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GULF COUNTRIES AND THE CHALLENGE OF THE ENERGY TRANSITION

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GULF COUNTRIES AND THE CHALLENGE OF THE ENERGY TRANSITION

The Gulf countries – Saudi Arabia, Bahrain, United Arab Emirates, Kuwait, Oman and Qatar – are experiencing an economic boom. The discipline of the cartel of oil-producing countries and international geopolitical tensions are keeping oil and gas prices high and feed into the fiscal and external accounts of countries still highly dependent on oil revenues. Contrary to previous periods of economic upturn, it seems that most governments are maintaining a degree of fiscal discipline, which, over the medium term, should reduce vulnerability to variations in oil revenues. In the longer term, climate change and the associated energy transition pose an existential challenge for these hydrocarbon-based economies. While production conditions are initially conducive to maintaining oil revenues, the prospects outlined by alternatives to hydrocarbons remain very uncertain for the time being.

For around a decade, Gulf countries (GCC) have faced two major issues: firstly, upheavals in the oil market from 2014, with painful macroeconomic consequences; and secondly, increased awareness of the consequences of climate change. The latter tends to accelerate the energy transition, a source of major upheaval for these structurally hydrocarbon-dependent economies. These two constraints have prompted governments to take action in two areas: accelerating economic reforms in order to reduce dependence on oil; and preparing for the post-oil scenario through efforts to transform economies.

ECONOMIC UPTURN

Since 2021, the upturn in oil prices has been a supporting factor for business and has significantly improved macroeconomic indicators in the Gulf. Nonetheless, this improvement follows five difficult years during which imbalances have intensified and growth has remained below other emerging countries.

Lower growth than other emerging economies until 2020

Gulf economies experienced a significant slowdown between 2016 and 2020 due to the consequences of lower oil prices and the Covid-19 pandemic. On the oil market, the development of shale oil has enabled the United States to regain a major place in the global oil market (becoming the world's leading producer from 2017). This has led Gulf producers to strengthen the influence of the OPEC cartel by extending it to other producing countries (mainly Russia) and to reduce their production of oil in order to support prices. In addition, the 2020 global economic recession significantly reduced energy demand and forced producers to curtail production. Therefore, in the Gulf, crude oil production reduced by 10% between 2016 and 2020. Over this period, oil GDP (on average around 37% of total GDP during this period, including some refined products derived from oil) fell by 1.1%, while it had increased by 4.3% over the previous five years. At the same time, the fall in prices led to a 45% decline in cumulative oil export revenues between the periods 2011-15 and 2016-20.

Against this unfavourable backdrop, the Gulf economies recorded lower growth than all of the emerging and developing countries (EDCs). According to the IMF, EDCs grew by an average of 4.4% between 2016 and 2019, compared with 1.3% for the Gulf countries, and 1.6% if only non-oil GDP is taken into account. Not surprisingly, this underperformance underlines the continued link between oil revenues and economic activity in the Gulf. In 2020, despite the relatively limited role of services in GDP creation, the recession was more pronounced in the Gulf than for all emerging countries (-4.6%, including -4.3% for non-oil GDP, compared to -1.9% for GDP in the EDCs). The reduction in the number of expatriate workers in the context of the pandemic may have been a factor in speeding up the recession.

Moderate economic recovery

With the global economic recovery starting in 2021, the oil market has become much more favourable to producing countries. Against this backdrop, oil production from the enlarged OPEC+ cartel started to rise again from mid-2021, mainly in Saudi Arabia and the United Arab Emirates (UAE), which have the main unused production capacities that can be mobilised in the short term. Nonetheless, the Gulf economies are still far removed from the economic recovery seen in the rest of the world. While recovery was 6.8% on average for EDCs, it was only 2% on average in the Gulf (4% for non-oil sectors). It was only in 2022 that growth exceeded that of other emerging countries (6% in the Gulf compared to 3.8% for EDCs), mainly as a result of the increase in oil production.

Over the past decade, despite significant investment in infrastructure (in particular linked to 'Vision 2030' programmes) and some progress in economic diversification, there has been little change in the dependence on oil, which constitutes a barrier to growth. The relatively moderate non-hydrocarbon GDP growth can be explained to some extent by the continuing difficulties in the property sector (which, having been an economic driver in the Gulf in the decade 2000-10, has suffered from excess supply for many years[1]), and a less pro-cyclical fiscal policy for a number of years.

REAL GDP GROWTH, GCC AVERAGE

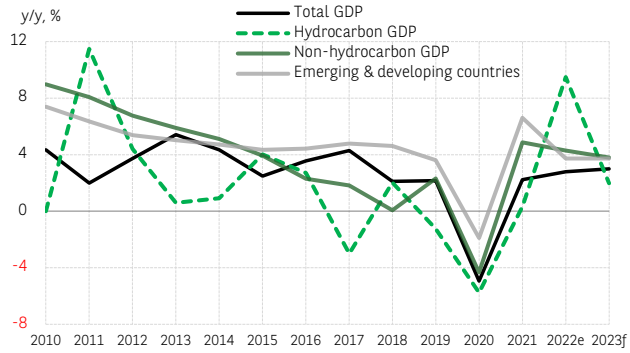

CHART 1

SOURCE: NATIONAL, IMF, BNP PARIBAS

1 Growth in the construction sector averaged 10% in the period 2000-10 and 3.3% in the next decade.

REAL GDP GROWTH

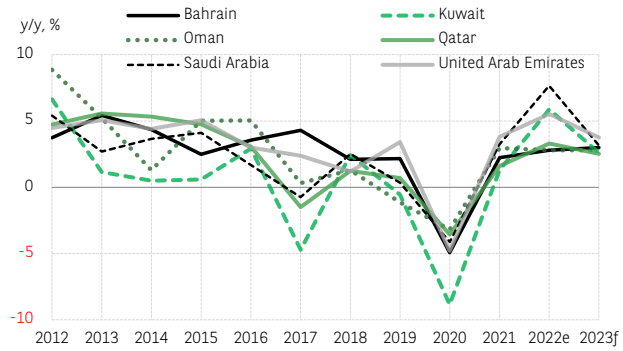

CHART 2 SOURCE: NATIONAL, IMF, BNP PARIBAS

CONSUMER PRICE INDEX AND PROPERTY PRICES

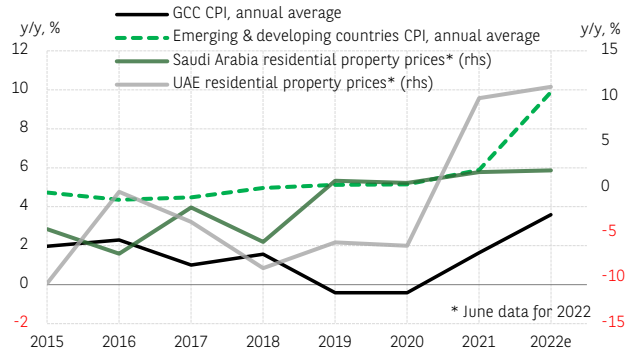

CHART 3 SOURCE: NATIONAL, IMF, BIS, BNP PARIBAS

In addition to these structural factors, there is currently an increase in headline interest rates throughout the region, with the pegging of currencies to the US dollar forcing national monetary authorities to follow US monetary policy, even if inflationary pressures there are lower. The impact of this monetary tightening on activity should be limited, as suggested by an analysis by the International Institute of Finance[2] on the link between the rise in American rates and the growth in non-hydrocarbon GDP. Indeed, this relationship is all the weaker when oil prices are high, which is currently the case.

Inflation remains under control

In an international environment characterised by high inflationary pressures, these remained moderate in 2022, at around 3.5% on average across the region (compared to an estimated 9.9% for EDCs, according to the IMF). Food prices and, to a lesser extent, housing costs are the main drivers of the increase in prices. The rate of increase in housing costs varies by country, but there is a general upward trend following many years of falling or stagnating prices. The relative moderation of inflationary pressures can be explained by three main factors: the maintenance of subsidies or price caps on certain types of goods (for example, essential goods or fuels); the absence of upward pressure on rents within an environment where, there is still an excess of supply; and the appreciation of the US dollar, with the resulting moderation of imported inflation. The drop in global agricultural commodity prices during the second half of 2022 and the unfavourable outlook for global growth in 2023 should contribute to the reduction in inflationary pressures in 2023 (expected annual rate of 2.6% on average, compared to 8.1% for EDCs).

Restoration of public accounts

From 2021 onwards, the rise in oil prices has enabled public finances to emerge from seven years of continuous deterioration. Since 2015, fiscal deficits have been recurrent and quite high (5.1% on average between 2015 and 2021). Most countries got through this period at the cost of an increase in their net debt, but without jeopardising their solvency. This was made possible by high public assets, moderate levels of public debt and favourable financing conditions in international capital markets.

However, the deterioration in the financial situation of Bahrain and Oman, the result of five successive years of high fiscal deficits, has raised questions about their solvency and their ability to repay their debt in foreign currencies. Between 2015 and 2020, the average fiscal deficit was 15% of GDP in Bahrain and 13% of GDP in Oman. Conversely, Qatar and the UAE limited their fiscal deficits during this period thanks to relatively more diversified revenues and contained expenditure. Deficits were significant in Saudi Arabia, but solvency indicators remained comfortable. In Kuwait, a political deadlock caused temporary pressures on the government's liquidity, but without challenging the state's solvency given the very high level of sovereign assets.

From 2015, governments made asset sales in order to finance fiscal deficits. But most were covered by debt issues in local and international markets. Risk premiums remained moderate, reflecting sustained demand from international investors for sovereign debt that was well rated and better remunerated than government bonds from the advanced economies during this period. Expressed as a percentage of GDP, government debt tripled between 2015 and 2020 to an average of 41% of GDP. It doubled in Bahrain to 130% of GDP and multiplied by 4.4 in Oman to 70% of GDP. The interest paid on government debt expressed as a percentage of total revenue was 10% in 2021 in Oman (compared with 0.4% in 2015) and 27% in Bahrain (14% in 2015).

In 2022 and 2023, the region is expected to post an average fiscal surplus of 5.5% and 3.7% of GDP respectively. These surpluses will feed into government asset stocks and will allow a moderate decline in government debt effective from 2021. Indeed, the priority of governments is not to reduce debt, but rather to improve its profile by continuing to issue on longer maturities if market conditions are favourable. Despite the expected fiscal surpluses, governments continue to issue debt in order to develop the local debt market by increasing its liquidity and diversifying maturities. In Saudi Arabia, for example, government issues of sukuk have risen sharply in recent years. Over the first ten months of 2022, these issues were around USD 20 billion (2.1% of GDP).

2 Iradian G, Chen S, 'Limited US monetary policy spillovers to GCC', IIF, June 2022.

FAVOURABLE REFORMS OVER THE MEDIUM TERM

Leaving the economic ups and downs aside, most governments have implemented reforms aimed at reducing their dependence on oil. As a result, economic diversification is improving. This progress is slow in sector-based terms and remains limited in terms of external accounts. Above all, it is significant in terms of public finances.

Economic diversification remains insufficient and uneven

Diversification of the Gulf economies outside the hydrocarbon sector has been a recurring issue for several decades. The combination of volatile oil revenues, which is a factor of fragility for public finances, and an economic system favouring public employment of nationals (in a context of relatively strong demographic pressure in certain countries, particularly Saudi Arabia, Bahrain and Oman) has made it necessary to implement policies for economic diversification, particularly in order to create jobs in the private sector.

According to the economic diversification index[3] developed by the World Government Summit[4] (WGS), the Gulf economies have been among the fastest progressing in the world since 2000, although they remain in the quartile of the world's least diversified economies. Saudi Arabia and Oman experienced the most significant improvement. By contrast, Bahrain has not changed much due to a historically more diversified economy as the country does not have abundant hydrocarbon resources. According to this study, this development is explained mainly by components linked to the diversification of production and, to a lesser extent, external trade. Diversification of government revenues is changing very slowly.

In 2020, non-hydrocarbon GDP accounted for around 65% of the region's total GDP, compared with 60% in 2010. Oman and Qatar have recorded the most significant progress (from 53% to 71% and from 44% to 61% respectively), while the structure of GDP in Bahrain and the UAE has hardly changed, given an already high level of diversification before 2010 (from 79% to 81% and from 69% to 71% respectively). In Saudi Arabia, where this issue of diversification is the most acute, the share of non-hydrocarbon GDP has only increased slightly over the past decade (from 55% to 56%).

From a sector perspective, the increase in non-hydrocarbon GDP has generally benefited the services sector, mainly trade, financial services and real-estate services.

The share of the manufacturing sector (including downstream oil) is relatively stable. In Oman, the growth in services is significant (from 38% to 47% of GDP over the decade) and, in addition to financial and real-estate services, relates mainly to the public sector as a whole. The change in GDP in Qatar is more unusual since, together with the significant drop in the share of oil-related GDP, the construction sector grew the most over the period (from 5% to 12%), linked to the accelerated development of infrastructure over the past decade.

However, the results of the WGS study on GDP diversification should be put into perspective. For the time being, the services and construction sectors remain closely linked to the oil economy. The sharp slowdown in growth in the service sector from 2015 onwards is therefore concomitant with the drop in oil income. In the manufacturing sector, one-third to half of activity is in the petrochemicals and oil refining sectors. These are closely related to the hydrocarbon sector.

FISCAL AND CURRENT-ACCOUNT BALANCES, GCC AVERAGE

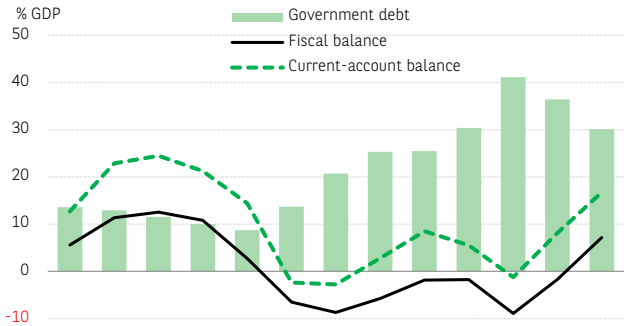

CHART 4 SOURCE: NATIONAL, IMF, BNP PARIBAS

EUROBOND ISSUANCES, TOTAL GCC

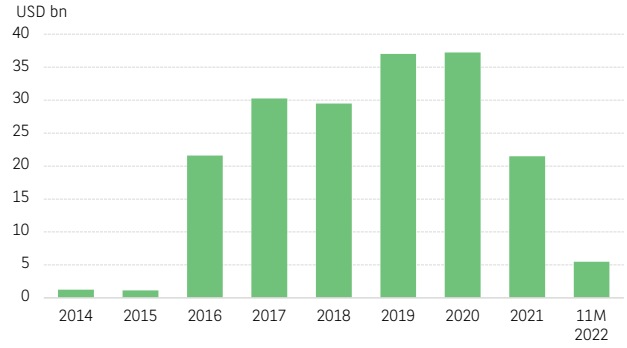

CHART 5 SOURCE: BLOOMBERG, BNP PARIBAS

GOVERNMENT DEBT AND DEBT SERVICE

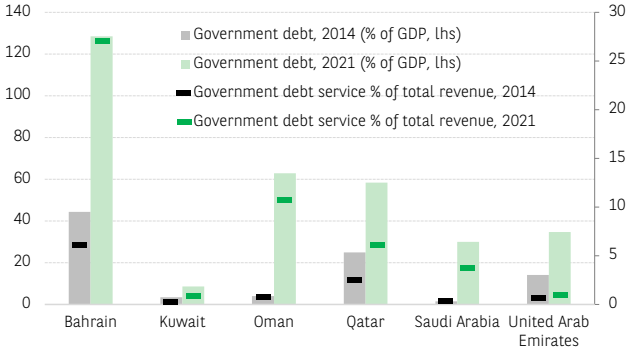

CHART 6 SOURCE: NATIONAL, IMF, BNP PARIBAS

3 This index is comprised of three sub-components assessing the degree of diversification in production, foreign trade and government revenues.
4 Prasad A., Refass S., Saidi N., Salem F., Shepherd B., 'Global Economic Diversification index 2022', Dubai: Mohammed bin Rashid School of Government. www.EconomicDiversification.com

Reforms should make public finances less vulnerable to the oil economy

The changes in the management of public finances over the past decade are notable, even though they differ between countries and dependence on hydrocarbon revenues remains significant.

There has been an increase in revenues from taxation, a reduction in dependence on oil price variation and an effort to rationalise the public sector through a dual approach of consolidation and privatisation. The rapid deterioration in public finances from 2015 onwards in all of the Gulf countries acted as a wake-up call for governments and brought about a process of fiscal reforms. Unlike earlier periods of oil price changes during which fiscal consolidation efforts were interrupted by the recovery of the oil market, the reforms that have been in place for around five years appear to be long term. They should help reduce the volatility of fiscal performance.

Introduction of non-oil taxation

Since 2019, progress has been made in diversification on the revenue side. On average, hydrocarbon revenues accounted for around 71% of total fiscal revenues during the period 2015-21, which was around 11pps lower than in the period 2008-2014. The most significant progress was made by Saudi Arabia (-27pps) and the UAE (-22pps), while diversification was more or less stagnant in Oman and Qatar.

The introduction of value added tax (VAT) is currently the main diversification measure in relation to fiscal revenues. The UAE, Oman and Bahrain apply a rate of 5%, while Saudi Arabia increased this rate to 15% in 2020. For the first group of countries, VAT income is not very high (around 1-2% of GDP), so the structure of fiscal revenues has not fundamentally changed. In contrast, in Saudi Arabia, the share of tax on goods and services (of which VAT is the main component) increased to 29% of total fiscal revenues in 2021 compared to 4.8% in 2016. The UAE, which has the lowest dependence on hydrocarbon revenues (around 50% according to IMF estimates), is considering other taxation measures such as the introduction of a federal corporate income tax. Elsewhere in the Gulf, the revenue structure has not changed significantly for the time being and continues to depend directly on hydrocarbons (around 75%).

Relative moderation in fiscal expenditure

Along with revenue diversification, moderation in expenditure is helping to reduce the fiscal vulnerability of these countries to oil prices. Indeed, after the increase in spending from 2011 onwards (in particular to cope with an increase in political pressures in the region), expenditure has fallen since 2015 and the drop in oil prices. Primary expenditure (i.e. excluding interest on debt) as a percentage of non-oil GDP fell to 49% in 2021 compared to 67% in 2011. Nevertheless, significant differences remain, with this figure standing at 27% and 39% in Bahrain and the UAE respectively in 2021 due to their relatively diversified economies, while the ratio was 94% in Kuwait.

Lower fiscal vulnerability

The major consequence of these fiscal measures is a reduction in the vulnerability of public finances to oil prices, commonly measured by calculating the breakeven price per barrel of oil. Thus, for all countries, this price fell between 2015 and 2021. In the case of Saudi Arabia, the break-even price fell from USD 119 per barrel (USD/bbl) in 2014 to around USD 70/bbl in 2021, and this decline is expected to continue to

ECONOMIC DIVERSIFICATION INDICATORS, GCC AVERAGE

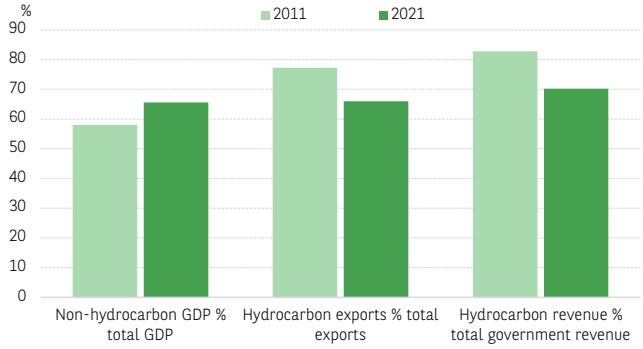

CHART 7 SOURCE: NATIONAL, IMF, BNP PARIBAS

FISCAL VULNERABILITY, GCC AVERAGE

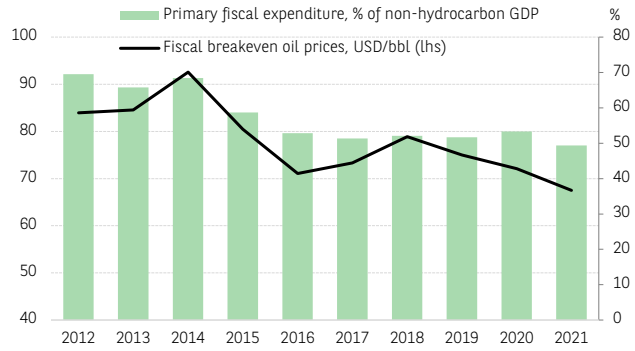

CHART 8 SOURCE: NATIONAL, IMF, BNP PARIBAS

around USD 65/bbl by 2023. In the UAE, the breakeven price has also decreased from USD 85/bbl to USD 63/bbl and is expected to remain within the USD 60-65/bbl range in the short term.In Kuwait, it has remained at a moderate level over the past decade (around USD 64/bbl in 2021, according to the budgetary definition adopted by the IMF). In Bahrain, despite a recent fall, the breakeven price remains at a very high level (USD 113/bbl in 2021) due to the downward rigidity in public spending. Vulnerability is falling in Oman, but remains at around USD 85/bbl in the short term. The budgetary balance remains fragile. In Qatar, the break-even price is the lowest in the region (less than USD 50/bbl), although this indicator is relatively less relevant for this country given the importance of gas revenues in fiscal revenues.

Positive measures to rationalise the public sector

A reorganisation of the public sector and the entry of the private sector into the capital or management of public entities has been under way for around five years. For the time being, the public sector continues to dominate the economy. Private sector participation in capital and/or public asset management is mainly limited to utility infrastructures (water, power generation) and non-core assets of national oil company (oil pipelines, fuel retail network).

The IPO of part of Aramco's capital is an exception and is part of the more general policy of the Saudi sovereign fund (Public Investment Fund) to mobilise resources in the context of the Vision 2030 programme. These movements only marginally strengthen the role of the private sector, and above all allow commercial public-sector companies to refocus on the core of their business, including by expanding internationally.

LONG-TERM OUTLOOK AND ENERGY TRANSITION

As major producers and significant consumers of hydrocarbons, the Gulf states are particularly exposed to the consequences of the energy transition. On the one hand, they are very significant greenhouse gas (GHG) emitters, and on the other hand, they remain economically very dependent on hydrocarbons despite the recent progress in diversification. Gulf countries contribute around 2.8% of global GHG emissions, while their total population accounts for 0.8% of the world's population. On average, CO2 emissions per capita are four to eight times higher in the Gulf than in the rest of the world. This is due in particular to the importance of energy-intensive industries, the specific climatic and geographical conditions (significant requirements for air conditioning and water desalination equipment) and an energy mix dominated almost exclusively by hydrocarbons. According to the World Bank, electricity generation generates 75% of GHG emissions in the Gulf[5] . All countries in this region have ambitious plans to decarbonise their electricity production (for example, in Saudi Arabia, to generate 50% of the electricity supply from renewable energies by 2030), but some also plan to increase natural gas production to meet the rise in domestic energy consumption.

Demand for hydrocarbons will decrease over the long term; only the pace at which this will happen is uncertain

Referring to the energy transition scenarios drawn up by the International Energy Agency (IEA)[6] , 2050 is a reference year. It shows the changes to be made to limit warming to 1.5°C within a reasonable time.

In the scenario where total carbon neutrality is achieved by 2050[7], the reasoning works backwards, describing the necessary changes in the global energy mix and consumption to achieve carbon neutrality by 2050. The other two scenarios are, on the one hand, the continuity of current policies[8] , which considers what governments are actually doing in order to achieve their GHG reduction targets; and on the other hand, the scenario assuming that governments will put in place all necessary measures to achieve the stated targets [9].

Whatever the scenario, reducing the share of carbon-based energy in the global energy mix is an irreversible process, but one which could be significantly delayed if adequate policies are not in place. Demand for hydrocarbons is expected to decline by 2050. In particular, a plateau of demand for oil should be reached in 2024 according to the APS scenario, but only in 2035 in STEPS. However, the possibility of a pullback in the peak of hydrocarbon demand over time seems less and less likely, and the main uncertainty is more to do with the pace of implementation of renewable energies. Indeed, the current upheavals in the European gas market and, more generally, the sharp

5 World Bank, 2022, 'Gulf Economic Update. Green growth opportunities in the GCC'
6 International Energy Agency, 2022, World Energy Outlook.
7 Net Zero Emissions (NZE)
8 Stated Policies Scenario (STEPS)
9 Announced Pledges Scenario (APS)

GREENHOUSE GAS EMISSION (GHG)

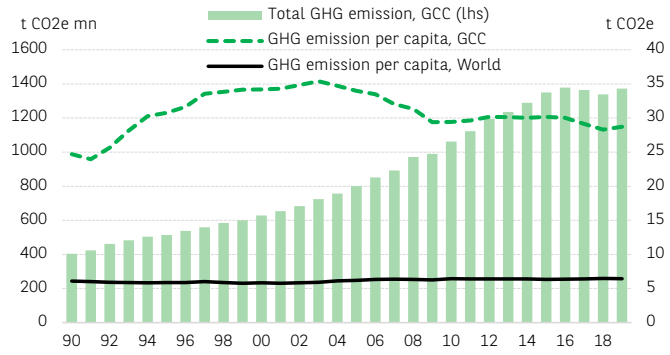

CHART 9 SOURCE: OUR WORLD IN DATA, BNP PARIBAS

PRIMARY ENERGY MIX, GCC

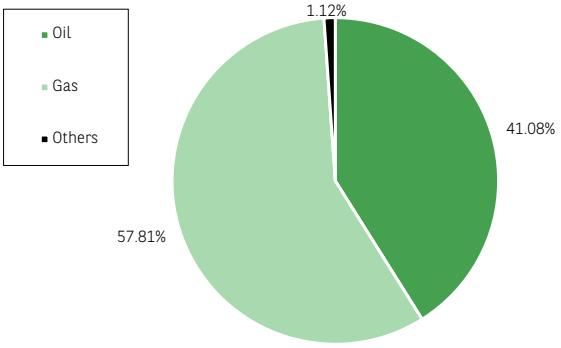

CHART 10 SOURCE: OUR WORLD IN DATA, BNP PARIBAS

CRUDE OIL PRODUCTION (SCENARIO IEA WEO 2022)

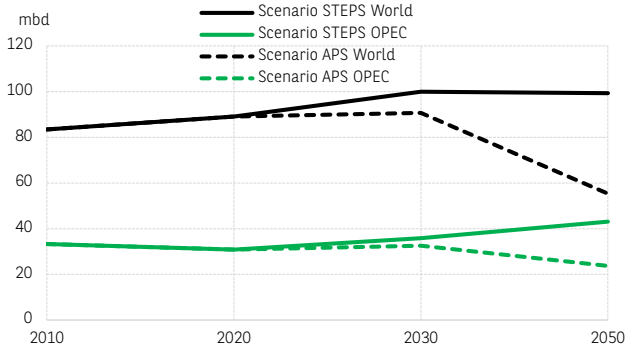

CHART 11 SOURCE: IEA, BNP PARIBAS

drop in the cost of producing electricity from renewable sources[10] have accelerated the deployment of renewable energies in certain regions. Currently, the central assumption is that these renewables will not only meet the rise in global energy demand, but will also begin to replace carbon-intensive energy sources in the energy mix.

Against this backdrop, Gulf countries are exposed in the longer term to the consequences of a sharp fall in the value of their main productive asset due to the decline in global demand for oil. The consequences will be all the more pronounced as they will directly affect not only (public) oil companies, but also the public finances and external accounts.

Faced with this challenge of the decarbonisation of economies, Gulf countries have a dual strategy: over the medium term, to maximise their oil and gas production in order to benefit from favourable production and market conditions; and in the longer term, to be involved in the development of low-carbon energy sources.

A favourable situation on the hydrocarbons market, at least in the medium term

In all scenarios, the demand for oil is likely to continue to increase in the short term. From the perspective of the Gulf countries, this justifies investment in new production capacities. Beyond this, and in the context of a gradual decline in global demand and an increase in the cost of carbon emissions, Gulf producers have certain advantages, which should allow them to maintain a certain level of hydrocarbon production for longer than most other producer countries. The two main advantages are one of the lowest extraction costs in the world and oil production, which emits lower greenhouse gases than other producers. According to the IEA, the carbon intensity of oil production will be an increasingly important factor in setting the price of a barrel of oil in the medium to long term. This gives the Gulf producers an advantage in terms of market share, but does not guarantee a level of production. In fact, according to the various scenarios, the market share of OPEC members (Gulf member countries are responsible for around 58% of the cartel's production) will continue to increase until 2050 (from 35% in 2021 to 43-52% in 2050 depending on the scenario), but in relation to a total oil supply that varies significantly depending on the scenario. It increases by 10% in the STEPS scenario, but shrinks by almost half in the APS scenario. In this rather uncertain context, some countries are aiming to increase their production capacity in the medium term in order to meet demand, using oil with low extraction costs and lower carbon emissions than international standards. The UAE plans to increase its production capacity by 19% by 2025-30 and Saudi Arabia by 8%.

With regard to changes in oil prices, the various IEA scenarios are unsurprisingly not favourable for producing countries. Only the STEPS scenario predicts that prices will reach USD 95/b in real terms (2021 price) by 2050. This would allow all Gulf countries to keep government finance ratios at an acceptable level, assuming a stable break-even price per barrel. On the other hand, the price projections under the APS scenario would put most countries in fiscal difficulty (assuming a small increase in fiscal revenue diversification), since the expected prices are significantly below current break-even prices.

The status of gas as a transitional energy under scrutiny

Considering gas producers and exporters, mainly Qatar (the world's second-largest exporter of Liquefied Natural Gas in 2021), the outlook is likely to be less uncertain than for oil, but can change quite quickly.

GAS PRODUCTION (SCENARIO IEA WEO 2022)

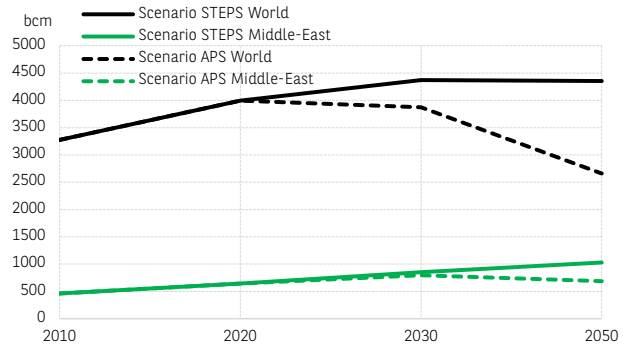

CHART 12 SOURCE: IEA, BNP PARIBAS

RENEWABLE ENERGY PRODUCTION (SCENARIO IEA WEO 2022)

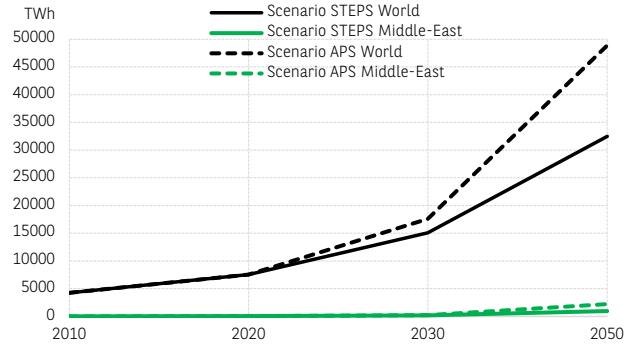

CHART 13 SOURCE: IEA, BNP PARIBAS

Until recently, natural gas has been considered an energy of transition, particularly for emerging countries, i.e. it can provide the transition between the current energy mix, dominated by hydrocarbons (oil and coal), and that envisaged by the transition scenarios, dominated by renewable energy sources. This is a support element for the demand for natural gas, particularly in Asia, which according to the APS scenario, will become the leading consumer region by 2030. However, the sharp fall in the cost of renewable energies and the disruption in the gas market caused by the war in Ukraine could reduce the attractiveness of gas over the long term. In its latest report, the IEA has significantly revised downwards its gas demand projections, and stresses that the 'golden age' for gas in the 2010s is now a thing of the past. According to the scenario where current policies are continued (STEPS), the average annual growth in demand is expected to be 0.4% between 2021 and 2030, compared with 2.2% in the previous decade. In the median scenario (APS), demand in 2030 is projected to be 10% lower than in 2021. Nonetheless, even though the medium and long-term prospects are less favourable, those for Gulf producers continue to be relatively favourable. Like oil, the price competitiveness of Qatari gas should allow the emirate to maintain a significant market share over the long term.

10 The cost of photovoltaic projects fell by 85% between 2010 and 2020.

WORLD HYDROGEN DEMAND (SCENARIO IEA WEO 2022)

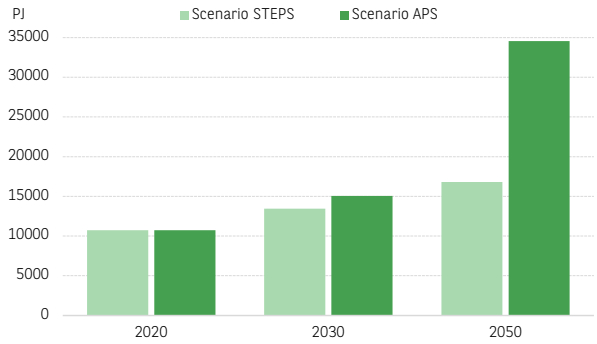

CHART 14 SOURCE: IEA, BNP PARIBAS

Energy transition and prospects for the hydrogen market

Given the gradual reduction in the share of hydrocarbons in the global energy mix, Gulf countries are seeking to develop the production of alternative energy sources. In this context, the development of the decarbonised hydrogen market is being put forward as an important opportunity.

The development of green hydrogen promoted by the energy transition

Currently, the use of hydrogen on a large scale relates mainly to the industrial sector (steel, petrochemicals and fertilisers) in Europe and the United States. According to the IEA[11], only 0.7% (2021) of total hydrogen production is low emission. In the NZE 2050 scenario, the production of decarbonised hydrogen globally will increase from 0.3 million tonnes (mt) currently to 90 mt in 2030, then 450 mt in 2050. Apart from its traditional industrial use, development prospects are centred mainly on the energy generation and heavy transport sectors (land and sea freight). The development potential of hydrogen production was confirmed in 2021 with a sharp increase in the number of green hydrogen production projects. According to the IEA, the installed capacity for production by electrolysis is expected to be 1.4 GW by the end of 2022, i.e. three times the installed capacity in 2021. In the medium and long term it is expected to account for approximately three-quarters of the production capacity of decarbonised hydrogen.

The post-oil scenario remains uncertain in the Gulf

On the basis of significant gas resources and low production costs, and given the development potential of renewable energies (solar and wind) for producing hydrogen at low cost, the production of decarbonised hydrogen has been identified by Gulf countries as an important area for development. The UAE was the first to export decarbonised hydrogen to the German chemical industry. Projects are under way[12] in Oman, Qatar, the UAE and Saudi Arabia, where the green hydrogen component of the NEOM programme will have a capacity of 4 GW and is expected to be completed in 2026.

However, for the time being, it is hard to see the decarbonised hydrogen industry as providing an alternative to the revenues generated by oil and gas exports. Indeed, according to IEA projections, by 2050 the hydrogen market will account for only a small proportion of the current oil and gas market. Furthermore, the production of decarbonised hydrogen is potentially much more widely distributed globally than that of oil and gas, preventing the creation of rents. Under the STEPS scenario with a time horizon of 2050, hydrogen will only generate 1% of combined oil and gas revenues for the entire region, with the latter remaining at a high level, compatible with the operation of the rentier system.

In the APS scenario, total hydrogen and hydrocarbon revenues account for approximately 90% of 2021 oil and gas revenues. Hydrogen revenues are higher than those of oil and gas under the Net Zero Emissions (NZE) scenario, but at a much lower level than current hydrocarbon revenues. In the latter scenario, combined oil, gas and hydrogen export revenues are more than four times lower (in constant terms) than 2021 revenues.

Apart from a hydrogen market less favourable to the Gulf states than oil, water resources could be a limiting factor for its large-scale development. The Gulf states are among the most exposed to rising temperatures and declining water resources. Whatever the mode of production, decarbonised hydrogen requires a significant amount of water, which will require additional capacities for the desalination of sea water, and these are very energy intensive.

GREY, BLUE OR GREEN HYDROGEN

There are three main categories of hydrogen (H_2) depending on how they are produced and their level of GHG emissions.

Grey hydrogen is produced using fossil fuels (mainly natural gas) and emits around 10-12 kg of CO_2 per kg of H_2 produced.

Like the grey version, **blue hydrogen** is produced with fossil fuels, but the use of carbon capture and storage technologies limits CO_2 emissions to 3-5 kg per kg of H_2 produced.

Green hydrogen is produced by electrolysis of water using renewable electricity and production emits around 1 kg of CO_2 per kg of H_2.

Conclusion

Oil and gas revenues continue to be structurally important for the Gulf economies, as evidenced by the current rebound driven by the rise in hydrocarbon prices. Nonetheless, governments have started to take measures to reduce their dependence on the oil market. The oil counter-shock in the period 2015-20 was a wake-up call, which forced governments to bring order to public finances and so reduce their vulnerability in the medium term. The upheavals implied by the ongoing energy transition are of a different magnitude. They call into question the long-term sustainability of Gulf economies. These economies have a number of advantages to help them deal with this challenge, including lower extraction costs, significant financial resources, and governments and public companies that are heavily involved in reform and investment programmes. Nonetheless, the planned ending of the dominant position of fossil fuels in the global energy mix is a very significant source of uncertainty for these countries, and at present, the proposed alternatives are a long way from answering all of the questions about the long-term economic prospects.

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