FIPI

Federation of Indian Petroleum Industry

POLICY & ECONOMIC REPORT OIL & GAS MARKET

APRIL 2022

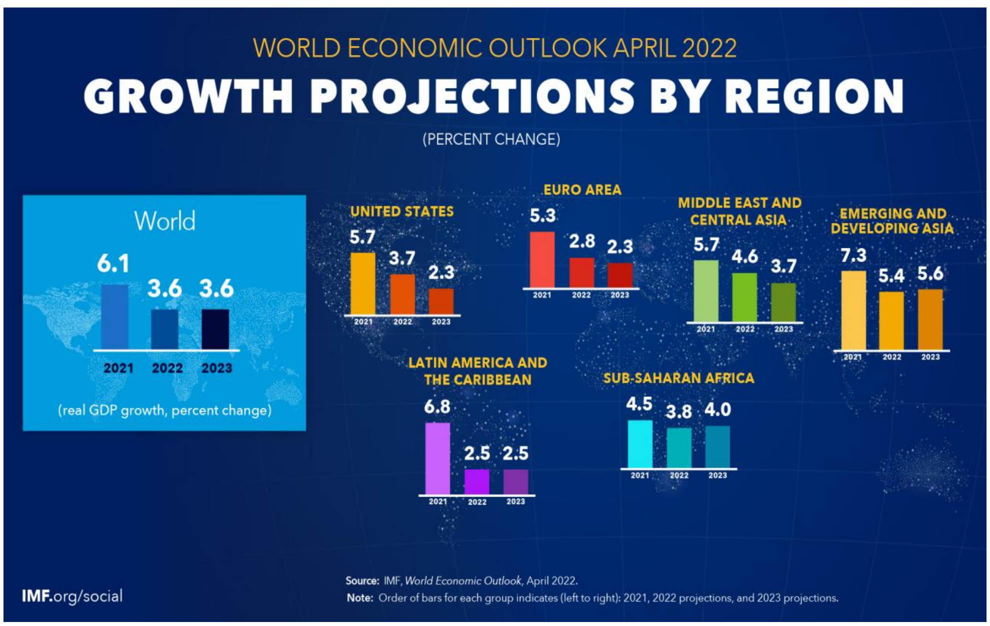
Table of Contents

Executive Summary

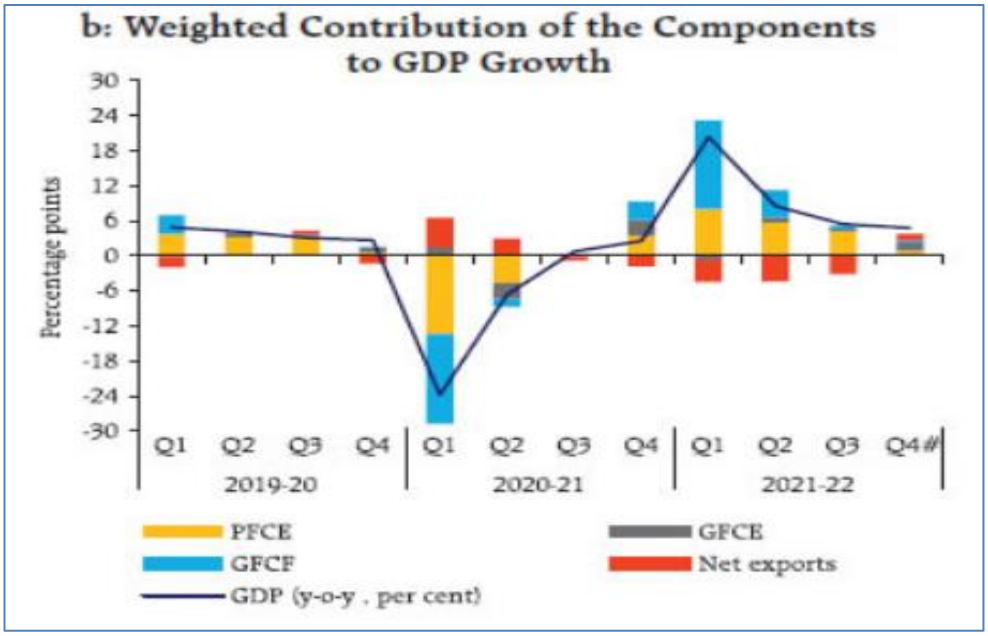
The war in Ukraine has led to a significant economic slowdown in many parts of the world and has created inflationary pressures along with supply side disruptions. Fuel and food prices have increased rapidly on the global front, with populations residing in the low and emerging economies been affected the most. An economic contraction is projected for Russia due to sanctions being imposed on its exports by US and European countries.

IMF in its latest World Economic Outlook projections published in the month of April 2022 has forecasted the following: -

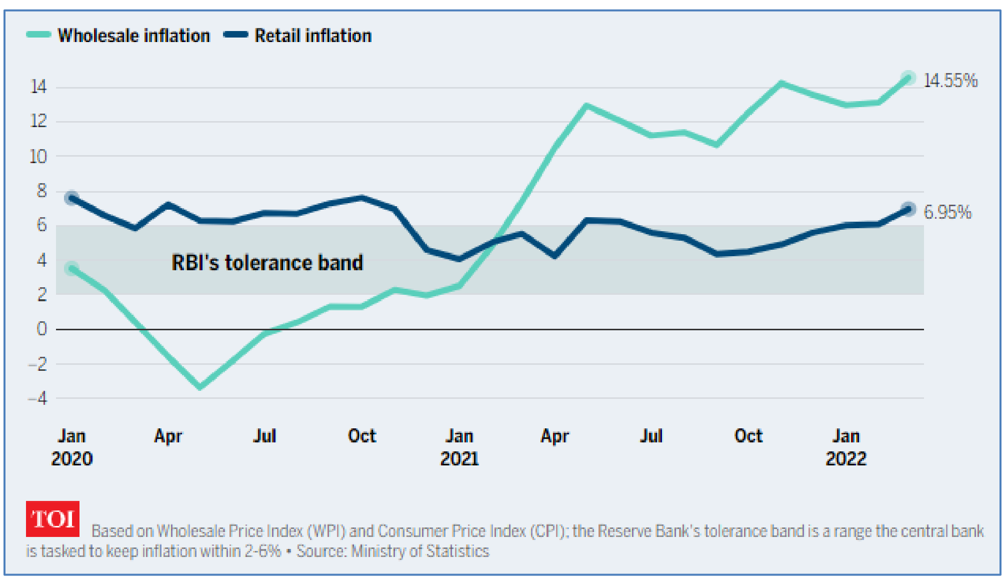
- Global growth is projected to slow from an estimated 6.1 % in 2021 to 3.6 % in 2022 and 2023. This is 0.8 % and 0.2 % points lower for 2022 and 2023 than projected in January. Beyond 2023, global growth is forecast to decline to 3.3 %.
- Commodity price increases including fuel and food prices have led to inflation projections in year 2022 as 5.7 % in advanced economies and 8.7 % in emerging market and developing economies, which are 1.8% and 2.8 % points higher than projected last January.



The Reserve Bank slashed economic growth projection to 7.2 % for the current fiscal 2022 from 7.8 % estimated earlier amid volatile crude oil prices and supply chain disruptions due to the ongoing Russia-Ukraine war. RBI projected the real GDP growth for Q1:2022-23 at 16.2 %; Q2 at 6.2 %; Q3 at 4.1 %; and Q4 at 4 %, assuming crude oil (Indian basket) at USD 100 per barrel during 2022-23.



Costlier food items pushed the retail inflation to a 17-month high of 6.95 per cent in March, much above the upper tolerance level of the RBI while the wholesale price-based inflation rose to a four-month high of 14.55 % in March, mainly due to hardening of crude oil and commodity prices.



For future, the inflation trajectory will depend upon the geopolitical situation and its impact on global commodity prices and logistics. International crude oil prices remain volatile and elevated, due to ongoing war between Russia and Ukraine that has caused a disruption in global supply chain. With the broad-based surge in prices of key industrial inputs and global supply chain disruptions, inflation in India also continues to be a growing concern. Oil companies in India had begun passing on the high import cost of global crude oil prices by hiking domestic petrol and diesel prices from March 2022.

Taking above factors, RBI has projected inflation at 5.7 per cent in 2022-23, with Q1 at 6.3 per cent; Q2 at 5.8 per cent; Q3 at 5.4 per cent; and Q4 at 5.1 per cent.

The CMIE data for first three weeks of March suggest that the quantum of employment continues to remain a challenge, with pressure on the labor market as the unemployment rate rose to 7.60% in the month of April 2022 with urban unemployment rate at 9.10% and the rural unemployment rate is 7% in April 2022.

Further, foreign exchange reserves stand at US$ 606.5 billion as on April 1, 2022 which are further bolstered by the net forward assets of the RBI. The Reserve Bank remains committed to maintain orderly conditions in the domestic financial markets in order to sustain economic growth.

The International Monetary Fund (IMF) has cut its growth forecast for India for FY23 by 80 basis points to 8.2 percent, warning that Russia's invasion of Ukraine would hurt consumption and hence, growth, by way of higher prices. IMF cited that higher inflation could damper the sentiments on private consumption and investment - and a drag from lower net exports. Although the IMF's growth forecast for India for the current financial year has been cut sharply, it remains significantly higher than local projections. The Reserve Bank of India (RBI), for instance, has pegged the GDP growth for FY23 at 7.2 percent. As per the statistics ministry's second advance estimate, India will likely clock a GDP growth of 8.9 percent in FY22.

Even for FY24, the difference between the IMF and RBI's GDP growth forecasts is large. While the multilateral agency sees the Indian economy growing 6.9 % next year, the Indian central bank has projected an expansion of 6.3 percent.

Oil prices have surged after the Russian invasion of Ukraine, and have been extremely volatile. The lockdowns in China amid outbreaks of COVID-19 and release of 120 million barrels and 60 million barrels of oil, respectively by IEA and US from their emergency stockpiles have softened the rising energy prices. However, the risks are more tilted to the upside, given the war in Ukraine and a potential embargo on Russian exports as well as shut down of Libya's largest oil field thereby falling short of 550,000 barrels per day of output. As a result of above, the Brent crude prices rose and was trading at $107/bbl and US crude at $102/ bbl.

Non-OPEC supply in 2022 is revised down by 0.3 mb/d to 2.7 mb/d, mainly on the back of a downward revision due to Russia. OPEC cut its forecast of Russian output by 530,000 bpd. On the other hand, the US liquids supply growth forecast for 2022 is revised up by 0.3 mb/d to 1.3 mb/d. OPEC NGLs are forecast to grow by around 0.1 mb/d both in 2021 and 2022, averaging 5.1 mb/d and 5.3 mb/d, respectively. OPEC and its allies, including Russia, are unwinding record output cuts put in place in 2020. The group will add another 432,000 bpd of crude to the market in May. OPEC's report showed OPEC output in March rose by just 57,000 bpd to 28.56 million bpd, lagging the 253,000 bpd rise that OPEC is allowed under the OPEC+ deal.

U.S. natural gas prices surged to the highest level in more than 13 years as Russia's war on Ukraine causes a global energy crunch. For the year, U.S. natural gas prices are now up 108%, currently trading at 7.25 $/mmbtu, which is adding to inflationary concerns across the economy. The U.S. is also sending record amounts of liquefied natural gas to Europe, which is lifting Henry Hub prices.

In Europe, Spot gas prices have soared to record highs as country moves away from dependence on Russian energy. The natural gas spot price at the Title Transfer Facility (TTF) in the Netherlands in Europe has been trading at all-time high levels. The TTF price averaged $30.45 per MMBtu. Europe's push for more diversified natural gas supply has intensified demand for liquefied natural gas (LNG) cargoes. Russia is Europe's largest natural gas supplier, meeting 33% of the region's demand in 2021. Supplies from Russia in the first quarter of 2022 were 30% lower than the same period of 2021. This has resulting in a six-fold gas price increase in the first quarter of 2022 compared to one year earlier.

Economy in Focus

1. A snapshot of the global economy

Global economic growth

The war in Ukraine has led to a significant economic slowdown in many parts of the world and has created inflationary pressures along with supply side disruptions. Fuel and food prices have increased rapidly on the global front, with populations residing in the low and emerging economies been affected the most. An economic contraction is projected for Russia due to sanctions being imposed on its exports by US and European countries.

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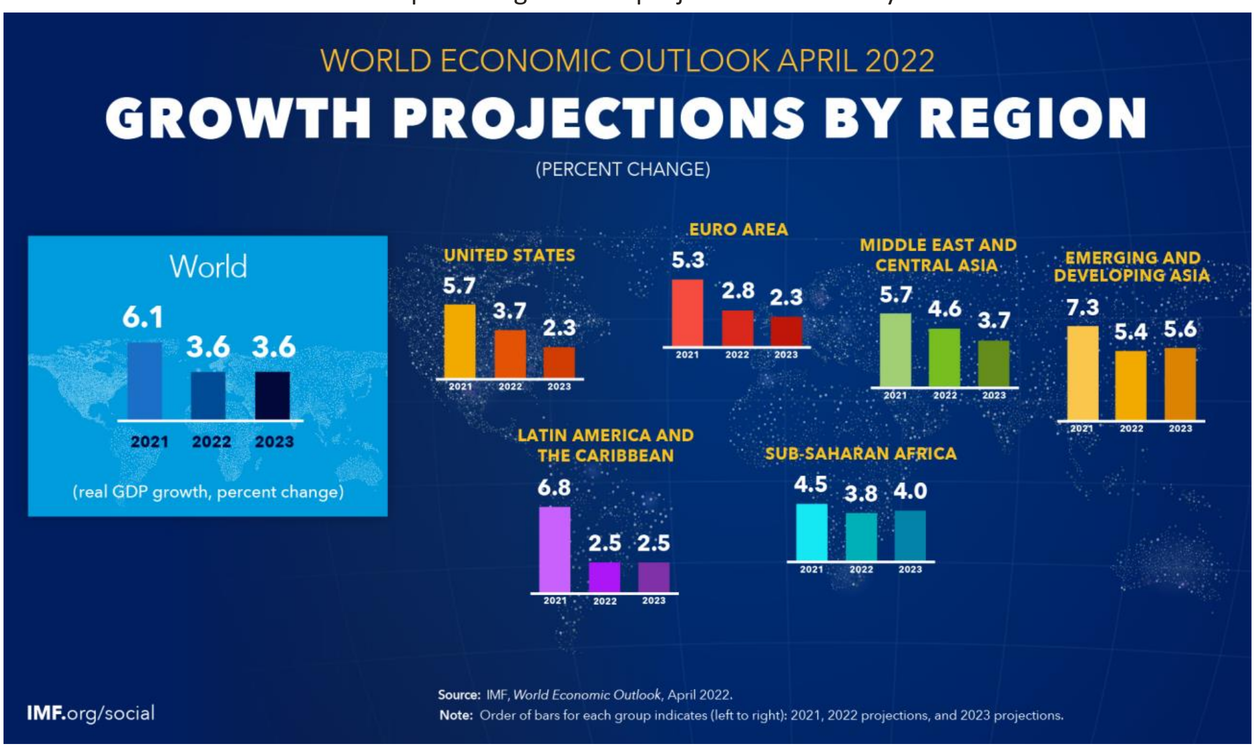


At the global level, Russia invasion on Ukraine and sanctions imposed on Russia have many inflation and supply side challenges that continue to grow.

- The inflated price pressures have led central banks to tighten monetary policy. As a result, interest rates have risen sharply and asset price volatility have increased which further have an adverse impact on household and corporate balance sheets, consumption, and investment.
- With higher borrowing costs and rising nominal interest rates, cost of fiscal support has also increased.
- Tight financial conditions pose rising debt- stress among corporate borrowers in many low and emerging countries.
- Worker shortages and labor mobility restrictions have led to supply disruptions thereby posing wage induced inflation pressures in many parts of the world.

The major developments taken place in various advanced and emerging regions of the world are as below:

- With loss of life, destruction of physical capital, and flight of citizens, the Ukrainian economy is expected to contract by 35 % in 2022.
- The tight trade and financial sanctions and the oil and gas embargo imposed by many large economies have a severe impact on the Russian economy. With loss of investor confidence and drop in private investment and consumption, IMF has forecasted sharp contraction in 2022, with GDP falling by about 8.5 %, and a further decline of 2.3 % in 2023.
- Greater dependence on energy imports from Russia have led to rising energy prices, higher inflation and supply chain disruptions in euro area. IMF has projected euro area GDP growth in 2022 revised down to 2.8 %.
- Countries in the Middle East, North Africa, Caucasus, and Central Asia regions are highly exposed to global food prices, particularly the price of wheat, which is expected to remain high throughout the year. IMF has projected GDP in the Middle East and Central Asia to grow by 4.6 % in 2022.
- In U.S., the forecast is downgraded to 3.7% in 2022 and 2.3% in 2023; due to faster withdrawal of monetary support and continues supply chain disruptions.
- In China, the combination of more transmissible variants and the strict zero-COVID strategy has led to repeated mobility restrictions and localized lockdowns. This has an adverse impact on private consumption and investment. IMF has thus forecasted a 0.4 %-point downgrade for 2022.

Latest World Economic Outlook Growth Projections

(real GDP, annual percent change)	2021	PROJECTIONS 2022	PROJECTIONS 2023
World Output	6.1	3.6	3.6
Advanced Economies	5.2	3.3	2.4
United States	5.7	3.7	2.3
Euro Area	5.3	2.8	2.3
Germany	2.8	2.1	2.7
France	7.0	2.9	1.4
Italy	6.6	2.3	1.7
Spain	5.1	4.8	3.3
Japan	1.6	2.4	2.3
United Kingdom	7.4	3.7	1.2
Canada	4.6	3.9	2.8
Other Advanced Economies	5.0	3.1	3.0
Emerging Market and Developing Economies	6.8	3.8	4.4
Emerging and Developing Asia	7.3	5.4	5.6
China	8.1	4.4	5.1
India	8.9	8.2	6.9
ASEAN-5	3.4	5.3	5.9
Emerging and Developing Europe	6.7	-2.9	1.3
Russia	4.7	-8.5	-2.3
Latin America and the Caribbean	6.8	2.5	2.5
Brazil	4.6	0.8	1.4
Mexico	4.8	2.0	2.5
Middle East and Central Asia	5.7	4.6	3.7
Saudi Arabia	3.2	7.6	3.6
Sub-Saharan Africa	4.5	3.8	4.0
Nigeria	3.6	3.4	3.1
South Africa	4.9	1.9	1.4
Memorandum			
Emerging Market and Middle-Income Economies	7.0	3.8	4.3
Low-Income Developing Countries	4.0	4.6	5.4

Source: IMF, *World Economic Outlook*, April 2022

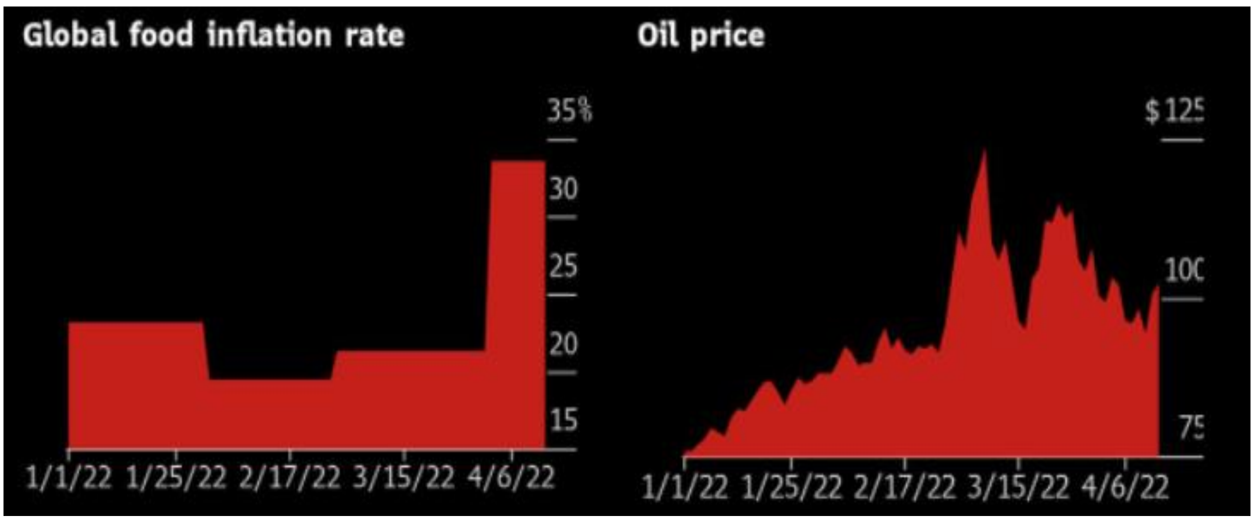
Note: For India, data and forecasts are presented on a fiscal year basis, with FY 2021/2022 starting in April 2021. For the April 2022 WEO, India's growth projections are 8.9 percent in 2022 and 5.2 percent in 2023 based on calendar year.

INTERNATIONAL MONETARY FUND IMF.org

Global inflation

The war in Ukraine and broadening of price pressures, has put inflation to remain elevated in the medium term. The impact of commodity prices was seen more in case of food and fuel prices.

- The sharp rise in oil and gas prices reflecting tight fossil fuel supply and geopolitical uncertainty have led to a significant increase in energy costs. These increases were the main driver of headline inflation in Europe and United States.
- In most emerging market (including in the Middle East and Central Asia), and developing economies rising food prices and rising oil and gas prices drove up the cost of fertilizers.



Source: - UNFAO, Bloomberg

Future inflation levels

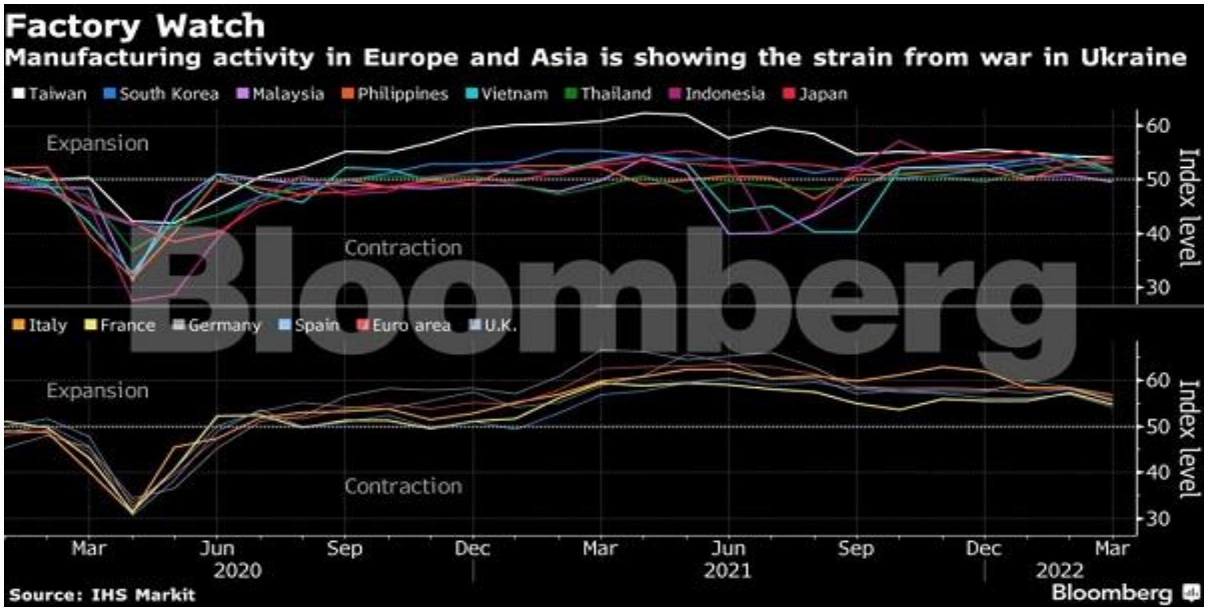
- For 2022, IMF has projected inflation at 5.7 % in advanced economies and 8.7 % in emerging market and developing economies; 1.8 and 2.8 % points higher than in the January World Economic Outlook.
- Inflation in 2023 is projected at 2.5 % for the advanced economy group and 6.5 % for emerging market and developing economies.

Central Bank stance on inflation

Appropriate monetary policy response has been taken by economies all over the world to curb inflation. The US Fed had already raised its policy interest rate by 25 basis points. The Bank of England (0.75%) and Bank of Canada (0.50%) has also raised its policy rates to curb inflationary pressures.

Global output

Global output slowed down as manufacturing activity softened in major developed countries, Europe and Asia, as many factories saw worsening supply shortages and soaring costs after Russia's invasion of Ukraine.



The purchasing managers' index for the euro area sank to a 14-month low, at 56.5 with Germany and France, hardest hit. In Asia, manufacturing hubs South Korea and Vietnam saw the sharpest downturn in their PMIs. Taiwan, Thailand and Malaysia also declined, with the PMI slipping below 50.

While Japan saw dwindling number of covid cases, and allowed factories to ramp up production, China witnessed decline in manufacturing activity due to emergence of fresh Covid cases and mobility restrictions hampering demand and investment growth. The Caixin Manufacturing Purchasing Managers' Index fell to 48.1 from 50.4 in February.

2. World Bank cuts Asia's 2022 growth outlook on Ukraine war

The World Bank has downgraded its economic outlook for East Asia and the Pacific, due to war in Ukraine, rising inflation in the United States, and slowing growth in China.

The region is expected to see growth of 5 % in 2022, down from a forecast of 5.4 % in October. China is forecast to grow 5 % this year, down from 5.4 %, according to the report. The downward revision is due to the emergence to Covid cases and fresh lockdown being placed in the region that has affected production and demand.

Excluding China, the East Asia and Pacific region is expected to see 4.8 % growth, down from 5.2 %. In Southeast Asia, the Philippines had the strongest outlook, with growth estimated to hit 5.7 %, followed by Malaysia, Vietnam and Indonesia.

World Bank cites rising energy prices, supply chain disruptions and weaker demand in China as the main reasons for a downgraded economic growth forecast.

3. <u>Clean energy spending has jumped 50% to record levels since Oct end: IEA</u>

Clean energy spending made by governments in response to the Covid-19 crisis has risen by 50% over the past five months and now stands at over USD 710 billion worldwide, according to the latest update of the IEA's Sustainable Recovery Tracker.

This spending is more than 40% larger than the global green spending made by governments through stimulus packages during global financial crisis in 2008. Advanced economies account the bulk of this effort, with over USD 370 billion intended to be spent prior to the end of 2023.

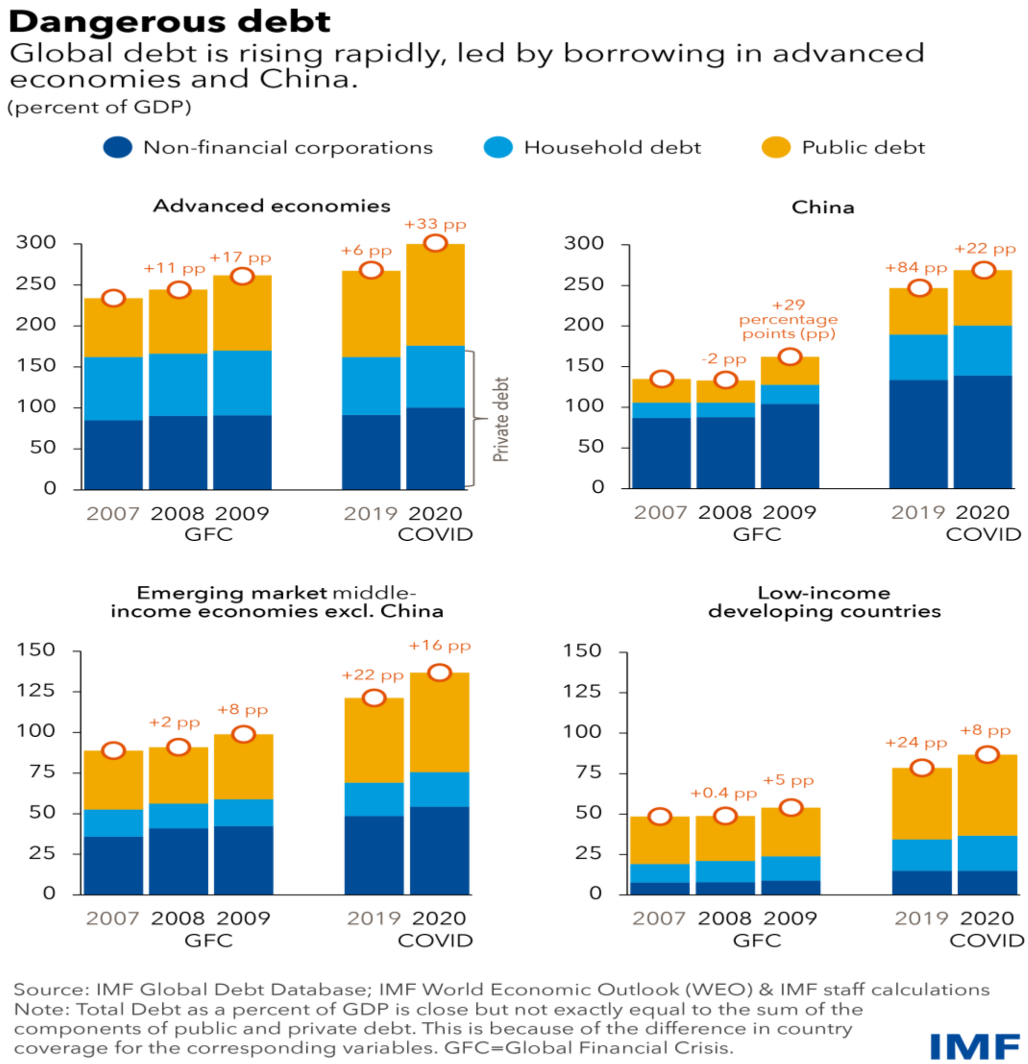
Across emerging and developing economies, the total amount of fiscal resources being dedicated to sustainable recovery measures is one-tenth of the amount in advanced economies. In emerging and developing economies, around USD 52 billion of sustainable recovery spending is planned by the end of 2023. The gap is unlikely to narrow in the near term, as governments with already limited fiscal means now face the challenge of maintaining food and fuel affordability for their citizens amid the surge in commodity prices following Russia's invasion of Ukraine.

Rising fossil fuel prices, due to Russia's invasion of Ukraine, have pushed governments both to enact immediate measures to make energy more affordable and to explore efforts to reduce fossil fuel dependency. The IEA's tracking shows that emergency affordability support by governments worldwide for households and businesses has reached about USD 270 billion since the start of the winter heating season in the Northern Hemisphere in 2021. But many of the measures most effective in reducing oil and gas demand such as installing heat pumps and expanding the use of public transport, bike lanes and high-speed rail have not yet received the needed level of government support to date. The IEA's recent 10-Point Plans on natural gas and oil highlight the key areas where immediate action can be taken.

Overall, public spending on sustainable energy remains a small proportion of the USD 18.2 trillion in fiscal outflows that governments have dedicated to countering the economic impacts of Covid-19. But the IEA estimates that government spending that was planned for spending prior to 2023 could support over USD 1.6 trillion worth of sustainable investments by mobilizing higher levels of private sector participation.

4. <u>Global Debt Burden Requires Decisive Cooperation- IMF</u>

The deficits over the period of time have increased and debt accumulated much faster than it was in the early years of recession, including the Great Depression and the Global Financial Crisis.
According to the IMF's Global Debt Database, borrowing jumped by 28 % points to 256 % of gross domestic product in 2020. Government accounted for about half of this increase, with the remainder from non-financial corporations and households. Public debt now represents close to 40 % of the global total, the most in almost six decades.



Emerging market and developing countries (excluding China) accounted for a relatively small share of the increase. Although their public debt remains far below 1990s levels, debt in these economies has risen steadily in recent years. This is reflected by their ability to tap private markets, increased creditworthiness, and development of their domestic debt markets. Servicing costs have also been on a steep incline.

In advanced economies, economic activity, spending, and revenues are projected to return close to pre-pandemic projections by 2024. But the situation in developing countries is much more concerning. Both emerging and low-income economies face persistent GDP and revenue losses. This implies that primary spending will be lower, pushing countries further back from reaching the Sustainable Development Goals.

Further, sharp increases in energy and food prices are adding to these pressures for the poorest and most vulnerable. Food accounts for up to 60 % of household consumption in low-income countries. For low-income countries that rely on imported fuel and food, the shock may require more grants and highly concessional financing to make ends meet while supporting those households in need.

Global financial conditions are tightening as major central banks raise interest rates to contain inflation. In most emerging markets, sovereign spreads are already above pre-pandemic levels. The credit crunch is further deteriorated by declining overseas lending originating from China, which is confronting solvency concerns in the real-estate sector; lockdowns in Shanghai and other major cities; and problems associated with existing loans to developing countries.

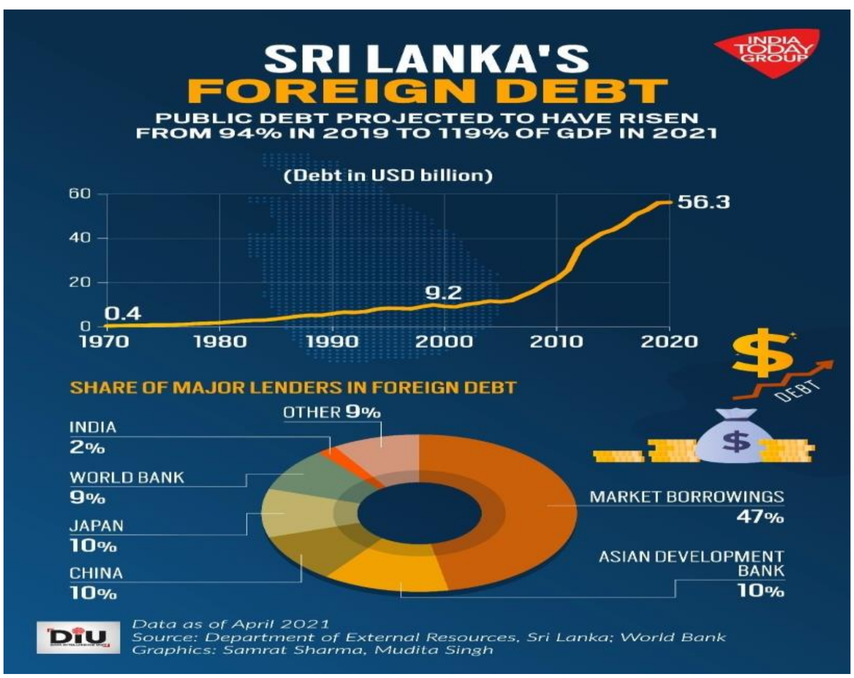
5. Sri Lanka announces $51-billion debt default to combat crisis

Sri Lanka announced a pre-emptive default on all its foreign debt totaling $51 billion. The Government is taking the emergency measures, pending full discussions with the International Monetary Fund (IMF) to prevent a further deterioration of the country's financial position. China is its largest bilateral lender, accounting for 10% of its foreign debt, followed by Japan and India.

Estimates showed Sri Lanka needed $7 billion to service its debt load this year, against just $1.9 billion in reserves at the end of March. Sri Lanka's economic crisis began with the country being unable to import essential goods. This was after the Covid-19 pandemic impacted revenue from tourism and remittances. The government imposed a wide import ban to conserve its foreign currency reserves and use them to service the debts it has now defaulted on.

Debt Trap

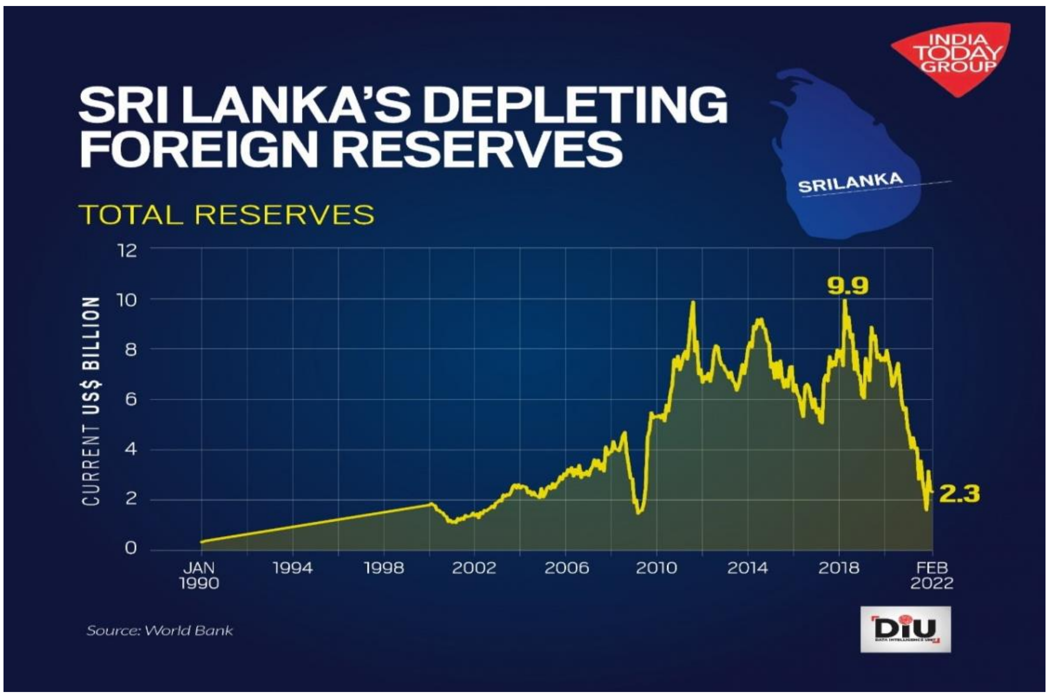
Sri Lanka has foreign-currency reserves of around USD 1.9 billion, while the total debt repayment target in the year 2022 is USD seven billion. Of this, USD 1 billion worth of bonds are maturing as early as July 2022. External debt in Sri Lanka has been on a steep rise since 2005. From USD 11.3 billion in 2005, it rose to USD 21.7 billion in 2010, USD 43.9 billion in 2015, and USD 56.3 billion in 2020 during the Covid pandemic. China accounted for ten per cent of the loans while India constituted two per cent as of April 2021.



The trouble was that the country's external debt rose quicker than the GDP. The external debt to GDP ratio rose from 31.6 per cent in 2010 to 32.4 per cent in 2015, and further to 40.4 per cent in 2020. The rise in total debt, along with their interest rates together forced the central bank to push policy rates to check inflation. However, the currency tumbled against the dollar and the central bank drained foreign reserves to hold the exchange rate in place. However, these factors backfired and pushed the Sri Lankan economy into a vicious cycle.

Foreign-Currency Reserves Slip

The foreign reserves in Sri Lanka in 2018 were near USD ten billion. This nosedived to under USD two billion in 2021.



Weak Currency

On the other side, the Sri Lankan Rupee depreciated by more than 50 % against the US dollar this year alone. This means that Sri Lanka now has to shell out nearly Rs. 310 to buy a dollar now, compared to Rs. 200 in January.

The Sri Lankan Rupee has depreciated against the Indian Rupee by 31.6 per cent, the Euro by 31.5 per cent, the pound sterling by 31.1 per cent, and the Japanese Yen by 28.7 per cent between January 1 and March 31, according to the Central Bank of Sri Lanka.

Rising Prices

Following the economic turbulence and a massive protest against the sudden hike in the prices of household items, especially food items, cabinet ministers and the central bank's governor have quit their posts in Sri Lanka. The spillovers have now started affecting the common people's pockets. Altogether, headline inflation rose to 18.7 % in March 2022 from 15.1 % in February 2022, food inflation stood at 30.2 % in March, according to the Central Bank of Sri Lanka.

The Sri Lankan government sought aid from both India and China and approached the IMF for a debt relief package. It is struggling to finalize a USD one billion credit line with India.

6. India

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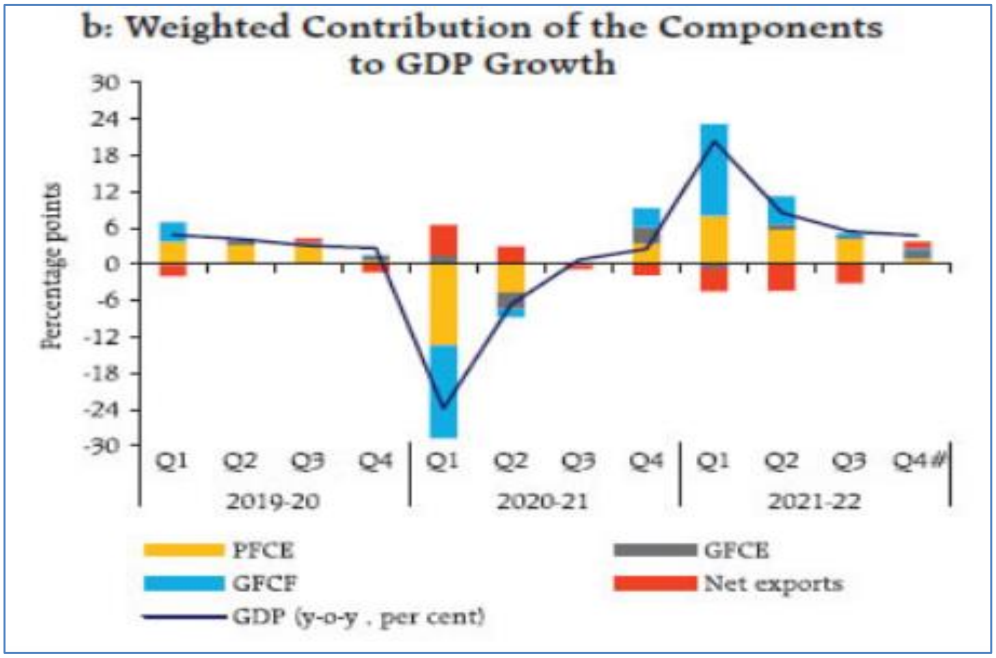

According to RBI, the salient trends reflecting 2021-22 Q4 position are: -

- Private consumption and government expenditure were the key drivers of aggregate demand.
- Private final consumption expenditure (PFCE)'s share in overall GDP dropped to 56.6 per cent in 2021-22 from 57.3 per cent in the previous year, weighed down by incomplete recovery in the labor force participation rate, and weak consumer confidence.
- Gross fixed capital formation (GFCF) expanded by 14.6 % in 2021-22 on the back of a favorable base (-10.4 per cent in 2020-21) and its share in GDP rose marginally to 32.0 per cent as against 31.8 per cent in 2019-20.
- Exports at US$ 40.4 billion touched a new record in March 2022 and remained above US$ 30 billion for the thirteenth consecutive month. During 2021-22, merchandise exports at US$ 417.8 billion crossed the target of US$ 400 billion. Merchandise exports were driven by engineering goods, petroleum products, chemicals, gems and jewelry, cotton textiles, and electronic goods.

- Expanding vaccination coverage, and relaxation of restrictions on mobility and activity enabled a recovery in demand for contact-intensive services such as air travel, hotels and restaurants, recreation and culture.
- Investment activity weakened, driven down by sluggish construction activity due to unseasonal rains, rising input costs and shortage of manpower.

Inflation in India

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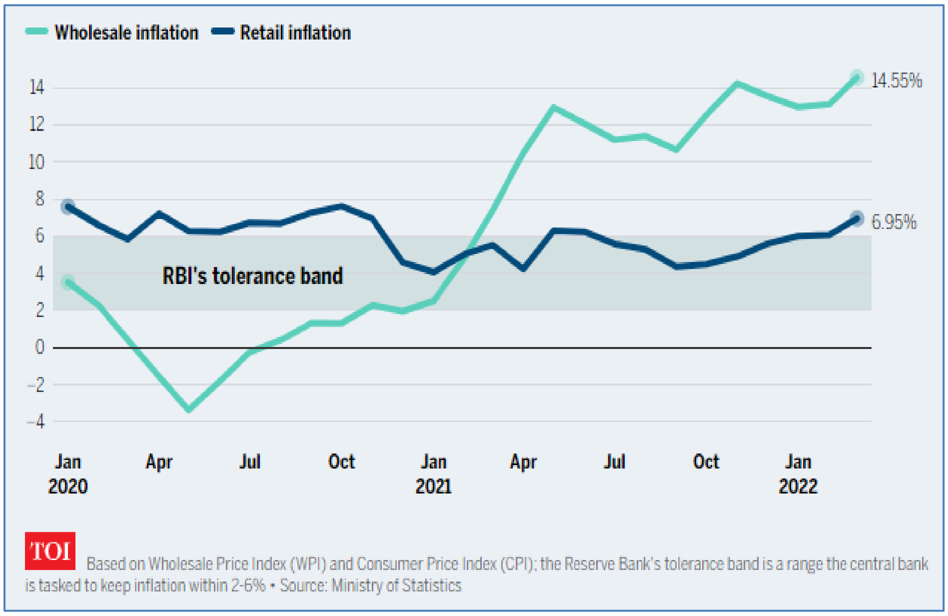

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Taking above factors, RBI has projected inflation at 5.7 per cent in 2022-23, with Q1 at 6.3 per cent; Q2 at 5.8 per cent; Q3 at 5.4 per cent; and Q4 at 5.1 per cent.

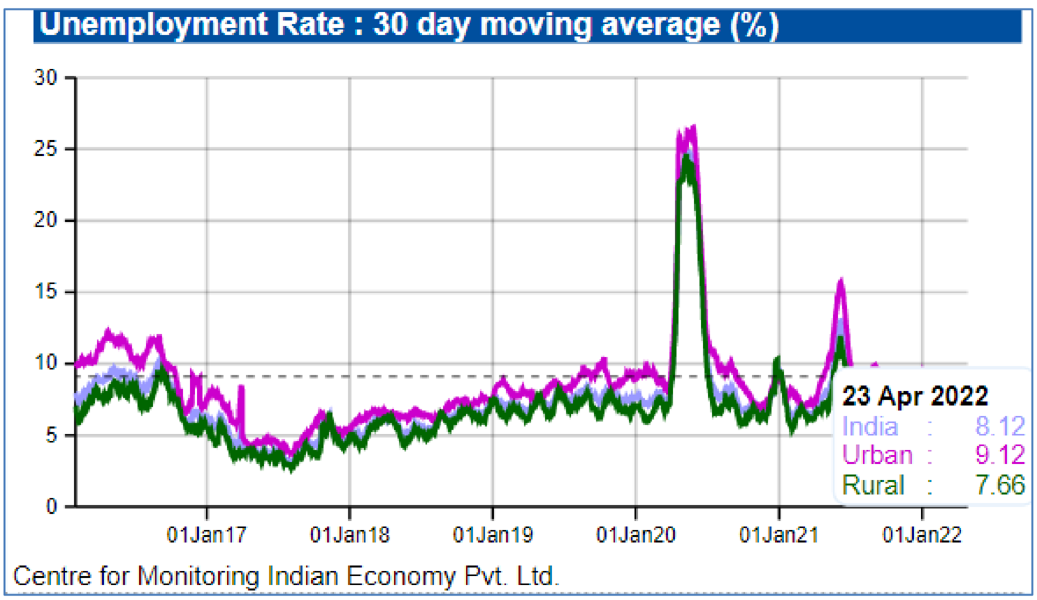
RBI stance in inflation

- The Reserve Bank of India (RBI) has hiked the repo rate by 40 bps up to 4.40% from 4% earlier. The last time repo rate was cut was in May 2020 and has been kept unchanged since then.

- The standing deposit facility (SDF) rate stands adjusted to 4.15 %; and the marginal standing facility (MSF) rate and the Bank Rate to 4.65 %.
- The central bank also hiked the cash reserve ratio (CRR) by 50 bps to 4.5 %. This will lead to excess liquidity being pulled out of the system
- This move ensures RBI's stance to remain accommodative while focusing on withdrawal of accommodation to ensure that inflation remains within the target going forward while supporting growth.
- The core mandate of the central bank is to manage retail inflation and ensure that it remains within the range of the 2-6%.

India's employment

The CMIE data for first three weeks of March suggest that the quantum of employment continues to remain a challenge, with pressure on the labor market as the unemployment rate rose to 7.60% in the month of April 2022 with urban unemployment rate at 9.10% and the rural unemployment rate is 7% in April 2022.



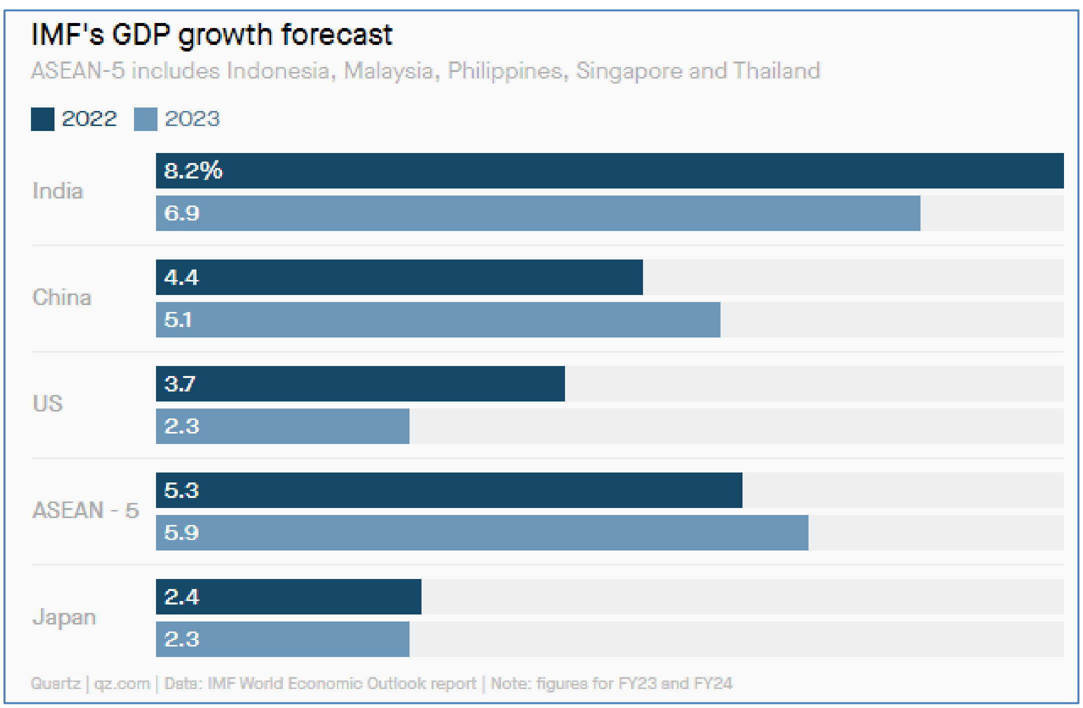
India's external sector

Despite the worsening global supply shocks slowing the recovery in the world economy, India's merchandise exports grew robustly in 2021-22, overshooting the target of US$ 400 billion. A sharp escalation in international commodity prices in conjunction with domestic demand recovery has also led to a strong rebound in imports and a widening of trade and current account deficits. The sustained and robust growth in services exports and in-bound remittances continue to keep our invisible account balance in large surplus, which helps to offset partly the merchandise trade deficit. Despite the sharp jump in crude oil and other commodity prices, RBI expects the current account deficit to remain at sustainable levels which can be financed with normal capital flows.

Further, foreign exchange reserves stand at US$ 606.5 billion as on April 1, 2022 which are further bolstered by the net forward assets of the RBI. The Reserve Bank remains committed to maintain orderly conditions in the domestic financial markets in order to sustain economic growth.

Outlook on India's economic growth by international agencies

- The International Monetary Fund (IMF) has cut its growth forecast for India for FY23 by 80 basis points to 8.2 percent, warning that Russia's invasion of Ukraine would hurt consumption and hence, growth, by way of higher prices.
- IMF cited that higher inflation could damper the sentiments on private consumption and investment - and a drag from lower net exports. Although the IMF's growth forecast for India for the current financial year has been cut sharply, it remains significantly higher than local projections.
- The Reserve Bank of India (RBI), for instance, has pegged the GDP growth for FY23 at 7.2 %. As per the statistics ministry's second advance estimate, India will likely clock a GDP growth of 8.9 percent in FY22.
- Even for FY24, the difference between the IMF and RBI's GDP growth forecasts is large. While the multilateral agency sees the Indian economy growing 6.9 % next year, the Indian central bank has projected an expansion of 6.3 percent.
- The surge in crude oil prices has already stoked retail inflation to a 17-month high in India. IMF sees the figure to average 6.1% in the current financial year, breaching RBI's 6% cap. It may ease to 4.8% in 2023-24.



- The Asian Development Bank (ADB) forecasts India's GDP growth to moderate to 7.5% in 2022-23 from an estimated 8.9% in 2021-22, but will pick up to reach 8% in 2023-2024.
- The ADB has factored in the Russia-Ukraine conflict's implications for India, which will be largely indirect through higher oil prices, and has assumed that the severity of the COVID-19 pandemic will subside with a rise in vaccination rates.
- ADB noted that the impact on inflation would be moderated by fuel subsidies and oil refineries stocking up on cheap crude from the Russian Federation. ADB predicted an average inflation rate of 5.8% in 2022-23, and 5% in 2023-24.
- Further, ADB noted that India's fiscal policy is expected to be supportive of growth, and higher capital spending will improve efficiency of India's logistics infrastructure, investment, jobs and sustain growth.
- World Bank cuts India's FY23 GDP growth forecast to 8% from 8.7%. The World Bank also cited reasons as worsening supply bottlenecks and rising inflation risks caused by the Ukraine crisis. According to World Bank, household consumption will be constrained by the incomplete recovery of the labor market from the pandemic and inflationary pressures.

LESSON FROM ECONOMICS

ECONOMIC RECOVERY-VARIED SHAPES

Background:

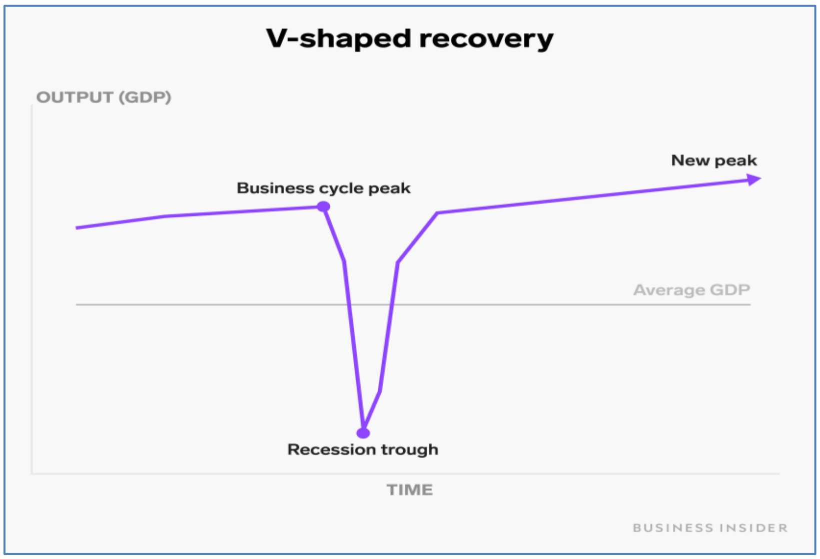
Recovery shapes are used by economists to characterize different types of recessions and their ensuing recovery. Recovery shapes are a way to discuss and forecast the complexities of an economic downturn, and how long it may take to recover.
The shapes are described as a letters like V, U, W, L and K, named after how each recovery looks when charted on a graph that gauges the overall health of the economy.

Recession and recovery-process

- A recession is a significant economic downturn - measured by a drop in the gross domestic product (GDP)- spread across the economy that lasts more than a few quarters.
- After a recession hits its lowest point, or trough, the economy begins to grow again.
- But it can recover in a number of different ways. It can bounce back immediately, it can bounce back and then dip again, or it can remain near the low point and take years to fully recover its former levels of output.

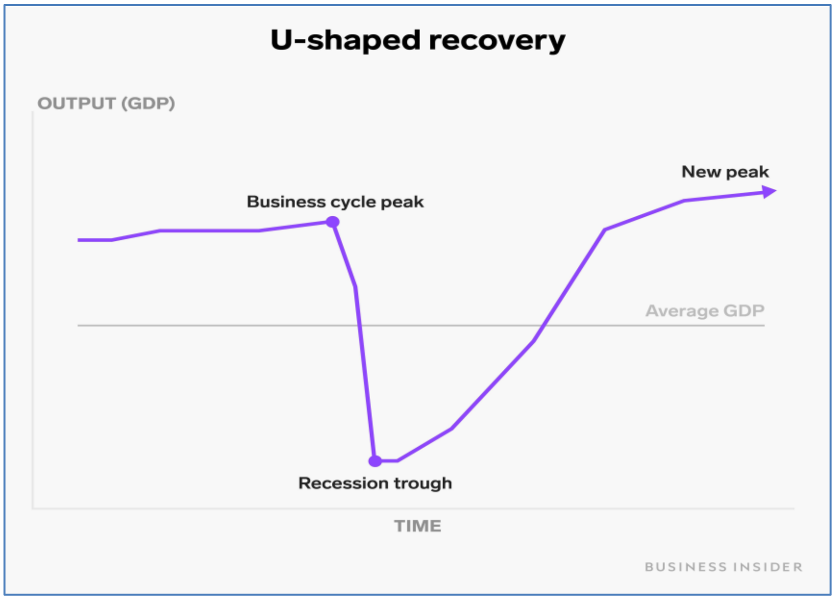
- V, U, W, L, and K are the most common letters used to characterize all these various recovery paths. The letters resemble the shape the economy takes on a graph that shows GDP plotted against time.

1. **V-shaped recovery-** In a V-shaped recovery, the economy experiences a sharp decline but then bounces back almost immediately to its pre-recession level. This can occur when the economic interruption that caused a recession doesn't last long. It could be that swift and appropriate monetary and fiscal policies adopted by governments successfully mitigate the impact of the recession.



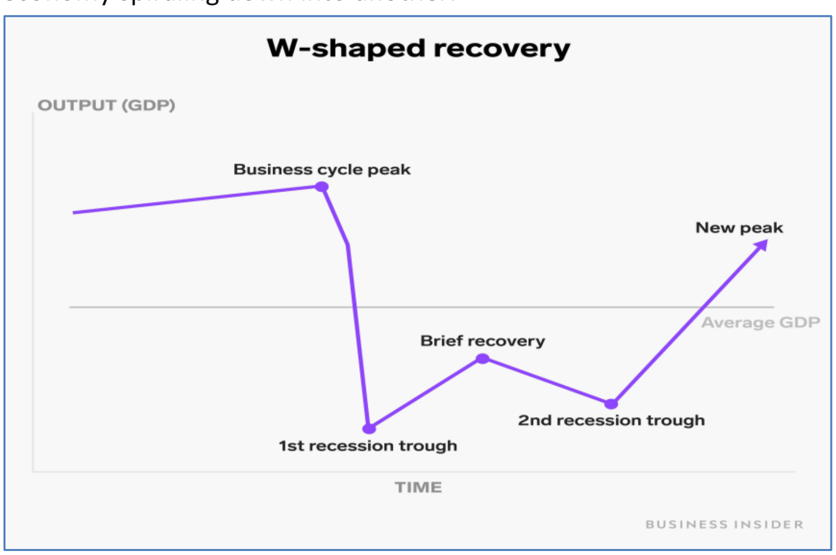
A V-shaped recovery followed the recession in U.S. in 1953, in which the economy achieved a full comeback by the first quarter of 1954, less than a year after it first declined. This recession was relatively brief and mild, with only a 2.2% decline in GDP and an unemployment rate of 6.1%. Growth began to slow in the third quarter of 1953, but by the fourth quarter of 1954 was back at a pace well above the trend. The actions of the Federal Reserve which spotted the slowdown early on and moderately increased government spending to stimulate the economy helped in the recovery process.

2. **U-shaped recovery**- the U-shaped recovery is one in which the economy declines and then spends a significant period of time at the trough before improving. This doesn't necessarily mean that the recession is more severe in terms of the loss in GDP, but it does mean that it lasts longer.



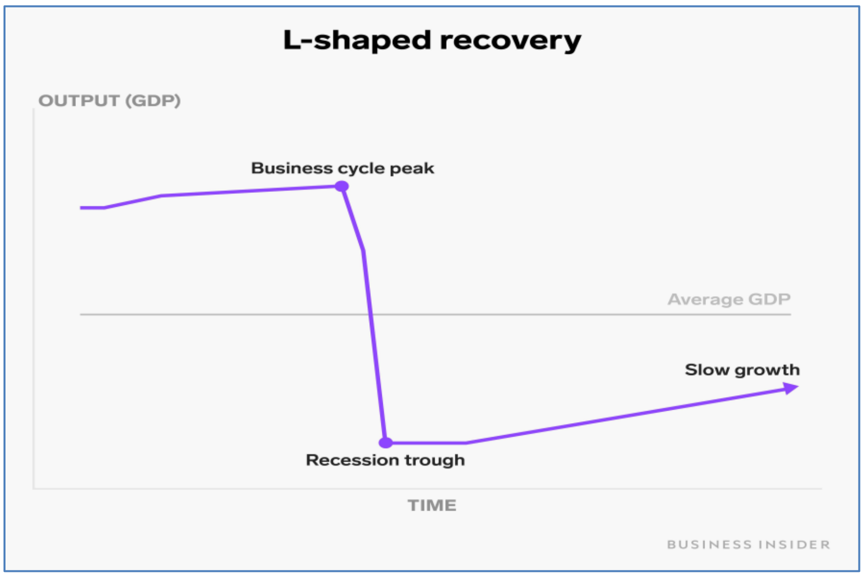
The 1973-1975 U.S. recession, in which the economy didn't resume pre-recession levels until 1976, is a clear example of a U-shaped recovery. The onset of the recession was marked by the 1973 oil crisis and increased oil prices as well as the 1973–74 stock market crash, which affected all the major stock markets in the world. The recovery was marked by persistently high unemployment and accelerating inflation that would characterize the 1970's as the era of stagflation.

3. **W-shaped recovery-** A W-shaped recovery, also known as a double-dip recession, is one in which there's a brief economic comeback tricking of getting a V-shaped recovery but then the economy falls a second time. It's essentially two recessions in one, which prolongs the impact of the first and can shatter consumer confidence. Sometimes the nature of world events forces the economy back into a second recession, or fiscal and monetary policies aimed at easing the first decline can send the economy spiraling down into another.



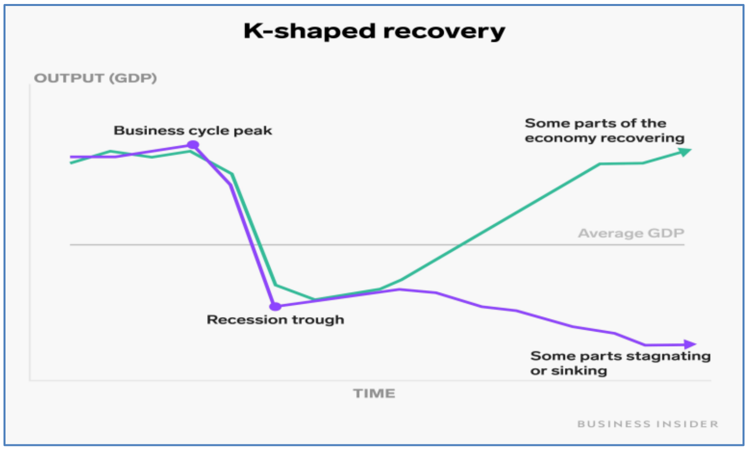
In January of 1980 the economy dipped but recovered itself just six months later. Then, after the Federal Reserve raised interest rates to counter inflation, the economy fell into a second dip in July of 1981 that lasted 16 months.

4. **L-shaped recovery-** Resembling an L tilted backward slightly, the L-shaped recovery has the lengthiest recession period of all and is called as a depression. After a sharp decline, GDP begins to increase, but recovery is very gradual and lengthy. It can take years for the economy to get back to where it was pre-downturn, and in some cases, this slow revival drags on indefinitely. L-shaped recoveries are typically characterized by persistently high unemployment, a slow return of businesses investment activity, and a sluggish rate of growth in economic output.

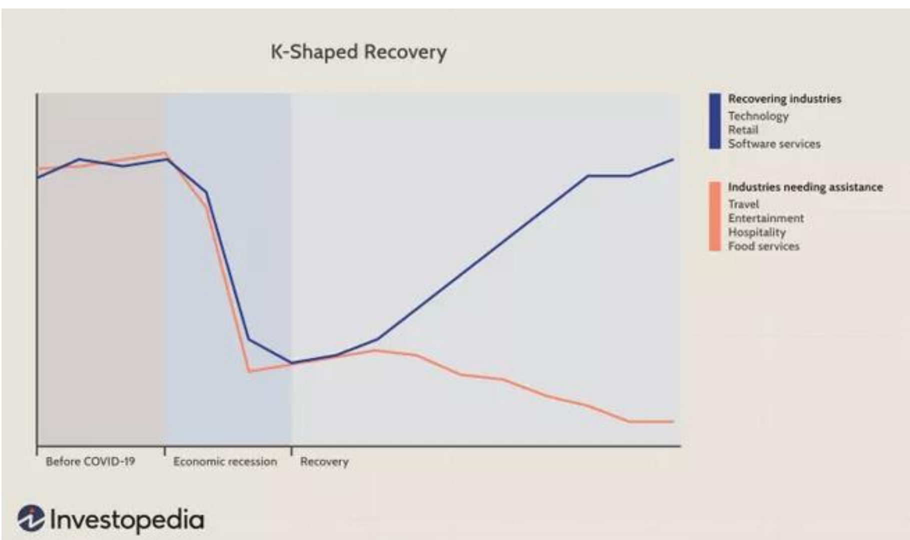


Some economists characterize the Great Recession as an L-shaped recovery. Although it technically lasted only from 2007-09, as measured by GDP, many other key economic indicators didn't reach their pre-recession levels for four to six years and a decade later, the overall economy still lagged behind pre-recession projections.

5. **K-shaped recovery**- This term has been created to describe what economists see happening with the COVID-19 pandemic. In this situation, one segment of the economy trends upward - experiencing more of a V-shaped or U-shaped recovery - while another segment either sinks further or recovers much more slowly, like with the L-shaped recovery. This divergence between two different economic groups is depicted by the two diagonal lines in the letter K.



The affected groups are both industries and individuals. Some industries with access to government support have been able to continue operating or have even thrived during the pandemic (i.e., high-tech and e-commerce) while others have suffered a major slowdown or been virtually unable to function (i.e., travel and hospitality, arts and entertainment). The divergence between these two groups is represented by the two diagonal lines in the letter K. Such a recovery takes place when different parts of the economy recover at vastly different rates. The K-shaped recovery has further exacerbated, the already existing inequalities.



Conclusion-

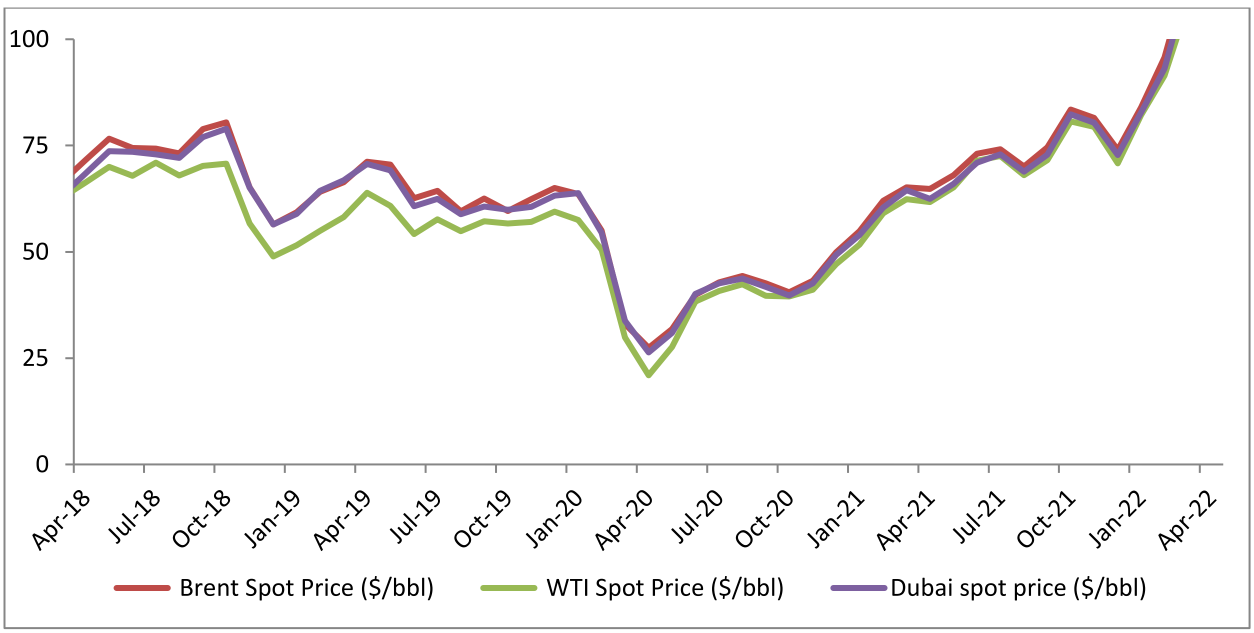
It is difficult to predict the shape of economic recovery in India. During the Covid year, India's Gross Domestic Product (GDP) contracted 7.3% in 2020-21, as per provisional National Income estimates released by the National Statistical Office. According to the Economic Survey 2021-22, India's GDP would increase at 9.2 % in 2021-22, with the next fiscal year's growth rate expected to be between 8 and 8.5 %. The uncertainty still glooms over the economic growth of the country in case a new Covid-19 type emerges that might have a negative influence on future expansion ambitions.

Oil Market

Crude oil price – Monthly Review

- Oil prices have surged after the Russian invasion of Ukraine, and have been remained extremely volatile. The lockdowns in China amid outbreaks of COVID-19 and release of 120 million barrels and 60 million barrels of oil, respectively by IEA and US from their emergency stockpiles have soften the rising energy prices.
- However, the risks are more tilted to the upside, given the war in Ukraine and a potential embargo on Russian exports as well as shut down of Libya's largest oil field thereby falling short of 550,000 barrels per day of output. As a result of above, the Brent crude prices rose and was trading at $107/bbl and US crude at $102/ bbl.
- World Bank has forecasted all energy prices to remain higher for longer. Brent crude oil prices are forecast to average $100/bbl in 2022, before falling down to $92/bbl in 2023 as oil production grows. Natural gas prices are expected to remain high in 2022, with the European benchmark more than doubling compared to 2021.

Figure 1: Benchmark price of Brent, WTI and Dubai crude



Source: WORLD BANK

- Brent crude price averaged $ 102.36 per bbl in April 2022, down by 0.2 % on a month on month (MoM) and up by 62.6 % on year on year (YoY) basis, respectively.
- WTI crude price averaged $ 106.10 per bbl in April 2022, down by 8.2 % on a month on month (MoM) and 63.7 % on year on year (YoY) basis, respectively.

- Dubai crude price averaged $ 101.65 per bbl in April 2022, down by 6.3 % on a month on month (MoM) and 64.7 % on year on year (YoY) basis, respectively.

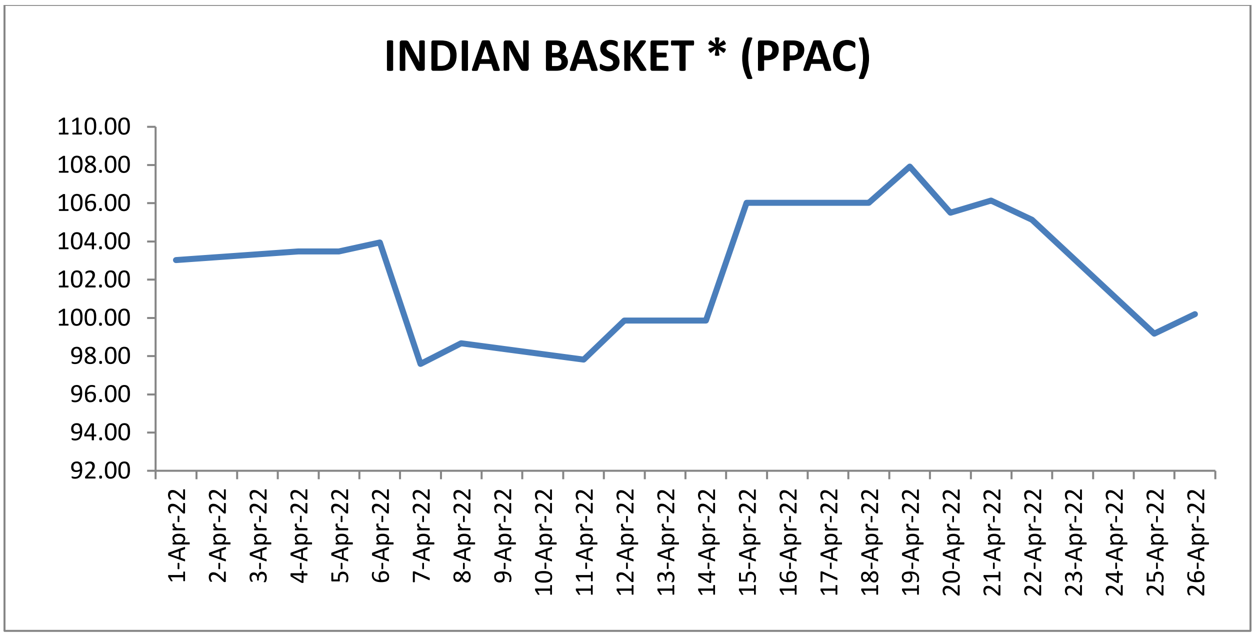
Table 1: Crude oil price in April, 2022

Crude oil	Price ($/bbl)	MoM (%) change	YoY (%) change
Brent	102.36	-0.2%	62.6%
WTI	106.10	-8.2%	63.7%
Dubai	101.65	-6.3%	64.7%

Source: WORLD BANK

Indian Basket Crude oil price

Figure 2: Indian crude oil basket price in $ per bbl



Source: Petroleum Planning & Analysis Cell

- Indian crude basket price averaged $ 102.58 per barrel in April 2022, down by 10.2 % on Month on Month (M-o-M) and up by 63.0 % on a year on year (Y-o-Y) basis, respectively.

Oil production situation

- Non-OPEC liquids supply growth is unchanged at around 0.6 mb/d y-o-y. Total US liquids production increased by 0.1 mb/d, y-o-y. The largest growth increases were seen in Canada, Russia and China. The production is estimated to have declined in the UK, Brazil, Colombia and Indonesia.

- Non-OPEC supply in 2022 is revised down by 0.3 mb/d to 2.7 mb/d, mainly on the back of a downward revision for Russia. OPEC cut its forecast of Russian output by 530,000 bpd. On the other hand, the US liquids supply growth forecast for 2022 is revised up by 0.3 mb/d to 1.3 mb/d. OPEC NGLs are forecast to grow by around 0.1 mb/d both in 2021 and 2022, averaging 5.1 mb/d and 5.3 mb/d, respectively.

- OPEC and its allies, including Russia, are unwinding record output cuts put in place in 2020. The group will add another 432,000 bpd of crude to the market in May.

- OPEC's report showed OPEC output in March rose by just 57,000 bpd to 28.56 million bpd, lagging the 253,000 bpd rise that OPEC is allowed under the OPEC+ deal.

Oil demand situation

- World oil demand is expected to average 99.4 mb/d in 2022, up by 1.9 mb/d from 2021.

- OPEC cut its forecast for growth in world oil demand in 2022 citing the impact of Russia's invasion of Ukraine, rising inflation and the resurgence of the Omicron coronavirus variant in China. In a monthly report, OPEC said world demand would rise by 3.67 million barrels per day (bpd) in 2022, down 480,000 bpd from its previous forecast.

Table 2: World Oil demand in mbpd	2021	1Q2022	2Q2022	3Q2022	4Q2022	2022	Growth	%
Total OECD	**44.75**	**44.16**	**45.82**	**47.47**	**47.95**	**46.61**	**1.86**	**4.16**
~ of which US	*19.93*	*19.70*	*21.01*	*21.30*	*21.26*	*20.82*	*0.89*	*4.49*
Total Non-OECD	**52.07**	**53.79**	**53.29**	**53.60**	**54.86**	**53.89**	**1.81**	**3.48**
~ of which India	*4.76*	*5.28*	*4.82*	*4.97*	*5.35*	*5.10*	*0.34*	*7.16*
~ of which China	14.56	14.34	15.10	15.06	15.65	15.04	0.48	3.27
Total world	**96.82**	**98.95**	**99.12**	**101.06**	**102.81**	**100.50**	**3.67**	**3.79**

Source: OPEC monthly report, April 2022

 # During 2022 rising oil demand will be supported by increasing requirements in all main petroleum product categories, however, some downside risks pertain relating to rising COVID-19 cases, new variants and their associated containment measures, as well as fuel substitution.

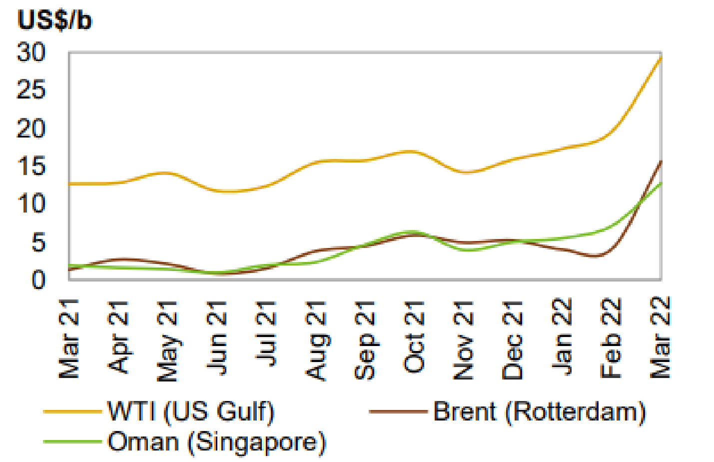
*Note: *2021=Estimation and 2022 = Forecast. Totals may not add up due to independent rounding*

Global petroleum product prices

US Gulf Coast (USGC) refining margins against WTI soared, posting gains for the fourth consecutive month. Except naphtha, positive market performances were observed in all petroleum products. There was rise in product exports amid concerns over tightening product availability with regards to sanctions being imposed on Russian crude, which led to European countries to seek alternative suppliers, mainly for diesel.

Refinery margins in Rotterdam against Brent rose sharply, as robust performances were seen at the middle of the barrel. Concerns over purchases of Russian crude and product supplies triggered further concerns of a product shortage in the region, particularly that of diesel, as European refiners sought alternative sources of crude and products. As a result, the product prices skyrocketed to reach record-breaking highs levels and surpassed price levels for the products observed in the USGC and in Singapore.

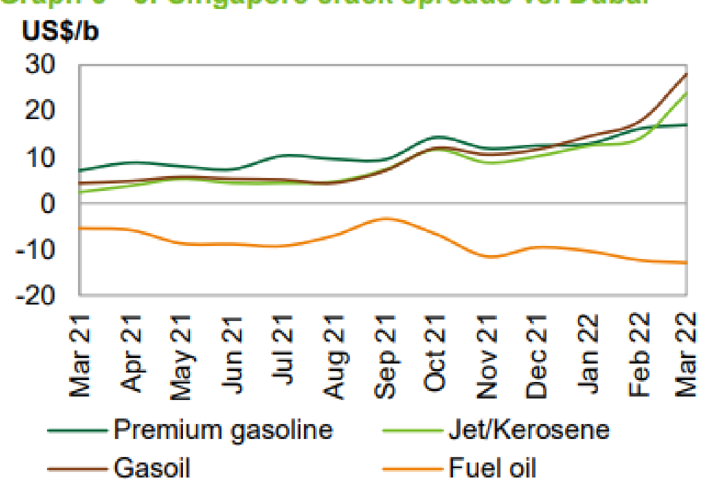
Graph 6 - 1: Refining margins



Sources: Argus and OPEC.

Asian naphtha crack spreads reversed trends again and exhibited losses affected by ample supply availability amid weaker petrochemical feedstock requirements over the month due to high volumes of steam cracker maintenance. The Singapore naphtha crack spread against Oman averaged 93¢/b, having decreased by $2.71 m-o-m while increasing by 30¢ y-o-y.

Graph 6 - 5: Singapore crack spreads vs. Dubai



Sources: Argus and OPEC.

The Singapore gasoil crack spread soared to a new record-breaking high reflective of strong regional demand, firm industrial and manufacturing activity as well as a contraction in gasoil availability in the region. The Singapore gasoil crack spread against Oman averaged $28.02/b, up by $10.22 m-o-m and up by $23.67 y-o-y.

Table 3: Singapore FOB, refined product prices ($/bbl)

Singapore product prices	Price ($/b) in March 2022	MoM (%) change	YoY (%) change
Naptha	111.42	16.4%	71.3%
Premium gasoline (unleaded 95)	131.07	18.4%	78.5%
Regular gasoline (unleaded 92)	127.47	17.7%	78.4%
Jet/Kerosene	134.32	26.5%	101.0%
Gasoil/Diesel (50 ppm)	142.08	28.8%	104.3%
Fuel oil (180 cst 2.0% S)	136.25	24.7%	99.2%
Fuel oil (380 cst 3.5% S)	97.61	22.3%	65.5%

Source: OPEC

Petroleum products consumption in India

Monthly Review:

- Overall consumption of all petroleum products in March 2022 with a volume of 19.4 MMT registered a growth of 4.2% on volume of 18.6 MMT in March 2021.
- MS (Petrol) consumption during the month of March 2022 with a volume of 2.9 MMT recorded a growth of 6.1% on volume of 2.7 MMT in March 2021.
- HSD (Diesel) consumption during the month of March 2022 with a volume of 7.7 MMT recorded a growth of to 6.7% on volume of 7.2 MMT in the month of March 2021.
- LPG consumption during the month of March 2022 with a volume of 2.5 MMT registered a growth of 9.9% over the volume of 2.3 MMT in the month of March 2021
- ATF consumption during March 2022 with a volume of 0.543 MMT registered a growth of 14.6% over the volume of 0.474 MMT in March 2021.
- Bitumen consumption during March 2022 with a volume of 0.89 MMT recovered 88.4% on a month-on-month basis over volume of 1.01 MMT in the month of March 2021.
- Kerosene consumption registered a de-growth of -26.2% during the month of March 2022 as compared to March 2021.

Table 4: Petroleum products consumption in India, March 2022

CONSUMPTION OF PETROLEUM PRODUCTS (P)	Consumption in '000 MT	MoM (%) change	YoY (%) change
LPG	2,479	3.3%	9.7%
Naphtha	1,111	-6.6%	-18.3%
MS	2,909	14.0%	6.2%
ATF	543	24.8%	14.2%
SKO	114	-2.5%	-26.2%
HSD	7,707	18.3%	6.7%
LDO	82	-3.9%	-26.8%
Lubricants & Greases	470	18.0%	29.8%
FO & LSHS	580	11.1%	9.8%
Bitumen	895	1.4%	-1.0%
Petroleum coke	1,335	-4.9%	-17.9%
Others	1,184	9.6%	15.1%
TOTAL	**19,410**	**10.4%**	**3.4%**

Source: PPAC

Natural Gas Market

Natural Gas Price – Monthly Review

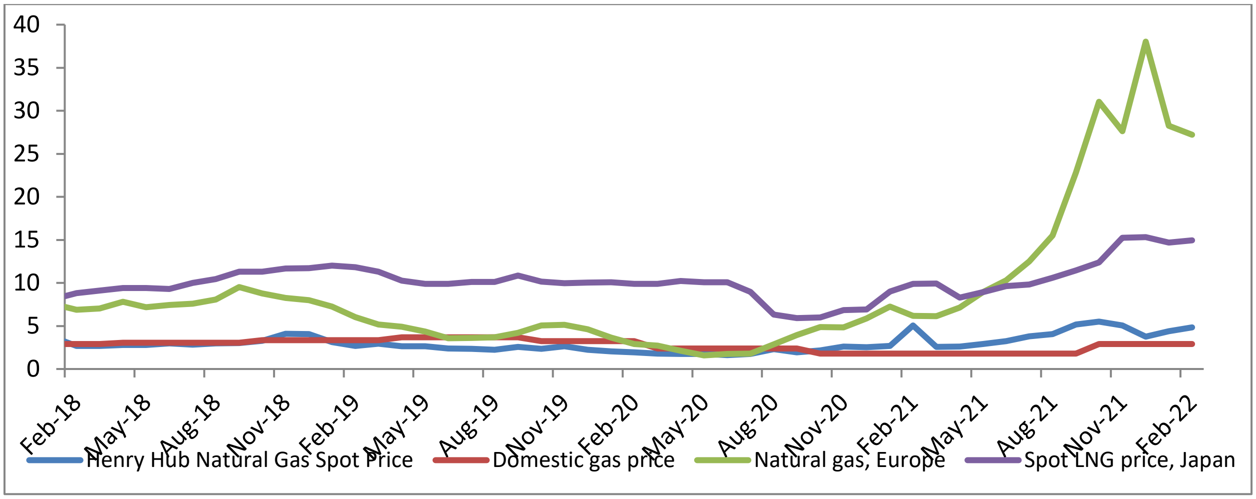
- U.S. natural gas prices surged to the highest level in more than 13 years as Russia's war on Ukraine causes a global energy crunch. For the year, U.S. natural gas prices are now up 108%, currently trading at 7.25 $/mmbtu, which is adding to inflationary concerns across the economy. The U.S. is also sending record amounts of liquefied natural gas to Europe, which is lifting Henry Hub prices.

- In Europe, Spot gas prices have soared to record highs as country moves away from dependence on Russian energy. The natural gas spot price at the Title Transfer Facility (TTF) in the Netherlands in Europe has been trading at all-time high levels. The TTF price averaged $30.45 per MMBtu. Europe's push for more diversified natural gas supply has intensified demand for liquefied natural gas (LNG) cargoes. Russia is Europe's largest natural gas supplier, meeting 33% of the region's demand in 2021. Supplies from Russia in the first quarter of 2022 were 30% lower than the same period of 2021. This has resulting in a six-fold gas price increase in the first quarter of 2022 compared to one year earlier. The prices were also boosted by Russia's moves to drastically reduce short-term gas sales to Europe, which had left European storage levels 17% below their five-year average at the start of the European heating season.

- Japan Liquefied Natural Gas Import Price is averaging at $ 18.03 per MMBtu for April 2022, up from 17.00 last month which is a change of 6.09% from last month. The rise in prices is a result of persistent cold weather conditions in Japan that results in increase in natural gas heating expenditures during winter.

- The price of domestically produced natural gas is $6.10 per million British thermal unit (MMBtu) from April1, 2022 to September 30, 2022. The price of domestic gas price has been hiked by 110 percent from the previous revision which was $2.90 per MMBtu for October 1, 2021, to March 31, 2022. The domestic gas price increase was driven by the significant run-up in the prices of gas at global gas hubs. Further, the maximum sale price allowed to natural gas production from deep-water, ultra-deep-water, high pressure and high-temperature discoveries was increased from $6.13 per MMBtu to $9.92 per MMBtu.

Figure 3: Global natural gas price trends



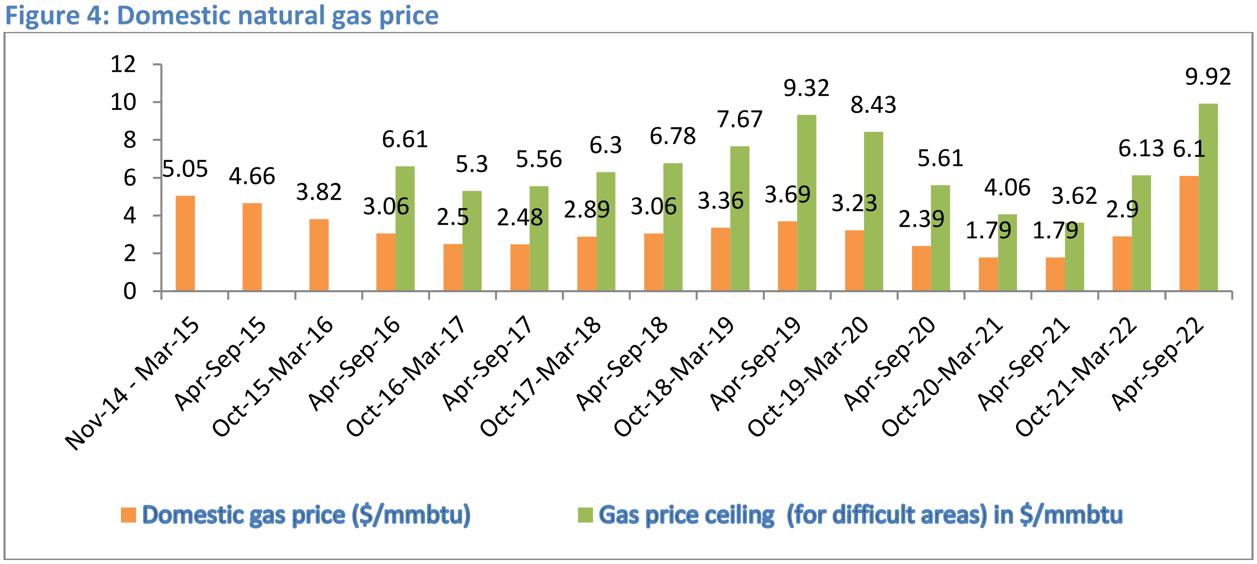
Source: EIA, WORLD BANK

Table 5: Gas price

Natural Gas	Price ($/MMBTU) in April 2022	MoM (%) change	YoY (%) change
India, Domestic gas price	6.10	-	240%
India, Gas price ceiling – difficult areas	9.92	-	174.03%
Henry Hub	7.25	10.0%	-4.9%
Natural Gas, Europe	30.45	-3.6%	342.0%
Liquefied Natural Gas, Japan	18.03	6.09%	128.4%

Source: EIA, PPAC, World Bank

Figure 4: Domestic natural gas price



Source: PPAC

Indian Gas Market

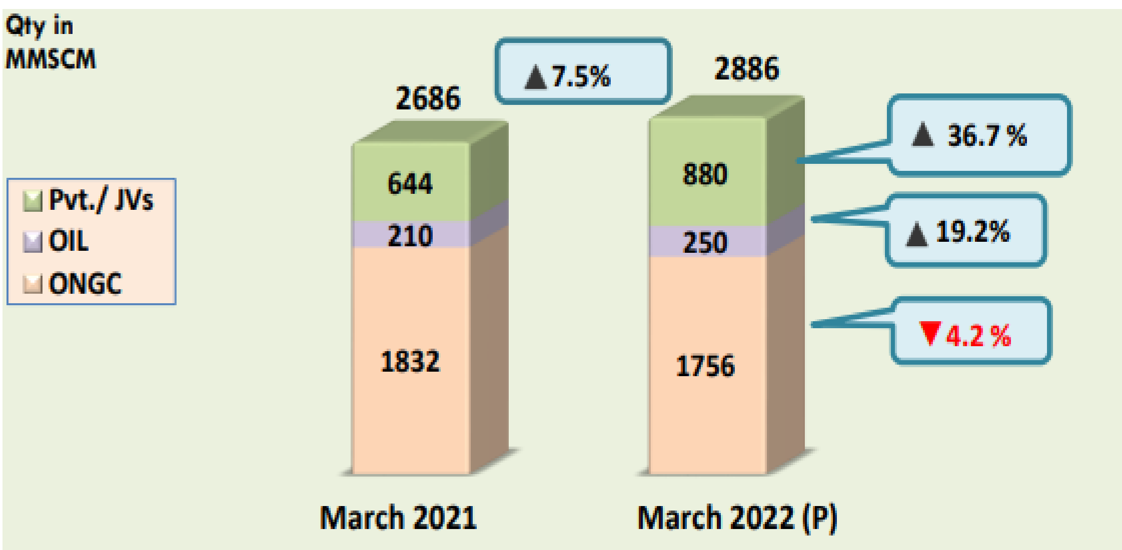
- Gross production of natural gas for the month of March, 2022 was 2886 MMSCM (increase of 7.5% over the corresponding month of the previous year).
- Total imports of LNG (provisional) during the month of March 2022 were 2613 MMSCM (decrease of 7.8 % over the corresponding month of the previous year).
- Natural gas available for sale during March 2022 was 4923 MMSCM decrease of 1 % over the corresponding month of the previous year).
- Total consumption during March 2022 was 4908 MMSCM (provisional). Major consumers were fertilizer (32%), City Gas Distribution (CGD) (24%), power (13%), refinery (8%) and petrochemicals (4%)

Monthly Report on Natural gas production, imports and consumption – March 2022

1. Domestic Natural Gas Gross Production:

Domestic natural gas gross production for the month of March, 2022 was 2886 MMSCM (increase of 7.5 % over the corresponding month of the previous year).

Figure 10: Domestic natural gas Gross production (Qty in MMSCM)

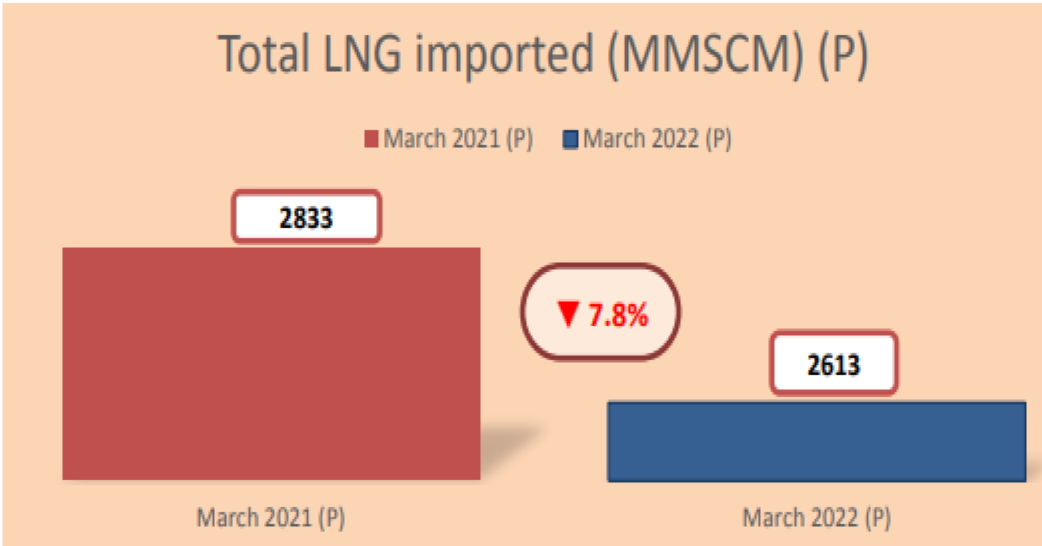


Source: PPAC

2. LNG imports:

Total imports of LNG (provisional) during the month of March 2022 were 2613 MMSCM (decrease of 7.8 % over the corresponding month of the previous year 2833 (MMSCM).

Figure 11: LNG imports (Qty in MMSCM)

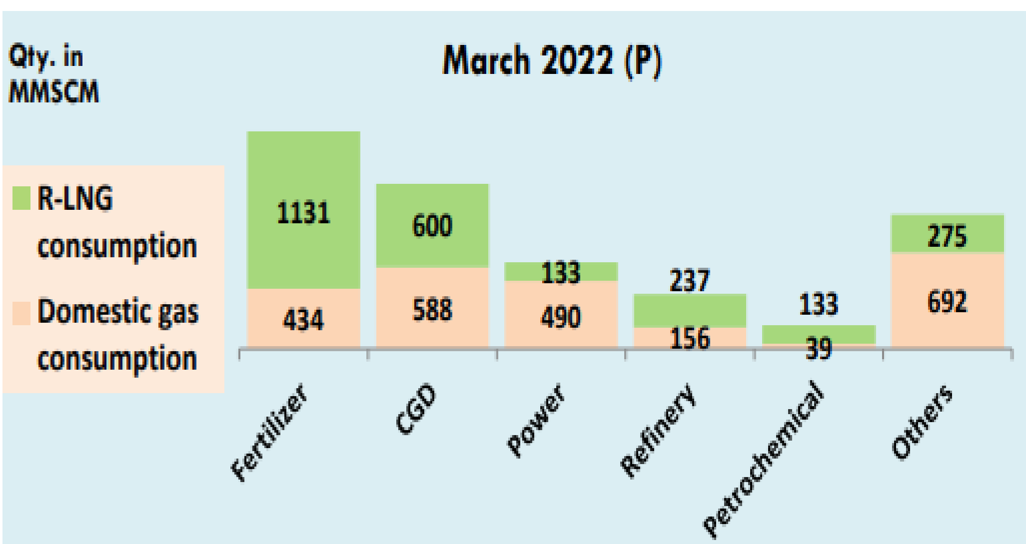


Source: PPAC

3. Sectoral Consumption of Natural Gas:

Total consumption of natural gas during March 2022 was 4794 MMSCM. Major consumers were fertilizer, CGD, power, refinery, others and petrochemicals.

Figure 12: Sectoral Consumption of Natural Gas (Qty in MMSCM) in February 2022



Source: PPAC

Key developments in Oil & Gas sector during March 2022

- **Monthly Production Report for March, 2022**

1. Production of Crude Oil

Indigenous crude oil and condensate production during March 2022 was lower by 3.4 % than that of March 2021 as compared to a de-growth of 2.2 % during February 2021. OIL registered a growth of 3.1 % and ONGC registered a de-growth of 1.8 % during March 2022 as compared to March 2021. PSC registered de-growth of 9.9 % during March 2022 as compared to March 2021. De-growth of 2.6 % was registered in the total crude oil and condensate production during April - March 2022 over the corresponding period of the previous year.

2. Production of Natural Gas

Gross production of natural gas for the month of March 2022 was 2886 MMSCM which was higher by 7.5% compared with the corresponding month of the previous year. The cumulative gross production of natural gas of 34024 MMSCM for the current financial year till March 2022 was higher by 18.7% compared with the corresponding period of the previous year.

3. Crude Oil Processed (Crude Throughput)

Crude oil processed during March 2022 was 22.3 MMT, which was 6.4 % higher than March 2021 as compared to a growth of 9.8 % during February 2021. Growth of 9.0 % was registered in the total crude oil processing during April- March 2022 over the corresponding period of the previous year.

4. Production of Petroleum Products

Production of petroleum products registered a growth of 5.8 % during March 2022 over March 2021 as compared to a growth of 8.8 % during February 2021. Growth of 8.9 % was registered in the total POL production during April- March 2022 over the corresponding period of the previous year.

Key Policy developments in Energy sector

- **India’s first pure green hydrogen plant commissioned in Jorhat**

Oil India Limited (OIL) has taken the first significant step towards Green Hydrogen Economy in India with the commissioning of India’s First 99.999% pure Green Hydrogen pilot plant, with an installed capacity of 10 kg per day at its Jorhat Pump Station in Assam.

The plant was commissioned in a record time of 3 months. The plant produces Green Hydrogen from the electricity generated by the existing 500kW Solar plant using a 100 kW Anion Exchange Membrane (AEM)

Electrolyser array. The use of AEM technology is being used for the first time in India. This plant is expected to increase its production of green hydrogen from 10 kg per day to 30 kg per day in future.

The company has initiated a detailed study in collaboration with IIT Guwahati on blending of Green Hydrogen with Natural Gas and its effect on the existing infrastructure of OIL. The company also plans to study use cases for commercial applications of the blended fuel.

- **BPCL, HPCL walk away with city gas licenses in latest bid round**

State-owned Bharat Petroleum Corporation Ltd (BPCL) and Hindustan Petroleum Corporation Ltd (HPCL) have bagged two licenses each for retailing CNG to automobiles and piped cooking gas to households in the latest bid round.

Seven companies had put in 21 bids for city gas licenses in five areas in states like Uttar Pradesh and West Bengal. The Petroleum and Natural Gas Regulatory Board (PNGRB) had offered 5 Geographical Areas (GAs), spread over 27 districts in five states, in the 11A city gas distribution (CGD) bid round.

BPCL won the license for a GA comprising districts such as Lakhimpur Kheri, Sitapur and Mahrajganj in Uttar Pradesh and another for Chhattisgarh's Koriya, Surajpur, Balrampur and Surguja districts have been clubbed into one GA.

HPCL won the license for a GA made up of Banka in Bihar as well as Dumka, Godda, Jamtara and Pakur districts in Jharkhand. It also won the license for GA made up of Birbhum, Murshidabad, Malda and Dakshin Dinajpur districts of West Bengal.

GAIL Gas Ltd, a unit of state gas utility GAIL, won the license for the Kodagan, Bastar, Sukma, Bijapur and Dantewada districts in Chhattisgarh.

After this bid round, about 88 per cent of the country's area would be authorized for the development of city gas distribution (CGD) network to provide access to natural gas to approximately 98 per cent of the population.

- **Joint Statement on meeting between MoP&NG and Minister of Mines and Energy of Brazil on Cooperation between India and Brazil in the Energy Sector, Bioenergy and Biofuels**

The Minister of Mines and Energy of the Federative Republic of Brazil, H.E. Mr. Bento Albuquerque paid an official visit to the Republic of India on April 19th -22nd, 2022 on the invitation of the Minister of Petroleum & Natural Gas of the Republic of India, Mr. Hardeep Singh Puri. H.E. Minister Albuquerque was accompanied by a delegation of private sector leaders of the biofuels and automotive sectors.

The leaders reviewed the existing bilateral cooperation across the entire spectrum of the energy sector and committed to enhance the beneficial partnership between the countries.

The two sides recognized the importance of the robust investment in the Brazilian oil and gas sector made by Indian companies and reaffirmed their commitment to safeguard existing investments, while encouraging further bilateral investments. The Indian side expressed interest for sourcing crude oil under long term special contracts.

The two Ministers reviewed the long list of bilateral and international activities and initiatives undertaken in the biofuels sectors in recent years, including the exchange of technical visits, the two editions of the Brazil-India Ethanol Talks, Symposium on Aviation Biofuels, launching of the Joint Working Group on Bioenergy Cooperation, Roundtable on India-Brazil Collaboration in Biofuels in the automobile Sector etc. They also noted bilateral coordination within G-20 on Climate and Energy, BRICS Energy Ministerial, Bio future Platform, Clean Energy Ministerial, Mission Innovation initiative and IBSA joint Working Group on energy, and the work carried out in the context of the United Nations High-Level Dialogue on Energy.

The Ministers identified priorities for further bilateral cooperation in nine key areas as follows under two broad focus zones:

I) **Implementation and scaling up**

a. Technical aspects of vehicle use of E20 blends in current fleets,
b. Technical aspects of higher blends of ethanol use in flex-fuel vehicles,
c. Flex-fuel technologies – four-stroke and two-stroke engines (Otto Cycle),
d. Biodiesel implementation,
e. Biogas / Biomethane policy and incentives, and
f. Efficient heat and power generation in sugar and ethanol plants.

II) **Technology and future fuels**

a. Sustainable aviation fuels – policies, feedstocks and implementation steps,
b. Second generation ethanol – policy and technologies, and
c. Synthetic biology cooperation.

The two Ministers took note of the recommendations of companies of the two countries, based on their various interactions including the concluded Roundtable on India-Brazil Collaboration in Biofuels in the automobile Sector. Some of the recommendations included:

- establishing a public policy to use ethanol as gasoline substitute to reduce external dependence, increase octane number of Otto cycle fuels and reduce greenhouse gas emissions;
- using the Life Cycle Assessment from well-to-the-wheel to evaluate sustainable mobility, considering energy generation step;
- developing a roadmap to introduce flex-fuel and hybrid flex-fuel vehicles;
- joint development of ethanol and biomethane fuel cell vehicles; and
- collaboration between the two Countries to develop less water intensive and higher sugar yield crop.
- water, genetic management and biotechnology of energy crops leading to first, Second and third generation biofuels and development of biotechnology for liquid bio-fuels and valorisation of agro industrial residues.

- The Ministers also agreed that it is critical to reinforce the promotion of sustainable bioenergy and biofuels at the global level, which would diversify options for energy security, boost rural development, bring about technological and industrial innovation, and create jobs and opportunities while reducing local and global emissions.

- **EOI sought for setting up a manufacturing zone on pilot basis for Power & Renewable Energy Sector**

Ministry of Power has sought Expression of Interest (EOI) for setting up a manufacturing zone on pilot basis for Power & Renewable Energy Sector. The Ministry had earlier issued orders conveying implementation of a Scheme for Setting up a Manufacturing Zone for Power and Renewable sector on pilot basis with a budgetary outlay of Rs.400 crore over a period of five years.

This is Central Sector Scheme and the duration of the Scheme is five years from FY 2022-23 to FY 2026-27. The last date for submission of Expression of Interest is 8th June 2022.

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