ECO FLASH

N°23-07

25 July 2023

GREENFLATION: HOW INFLATIONARY IS THE ENERGY TRANSITION?

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Greenflation most often refers to inflation linked to public and private policies implemented as part of the green transition.

Adapting production methods to low-carbon technologies, which emit fewer greenhouse gases, will require, on the one hand, massive and costly investments which will increase the marginal cost of each unit produced in the short term and, on the other hand, the use of rarer and therefore more expensive materials. This will create upward pressure on prices.

The ecological transition will also require putting the "price signal" into play: increase the price of fossil fuels through taxation (carbon tax) and emission allowance markets (explicit price) as well as regulations (implicit price).

The energy transition can also have indirect macroeconomic effects on inflation, both up and down. It would seem that in the short term, these effects are mainly inflationary, while in the medium/long term, the disinflationary effects of supply support and productivity gains could become more significant.

The sooner decarbonisation is initiated, in a clear, gradual and supported manner, the more its disruptive and inflationary effects are expected to diminish, and the sooner its positive effects would occur.

LME GLOBAL INDEX OF COMMODITY PRICES

CHART 1

SOURCE: LME, BNP PARIBAS

GREEN PRODUCTION WILL INITIALLY COST MORE

The green transition will largely involve a change in production methods. The physical capital used to produce today is largely responsible for the high greenhouse gas (GHG) emissions. In order to produce "green", this capital will need to be replaced by structures, equipment, materials and techniques that emit fewer GHGs. These major changes are likely to be inflationary, although opposite effects cannot be ruled out. We distinguish between several channels.

First, some of the minerals needed to develop a "net zero" industry are available in limited quantities and some are difficult to extract even though they are in high demand. According to the International Energy Agency, total demand for minerals to produce low-carbon technologies is expected to increase fourfold by 2040[1] assuming that the objectives of the Paris Agreements are met (see Chart 1). Regarding lithium, for example, for which demand is expected to quadruple between 2025 and 2035[2], scientists are still divided as to whether the reserves available will be sufficient to meet the growing demand for electric batteries. A first major difficulty comes from the high concentration of ore supply in the hands of a very small number of producers.

1 *The Role of Critical Minerals in Clean Energy Transitions*, Analysis, IEA
2 *The Stumbling Block in 'the Race of our Lives': Transition-Critical Materials, Financial Risks and the NGFS Climate Scenarios*, Banque de France (banque-france.fr)

CARBON PRICE IN THE EUROPEAN UNION

CHART 2 SOURCE: ICE, BNP PARIBAS

THE DIFFERENT SHADES OF GREEN INFLATION

Climateflation: Price increases linked to the "physical" effects of climate change, such as floods, fires and droughts, which disrupt supply and demand and increase production costs, particularly food products. Climate issues can also increase price volatility.

Fossilflation: Price increase due to "fossil fuel" components such as oil or gas. Fossilflation was largely responsible for the surge in inflation observed in Europe in 2021 and 2022.

Greenflation: Rising prices resulting from the adaptation of production processes to a decarbonised economy. It also includes the effects of carbon tax and public investment policies.

BOX 1 SOURCE : BNP PARIBAS

91% of lithium was produced by only three countries in 2022[3] (Australia, Chile and China), and more than 52% of cobalt production came from the Democratic Republic of Congo[4] in 2020. The European example of Russian gas shows to what extent the dependence on a single partner makes importing countries highly exposed to changes in commodity prices. In addition, operation of a new mine can spread over twenty years[5], adding an additional supply constraint. Finally, environmental barriers (biodiversity damage) also weigh on the supply of these minerals.

This concentration of supply, as well as the constraints on mining techniques, make supply very inelastic. This combination of low supply and strong demand creates an inflationary configuration on these markets. Lithium prices have increased sixfold since 2009. Prior to the pandemic and the energy crisis that followed, this same lithium price had increased by 43% since 2009. The evolution of the London Metal Exchange (LME) index also illustrates the high volatility surrounding the price of these minerals (see Chart 2). However, this type of effect must be put into perspective. Indeed, it is above all a distortion in the relative prices of the goods mentioned compared to carbon-intensive goods. The total impact on inflation will depend on the extent of the rise in the prices of goods used by low-carbon technologies.

Secondly, companies and public authorities must direct their research towards new processes in order to decarbonise their industries. However, these new technologies require significant investment (notably in research and development), especially during the transition period. These investments in the energy transition are expected to represent 2% of global GDP on average per year until 2050[6] in order to complete this transition.

In the short term, the investments made will increase the fixed production costs which will be passed on to the prices and therefore have inflationary effects. On the other hand, part of the capital currently used will be declared obsolete before the end of its life cycle ("stranded assets").

This capital destruction constitutes a negative supply shock, which is potentially inflationary. However, we will see that the aggregated productivity gains that will result from green innovations should subsequently have a disinflationary effect.

THE INFLATIONARY EFFECTS OF A CARBON TAX

The ecological transition also requires putting the "price signal" in play: increasing the prices of polluting products to reduce their use.

These prices can be both explicit and implicit. The term "explicit" price refers to the actual price paid by the person who buys the good. Increasing the explicit price on a discretionary basis involves carbon taxation and emission allowance markets. The "implicit" price refers to the hidden costs of acquiring a good that is not reflected in the price paid at the time of exchange. Increasing the implicit cost can be achieved by regulating the production, exchange and consumption of the good.

For example, by facilitating administrative procedures for the installation of solar panels by private individuals, or conversely by making it more difficult to extract fossil fuels, a State would add to the implicit price of electricity produced from them. This increase in the prices of carbon products, such as oil or coal, is necessary as part of an energy transition policy, in order to reduce demand for these products, provided that alternatives are developed in parallel.

Among the most advanced options for increasing the price of fossil fuels, carbon tax is one of the easiest to apply technically. It works by having the producer of the emission pay a tax per tonne of CO_2 emitted. This increases the marginal cost of manufacturing any carbon-producing goods. This increase in costs is then largely reflected in the sale price of finished products and in the increase in these components in the consumer price index. The principle of carbon tax and its implementation are therefore likely to create inflation whenever the rate of this tax increases.

3 Lithium (usgs.gov)
4 *Cobalt Mining*, Cobalt Institute
5 Les incidences économiques de l'action pour le climat – Rapport Inflation, Chapitre 1.2.2 (strategie.gouv.fr)
6 *Global Energy Transformation: A Roadmap to 2050, International Renewable Energy Agency, Abu Dhabi (ISBN 978-92-9260-059-4).*

CARBON TAXATION AND EMISSION ALLOWANCE MARKETS:

While carbon taxation and emission allowance markets both have the same goal of increasing the cost of GHG emissions, their mechanisms differ. In an allowance market, the increase in the cost of carbon results from the setting of a market price. The largest example of an EU allowance market is the Emissions Trading System (ETS). For its part, the carbon tax is based on a rate set by governments. In particular, the latter may use carbon taxation to offset the absence of an allowance market in certain sectors (e.g. road transport).

BOX 2

POTENTIAL CARBON PRICE TRAJECTORIES TO 2050

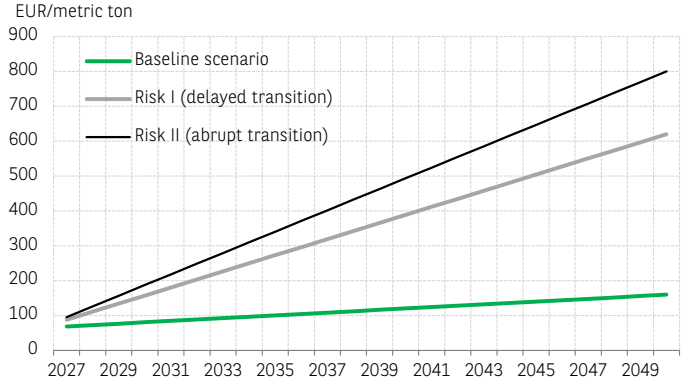

CHART 3 SOURCE: NOH ET AL. (2020), BNP PARIBAS

IMPACT OF CARBON PRICE INCREASE ON GERMAN INFLATION

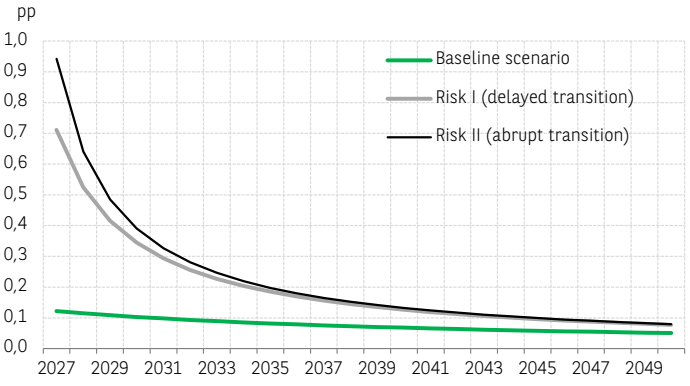

CHART 4 SOURCE: NOH ET AL. (2020), BNP PARIBAS (GLOBAL MARKETS CALCULATION)

Many countries (France, Denmark, Germany, etc.) have already introduced a carbon tax. The price per tonne of CO_2 is now more than ten times higher than when the Paris Agreements were signed in December 2015, according to the ICE. While recent events affecting the energy market contributed to this increase, pollution was already 2.8 times more expensive in February 2020 than in December 2015[7]. In France, since 2018, the carbon tax has been EUR 44.6/tonne of CO_2 emitted, for a European market price of EUR 88.1/tonne of CO_2 in June 2023 (see Chart 3).

What do research and business models say about the impact of a broad-based carbon tax on medium and long-term inflation?

According to Banque de France[8] the inflationary impact of the carbon tax depends on the gradual and early implementation of the tax. The earlier and more gradual the implementation, the less inflationary the carbon tax would be, and *vice versa*. The study shows that in a scenario where the carbon tax is used to finance the public investment needed for the transition, the impact on inflation would be positive within five years (around +0.2 pp). In addition, this impact would be even greater in a scenario where implementation is abrupt and free of public investment policy in favour of the transition (around +0.5 pp).

This result shows the importance of supporting households most affected by the carbon tax. According to a case study conducted by BNP Paribas Global Markets[9] on Germany, the inflationary impact of an orderly rise in the price of carbon to 180 euros/tonne in 2050 would be +0.1 pp per year between 2026 and 2050. This impact, although seemingly small, nevertheless demonstrates that the implementation of a carbon tax will not be without effects on inflation, and is based on the hypothesis of a gradual and uninterrupted increase. This study also shows that the inflationary impact of carbon taxation increases when the transition is delayed and/or too sudden. The impact on German inflation of too steep a transition could thus amount to almost 1 point in 2026 and remain above +0.2 points until 2035.

OVER A LONGER PERIOD, DISINFLATION?

Without taking into account potential productivity gains linked to green investments, the Pisani/Mahfouz report from France Stratégie[10] estimates that the impact of all transitional measures on the household consumer price index would be +7 pp by 2040. However, disinflationary macroeconomic effects could also occur in the medium term. The classification of these effects, carried out by the Banque de France and found in the Pisani/Mahfouz report, according to their origin and the scenario considered, is particularly illuminating.

Firstly, some disinflationary effects could come from a negative demand shock linked to the transition policies put in place. This type of effect could occur in a scenario where high uncertainty generates a crisis of confidence among the various actors. This uncertainty would lead to a drop in household consumption via an increase in their precautionary savings[11], as well as a drop in private investment. This would result in lower aggregate demand than in a scenario with no period of uncertainty, which would have a negative impact on business and prices.

7 European Carbon Price at an All-Time High (bnpparibas.com)
8 *The transition to carbon neutrality: effects on price stability*, Banque de France (banque-france.fr), March-April 2023
9 *Climate and inflation: Hotter prices for a cooler planet* (bnpparibas.com)
10 *Les incidences économiques de l'action pour le climat*, France Stratégie (strategie.gouv.fr), rapport de synthèse : 2023-impacts-economics-report-pisani-5June.pdf (strategie.gouv.fr), 5 June 2023
11 *Will the green transition be inflationary? Expectations matter* (europa.eu)

In its study, the Banque de France estimates that such a scenario would have a maximum impact on inflation of around -0.75 points after five consecutive quarters. A negative demand shock could also be the result of a poor calibration of carbon tax increases and a lack of redistribution policies that would cause households' disposable income to fall. This would result in depreciated consumption that would drive all prices (and not just energy) down. Finally, the change in household behaviour (towards sobriety) called for by the fight against global warming (movement, energy, clothing) could also have a negative impact on prices.

Disinflationary pressures could also come from the positive effects of the transition on supply. These effects would occur in the medium/long term in a scenario where green investment, particularly private investment, would allow productivity gains that are large enough to offset the inflationary effects of the transition. According to the Banque de France, such a scenario would be disinflationary for France after five years, with an impact of -0.8 points on year-on-year inflation.

Conversely, transition policies could also have short-term inflationary macroeconomic effects. Policies in different countries, such as the Inflation Reduction Act[12] in the United States or the NextGenerationEU in Europe, are likely to stimulate global demand, among others for materials needed for decarbonised production and renewable energies. Initially, these goods will be more expensive than those currently in use and this increase in demand will lead to an increase in their price, as identified above. More generally, the positive demand shock initiated by the rise in public spending could be a factor in the spread of inflation, especially if budgetary support is financed by an increase in the carbon tax. In the long run, these investments could reduce inflation by increasing productivity, as would be for private investments.

Finally, as mentioned previously, negative supply shocks could also cause inflationary effects, such as a disorderly rise in carbon pricing, too sharp a tightening of environmental regulations, or even an acceleration of capital obsolescence.

To conclude, the "positive" disinflationary effects mentioned – those arising from supply – seem uncertain, if not hypothetical. Above all, they would only occur in the medium to long term. They could then dominate inflationary effects once the transition period has passed and economies have decarbonised. In the short term, however, the inflationary effects of the energy transition are likely to prevail.

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FOUR SCENARIOS WITH SHOCKS

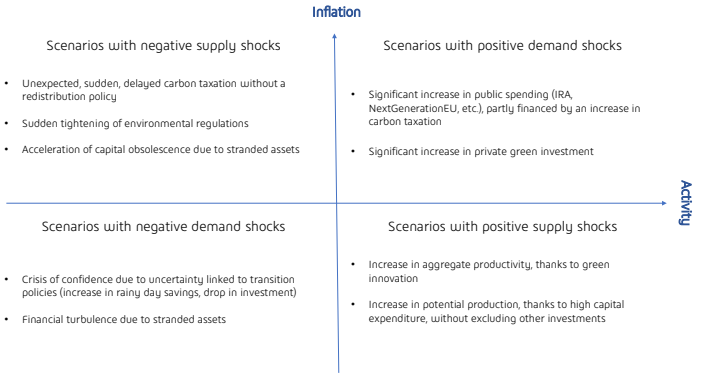

FIGURE SOURCE: BANQUE DE FRANCE, FRANCE STRATÉGIE, BNP PARIBAS

12 The Inflation Reduction Act (IRA), which was voted at the US Congress in August 2022, has the primary objective of accelerating the energy transition of the US economy. Its name "Inflation Reduction Act" comes in particular from its reform of the pricing of prescription drugs, but also from the drop in inflation which should come from the reduction in the exposure of the United States to the physical and energy risks associated with global warming (fossilflation and climateflation).
13 We also thank Romane Surel, an apprentice at BNP Paribas Economic Research from September 2021 to August 2022, for her contribution to this EcoFlash.

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Head office: 16 boulevard des Italiens – 75009 Paris France / Phone : +33 (0) 1.42.98.12.34
Internet: www.group.bnpparibas.com - **www.economic-research.bnpparibas.com**

Head of publication : Jean Lemierre / Chief editor: William De Vijlder

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