## 3.1.2 Industrial and environmental risks and risks related to climate issues

**TOTAL is exposed to risks related to the safety and security of its operations.**

The Group's activities involve a wide range of operational risks, such as explosions, fires, accidents, equipment failures, leakage of toxic products, emissions or discharges into the air, water or soil, that can potentially cause death or injury, or impact natural resources and ecosystems.

The industrial event that could have the most significant impact is a major industrial accident, *e.g.*, blow out, explosion, fire, leakage of highly toxic products or massive leakage, resulting in death or injury and/or accidental pollution on a large-scale or at an environmentally sensitive site.

Acts of terrorism or malicious acts against the Group's or contractors' employees, plants, sites, pipelines and transportation or computer systems could also disrupt the Group's business activities and could cause harm or damage to people, property and the environment.

Certain activities of the Group face additional specific risks. TOTAL's Exploration & Production activities are exposed to risks related to the physical characteristics of oil and gas fields, particularly during drilling operations, which can cause blow outs, explosions, fires or other damage, in particular to the environment, and lead to a disruption of the Group's operations or reduce its production. In addition to the risks of explosions and fires, the activities of the Gas, Renewables & Power, Refining & Chemicals and Marketing & Services business segments entail risks related to the overall life cycle of the products manufactured, as well as the materials used. With regard to transportation, the likelihood of an operational accident depends not only on the hazardous nature of the products transported, but also on the volumes involved and the sensitivity of the regions through which they are transported (quality of infrastructure, population density, environmental considerations).

TOTAL's workforce and the public are exposed to risks inherent to the Group's operations, which could lead to legal proceedings against the Group's entities and legal representatives, notably in cases of death, injury and property and environmental damage. Such proceedings could also damage the Group's reputation. In addition, like most industrial groups, TOTAL is concerned by declarations of occupational illnesses.

To manage the operational risks to which it is exposed, the Group has adopted a preventive and remedial approach by putting in place centralized HSE (health, safety and environment) and security management systems that seek to take all necessary measures to reduce the related risks (refer to point 3.3.3.3 of this chapter). In addition, the Group maintains third-party liability insurance coverage for all its subsidiaries. TOTAL also has insurance to protect against the risk of damage to Group property and/or business interruption at its main refining and petrochemical sites. TOTAL's insurance and risk management policies are described in point 3.4 of this chapter. However, the Group is not insured against all potential risks. In certain cases, such as a major environmental disaster, TOTAL's liability may exceed the maximum coverage provided by its third-party liability insurance. The Group cannot guarantee that it will not suffer any uninsured loss and there can be no guarantee, particularly in the event of a major environmental disaster or industrial accident, that such loss would not have a material adverse effect on the Group's financial condition, including its operating income and cash flow, and its reputation.

**Crisis management systems are necessary to effectively respond to emergencies, avoid potential disruptions to the Group's business and operations and minimize impacts on third parties or the environment.**

The Group has crisis management plans in place to deal with emergencies (refer to point 3.3 of this chapter). However, these plans cannot exclude the risk that the Group's business and operations may be severely disrupted in a crisis situation or ensure the absence of impacts on third parties or the environment. TOTAL has also implemented business continuity plans to continue or resume operations following a shutdown or incident. An inability for the Group to resume its activities in a timely manner could prolong the impact of any disruption and thus could have a material adverse effect on its financial condition, including its operating income and cash flow.

**TOTAL is subject to increasingly stringent environmental, health and safety laws and regulations in numerous countries and may incur material related compliance costs.**

The Group's activities are subject to numerous laws and regulations pertaining to the environment, health and safety. In most countries where the Group operates, particularly in Europe and the United States, sites and products are subject to increasingly stringent laws governing the protection of the environment (*e.g.*, water, air, soil, noise, protection of nature, waste management, impact assessments), health (*e.g.*, occupational safety, chemical product risk), and the safety of personnel and residents. Product quality and consumer protection are also subject to increasingly strict regulations. The Group's entities ensure that their products meet applicable specifications and abide by all applicable consumer protection laws. Failure to do so could lead to personal injury, property damage, environmental harm and loss of customers, which could negatively impact the Group's financial condition, including its operating income and cash flow, and its reputation.

TOTAL incurs, and will continue to incur, substantial expenditures to comply with increasingly complex laws and regulations aimed at protecting health, safety and the environment. Such expenditures could have a material adverse effect on the Group's financial condition.

The introduction of new laws and regulations could compel the Group to curtail, modify or cease certain operations or implement temporary shutdowns of sites, which could diminish its productivity and have a material adverse impact on its financial condition.

Moreover, most of the Group's activities will eventually, at site closure, require decommissioning followed by environmental remediation after operations are discontinued, in compliance with applicable regulations. Costs related to such activities may materially exceed the Group's provisions and adversely impact its operating results. With regard to the permanent shutdown of an activity, the Group's environmental contingencies and asset retirement obligations are addressed in the "Asset retirement obligations" and "Provisions for environmental contingencies" sections of the Group's consolidated balance sheet (refer to Note 12 to the Consolidated Financial Statements, point 8.7 of chapter 8). Future expenditures related to asset retirement obligations are accounted for in accordance with the accounting principles described in the same Note.

**Laws and regulations related to climate change as well as growing concern of stakeholders may adversely affect the Group's business and financial condition.**

Global concern over greenhouse gas ("GHG") emissions and climate change, which notably led to the signature of the Paris Agreement on December 12, 2015 as part of the United Nations Climate Change Conference (COP 21), is likely to lead to further regulation in these areas. These additional regulatory requirements could lead the Group to curtail, change or cease certain of its operations, and submit the Group's facilities to additional compliance obligations, which could adversely affect the Group's businesses and financial condition, including its operating income and cash flow.

Regulations designed to gradually limit fossil fuel use may, depending on the GHG emission limits and time horizons set, negatively and significantly affect the development of projects, as well as the economic value of certain of the Group's assets. Internal studies conducted by TOTAL have shown that a long term $CO_2$ price of $40/t[1] applied worldwide would have a negative impact of around 5% on the discounted value of the Group's assets (upstream and downstream)[2]. In addition, the average reserve life of the Group's proved and probable reserves is approximately 20 years and the discounted value of proved and probable reserves with a reserve life of more than 20 years is less than 10% of the discounted value of the Group's upstream assets. In response to these possible developments, natural gas, which is the fossil energy that emits the least amount of GHG, represented nearly 48% of TOTAL's production in 2017, compared to approximately 35% in 2005, and the Group's objective is to grow this percentage over the long term with the expected growth of gas markets. In addition, the Group ceased its coal production activities and is developing its activities in the realms of solar energy production and energy from biomass (renewable energies).

In Europe, the regulations concerning the market for $CO_2$ emission allowances, the EU Emissions Trading System (EU-ETS), entered a third phase on January 1, 2013. This phase marks the end of the overall free allocation of emission allowances: certain emissions, such as those related to electricity production, no longer benefit from free allowances, while for others free allowances have been significantly reduced. Free allocations are now established based on the emission level of the top-performing plants (*i.e.*, the least GHG-emitting) within the same sector ("top 10 benchmark"). Lower-performing plants must purchase, at market price, the necessary allowances to cover their emissions over these free allocations. The plants also need to indirectly bear the cost of allowances for all electricity consumed (including electricity generated internally at the facilities). The 2014 update to the EU-ETS list of sectors exposed to carbon leakage confirmed that refining activities in Europe are an exposed sector and should continue to benefit from free allocations partially covering its deficits. Based on available information, the Group has estimated that approximately 25% of its emissions subject to the EU-ETS will not be covered by free allowances during the period 2013-2020 and at least 30% during the period 2021-2030. The financial risk related to the foreseeable purchase of $CO_2$ emission allowances on the market is expected to rise due to the effects of the ongoing reform of the EU-ETS. At year-end 2017, the price of $CO_2$ emission allowances stood at approximately €7.5/t $CO_2$. The forecast for 2020 indicates that the price could rise to approximately €15/t[3] $CO_2$ due to the establishment of a "market stability reserve" as from 2019. The Group believes that the price of $CO_2$ emission allowances could rise to at least €30/t during phase 4 (2021-2030).

In addition, the growing concern of all stakeholders with regard to climate change could potentially have an impact on certain external financing of the Group's projects or influence certain investors involved in the oil and gas sector.

Finally, the Company and several of its affiliates have received claims issued by public entities in certain countries in view of financing the protective measures to be implemented in order to limit the consequences of climate change. The Group is subject to the risk of judicial actions in this area.

**The physical effects of climate change may adversely affect the Group's business.**

TOTAL's businesses operate in varied locales where the potential physical impacts of climate change, including changes in weather patterns, are highly uncertain and may adversely impact the results of the Group's operations.

Climate change potentially has multiple effects that could harm the Group's operations. The increasing scarcity of water resources may negatively affect the Group's operations in some regions of the world, high sea levels may harm certain coastal activities, and the multiplication of extreme weather events may damage offshore and onshore facilities. These climate risk factors are continually assessed in TOTAL's management and risk management plans.

The Group believes that it is impossible to guarantee that the contingencies or liabilities related to the matters mentioned in this point 3.1.2 would not have a material adverse impact on its business, financial condition, including its operating income and cash flow, reputation or outlook, if such risks were to occur.

*(1) As from 2021 or the current price in a given country.*

*(2) Sensitivity calculated for a crude oil price of $60/$80/b compared to a reference scenario that takes into account a $CO_2$ price in the regions already covered by a carbon pricing system.*

*(3) Company data.*