# *STRANDED GENERATION ASSETS & THE FUTURE IMPLICATIONS FOR THE EUROPEAN GAS NETWORK*

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## Overview

The market capitalisation of some of the top 14 European utilities has fallen from €501bn in 2007 to €216bn in 2016. This loss in value can be partially attributed to investments in both coal (Caldecott et al. 2017) and gas (Caldecott & McDaniels 2014) generation assets becoming stranded and mothballed. This paper aims to assess the future investment case and stranded asset risk for gas fired generation assets and the financial implications for each member states gas network in 2030, throughout the European Union. A simulation of the European power system at an hourly resolution based on the European Commissions Reference Scenario in 2030 is utilised to understand the operation of these generators. Based on the operation of the generators and market prices received in the simulation a valuation model and high-level gas network tariff model was developed. The results of this study point to gas generation assets potentially becoming stranded in some regions in Europe. Reduced running hours for gas fired generation assets result in significant reductions in gas demand from the power generation sector. This results in increases in the tariffs charged to network users in other sectors for the network to recover sufficient levels of revenue to remain viable. The paper concludes on the question of whether gas infrastructure is investable in Europe in the future based on the results.

## Methods

A Internal rate of return (IRR)model is used to value generation assets and a tariff allocation model for the gas network. The assumption of the model is that generators must achieve a minimum IRR of 8% to provide a sufficient investment case. Payments outside of the energy only market to achieve this are known as out of market payments. The market pricing and operational assumptions for gas generation assets and the gas network are derived from a soft-linking approach between an energy system and power system model, as described by (Deane et al. 2012). Assumptions for the power system model come from the EC Reference Scenario (European Commission 2016). The required revenue of each member states gas network to remain viable is calculated. Tariffs are allocated to all network users based on their respective demand for gas and the operational cost of the member states network. Cost assumptions for power generation assets and the network are sourced from a variety of industrial sources and surveys (JRC 2014; ACER 2015; Lochner 2011; Lazard 2016)

## Results

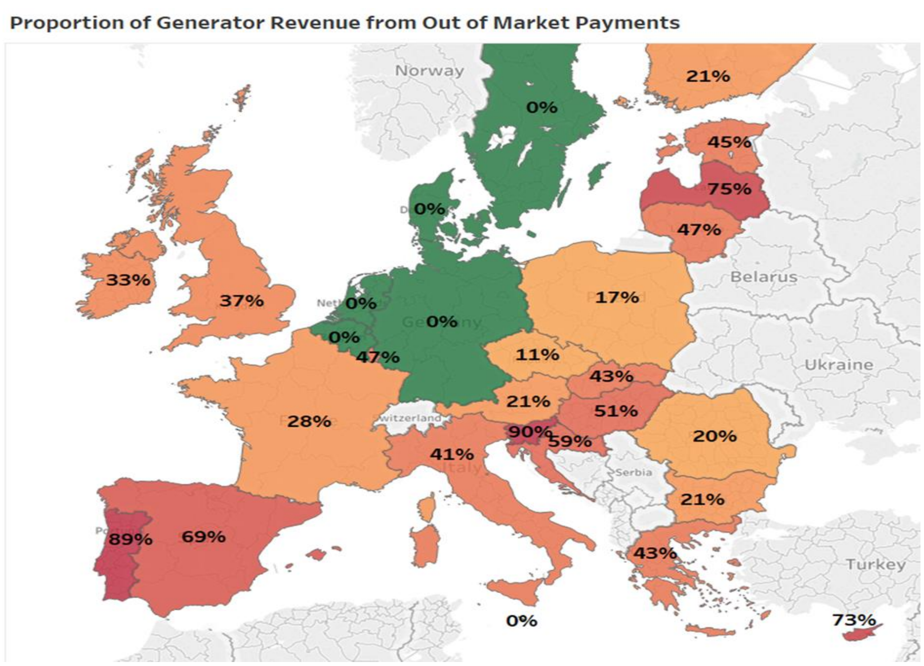


Fig.1

Few member states return a desirable Internal Rate of Return (IIR), in an energy only market, and require out of market payments to remain viable. Fig. 1 provides insights into what proportion of generator revenue out of market payments may have to be for suitable investment conditions. Member states which could rely heavily on out of market payments are ones in which generation assets encounter low capacity factors i.e they have low running hours. As generators bid their short run marginal cost (SRMC), this puts gas generators towards the end of the merit order making it difficult for generators to recover long run marginal costs. With generators at the end of merit order market prices received by generators and their bid price do not provide a sufficient spread to return a positive IRR in most member states, in energy only.

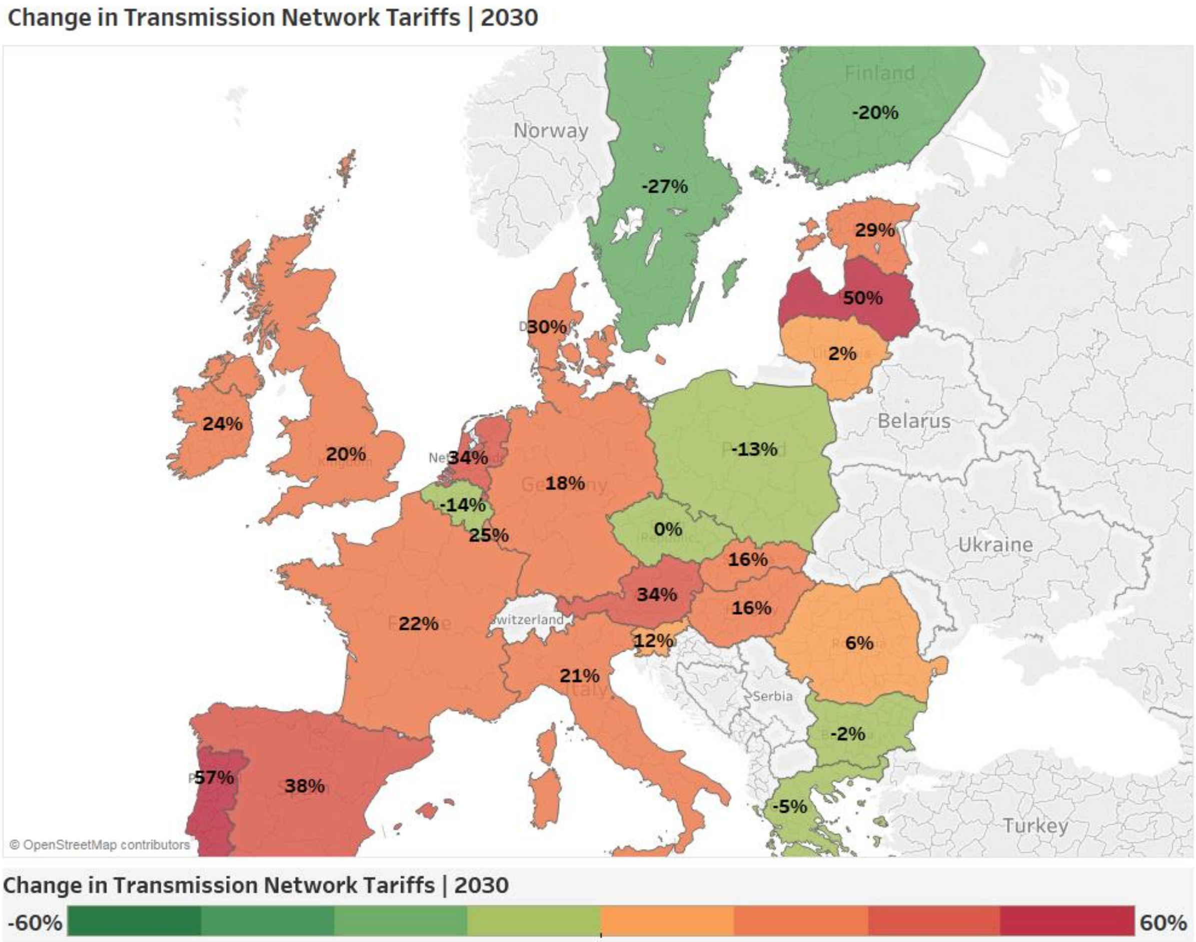


Fig. 2

Fig. 2 illustrates a potential change in tariffs charged to gas transmission network customers for transporting gas. The change in tariffs factors in gas demand for power generation but also other sectors. Changes in tariffs are required to recover network costs which are largely fixed. Portugal which could see the highest percentage increase in tariffs is largely being driven from a decline in gas consumption in sectors outside of power generation such as residential, services and industrial demand for gas. The same is also true for Spain and Latvia. This shows that the demand for gas in other sectors can have an impact on the viability of gas in power generation. Interestingly, in some member states while a fall in gas demand in power generation is increasing tariffs an increase in gas consumption in other sectors is reducing them.

## Conclusions

Existing literature on the future for gas and stranded assets in Europe has been country specific and lacked clarity on the impact of increasing electricity interconnection between member states. Additionally, they can lack the technical detail of effective power system operation which impacts market prices and capacity factors. This study aims to add to the discussion of what the stranded asset risk could be for gas infrastructure in Europe.

Changes in market reform have been suggested to ensure that gas generation assets recover long run marginal costs using capacity remuneration mechanisms. However, these suggested changes ignore the fall in gas demand and its impact on the gas networks competitiveness and its impact on other customers and the distribution network. Rewarding gas generators throughout Europe for the reliability they provide to the grid in meeting the variability of wind and solar could partially solve this problem. There is also an over capacity of these types of generation assets from now into 2030. This could lead to only the newest generation assets recovering long run marginal costs and older less efficient assets becoming stranded in order to keep electricity prices at competitive levels. The results of this paper, under the assumptions outlined, depict an unfavourable investment case for gas infrastructure in Europe and potential for stranded asset risk of both the network and power generation.

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