Empresa de Pesquisa Energética

SPECIAL REPORT

Oil Price Forecasts 2021-2030

FEBRUARY 2021

MINISTÉRIO DE MINAS E ENERGIA

PÁTRIA AMADA BRASIL GOVERNO FEDERAL

Empresa de Pesquisa Energética

Empresa de Pesquisa Energética (EPE), or Energy Research Office, is a government-owned entity, attached to the Brazilian Ministry of Mines and Energy. The purpose of EPE is to provide energy information, studies and research that support the planning of the national energy sector.

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Acknowledgements

This report was prepared in the Oil, Gas and Biofuels Studies Division of the Energy Research Office (EPE), under the Direction of Heloisa Borges Bastos Esteves.

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This report was based on, among others, analyses performed for a techinical note (*Projeção de Preços Internacionais de Petróleo e Derivados: 2020 - 2030*), published in Portuguese at the end of 2020.

Document Identification and Reviews

Oil Price Forecasts 2021-2030

Review:

r0 - February, 10th 2021 – Publication on the EPE website

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Summary

Oil Price Forecasts

Brazil's Energy Research Office (Empresa de Pesquisa Energética - EPE) prepared this Special Report in order to assist the Government with its long-term energy analyses. The note contains price forecasts for oil and its products in the long term, in addition to a brief discussion of the main assumptions involved.

1. International oil and oil products price forecasts

At the end of 2019, the conditions of world oil supply and demand indicated the continuity of the dynamics of the oil sector until then in effect. This can be exemplified by the relative stability of the price of Brent oil in the second half of 2019, registering the lowest volatility in the last five years (EPE, 2020a). However, the beginning of 2020 was marked by relevant geopolitical events (in particular, the intensification of tensions between the United States and Iran), as well as impacts arising from the actions to prevent the Covid-19 pandemic.

Measures of isolation and social distance, aimed at reducing the circulation of people, have been widely adopted in much of the world as a prevention of the pandemic. Although they vary in spectrum, such actions have impacted mobility, with consequences on consumption, services and industrial activity, reducing the level of global economic activity. Thus, reflexes of the pandemic caused impacts on the global demand for fuels, especially aviation kerosene (Jet-fuel), gasoline and diesel. Preliminary estimates from the International Energy Agency (IEA) indicate a significant reduction of 8.1 million b/d in global oil demand in 2020 (IEA, 2020a).

At the same time that demand has been severely affected, the oil industry has seen changes in the dynamics of world supply. The agreement to limit production between member countries of the Organization of Petroleum Exporting Countries (OPEC) and other major producers, in particular Russia, was not renewed in early March 2020. In April, Saudi Arabia announced the increase of its production to more than 12 million b/d, shifting to a high-volume strategy, in detriment of a collusive strategy followed since 2016. Thus, the world oil industry faced two concurrent shocks, one of demand and the other of supply, intensifying oil price fluctuations[1] (EIA, 2020).

In April, Opec+ (a group formed by members of Opec, Russia and other producing countries) agreed to reduce its oil supply by 9.7 million b/d (as of May). At the same time, additional production cuts were observed in other countries, mainly the USA and Canada (IEA, 2020a). In this context, Brent oil price levels recovered (daily prices above US$ 40/b since June), but still below the value verified at the beginning of 2020 (US$ 67/b) (EIA, 2020). However, this price level has proved to be sufficient for companies that opted for the strategy of paralyzing their production between April and May, to consider a resumption (EPE, 2020).

[1] Brent's spot price dropped from $ 67/b in early January to US$ 19/b in late March (EIA, 2020).

1.1. Brent oil price forecast

The context of the international oil market, described above, was the basis for the oil price forecasts prepared by EPE. A key premise is the resumption of global oil demand in the short term, mainly due to the gradual recovery of global economic activity[2].

On the supply side, OPEC+ will likely try to be more active in regulating the international crude oil market, in particular, with the longer-term maintenance of established production cuts. In addition, it is considered that involuntary production cuts, caused by logistical, market and/or inventory restrictions (as in the USA and Canada), should be partially maintained in the very short term. For the short/medium term, the gradual recovery of global demand for oil, driven in particular by Asian countries, should promote an increase in prices for this *commodity*.

In the EPE reference scenario, demand recovers, but slowly, reaching pre-crisis levels only in the second half of 2021. Restrictions on social mobility and quarantines may continue to occur over the next few months. However, we do not expect that such limitations reach the same levels as in April 2020, when more than 3 billion people were affected by some measure of restricted mobility or social isolation. Therefore, global mobility will continue to recover, especially from the northern hemisphere's summer.

The scenario also contemplates the action of OPEC+[3] in the sense of continuing to regulate the world supply, preventing new excess supply from occurring. As demand increases, OPEC+ will increase its production. The US$ 50/b price level should allow some fields to resume production. However, this price level does not encourage new investments in non-OPEC countries. We predict that lack of investment will drive the decline of fields to exceed the production of new wells, reducing US production. OPEC+ can take advantage of this supply decline to increase production. In this scenario, inventories do not reach the maximum limit of their capacity, but they remain high throughout 2021. Thus, oil prices should increase gradually and continuously in the upcoming couple of years. Spot Brent prices should average US$ 49/b is in 2021.

In the medium/long term, OPEC idle capacity is expected to decline. US unconventional production should also decline over this decade. This assumption comes from the reduction in investments in the upstream sector, which occurred in 2020 (Figure 1), which would accelerate the decline in world production in mature fields and the postponement of the entry of new projects.

[2] Aligned with International Monetary Fund estimates (IMF, 2020), EPE projections indicate a 3.0% retraction of the world Gross Domestic Product (GDP) in 2020, with a gradual recovery starting in 2021.

[3] Group formed by the OPEC alliance with other major oil producers, such as Russia.

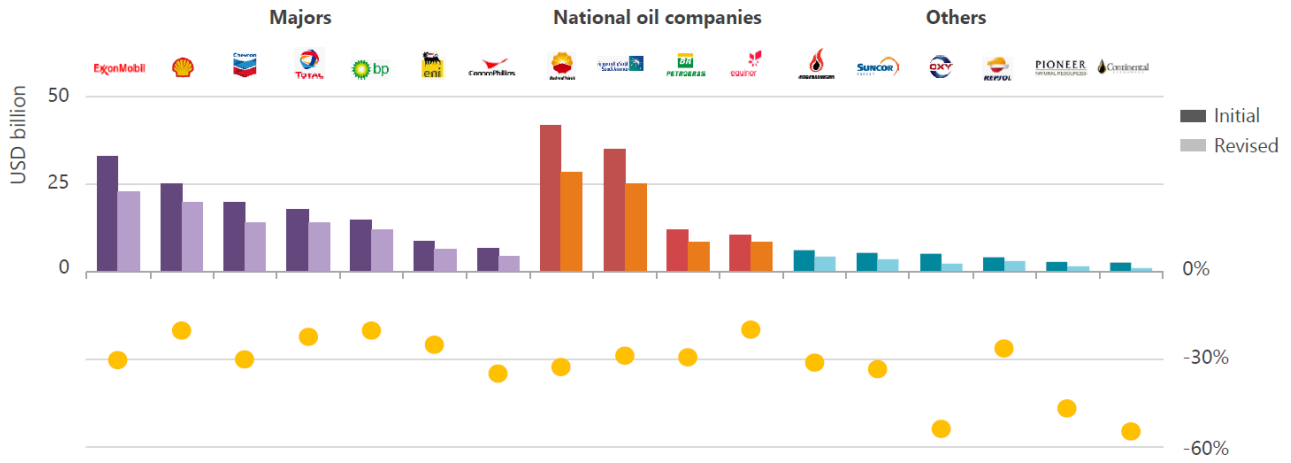

Figure 1 - Change in announced oil and gas company speding for 2020 versus initial guidance for the year
Source: IEA (2020b)

Insufficient investment may accelerate the decline in world oil production. If current investment levels in 2020 are confirmed, world production in 2025 is expected to be 2 million b/d lower than pre-pandemic estimates (IEA, 2020b). Eventually, if the investment level of 2020 extends until 2025, world oil production should be almost 9 million b/d lower in 2025 compared to previous estimates (Figure 2).

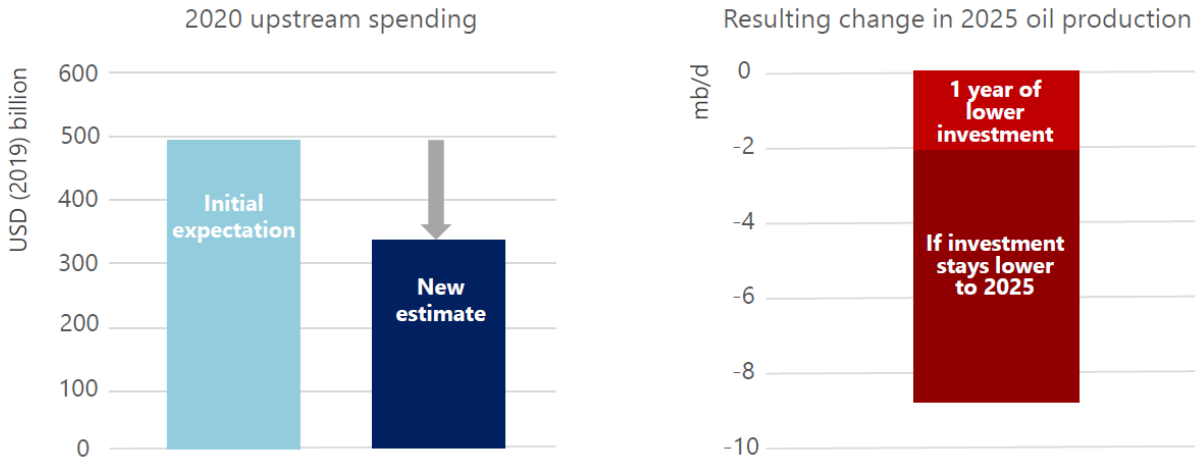

Figure 2 - Effect of lower investment on 2025 oil balances
Source: IEA (2020b)

In a scenario of growth in world demand for oil, there will be a need for significant investments in exploratory frontiers, implying higher price levels to make production profitable in these areas[4], as shown in Figure 3. Furthermore, it is plausible that the drop in investments, previously alluded to, could be partially mitigated by cost reductions and improvements in E&P techniques[5], in addition to the increase in sweet-spotting[6].

[4] The median of breakeven values of the main offshore projects in the world and unconventional onshore projects in the USA are around US$ 60/b, with some projects reaching up to US$ 100/b (HESS, 2019). The need to expand the exploratory frontier to higher-cost regions will drive oil prices to higher levels.

[5] The reduction in the activity of the oil industry, due to the fall in prices, usually leads to an oversupply in the availability of oil equipment and services, which causes a renegotiation of E&P contracts, with a consequent decrease in costs for oil companies.

[6] In a context of low capital availability, oil companies' strategies are directed towards more competitive ventures (the so-called sweet-spotting) at the expense of less profitable projects.

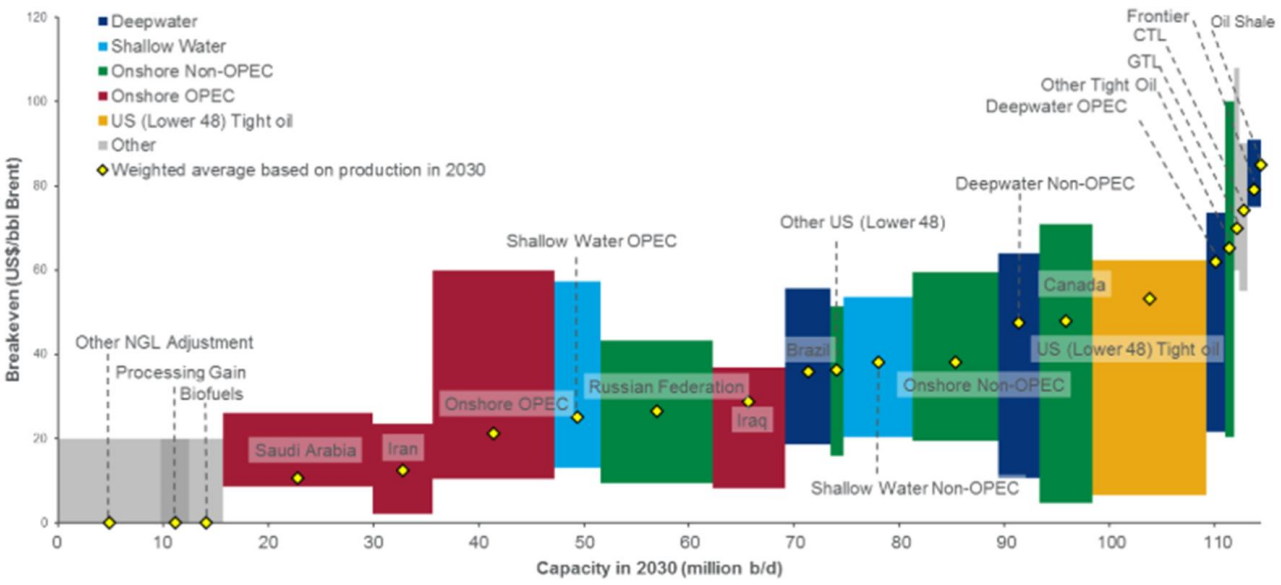

Figure 3 - Global oil production capacity in 2030 by breakeven and by country or producer group
Source: WOOD MACKENZIE (2019)

One should note that the 2014-2016 oil price bottom have impelled economic groups to act close to their operating costs. Profitability started rising again with prices in 2019, but margins are still slim, especially due to the pandemic. Although resilient in the short run, this strategy is not sustainable indefinitely. In addition, a context of low oil prices leads to a reduction in the budget and a deterioration in the macroeconomic conditions of oil-producing countries. This could become the catalyst for social tensions and political instabilities, instigating popular demonstrations and revolutions. For these reasons, there is interest from producer countries and oil companies in maintaining higher levels of oil prices.

A fundamental premise basing future oil prices is that alternative technologies and fuels will be widely disseminated as they become economically competitive (in the face of the resumption of oil prices), supported by stimuli from countries to address long-term climate change issues. However, according to IEA (2020b), even if governments direct efforts towards renewable energies, it will be necessary to increase investments in the oil and natural gas industry to avoid an imbalance of supply that results in a more significant increase of prices[7].

In the context of the evolution of demand for fossil fuels, the way of life of modern economies was built throughout the 20th century, supported, largely, by the energy provided by oil. The Covid-19 pandemic had a significant impact on people's mobility and industrial activity, accelerating some behavioral changes, such as teleworking. Another consequence was the reduction of emissions of atmospheric pollutants (anthropogenic sources), promoting improvements in air quality (EARTH, 2020).

[7] According to RYSTAD ENERGY (2019), the electrification of the economy will occur at an accelerated rate, especially with regard to the light vehicle, which may lead to a peak in oil demand before 2030. Even in this context, the institution estimates the need for investments in excess of US$ 200 billion per year in new oil and natural gas projects, mainly in the offshore environment. Investment in new offshore frontiers will increase the breakeven from US$ 40/b (average of currently sanctioned projects) to US$ 60/b by 2023.

There is a possibility that the decarbonization dynamics of economies will increase the pressure on governments[8]. Subsidies, incentives and investment programs aimed at increasing the electrification of the vehicle fleet have been implemented by several countries, such as China and European countries. However, despite the incentives and minimum requirements for public fleets, freight transportation presents itself as the most difficult to decarbonize[9], as well as the consolidation of electric buses for public transport (ITDP, 2020).

Commitments to carbon neutrality and a significant reduction in oil price outlooks were made mostly by European majors, a directive aligned with the intentions of the population and governments to reduce greenhouse gas emissions. This may be one of the factors for portfolios more concentrated in natural gas and for the greater commitment to investments in renewable energy[10].

Some oil companies have reported reductions in their long-term expectations for oil and natural gas prices[11.] Their outlooks were revisited due to the implementation of public policies in Europe, and due to the scenario of strong price fluctuations in the 1st half of 2020, with a significant decrease compared to the beginning of the year. In a context of low prices, there is a possibility of a renewed growth in demand for oil and natural gas[12].

As explained above, EPE reference scenario considers a persistent rise in demand for the next three decades, despite growing rates of decline throughout the 2040s. We expect that alternative technologies will become competitive, especially in individual transport and electricity generation, increasingly shifting the demand for oil. Long-term supply will continue to require advances in E&P activities, especially in exploratory frontier areas, which will increasingly burden this production. Areas with higher production costs, such as tar sands and ultra-deep waters, are expected to become essential to supply world demand in the long-term, especially given the expected decline in unconventional production in the USA. In this context, EPE projects a price evolution between US$ 80/b and US$ 90/b between the second half of the 2020s and the end of the 2040s.

Table 1 shows EPE's reference scenario for spot price of Brent oil. We consider, however, that international oil prices may follow alternative paths, with higher or reduced levels.

[8] In this regard, the European Commission announced a new growth strategy based on sustainable development, called European Green Deal, in which it undertakes to zero net emissions of greenhouse gases in the region by 2050 (EC, 2019; EC, 2020). In particular, Germany announced its national hydrogen strategy, in which it intends to decarbonize load transport and heavy industry, in addition to electrification in light vehicles (BMWE, 2020).

[9] The preference for the use of trucks powered by natural gas tends to spread in countries with abundant and cheap supply of this energy source. However, the possibility of a more vigorous growth of the economy may imply greater demand for diesel by 2050.

[10] Major investments in renewable energy can reach US$ 18 billion by 2025. Of this amount, US$ 10 billion will be invested by Equinor, of which US$ 6.5 billion will be allocated to offshore wind farm projects over the next three years (RYSTAD ENERGY, 2020b). The primary objective of these Equinor ventures is to supply energy to oil platforms (EQUINOR, 2020)

[11] Petrobras reduced its long-term price for Brent from US$ 65/b to US$ 50/b; BP from US$ 70/b to US$ 55/b; and Shell to US$ 60/b (PETROBRAS, 2020; BP, 2020; MEES, 2020; SHELL, 2020).

[12] Throughout the modern history of the oil industry, longer periods of low prices have always been followed by an increase in the elasticity of oil demand in relation to GDP. Despite the growing global awareness of environmental issues, relatively low oil prices between 2014 and 2017 contributed to the expansion of the fleet of SUVs (EIA, 2018). The low prices and popularization of these vehicles helped to reverse the downward trend in oil demand that had been occurring in Europe since 2006 (BP, 2020).

Table 1 – Reference Scenario of Brent oil spot price

Price (US$dec2019/b)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Brent *spot*	49	55	61	66	72	76	80	81	82	83

Source: EPE.

Permanently lower prices may occur in a context of slower recovery in global demand for the commodity, especially if economic incentives for renewable energies and alternative technologies are adopted. In this case, despite the tightening of energy and environmental policies, because of the global response to the threats of climate change, global oil demand is expected to increase slightly in the short and medium terms, which will tend to raise prices. Prices will still remain at the lower levels of historical averages. In the long-term, the gain in competitiveness and the scale of new technologies, together with greater attention to energy efficiency, will be able to reverse the growth trend of global oil demand, again reducing its prices.

In turn, permanently higher prices may occur in a context of a more accelerated recovery in world economic activity and, consequently, in global oil demand. In the medium term, the current reduction in upstream investments, caused by the low prices observed over the past few months, may affect the rates of decline in mature fields and the development of new projects, reducing the future supply of oil. In addition, the depletion of OPEC's idle capacity and the return of inventories to average levels may raise its prices even further. A context of low mobilization around effective climate policies, and low competitiveness in relation to the costs of expanding the use of renewable energies and alternative technologies, will lead to the growing world demand for oil. On the other hand, high prices for this commodity should lead to greater investments in renewable energy and alternative technologies, influencing the demand for fossil fuels and their prices in the long-term.

EPE's forecasts for the downward and upward scenarios of Brent oil spot prices are shown in Figure 4. For comparative purposes, IEA’s long-term forecasts are included, in addition to the price estimates of selected companies.

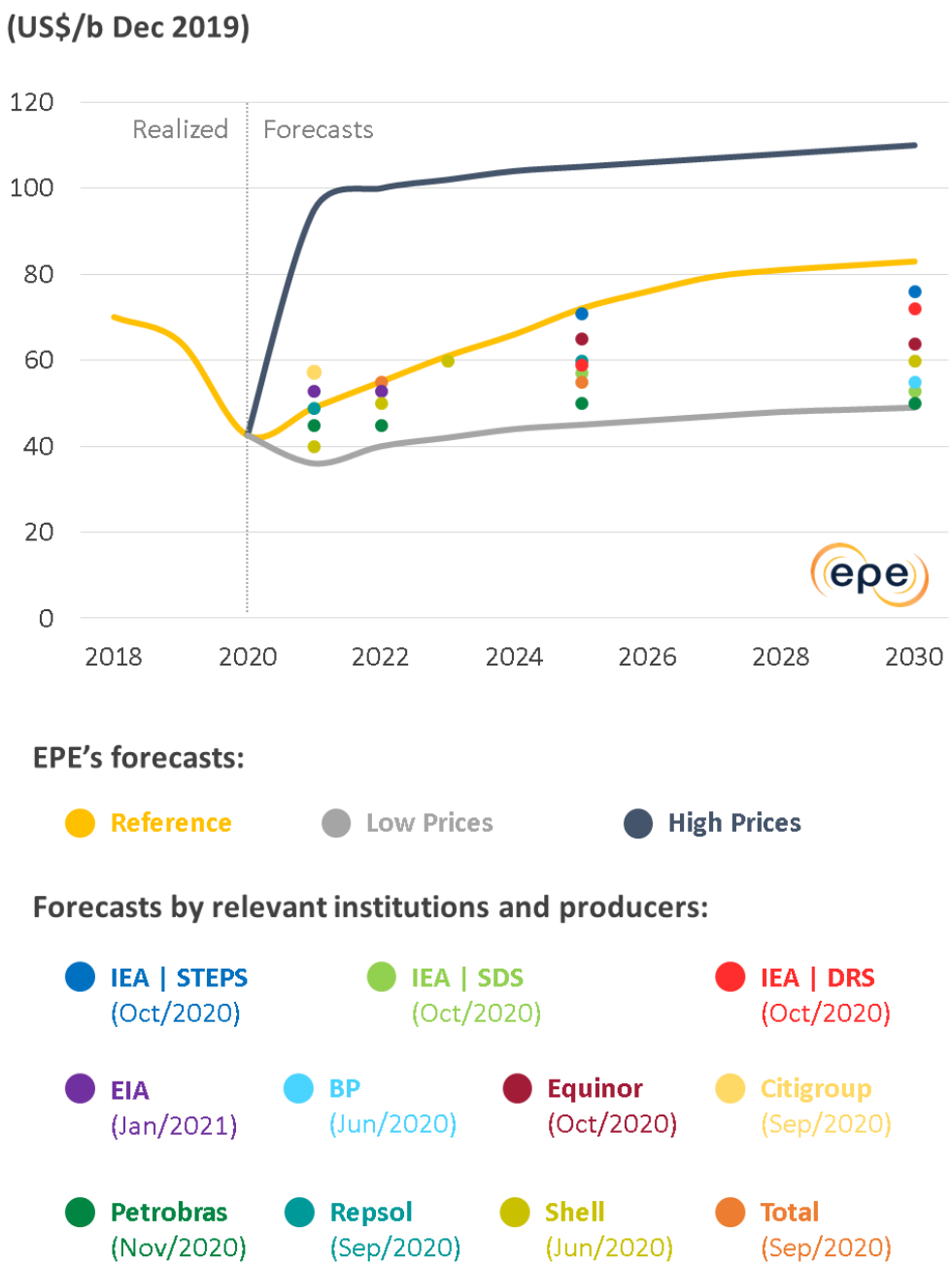

Figure 4 - Brent oil spot price forecasts

Note: IEA STEPS (Stated Policies Scenario) considers the public energy policies adopted and announced; IEA SDS (Sustainable Development Scenario) considers the adoption of public policies required for the increase in global temperature to remain below 1.8 °C.

Source: EPE; PETROBRAS (2020); BP (2020); SHELL (2020); IEA (2020e); EIA, (2021); ENI (2020); FITCH, (2020); CITI, (2020); EQUINOR (2020).

There is an alignment between the orders of magnitude of projections made by the selected agencies in the short/medium term. Both oil companies (Eni, Equinor, Woodside Petroleum and Shell), as well as government agencies (EIA), consultants and companies active in the financial market (Citi, Fitch Ratings, BBVA) converged their Brent oil projections in the short/medium term with those calculated in EPE's reference scenario. However, in the long term, EPE scenarios become more heterogeneous when compared to other institutions (such as those presented by Petrobras, BP and Shell). Equinor's scenario is in line with EPE's reference scenario: the Brent oil prices used in this company's forecasts were US$ 31/b in 2020; US$ 77/b in 2025 and US$ 80/b in 2030 (EQUINOR, 2020).

Government agencies and research institutions, when developing their scenarios, can adopt medium and long-term conceptions different from those adopted by oil companies. Furthermore, because some forecasts occurred at different times in the year 2020 (between April and July), their perceptions of the future market may have been influenced by the information available so far, which would partly justify differences and revisions in their numbers[13].

The forecasts presented in Figure 4 illustrate oil price scenarios by different companies, with their own purposes, social reasons and strategies, making their projections based on assumptions that best meet their planning. Oil companies, in determining their strategic plans (and, mainly, financial and accounting), tend to make more accurate forecasts for a five-year period, which are constantly revised, according to the signals issued by the market and the propensity to the risk tolerated by them.

Due to the structural uncertainty about the persistent impacts of the pandemic, and its effects on the prices and demands of oil and its products, the values of the companies' assets are affected, which leads to revisions in the planning, including the realization of impairment tests[14]. This instrument, even if based on technical and economic issues, can also be used for political purposes, with a view to consolidating the legitimacy of the strategies adopted, since, when opting for a more conservative estimate of oil prices, the value of its assets is deliberately influenced (PINTO, 2020). In this context, oil price projections, a vital element for asset valuation, may be guided by this strategy. Companies that set out ambitious targets for reducing atmospheric emissions and decarbonizing their operations, aligned with the prediction of an energy transition, tend to forecast higher long-term oil prices (MYERS, 2020).

2. Concluding remarks

The year 2020 was marked by events that led to a significant volatility in demand, supply and prices. Emphasis can be put on the impacts of the Codid-19 pandemic on the international oil supply and demand balance.

Several agencies and governments have touted that recovery packages from the current crisis should be directed towards a less carbon-intensive economy. Even if this is the case in most major economies, the difficulty of replacing oil in several sectors should allow oil demand to recover in the comping years, eventually surpassing pre-crisis levels. It follows that the gradually recovering global oil demand, combined with OPEC's disposition to balance the market, high spare capacity and high global inventories, should promote a fragile balance between supply and demand, leading to a gradual recovery in prices.

[13] As an example, EIA recalculated its forecasts in its publication *Short Term Energy Outlook* for Brent oil: US$ 33.00 and US$ 45.60 for the years 2020 and 2021 (projection in April/2020), the amounts have been updated to US$ 40.50 and US$ 49.70 for the years 2020 and 2021 (July/2020) (EIA, 2020).

[14] Accounting instrument for impairment of assets, which consists of comparing the carrying amount of the asset and its recoverable value. Impairment value of the assets can be obtained through the net sale price of assets and the estimate of their value in use, through a set of assumptions and estimates with respect to prices and expected sales. This makes it possible for the company to choose between several possibilities to write-off the impairment value of its assets, affecting its net profit accounting result (PINTO, 2020).

In the medium to long term, economic development and urbanization of energy-poor regions in Africa and Asia are expected to sustain the growth in oil demand. However, economic stimuli and policies aiming at carbon neutrality, can accelerate the energy transition, reducing the rate of growth of fossil fuel consumption. Therefore, we assume that demand for oil should remain high until new low-carbon technologies become more competitive and more readily available all over the planet. This is not expected to happen globally over the next decade.

Regarding oil supply, the reduction in E&P investments over the past few years should limit the expansion of the productive capacity in the medium to long term. Supply may not be able to meet the growth in demand in the years to come, which will influence prices, rebalancing investments in E&P.

The resumption of growth in global oil demand will require the development of new exploratory frontiers. Due to their higher costs, these projects require higher oil prices. Long-term prices are likely to revolver around the cost in these fringe regions.