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Original Paper

The Impact of the Energy Transition under the European Green Deal on Corporate ESG Disclosure—Analysis Based on European Policies and Business Practices

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Abstract

Starting from the implementation of European energy policies, this paper first discusses the pressure of the energy transition and the development of ESG disclosure in Europe. It then analyzes and identifies potential challenges that Chinese enterprises may encounter in practice, based on detailed data from the European Green Deal and Total's sustainability report, and offers relevant suggestions.

Keywords

Energy Transition, Carbon Footprint, Total Corporation, ESG, The European Green Deal

1. Introduction

1.1 Background

Europe is undergoing a huge energy transition, in the energy issue, Europe is facing multiple dilemmas, from the inside, the use of new energy and the shortage of fossil fuels have caused the rapid rise in energy costs of European residents, and European industry will have to face the price war implicated in the rise in raw materials; From an external point of view, the competitive pressure of China and the United States and the dependence on strategic new energy technologies have put Europe's energy imports at great risk to security.

1.2 Purpose and Significance of the Study

Europe is undoubtedly at the forefront of the global energy transition. This paper aims to analyze recent policy changes in Europe and the actual results achieved in recent years. By combining this analysis with Total’s sustainability report, it focuses on evaluating Europe’s achievements in green carbon reduction and puts forward targeted suggestions for Chinese enterprises to enhance their effectiveness in the energy transition and improve the quality of their ESG disclosures.

1.3 An Overview of the Structure of the Dissertation

This paper first analyzes the impact of the Russia-Ukraine war on European energy policy and explores the EU's policy changes regarding sustainability and ESG. It then discusses the effects of these policies on the European economy and businesses, with particular attention to energy-related measures and their implications. Beyond the analysis of Europe, the paper assumes a Chinese perspective to examine how advanced European policies might be applied by Chinese companies, offering comments and suggestions for improvement. Finally, it analyzes Total's sustainability report and summarizes its strengths in energy transition and sustainable development.

2. Policy Analysis of Energy Transition and ESG in Europe

2.1 The impact of the war in Ukraine on European energy policy

Russia was once the largest energy exporter to Europe. However, after the outbreak of the war in Ukraine, Russia became subject to joint sanctions from Western European countries and other NATO member states, which gradually restricted its energy supply to the region. Following the Nord Stream incident, Russia's energy exports to Europe were further reduced.

In response to the energy threat and the high cost of importing energy from Russia, Europe has accelerated the development of renewable energy. At the same time, it has imposed higher ESG requirements on enterprises, aiming to reduce dependence on Russian energy and increase investment in green energy sources such as wind and solar power to maintain the stability of Europe's energy supply.

2.2 The Effectiveness and Development of EU Energy Policy and ESG Reforms

In the field of natural gas, Europe is gradually reducing its dependence on Russia under the REPowerEU program. The program has achieved significant results. According to data from the European Green Deal report, Russia is no longer the largest supplier of natural gas to the European Union, having been replaced by Norway and the United States. Pipeline gas and liquefied natural gas (LNG) from these two countries accounted for 34% and 18% of EU gas imports in the first half of 2024, respectively. In contrast, imports of Russian gas (pipeline and LNG combined) fell from 45% of total EU gas imports in 2021 to just 18% by August 2024.

To meet the EU's medium-term goal of reducing net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels, Europe is considering reforming its energy taxation system. However, the response to energy tax reform (especially carbon tax reform) has been less than satisfactory. While Germany and France have made substantial progress in implementing subsidy policies, other European countries prefer to adopt a more moderate approach.

In terms of energy imports, infrastructure development has played a vital role in strengthening Europe's energy security. Between 2022 and 2024, the EU built 12 new gas receiving terminals and expanded six existing ones. The EU Energy Platform has also secured 75 billion cubic meters (bcm) of gas supply for Europe, contributing to the EU's total gas import capacity of approximately 284 bcm.

In the energy industry, faced with intense price competition from China, the United States, and other regions, the EU has signed strategic partnerships for a sustainable raw material value chain through the Critical Raw Materials Act. This legislation establishes key trade partnerships with countries such as Australia and Serbia, aiming to support Europe's supply of new energy equipment and nuclear fuel. These efforts are expected to help lower energy prices and enhance the competitiveness of the European energy sector.

Figure 1. Chart of the Decrease in Natural gas Energy Demand in European Countries

In the field of new energy, wind power generation has surpassed that of natural gas, becoming the second largest source of electricity in the EU after nuclear energy. The EU added 56 GW of solar capacity in 2023, a new record compared to the 40 GW added in 2022. At the same time, the cumulative installed capacity of wind energy in the EU onshore and offshore is 221 GW (201 GW onshore; 19 GW offshore), compared to 16 GW installed capacity in 2023.

Between 2021 and 2023, wind and solar capacity increased by 36%, saving around 35 billion cubic meters (bcm) of natural gas over 2 years. With 56 GW of new solar capacity added in 2023, the EU set another record, surpassing the 40 GW of new capacity added in 2022. Despite the steady growth of new energy sources and related boiler equipment, fossil fuel and fossil fuel boilers are still the main source of energy heating in Europe.

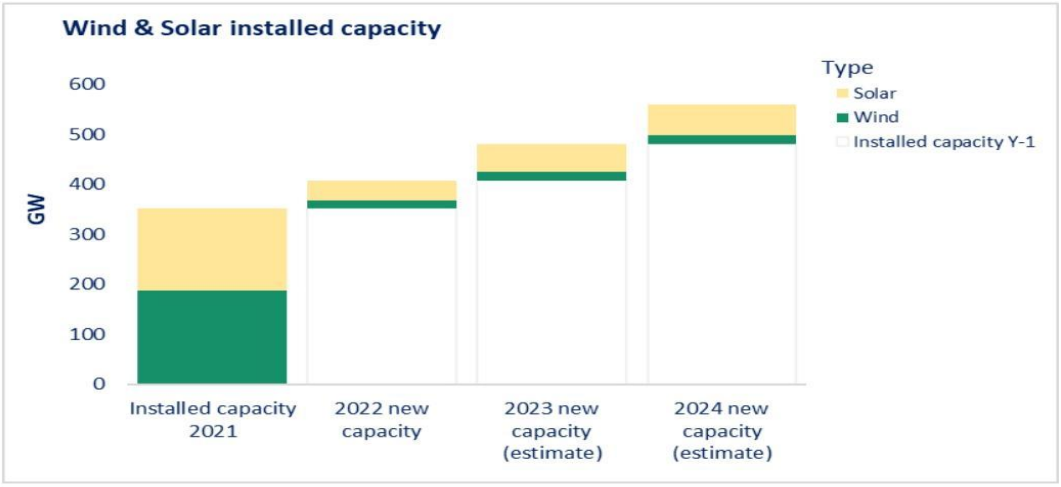

Figure 2. Wind and Solar Installed Capacity, based on Eurostat

In addition, hydrogen energy has become a major focus of European funding. The EU continues to support renewable hydrogen through initiatives such as the establishment of auction platforms, the creation of dedicated funds, and the development of "hydrogen valleys." However, it is worth noting that the European Court of Auditors has raised concerns regarding this approach, stating that the regulatory framework under the Enabling Act for low-carbon hydrogen needs to be strengthened. Similarly, in the context of implementation in China, greater emphasis should be placed on regulatory action and improvement.

In 2023 and 2024, two new EPR (European Pressurized Reactor) nuclear reactors are scheduled to be commissioned in the European Union. These reactors will generate carbon-free electricity sufficient to meet the needs of six million households. This development stands in stark contrast to Europe's stance a decade ago, when Germany's Green Party consistently opposed nuclear power—a position that made Germany one of the most controversial regions in the EU energy debate.

Employment remains a key pillar of EU policy. The EU is seeking to form more partnerships and agreements within the renewable energy sector to ensure that workers can acquire the necessary skills. This effort aims to fully realize the employment potential associated with the REPowerEU objectives.

In the legislative sphere, Europe is undergoing large-scale, three-tiered legislative revisions, largely driven by the growing implementation of treaties and regulations in recent years. Data from the European Green Deal shows that the number of new policy initiatives in 2024 alone has surpassed the combined total for 2021 and 2022. Grassroots surveys also indicate that this three-tier legislative framework is essential for effective policy implementation, as 10.6% of EU residents still reported being unable to adequately heat their homes in 2023.

2.3 An Overview of the European Green Deal and Related ESG Disclosures

As a comprehensive green policy initiative, the European Green Deal places the greatest emphasis on environmental (E) aspects, particularly in relation to carbon emissions, carbon footprints, green bonds,

and ecological and environmental changes. In the product sector, carbon content is becoming a central criterion for environmental assessments of enterprises. Although methods for quantifying carbon content vary across European countries and industry associations, the general trend—based on national associations and industry standards—is toward increasingly strict tolerance for corporate carbon emissions.

Carbon emissions and carbon footprints have become focal points of corporate ESG disclosures, in alignment with the Corporate Sustainability Reporting Directive (CSRD).

According to the Greenhouse Gas Protocol and ISO 14064 (hereinafter referred to as the relevant European Directive), **carbon emissions** refer to the greenhouse gases (usually measured in terms of carbon dioxide) that are directly generated by a company's activities, including emissions from factories and vehicles involved in production and sales. In contrast, the **carbon footprint** is a broader concept, encompassing the entire life cycle of emissions from a product or service—from raw material extraction to final disposal—and even includes tracking emissions across the entire value chain.

Clearly, the quality and complexity of carbon footprint disclosure are significantly higher than those of direct emissions disclosure. As a result, current European laws and regulations only mandate the disclosure of carbon emissions from corporate activities. To manage these emissions, an independent carbon emission trading system has been established—similar to that in China—and is currently being further developed and refined.

3. Analysis of Total's Decarbonization Practices

TotalEnergies wants to become one of the top five renewable energy producers by 2030 and become a green energy giant. Total's targets are clear: in 2019, the share of oil, gas and electricity in its business structure will be 55%, 40% and 5%, by 2030 the share of oil will be reduced to 35%, and by 2050 the proportion of oil, gas and electricity will be adjusted to 20%, 40% and 40%. In the field of renewable energy, TotalEnergies plans to invest US$60 billion over the next decade to achieve 100GW of renewable energy capacity by 2030. Total's figures are essentially the same as the expectations for the installed capacity required by the European Green Deal, and the company's approach to achieving its sustainability goals is climate and sustainable energy, caring for the environment, acting for the well-being of its employees, and positive impact on its stakeholders.

Hydrocarbons (especially LNG) and integrated energy (the core energy source of the energy transition) are the two foundations of Total's energy transition. Total has also achieved industry-low levels of methane emissions in its upstream oil and gas business, with LNG being an important part of Total's emissions reductions, generating 70 metric tons of *CO2 reductions* for Total.

Compared with the new investment in the construction of renewable energy assets, Total has not given up the management of oil and fossil fuel assets, reducing the emission scope and value of oil assets and reducing the cost of asset use has become an important way of Total's management, and Total is doing this: the first step, supply and demand analysis, Total as a global multinational company, said that

supply and demand are global supply and demand, not a single French supply and demand, Total through the global oil field situation and downstream product sales data, Considering that the demand for oil and fossil fuels is still on the rise, that is, the company will continue to produce oil and related fossil energy products, Total will not continue to consider large investment plans in this area, and predicts that oil demand will start to decline after 2030. In Total's sustainability report, it continues to add that although demand for oil and related fossil products will not decline in recent years, Total will continue to reduce emissions at a rate of at least 4% per year.

In order to meet the carbon reduction target, this is the second step of Total. Asset analysis, most of the design of oil and fossil energy assets are fixed assets, and when analyzing the quality of fossil energy fixed assets of Total, we should examine the rationality of its allocation, the combination with non-financial data, and the Five aspects of profitability, turnover, and value preservation are covered in Total's sustainable development report. Specifically, the report highlights the company's focus on reducing the costs and emissions associated with fossil energy assets. By utilizing data tools and monitoring equipment, Total has significantly reduced operating costs. Given that Total's human resources are primarily sourced from abroad, labor costs cannot be solely compared to European standards. However, in terms of carbon emission control, Total is undoubtedly an industry leader. Advanced technology and internal control processes have become essential tools for energy conservation and emission reduction.

When combining financial and non-financial data, identifying the carbon footprint of assets has become a key focus of corporate environmental and social disclosures. Due to varying financial statement standards, a specific analysis based on accounting standards applicable to mainland China can be conducted. For example, within the product value chain, products with carbon content are accounted for through three main categories: manufacturing expenses, management expenses, and sales expenses. This suggests that the main subjects involved in accounting are production costs, purchased fuel, and asset depreciation. The key challenge, however, lies in isolating the carbon footprint across these three categories. For instance, the carbon footprint of petroleum products may be attributed to the accumulated depreciation of fixed assets at the time of extraction, the management expenses related to purchased fuel, the transportation of equipment, and employee remuneration. Sales expenses—such as those related to gas stations—complete the process, which spans from upstream to downstream, headquarters to branches, and finally to the final sales and tax payments. The latter three categories, which are not directly related to ESG disclosure requirements, will not be discussed here.

Market adaptability represents the final step in Total's carbon reduction goals. This step not only continues the previous analysis of supply and demand and asset optimization, but also redefines TotalEnergies' position in the global energy market. Whether driven by the rapid rise of new energy vehicles or by the trillion-dollar graphics card industry powering artificial intelligence, Total has consistently managed to position itself as a global energy leader amidst rounds of industrial evolution and technological advancements, particularly in the area of low-carbon electricity supply.

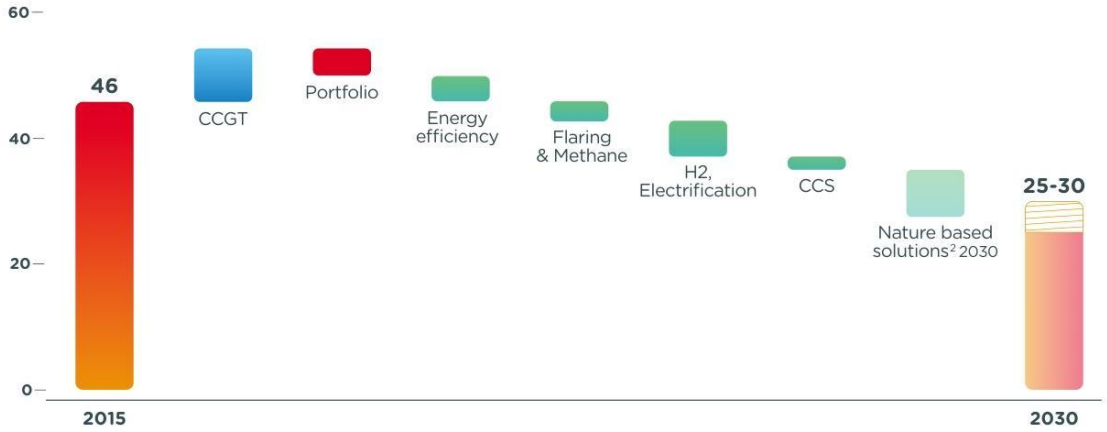

Figure 3. Contribution map of Total's Carbon Emission Reduction Technology Pathway

4. Review of other Aspects

As of the end of 2022, the total face value of green bonds issued by the EU government amounted to €266 billion, equivalent to 1.7% of the EU's GDP. Among EU countries, France and Germany had the highest stock of green bonds by the end of 2022, with €94.7 billion and €63.1 billion, respectively, accounting for 59.2% of the total outstanding green bonds issued by the EU government.

However, on February 26, 2025, the European Commission's Omnibus Package raised the threshold for mandatory ESG report disclosures under the Corporate Sustainability Reporting Directive (CSRD) for very large companies. Super-large companies from France and Germany, such as Volkswagen, BMW, Total, and other major industrial or energy companies, now account for the majority of ESG reports. For these companies, how to engage in green bond financing and manage financial data is of paramount importance.

In the realm of pollution control, toxic substances and waste discharge remain critical areas of focus for companies. However, a growing concern is the new type of electronic waste (e-waste). In 2022, Europeans generated 17.6 kg of e-waste per capita, with France producing 22.4 kg of e-waste per capita. This indicates that companies subject to mandatory ESG disclosures need to address the recycling and reprocessing of electronic products. Many retailers choose to sell e-waste to third-party recycling providers, such as SIM Recycling Solutions or Electronic Recyclers International, who then handle the treatment and decomposition process. Unfortunately, in rural areas, retailers are often forced to opt for smaller recyclers with less advanced processes due to transportation costs. In such cases, large companies might exploit this situation by outsourcing their e-waste processing to these smaller enterprises, thus transferring the ESG emissions of the processing stage to businesses not required to disclose ESG data. This could allow them to potentially "greenwash" their ESG reports.

5. Conclusions of the Study

In the course of this research, this paper highlights several issues regarding ESG information disclosure and the legal framework for European companies. The key findings are as follows:

First, in terms of disclosure guidelines, China's current ESG information disclosure standards are lagging behind. While some large domestic enterprises and regulators have mandated ESG disclosure, and local stock exchanges have published their own guidelines, there is no unified framework, and the existing guidelines lack a high level of professionalism. In contrast, European companies generally adhere to well-established standards, such as GRI, SDGs, and ISO standards, which are highly professional.

Second, in terms of disclosure channels, the number of ESG information disclosure channels for Chinese enterprises is relatively small compared to that of European enterprises, although the number of disclosure channels is increasing.

Third, in terms of information quality, the ESG disclosure of China's power generation enterprises suffers from issues such as incomplete information, a predominance of qualitative data over quantitative data, and a lack of objectivity and accuracy in the disclosed information.

Fourth, there is a lack of third-party independent assurance in the ESG information disclosure process of Chinese enterprises, which leads to insufficient objectivity and reliability in the ESG information that is disclosed.

Table 1. European Policy Objectives (Partial)

entity	Carbon emission targets	Time frame	Base year	remark
European Union	55% reduction in greenhouse gas emissions compared to 1990 levels	2030	1990	Achieve climate neutrality by 2050
Germany	65% reduction in greenhouse gas emissions compared to 1990 levels	2030	1990	Achieve carbon neutrality by 2045
France	40% reduction in greenhouse gas emissions from 1990 levels	2030	1990	Achieve carbon neutrality by 2050

European Steel Association	20-30% reduction in CO2 emissions compared to 2018	2030	2018	Based on the best available technology
European Chemical Industry Council	30% reduction in greenhouse gas emissions compared to 2015	2030	2015	Full lifecycle management
China	Peak carbon emissions by 2030	2030		Achieve carbon neutrality by 2060

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