensive blocks may lose attractiveness and thus some NOC oil resources will be stranded.

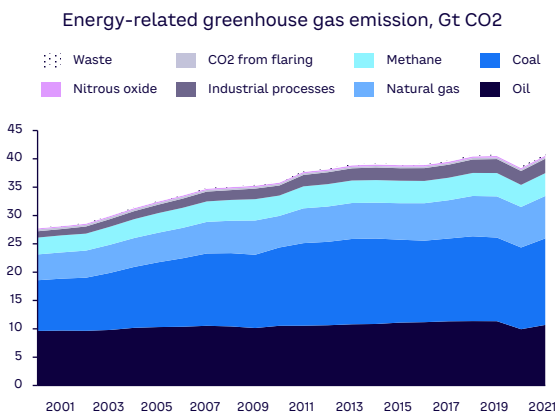
Some NOCs are taking the lead to reduce volatility. An example is Ecopetrol’s acquisition of Isagen, a leading hydropower generation and transmission company. This diversification move will shift the Colombian petroleum company’s revenue to 40% from midstream assets (pipelines) or energy transmission.

2. Sustainable funding

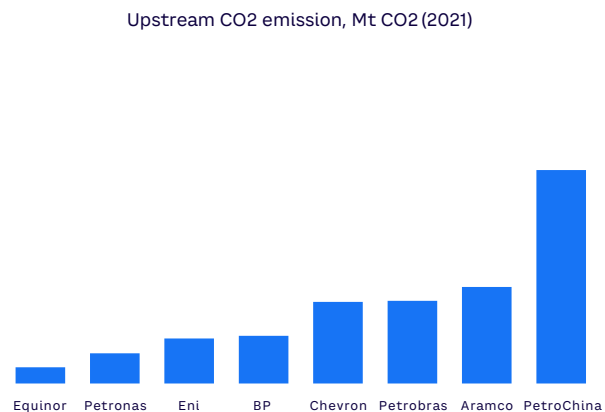
The negative financial effects on NOCs will come not only from revenue but also from paying higher yields on their debt, as capital markets transfer the cost of investor preference and public opinion pressure for cleaner energy. Sustainable, lower-interest bond issuance will not be available for carbon-intense companies without firm commitments to lower GHG emissions.

Figure 1. Energy-related carbon emissions among oil industry players

Energy-related CO2 emissions have reached their peak due to post-COVID economic recovery ...



... while some NOCs are the largest contributors to these CO2 emissions



Source: Arthur D. Little, company websites

Although the financial outlook is grim for NOCs and other O&G players still with carbon-intensive portfolios, there is a glimmer of hope for those that use innovation and technological advancements to yield efficiencies and adopt a circular economy process. For example, while many companies seek to diversify out of their core business of O&G extraction and production, US energy company Oxy remains true to its core business while leveraging carbon capture and storage to enhance its oil production through EOR methods. Oxy currently reports the largest onshore direct carbon capture at its EOR production field, where it will reportedly one day capture 1 million tons per annum of CO₂. With such innovations, sustainable funding may still be possible.

Some NOCs have already invested heavily in building a low-carbon portfolio. This presents a fast-growing and increasingly attractive asset class for potential investors looking to ride on the decarbonization bandwagon. A resurgence of interest in asset platforms and private asset ownership funds in recent years presents an opportunity for NOCs to fund their forays into low-carbon projects with support from institutional investors with green mandates. Further, some NOCs are already looking at fundraising through divestments or spin-offs of their low-carbon portfolios. For example, Italian multinational O&G company Eni recently announced plans to sell a 30% stake via IPO in its retail, renewables, and mobility unit, Plenitude. The sale will allow Eni to raise funds to further develop fully decarbonized energy products and free up cash flows to support its ongoing transformation.

3. Domestic priorities over international pressure

Most NOCs enjoy lower production costs than their private counterparts and could potentially afford to invest in longer-horizon decarbonization projects, yet their governments may not be willing to sacrifice short-term revenues. Clearly, the relative size of the NOC within a nation's economy will impact how much they become involved in

changing the energy landscape. While IOCs may be more flexible in transforming themselves into diversified energy companies, most NOCs still bear the burden of their assigned role as stewards of their countries' oil resources, with little room to broaden their energy output matrix. This may relax in the future, given renewed commitments by governments toward net-zero carbon emissions and the phase down of fossil fuel-based energy sources as part of COP26. In this case, NOCs may find themselves pressured to be key drivers toward meeting domestic carbon emissions reduction KPIs in support of national agendas.

While this dilemma around priorities has hindered many NOCs from joining their peers in an aggressive divestment of certain core businesses and pursuing renewable energy pathways, some leading NOCs have made a conscious decision to create new business opportunity options, where a small proportion of funds will go into developing renewable energy and related technologies. This strategy could enable NOCs to play in both conventional and renewable energy sources and to attract green funding to support their growth and diversification to greener and cleaner energy. Moreover, many NOCs are exploring (and some have already established) corporate venture capital, which is one way for NOCs to retain a minor role in the adjacent and transformative businesses while still maintaining a steadfast core business enabled by innovation and technology. NOCs that have developed internationalization strategies will also need to adopt sustainable strategies to ensure their international portfolio remains competitive, much like IOCs.

POTENTIAL TRANSFORMATIONAL TOOLS

Although there may be several ideas and tools to support companies in managing the dilemma NOCs face, we offer two areas of focus: (1) carbon-reducing incentives and planning and (2) eco-social transformation.

1. Carbon-reducing incentives & planning

Most NOCs still lack specific long- and medium-term carbon targets, as well as a portfolio of projects to curtail their GHG emissions. Not only have GHG taxes failed thus far to have reached populations in many developing nations, carbon-intensive energy is still subsidized in many countries and their NOCs still play a role in its distribution. The belief that petroleum products will necessarily lead to lower income for the NOC is still embedded in the minds of many decision makers.

Some NOCs, such as Pemex, are upgrading their refineries in an effort to reduce their imports of refined products, thereby decreasing crude exports. These investments, however, will increase emissions and could instead be channeled to cleaner and more profitable projects if there was a holistic, company-wide commitment to decarbonization. A similar situation can be seen in the power sector, where developing nations still prefer the cheaper power from coal, while renewable power is seen to be reserved for “richer nations.”

There must be a balance between subsidies (so that electrification is possible for all citizens) and the grand scheme of net-zero carbon (which will burden governments with significant tax implications). The potential exists that nations that have committed to net-zero targets will impose carbon tariffs on those that have not. Implementation of an international carbon market in accordance with Article 6 of the Paris Agreement may further burden developing nations in the absence of comprehensive international support to help those countries finance low-carbon energy projects and adopt related technologies.

In terms of organizational planning, digital transformation will be an essential element of carbon reduction. As data-driven decision making takes over traditional managerial tasks, NOCs will be better able to identify and exploit efficiency opportunities. For example, according to Capgemini Research Institute research, artificial

intelligence (AI) and machine learning (ML) are expected to improve power efficiency by 15% in the next three to five years and will reduce waste in all forms. Similarly, predictive maintenance can prolong the useful life of assets by preventing sudden breakdowns including those that might cause emission leakage, and smart building technologies can be adopted to reduce energy consumption as well.

2. Eco-social transformation

The ecosystem plays an important role in the energy sector when it comes to the energy transition. Governments are looking at driving economic recovery, especially in the wake of the COVID-19 pandemic. Studies have shown that energy transition, decarbonization, and net-zero initiatives have paved the way to significant job creation and upskilling of the workforce, including around digitalization. From simple yet high-impact methane emissions reduction projects to carbon sequestration and hydrogen production, state-owned enterprises will need investment, technology-transfer alliances, and capital from various players in the ecosystem, including those that traditionally have been associated with the energy sector as well as those that are now converging into the sector. These may include additive manufacturing, AI/ML, and advanced materials, among others.

A ROADMAP FOR NOC DECARBONIZATION

Despite the difficulty in quantifying the gains (especially in financial terms) from emission-reducing actions, NOCs could explore several options that would eventually become a feasible roadmap toward their role in the energy transition. The speed of change will depend on size, influence on budget, and national agenda. NOCs that have renewable energy as part of their portfolio will require additional planning to ensure they have sufficient cashflow for their core businesses. In all cases, NOCs can reduce their risk by partnering with experienced

industry players and technology providers, a path that should produce better returns and have a shorter time horizon than investing in R&D on their own. In addition, the coming revolution of electric mobility will change the energy matrix significantly, and those NOCs that start early on the conversion to public electric charging will have an advantage vis-à-vis utilities.

Initiatives for NOCs to consider can be divided into the following four lines of action (see Figure 2):

1. National agenda setting

- Influence national market regulation to give the NOC a dominant role in the definition of the speed and level of change/acceleration.
- Propose a national energy transition plan that fits with a sustainable NOC and include monetization of resources, even if those resources are not all used domestically.
- Consider the socio-economic benefits in job creation and upskilling the workforce and developing an innovation hub.

2. Efficiency & competitiveness of existing assets

- Add renewable generation assets to accelerate their path toward zero carbon, even if the output is limited to its own consumption.

- Ensure operational best practices and adopt stricter environmental standards (e.g., to minimize venting/flaring, fugitive emissions).
- Monitor and prevent unwanted leakage from assets.
- Reconfigure petrochemical processes for most hydrocarbons toward lower carbon emissions.
- Process renewables in traditional refineries through a hydrogen strategy.

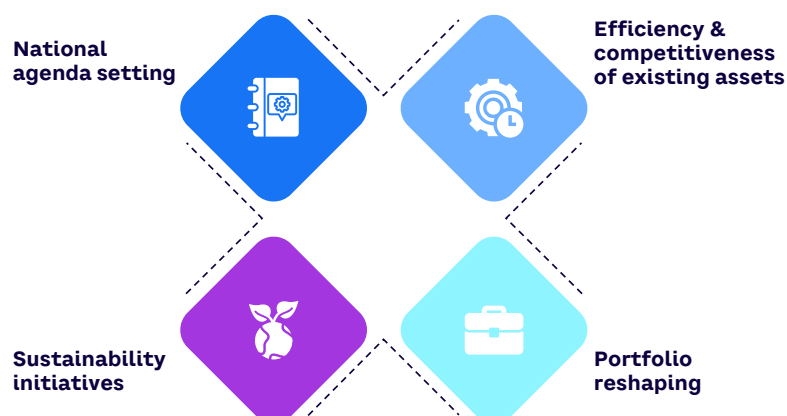
3. Portfolio reshaping

- Reevaluate natural gas portfolios as a intermediate step for energy transition.
- Diversify into the electricity value chain, either in logistics, generation, or storage of low-carbon fuels.
- Take a position in the electric mobility value chain, including batteries, charging at fuel stations, or car financing.

4. Sustainability initiatives

- Set fair and effective carbon-reduction targets, clear action plans, transparent organizational accountability (i.e., who is “at the helm”), and performance management measures.
- Invest in technology transfers from partners to address challenges such as methane-reduction projects.
- Participate in carbon-offset initiatives, such as reforestation or carbon capture and sequestration.
- Drive sustainability and community initiatives, such as water and waste management.
- Adopt sustainable construction approach for projects (through design simplification, material usage reduction, etc.) and smart building technologies.
- Make a bet for new future energy sources: hydrogen, geothermal, and third-generation biofuels.

Figure 2. Four paths to action for NOC energy transition



Source: Arthur D. Little

CONCLUSION

WHAT THE FUTURE HOLDS

THOSE WITH AN EARLY START WILL REAP THE BENEFITS OF COOPERATION WITH THE GLOBAL ENERGY ECOSYSTEM

However, while the path is clear for many leading O&G players due to public and investor sentiment for cleaner, greener fuel sources, many NOCs are still considering whether to build their portfolios and develop a roadmap for an energy transition or to wait until outside pressure forces them to commit to decarbonization. Some key topics they face in the decision include:

- 1** Most NOCs face current budget headwinds and pressure to maximize production and maintain energy transition efforts at their lowest priorities.
- 2** IOCs' commitments to net-zero carbon show that there is a feasible and financially sound long-term path toward drastically reducing GHG emissions.
- 3** NOCs need the right set of technologies, analyses, tools, and incentives to acknowledge the benefits of the transition and chart a roadmap toward a cleaner future.
- 4** As energy security is disrupted from COVID-19 and geopolitical crises, a window of opportunity will open for NOCs to pursue their energy transformation. Those with an early start will reap the benefits of cooperation with the global energy ecosystem.



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