Mitigating Climate Change While Producing More Oil: Economic Analysis of Government Support for CCS-EOR

Hossa Almutairi[a], Axel Pierru[b]

This paper examines the potential environmental impact of Carbon Capture and Storage with Enhanced Oil Recovery (CCS-EOR) technology from an economic perspective. CCS-EOR involves capturing carbon dioxide (CO_2) from various sources and injecting it into oil fields, leading to increased oil production through enhanced reservoir pressures. This approach has been regarded as a readily deployable carbon capture technology due to its economic viability and revenue potential from increased oil output.

A significant challenge faced by CCS-EOR, however, concerns the public perception of the technology, as storing CO_2 to stimulate oil production does not have an obvious climate benefit when first presented. As a result, the status of CCS-EOR as a climate change mitigation technology is often contested.

Addressing the question of the potential impact of CCS-EOR projects on global CO_2 emissions is therefore critical, since, presumably, the degree to which governments support these projects should be commensurate with their resulting reduction in emissions. Therefore, to design incentives that enable CCS-EOR projects, governments need to know whether the implementation of CCS-EOR reduces global CO_2 emissions, and, if so, to what extent.

Using a partial-equilibrium framework, we develop analytical formulas and marginal reasoning to evaluate the impact of incentivizing CCS-EOR projects on global emissions.

The total amount of global emissions attributable to implementing the incentivized CCS-EOR projects results from the addition of three effects:

- The first effect is the reduction in emissions due to the capture and storage of CO_2. Note that capturing a ton of CO_2 does not directly translate into an equivalent reduction in emissions at the source. For instance, facilities equipped with carbon capture tend to have a higher energy consumption per unit of output. Similarly, DAC installations are energy-intensive, potentially releasing CO_2 in their operational cycle. Emissions from CO_2 transportation to oil fields must also be considered.
- The second effect is the increase in emissions from the EOR oil produced.
- The third effect is the emissions saved due to the oil displaced from the global oil market by the EOR oil. We quantify the displacement effect with a simple, novel formula that depends on the price elasticities of global oil supply and demand.

Results indicate that CCS-EOR technology can potentially contribute to reducing global emissions. Depending on the technique used for enhanced oil recovery, the calculated emission reduction varies between 0.05 and 0.60 tons per ton of CO_2 stored (after full well-to-wheel decarbonization of the EOR oil).

If fully allocated to oil production, the environmental benefits of capturing a ton of CO_2 and storing it through conventional EOR can allow the oil producer to decarbonize 3.4 barrels on a well-to-wheel basis (i.e., including the emissions from the consumption of the barrels, which rep-

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resents most of the producer's scope 3) and 14.4 barrels when offsetting its oil-upstream emissions only. Fiscal incentives granted by governments to support CCS-EOR as a climate-change mitigation technology should be sized accordingly.

The US Inflation Reduction Act of 2022 (IRA) provides tax credits for CCS-EOR projects. Capturing a ton of CO_2 from industrial facilities or power plants for EOR provides a tax credit of \$60, while the credit for storing it in a saline reservoir is \$85 (Financial Times[4], 2022). The corresponding tax credits for a ton of CO_2 captured by DAC projects are \$130 and \$180, respectively. Political negotiations have significantly shaped the legislation, and the subsidies might have been tailored to the economics of CCS-EOR projects. However, the ratios 60 over 85 (equivalent to 71%) and 130 over 180 (equivalent to 72%) could be interpreted as an indication that, for the Biden administration, storing a ton of captured CO_2 through EOR reduces global emissions by 30% less compared to storing it in a saline reservoir. When examined in the context of our findings, the tax credit for CCS-EOR in the IRA is slightly higher than the amount that our calculations would justify.

With many countries committing to net-zero emissions targets by the second half of this century, it is imperative to consider and encourage all technology options. Since CCS-EOR has the potential to reduce global emissions, it must be recognized as part of the solution for achieving a net-zero world.

Long-term energy policy vs. dynamic public preferences? A review of German energy policy

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During the energy crisis peaking in 2022, numerous countries have implemented immediate policy measures to improve security of energy supply and to lower energy prices. In some cases, this came at the expense of environmental compatibility. Historically, short-term political rearrangements of priorities of energy policy goals often occurred following abrupt changes in public opinion.

We hypothesize that such dynamic public preferences pose substantial challenges for the pursuit of long-term energy policies, which eventually results in inefficiencies. To investigate this hypothesis, we analyze the case of Germany and map out the development of public preferences towards the energy policy goals over time.

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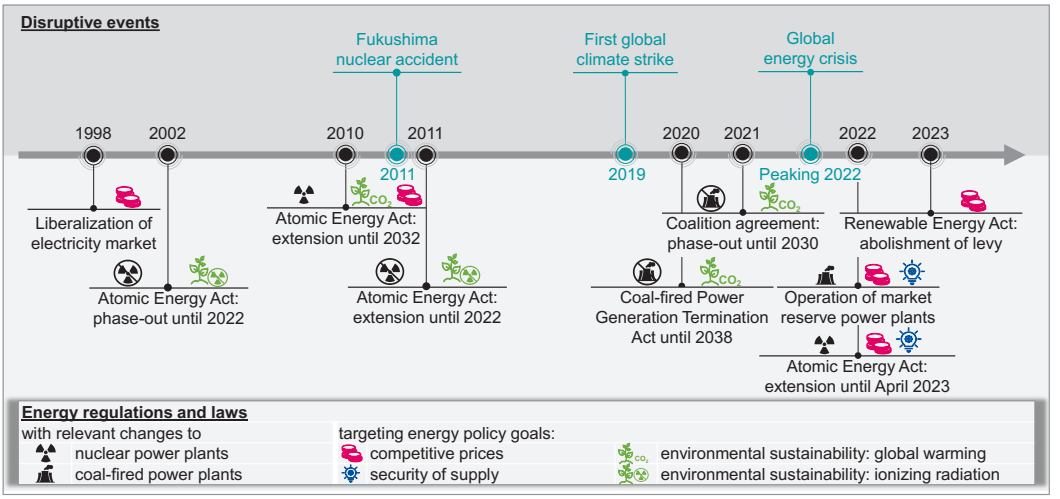
Figure 1: Timeline of selected energy regulations and laws in Germany and disruptive events



As depicted in Figure 1, we focus our analysis on three major events: 1) the nuclear accident in Fukushima in 2011, 2) the emergence of the climate strike movement in 2019, and 3) the global energy crisis peaking in 2022. In addition to analyzing public opinion research, we perform discrete choice experiments in 2011, 2015, and 2020 to gain insights into relative public preferences between different energy policy goals. The dynamic preferences are then compared to changes in the planning of power plant capacities (coal-fired, nuclear, and renewable).

Our results indicate that external shocks have a strong impact on public preferences. In the case of Germany, dynamic public preferences were followed by short-term changes in energy policy. As a consequence, inefficiencies arise in the long-term development of the energy system.

Overall, our paper highlights the value of an energy system's robustness to external shocks and sudden changes in public opinion and preferences. Measures such as diversification of energy sources, expansion of energy storage, and planned overcapacity may seem inefficient but could prove efficient when dynamic public opinion and preferences are factored in. Future research and energy policy should therefore put more emphasis on the role of dynamic public preferences.

Multivariate Convergence toward the SDGs 2, 6 and 7: An Empirical Analysis of World and MENA Region Countries

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This paper provides new evidence on the convergence process toward the achievement of three important SGDs: 2 6 and 7. The U.N. has set Sustainability Development Goals (SDGs) targets to be reached by 2030, with the ultimate goal of achieving a better future for the Earth. Among the vital resources for human mankind, water, energy, and food are essential for life and for human well-being, poverty reduction and sustainable development. Projections suggest that the demand for

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freshwater, energy and food will be on the rise due to, among other factors, demographic changes, economic development, changing diets, rapid urbanization, and international trade.

In thjis context, convergence appears to go hand in hand with the possibility of attaining the SDGs: although we cannot formally claim that convergence is a necessary condition for attainment of SDGs, it would certainly greatly help to reach the targets

While it is important to set targets for water, energy, and food sustainability indicators, another relevant aspect to consider is the trajectory countries are following toward those goals, the speed at which they are attaining them and whether countries in their transition toward sustainable water, energy, and food consumption levels have been exhibiting convergence of this dynamic process. In this respect the present paper fills the gap, adopting the theorical and methodological framework of the economic convergence analysis for a large group of 108 world countries and for a subgroup of 13 Middle East and Northern Africa (MENA) countries. This group is of special interest because its countries are characterized by specific conditions with respect to water, energy, and food availability. A subset of these countries enjoys an abundant energy endowment, but most lack of water and given critical desert conditions face unfavorable conditions for agricultural developments. We therefore pay attention to the convergence process toward the considered SDGs within the MENA region.

To empirically investigate the convergence of the three SGDs we start from the well-known concepts of univariate -convergence and -convergence to propose a multivariate version suited for dealing with the interrelated nature of the SDGs considered.

Our results are important as they show that not only are three SDG's interrelated – the WEF nexus – but also their convergence is and that the convergence process of each variable is affected by the starting values of the other components of the nexus, thus providing support to our multivariate approach.

Our results can provide new insights into the efficient and timely attainment of the SDG's. We assess the role of some exogenous factors affecting the multivariate convergence process and find some beneficial and differentiated effects on the SDG's nexus. These results have important policy implications because the fact that convergence can be influenced by specific determinants could suggest that appropriate policy intervention can be designed to spur the speed of convergence. We find that investment has a positive accelerating effect on water and energy convergence and foreign direct investment has a beneficial effect on food convergence. In addition, both openness to foreign trade and inflow of foreign direct investment have a positive accelerating effect on water convergence and food convergence, respectively, thus contributing to alleviate the issue of scarcity of affordable water in the world.

We showed that there are different time paths toward ending hunger, granting universal access to drinking water and ensuring universal access to affordable and renewable energy services. These time paths can be positively affected by policy driven variables and can also be mutual reinforcing.

Energy Transition in Oil-Dependent Economies: public discount rates for investment project evaluation

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The domestic energy transition of an oil-exporting economy often implies investing in projects that displace oil from domestic consumption. This can, for instance, be a project that enhances energy efficiency in an oil-consuming sector or develops renewables capacity displacing oil in the power sector. At the same time, most oil-exporting economies pursue economic diversification and industrial development policies, which ultimately leads to less dependence on oil revenues.

In this context, selecting welfare-enhancing projects necessitates understanding the extent to which economic dependence on oil impacts the present value of oil-related cash flows from a public policy perspective. This raises the issue of using public discount rates that capture both the risk of the cash flows and the characteristics of the oil-exporting economy considered. In public economics, the risk-adjusted discount rate applicable to an uncertain cash flow is obtained by summing the risk-free discount rate and a risk premium. The risk-free discount rate is suitable for discounting cash flows that are not correlated with aggregate consumption. The risk premium arises from the correlation of the considered cash flow with consumption.

Economic dependence on oil affects the risk-adjusted discount rate in two opposing ways. On the one hand, dependence on oil exports increases the economic vulnerability to fluctuations in oil prices. This leads to higher aggregate uncertainty for the whole economy, lowering the risk-free discount rate and enhancing the valuation of future cash flows (for precautionary reasons). On the other hand, it increases the correlation between oil-related cash flows and aggregate consumption, which yields a higher risk premium and a lower valuation of future cash flows. We study the interplay of these opposing effects in formulating risk-adjusted discount rates for oil-exporting countries.

The framework we propose also allows for valuing oil at its opportunity cost. The opportunity cost of oil depends on several factors, including the price elasticities of global oil demand and other producers' supply, as well as the country's share in the global market. Our calculations of the opportunity cost use the marginal revenue generated by the export of an additional barrel. This approach is applicable when domestic oil prices are set by the government, a common practice in oil-exporting countries.

We produce estimates of the risk-free discount rate, the risk-adjusted discount rate, and the opportunity cost of oil for 18 oil-exporting countries.

Per-capita aggregate consumption is an important input in the calculation. We however notice that, in countries with a significant expatriate population, economic growth does not always translate into increased per-capita consumption. In some instances, growth leads to more expatriate workers and a higher total population, causing a decrease in per-capita consumption. To avoid this potentially misleading representation of actual economic conditions, for GCC countries our analysis exclusively considers citizens when calculating per-capita consumption growth rates.

We find that, on average, a risk-free discount rate of 3.1% can be applied, but this rate needs to be adjusted upward by adding a risk premium of 1.4% for oil-related cash flows, which yields a risk-adjusted real discount rate of 4.5%. Our results, as presented in the table below, indicate significant disparities in country-specific discount rates, emphasizing the importance of selecting accurate discount rates.

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Calculated country-specific real public discount rates (in percent)

Country	Risk-free discount rate for cash flows not correlated with aggregate consumption	Risk-adjusted discount rate for oil-related cash flows
Algeria	3.99	4.43
Angola	0.51	1.83
Bahrain	3.87	5.22
Brunei Darussalam	2.61	3.03
Cameroon	3.19	3.37
Chad	-0.51	2.02
Gabon	0.23	0.33
Iraq	2.32	3.81
Iran	2.37	3.11
Kazakhstan	9.88	11.21
Kuwait	0.43	2.09
Oman	7.06	8.39
Qatar	13.42	17.37
Rep. Congo	-1.04	0.26
Russia	7.35	9.64
Saudi Arabia	7.19	8.73
Sudan[1]	-0.97	-1.06
United Arab Emirates[2]	-7.07	-3.57

Notes: [1] Sudan's oil production has been divided by four following the independence of South Sudan in 2011. [2] Excluding 2009 and 2010 when Dubai was hit by a financial and real estate crisis yields a risk-free discount rate of 0.85% and a risk-adjusted discount rate of 3.93%.

Our results also show that countries with limited export diversification tend to have lower public discount rates. Economies with poor diversification cannot compensate for revenue decreases in one export category by boosting revenues in other sectors. This lack of diversification increases volatility in future aggregate consumption, resulting in a stronger precautionary effect that reduces the risk-free public discount rate.

To illustrate how our results materially impact the public valuation of future oil-related cash flows, for each country we determine the present value of reducing domestic consumption by a barrel of oil per day from 2023 to 2040, disentangling the various effects at play. We show that, on average, the individual impacts of the opportunity cost, risk premium, and riskless discount rate account for 6%, 10.5%, and 18.5% of the cumulative undiscounted cash flows, respectively. The cumulative impact of these three effects results in a present value that is 35% lower compared to the undiscounted sum of cash flows, with a higher impact for GCC countries.

Our estimates are especially useful to policymakers in oil-rich countries considering investment projects or policies freeing oil from domestic consumption or using oil as an input. They enable governments to perform more accurate cost-benefit analyses, ensuring that decisions made enhance welfare and economic development. This is especially critical for oil-exporting countries pursuing domestic energy transitions and industrial development.

Strategic Commodities' Price Risk and Financial Contagion in Oil and Gas Exporting Countries

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This study investigates the occurrence of stock market contagion effects stemming from strategic commodities and the United States (U.S.) equity markets to major oil and gas exporting nations amid the COVID-19 and Russian-Ukraine crises. Employing a multi-factor asset pricing model and risks spillover technique, we scrutinize the sensitivities of market returns to these risk factors and the dynamics of shocks transmission among market sensitivities over time. Our findings reveal that these equity markets generally demonstrate positive and variable sensitivities to the three factors, with Canada, UAE, Kuwait and Saudi Arabia experiencing significant periods of negative response to the gas price factor. Notably, the Russian market exhibited the highest responsiveness to the U.S. factor at the outbreak of the Russian-Ukraine war, whereas the Russian market displays the greatest sensitivity to both oil and gas price risks. The degree of shocks propagation among market sensitivities is about 75.8% and is mainly driver by sensitivities to the U.S. market factor in the energy market, followed by the sensitivity of oil prices to the gas market. Policymakers in these nations should be cautious of potential contagion from the US market and these critical commodities, particularly oil, to mitigate any adverse impacts on their economies.

Export Diversification and Energy Consumption Efficiency in the Light of Non-linear Evidence

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We estimate the effects of export dynamics on energy consumption using a balanced panel of 95 economies and three subsamples, i.e., low- and lower-middle-income (LMEs), upper-middle-income (UMEs), and high-income (HIEs) from 1997 to 2013. We show the non-linear linkages between export diversification (ED) and energy use. More specifically, we show the inverted-U shape ED effects on energy use per output unit. This result implies the increases in energy inefficiency in the progress of diversification improvement in exports until a threshold level from which ED would help to enhance energy efficiency. Our analysis of the three subsamples shows consistent findings regarding the effects of ED across income levels. The inverted-U shape effects of ED are consistent in LMEs and UMEs, while it is ambiguous in HIEs. The results suggest that low and

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middle economies should diversify exports as much as possible to pass the threshold, where diversification can improve energy efficiency.

Net-Zero Policy vs Energy security: The impact on GCC countries

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Gulf Cooperation Council (GCC) countries have accumulated large oil portfolio revenues. However, much of the world economy is pursuing Net Zero policies and in turn their expected future reliance on fossil fuel resources through investments in Renewable Energy Sources (RES). At the time of writing, 131 countries covering 85% of the world's population had committed to 'net zero' policies. This necessarily exposes GCC countries to long-term structural challenges associated with a world economy less dependent on oil through two primary risks: i) loss of export revenues, and ii) stranded reserves. Oil exporting nations should, and are, focusing on economic adaptation strategies (viz. fiscal diversification) in order to reduce risks by pooling uncorrelated income streams.

We construct oil portfolios for four Gulf Cooperation Council countries (Kuwait, Oman, Saudi Arabia, United Arab Emirates) and focus on their top five importing counterparties. Portfolio returns have been estimated in the period 2008-2018, computing volatility spillovers à la Diebold and Yilmaz. Effects of economic variables (including policy uncertainty, market uncertainty, renewable market shares, exchange rates and industrial production) on volatility spillover indices are estimated using different panel linear regression models.

Our modelling results find aggregate 'quantity' volatility spillovers are lower than 'price' volatility spillovers, confirming the structural rigidity of oil demand. Analysis of net contributors for price and quantity volatility suggest China is a net transmitter of quantity spillovers due to its crucial role in driving global oil demand dynamics and energy security while India seems to absorb quantity and price shocks from oil markets. We also find increasing economic and policy uncertainty in importing nations increases the volatility of oil export portfolios. This suggests political tensions increase oil market fluctuations and threaten the stability of GCC's oil export portfolios and revenues streams. Finally, and unsurprisingly, our modelling finds climate change mitigation policies and associated increases in renewable market shares were found to reduce volatility spillovers from foreign markets, enabling the importing nation to better absorb foreign market shocks. Oil portfolio risk management will therefore become increasingly important for GCC countries. Rising renewable shares within the domestic energy production mix is therefore predictable.

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Projecting Saudi Arabia's CO_2 Dynamic Baselines To 2060: A Multivariate Approach

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As a party to the Paris Agreement, which aims to limit the global average temperature rise to below 2 degrees Celsius and as close as possible to 1.5 degrees Celsius, Saudi Arabia has submitted a nationally determined contribution (NDC). NDCs are essentially climate action plans encompassing a party's climate target and the initiatives or policies it plans to implement to achieve that target. NDCs lie at the heart of the Paris Agreement and are submitted in 5-year intervals, with each successive NDC (either referred to as a new or updated NDC) reflecting higher ambition. Saudi Arabia has so far participated in two successive rounds of NDC submissions. In its most recent updated NDC, submitted in 2021, Saudi Arabia announced its new pledge to reduce greenhouse gas (GHG) emissions by 278 million tonnes (Mt) of carbon dioxide (CO_2) equivalent (eq) annually by 2030.

Saudi Arabia's NDC emission target is expressed as a reduction below a baseline or business-as-usual emissions growth scenario. A country's baseline is a counterfactual scenario showing how emissions would evolve, assuming that no mitigation policies or measures would be implemented beyond those already in force and/or planned to be adopted. Although Saudi Arabia did not publicly disclose a quantitative baseline in its NDC at the time of writing, it provided qualitative details on its baseline, which it refers to as 'dynamic baselines.' Saudi Arabia's dynamic baselines depend on the level of economic development and the extent of economic diversification that occurs in the country over the coming years. Specifically, Saudi Arabia has envisioned two distinct but possible baseline scenarios. The first, taken as the default scenario, Saudi Arabia achieves economic diversification, driven by its oil exports, with oil export revenues directed into investment in high-value-added sectors like financial services and tourism. In the second scenario, oil resources are utilized domestically to expand Saudi Arabia's energy-intensive industrial base, with increasing contributions to the national economy from industries such as petrochemicals, cement, mining, and metal production.

Focusing only on CO_2 emissions, which account for around 80-90% of total GHG emissions in Saudi Arabia, this paper contributes to understanding how they might evolve in Saudi Arabia through 2030 and up to 2060 by producing various dynamic emissions scenarios. To achieve this, we estimate equations using both Autometrics and the Structural Time Series Model (STSM), two methods that can explain the emissions data through a combination of trends, interventions, and right-hand side variables like GDP and energy prices – but in different ways. Using both methods, we estimate multiple equations with different sets of explanatory variables (drivers). The econometric results reveal that the coefficients on variables such as gross domestic product (GDP) and the real energy price are consistent across the estimated equations, which points to the coefficients' robustness. From the estimation, to generate CO_2 emissions projections across the different scenarios, we

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settle on a preferred specification that passes all diagnostic tests and outperforms all other models and specifications. Furthermore, the specification has the advantage of including the useful drivers that can influence CO_2 emissions projections when producing several scenarios under different policies or levers– the drivers being GDP, the real energy price, the service value-added share, and an underlying emissions trend (UET) that captures the combined effect of exogenous factors such as consumer behavior and energy efficiency.

Given the preferred specification, several scenarios were constructed before generating the CO2 emissions projections, reflecting the different assumptions on the drivers of CO_2 emissions, GDP, the real energy price, economic structure, and the UET. We, therefore, build a number of scenarios, starting with a baseline scenario that acts as a reference, showing how CO_2 emissions might evolve in Saudi Arabia without any additional policy efforts, assuming the underlying drivers continue to evolve in the future as they did in the past (by utilizing the baseline assumptions on the evolution of the drivers in the preferred econometric model. The baseline scenarios suggest that Saudi CO_2 emissions would rise from 540 Mt in 2019 to 621 Mt in 2030 and 878 Mt in 2060.

The various CO_2 emissions scenarios around the baseline projection highlight how different factors might affect CO_2 emissions in Saudi Arabia up to 2060. The gap between the highest and lowest projections underscores how much emissions could evolve differently depending on the underlying drivers. In the highest scenario, in which GDP grows fastest, the economy becomes more heavily industrialized, energy prices decline in real terms, and the UET grows at a constant rate, CO_2 emissions would grow to 666 Mt in 2030 and 1,391 Mt by 2060. On the other hand, in the lowest scenario, in which GDP grows slowest, energy prices are reformed, the economy diversifies, and the UET declines at a constant rate, CO_2 emissions would decline to 516 Mt in 2030 and 465 Mt by 2060.

Additionally, we emphasize the significant impact of economic structure and GDP growth on CO_2 emissions, and our findings align with Saudi Arabia's NDC priorities. In a scenario highlighting heavy industrialization, emissions are projected to reach 646 Mt in 2030 and 1,096 Mt in 2060. Conversely, an emphasis on economic diversification with high service shares forecasts emissions of 602 Mt in 2030 and 769 Mt in 2060. The 46 Mt difference by 2030 and 327 Mt by 2060 between these scenarios underscores the pivotal role of GDP composition in emission trajectories. Additionally, in a high GDP growth scenario, emissions are estimated to reach 635 Mt in 2030 and 985 Mt in 2060, while a low GDP growth scenario projects emissions of 607 Mt in 2030 and 781 Mt in 2060. These insights provide context for the strategic focus of the Saudi government on these variables in its updated NDC.

To conclude, our paper generates several key insights for policymakers. First, it highlights how different variables, such as GDP and energy prices, influence CO_2 emissions projections. Second, it reveals the critical role the economy's structure can play, especially in a country like Saudi Arabia undergoing rapid economic transformations. Third, it demonstrates that even in the lowest emissions scenario, further efforts are needed to achieve net zero by 2060. These efforts could encompass policies such as carbon pricing and investment in carbon removal technologies such as direct air capture. These additional efforts will be necessary for the Kingdom of Saudi Arabia to achieve its goals of net zero and a sustainable future.

The Role of the Petrochemical Sector's Exports in the Diversification of the Saudi Economy. A Scenario Analysis of the Foreign and Domestic Price Shocks

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Saudi Arabia's petrochemical sector accounts for a significant portion of non-oil exports and has the potential to contribute significantly to the Kingdom's diversification. In this study, *Autometrics*—a machine learning method, was first employed to estimate export equations of chemicals and rubber-plastics for 1993–2020. The estimated equations were then integrated into a macroeconometric model called KAPSARC Global Energy Macroeconometric Model (KGEMM) and a scenario analysis was performed for the diversification effects of foreign and domestic price shocks till 2035.

The scenario analysis showed that a 10% increase in foreign prices leads to 0.40% and 0.13% more diversified exports and economy on average for 2023–2035. Regarding domestic prices, a 19% increase in industrial fossil fuel prices and a 10% increase in ethane price result in less than a 0.1% contraction in the diversification of exports and economy if the revenues from the price reforms are not recycled back to the economy. The reforms can boost economic diversification by 0.05% if the revenues are recycled back to the petrochemical sector as an investment. If domestic price reforms are coupled with the investment in the petrochemical sector and 50% of this investment goods are locally produced, then diversification of Saudi export and economy enlarge considerably—by 0.20% and 0.26%, respectively.

Which Way to Choose? A Generic Modular Life Cycle Assessment for Hydrogen Production and Import Pathways to Germany

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Hydrogen is poised to play a pivotal role in future low-CO_2 energy systems globally. This study uses Germany as a case study to examine various hydrogen production and import pathways, focusing on their Global Warming Potential (GWP). Employing a modular life cycle assessment, we identify and evaluate the primary environmental drivers across these pathways, which include production, conversion, transportation, and reconversion stages. Our findings highlight the significance of the electricity source for hydrogen production and conversion, as well as the efficiency of subsequent processes, including carbon capture rates for blue hydrogen, as critical factors influencing GWP. The necessity for hydrogen imports in countries with high demand and limited domestic production underscores the importance of optimizing hydrogen supply chains for reduced CO_2 emissions. This analysis offers valuable insights for advancing sustainable energy transitions in other high-demand regions as well.

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Beyond Cost: A Multifaceted Look at Financial Incentives and Residential Energy Renovation Behavior

Fateh Belaïd[a] and Camille Massié[b]

This article analyzes the structural barriers hindering the massive adoption of energy efficiency investments, and fueling the well-known energy efficiency paradox. Based on a rich cross-sectional dataset surveying 3,000 French homeowners in 2018, a Logit model is developed to estimate the probability of households to renovate their homes. A focus is made on financial incentives for energy-efficient retrofit works, which take the form of direct subsidies. Accounting for dwelling and household heterogeneity, results suggest the existence of a threshold effect in the impact of financial incentives, estimated around 2,400 euros minimum, optimal around 3,000 euros. It is only above this amount of aid that households feel encouraged to undertake renovation work. This has implications for the design of future effective energy policies.

Towards Net Zero Emissions: The Impact of Green Innovation, GHG and CSR on the Financial Success of U.S. Corporate Venture Capital Parents

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This paper analyzs the influence of green innovation and environmental performance on the success of US corporate venture capital (CVC) parent firms. Furthermore, it investigates the intermediary function of corporate social responsibility (CSR) in this relation. Our sample consists of CVC parent firms obtained from multiple databases between 2002 to 2019. Our findings suggest that incorporating sustainability into target company plans has the dual benefit of improving environmental outcomes and boosting long-term financial performance for CVC parent firms. We find that companies that have lower levels of greenhouse gas (GHG) emissions demonstrate better financial success over the long term. Moreover, allocating resources to environmentally-friendly advancements results in positive financial results in both the short and long term. Our findings have important significance for policymakers and practitioners, providing guidance for the creation of sustainable business strategies. By promoting innovation focused on sustainability and decreasing GHG emissions, CVC parent firms may actively contribute to a more sustainable future while also assuring long-term financial success.

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