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The importance of fossil fuel divestment and competitive procurement for financing Europe's energy transition

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ABSTRACT
For Europe to meet its climate targets, large financial investments in the energy sector are required. Cost reductions for low-carbon power generation are critical to achieve these targets. Particularly pertinent are decreases in financing costs as measured by the WACC. The cost of capital has a bigger impact on the LCOE for renewable energy than for fossil fuel-based power production. It is therefore essential that policy makers and project developers increase their understanding of what drives the cost of capital, including (perceived) investment risks. We believe two areas deserve special attention: (1) the use of competitive bidding for renewable energy projects, which can put downward pressure on their financing costs, and (2) the divestment from fossil fuel projects, which can drive up their financing costs. Using the integrated assessment model TIAM-ECN we demonstrate that Europe's future energy system is highly sensitive to the level of financing costs.

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Introduction

The global energy sector is the largest source of GHGs, responsible for about 35% of total anthropogenic GHG emissions (IPCC 2014). A share of about 90% of energy-related GHG emissions derives from CO_2 produced by burning fossil fuels (IPCC 2014). Transitioning to clean energy may eventually globally cost trillions of US$ every year (IEA 2014, 2017; IFC 2016; New Climate Economy 2016). Average annual additional investments in the EU alone are projected to amount to 38 billion € (45 billion US$) between 2011 and 2030 to achieve the EU's climate and energy goals (EC 2018).

Given the scale of investment needs for low-carbon power generation, further cost reductions are critical (OECD/IEA and IRENA 2017). Capital expenditures of some renewable technologies have decreased substantially during the past decade. For example, the cost of a crystalline solar PV module in Germany declined by about 80% between 2010 and 2015 (IRENA 2018b). Consequently, installed capacity of solar PV in Europe has risen from about 5 GW in 2007–110 GW in 2017 (IRENA 2018b).

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Technological learning and economies of scale have been key drivers behind these steep cost reductions (IRENA 2018a). While learning and scale-driven cost savings will probably continue to be realised, particularly for innovative renewable energy technologies, large cost reductions through these mechanisms become harder to achieve for more mature technologies such as solar PV. Policy makers and project developers thus need to identify other opportunities for cost savings if they wish to scale up the deployment of renewables. One such domain is financing costs.

Financing costs

Most renewable energy projects for power production are characterised by high up-front capital expenditures and no fuel costs during operation. This means that the Weighted Average Cost of Capital (WACC), commonly used as a measure of financing costs, for these projects has an even more critical impact on the levelised cost of electricity (LCOE) than for their fossil-based counterparts in which most costs arise from fuel expenses (IPCC 2014; Schmidt 2014; Tsiropoulos, Tarvydas, and Zucker 2017).[1]

The level of financing costs for power generation projects is impacted by, amongst others, the stability of local financial markets and banking systems, local regulatory conditions, the robustness and consistency of policy, technological novelty and off-taker reliability, which all impact the perceived risks to financiers (IRENA 2017). Furthermore, studies have shown that financing costs vary across countries (Hail and Luez 2006; Ondraczek, Komendantova, and Patt 2015), power generation technologies (Egli, Steffen, and Schmidt 2018; Salm 2018) and time (Egli, Steffen, and Schmidt 2018). We believe that two areas deserve dedicated attention, given their potential to influence investment risk, and thus their impact on the availability and cost of finance: (1) competitive procurements for renewable energy projects by governments and Power Purchasing Agreements (PPAs) with large companies; and (2) divestment from fossil fuels.

Competitive bidding and PPAs

In recent years, various European governments have been moving away from fixed feed-in tariffs towards market-based renewable energy support mechanisms and processes such as competitive bidding for mature renewable energy technologies such as wind and solar. Well-designed policy support mechanisms, including competitive bidding, can help governments to efficiently manage large scale renewable energy deployment and associated costs, and create market competition. Although fixed feed-in tariffs might result in lower financing costs for projects and often reduce the perceived risk of investors (Giebel and Breitschopf 2011; Grau 2014; DiaCore 2016), recently there seems to have been a rise in investor confidence for large renewable energy projects even without the availability of feed-in tariffs (IRENA 2017). Competitive bidding is putting downward pressure on all price components, including financing cost, thanks to the awarding of long-term contracts for financial support from the government, and in some cases backed-up with PPAs with large creditworthy companies. However, as Polzin et al. (2019) point out, it is essential that competitive bidding schemes are well-designed and well-implemented; otherwise new risks could be introduced, potentially leading to adverse effects on financing cost. Auction designs for offshore wind in the Netherlands, for example, focus on investor security and establishing long-term stability, resulting in low bids and even subsidy free projects (RVO 2017). The guaranteed revenue streams for project developers instill confidence in, and lower the risk perceptions of, investors in the presence of a credible off-taker (IRENA 2017). Some investors seem to already start favouring the less volatile revenues from these auctioned long-term contracts over those from traditional fossil fuel power plants, which are increasingly tied to energy spot markets with highly volatile prices due to the high penetration of renewables (IRENA 2017). Well-designed competitive bidding, in combination with the current abundance of capital, could also result in competition between financial institutions, which can further lower financing costs.

Divestment from fossil fuels

It has been claimed that divestment from fossil fuels has become one of the fastest growing social movements in history (SSEE 2013). A central target of the movement is to convince large institutional investors – who play a key role in providing capital to companies – to reduce their holdings in the fossil fuel industry. The current scale of divestment is relatively small in comparison to the size of the fossil fuel industry: the industry had a market capitalisation of 4.9 trillion US$ in 2014 (BNEF 2014) and divestment has so far only been a small fraction of this (HSBC, 2015). It is hard to quantify the current level of divestment and it would be premature to evaluate the effectiveness of the movement. Nonetheless, should divestment gain traction among large investors, the supply of capital could decrease, and financing costs could rise for fossil fuel-based power generation projects.

Insurance companies are institutional investors that could play a significant role in this context. With total assets under management of approximately 31 trillion US$ (Unfriend Coal 2017), the insurance sector fulfils an essential function in the world economy with its underwriting and investment activities. Insurance companies are concerned about climate change for several reasons: their fossil fuel assets could be stranded, they could face increasing liability for damages linked to their investments, their markets might shrink, and their payouts could rise (Bank of England 2015; Unfriend Coal 2017; DNB 2018). Major insurance names such as Allianz, Aviva, and Zurich have begun responding to these threats by shifting assets away from fossil fuel companies, and some insurers are already refusing to underwrite their operations (Unfriend Coal 2017). If insurers stop covering the (non-climate) risks of fossil fuel projects or charge higher insurance premiums commensurate with the higher risks associated with climate change, it may become difficult to open new coal mines or build new coal-fired power plants, and those already in operation may have to be shut down. Fossil fuel projects that go ahead could face higher financing costs due to higher risk premiums applied by investors.

Scenarios

In Figure 1 we show projected business-as-usual (BAU) electricity supply in Europe – disaggregated by power generation technology – under four different scenarios of financing costs, produced with the integrated assessment model TIAM-ECN (see e.g. Kober, van der Zwaan, and Rösler 2014; van der Zwaan et al. 2018).[2] We inspect a BAU scenario without 2°C climate policy to understand what the effect of financial developments only could be,

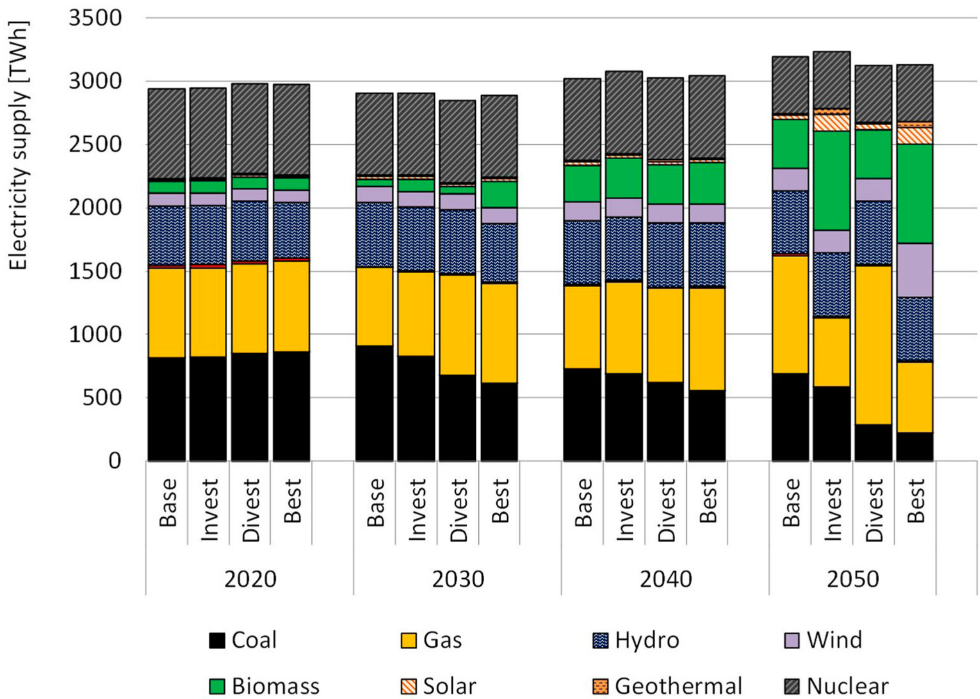

Figure 1. Assessing the effects of changes in financing cost: projections for electricity supply in Europe with the TIAM-ECN model.

reflecting the power of finance, and expressing the possibilities if climate policies don't materialise, fail, or prove insufficient. From a starting point of 7.5%/yr in 2020, financing costs remain constant under scenario *Base* for both renewable and fossil fuel technologies until 2050 (roughly at current values). Scenario *Invest* simulates favourable policy for renewable electricity generation, by assuming that the WACC falls linearly by 5%/yr in absolute terms down to 2.5%/yr in 2050. Scenario *Divest* represents an unfavourable financial climate for fossil fuels, by assuming that the WACC increases linearly by 5%/yr in absolute terms up to 12.5%/yr in 2050. Scenario *Best* combines the WACC assumptions under scenarios *Invest* and *Divest* for renewable electricity and fossil fuels, respectively (see Sweerts, Dalla Longa, and van der Zwaan 2018, for a similar scenario analysis for Africa).[3] Examples of studies with TIAM-ECN that provide detailed description of our key assumptions include Kober, van der Zwaan, and Rösler (2014), for power supply, and van der Zwaan et al. (2018), for technology diffusion.

As Figure 1 shows, in all scenarios renewables play progressively a larger role in fulfilling Europe's energy needs. Already in 2030 impacts can be discerned from differences in financial environments on the power supply mix, notably in terms of the role played by coal-based electricity generation. In 2030 and 2040 the effect on renewables (biomass, hydropower, solar and wind energy) remains relatively modest. From 2040 onwards, however, the changes as a result of financing costs are sufficient enough to generate a sizeable shift in the electricity generation breakdown. For example, we obtain a much larger share of renewables in scenario *Best* than in *Base*. Coal becomes marginalised in scenarios

Divest and *Best*, as divestment gains momentum and the insurance industry responds strongly to climate change threats. Renewable technologies such as biomass and PV play much larger roles in scenarios *Invest* and *Best* than in *Base* and *Divest*, as an increase in the use of competitive procurement in Europe helps drive down financing costs for renewable electricity investments, thereby supporting a successful energy transition.

Clearly, a focus on financing costs is fundamental for achieving energy and climate goals, in Europe and elsewhere. We think that more research is needed to better understand how to mitigate the (perceived) risks of investing in clean energy. More attention should be paid by e.g. the IPCC to the influence of these investment risks on financing costs, in particular trends in competitive procurement and divestment, and how these can be accounted for in integrated assessment models (IAMs) to better understand their consequences for the energy transition. The effect of financing conditions on the deployment of renewable energy has previously been studied in IAMs (Iyer et al., 2015), but generally not much attention has been payed to the role of financing in IAMs. We recommend that all IAM analysts subject their analyses to studies about changes in financing mechanisms and values of financing costs.

Conclusions

With the TIAM-ECN integrated assessment model we showed that the nature and extent of decarbonisation of Europe's future energy system is strongly determined by the level of financing costs. We thus argue that it is fundamental that policy makers and project developers increase their understanding of what drives the cost of capital. As we pointed out in this paper, we believe two areas deserve special attention to better understand what drives financing costs: (1) the use of competitive bidding for renewable energy projects, and (2) the divestment from fossil fuels. These two factors, with potential opposite effects on the financing costs for these respective types of projects, need to be studied in more detail by the scientific community, and by energy analysts and integrated assessment modellers in particular.

Notes

1. We henceforth use the terms financing costs, cost of finance, cost of capital, and WACC interchangeably. The authors understand that these terms are not equivalents: e.g. the WACC is one way to measure financing costs, but there are other ways to measure financing costs. We believe this simplification is appropriate for the purpose of this paper.
2. In these scenarios, Europe consists of the following countries: Andorra; Austria; Belgium; Switzerland; Germany; Denmark; Spain; Finland; France; Faeroe Islands; Channel Islands; Isle of Man; United Kingdom; Gibraltar; Greece; Greenland; Ireland; Iceland; Italy; Liechtenstein; Luxembourg; Monaco; Malta; Netherlands; Norway; Portugal; San Marino; Sweden.
3. It should be noted that the scenarios do not account for differences in financing costs between countries. The approach of the study was to assess the impact of changes in financing costs at the regional level; Western Europe is modelled as a single region in TIAM-ECN.

Disclosure statement

No potential conflict of interest was reported by the authors.

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