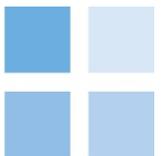


European transmission tariff structures

Cambridge Economic Policy Associates

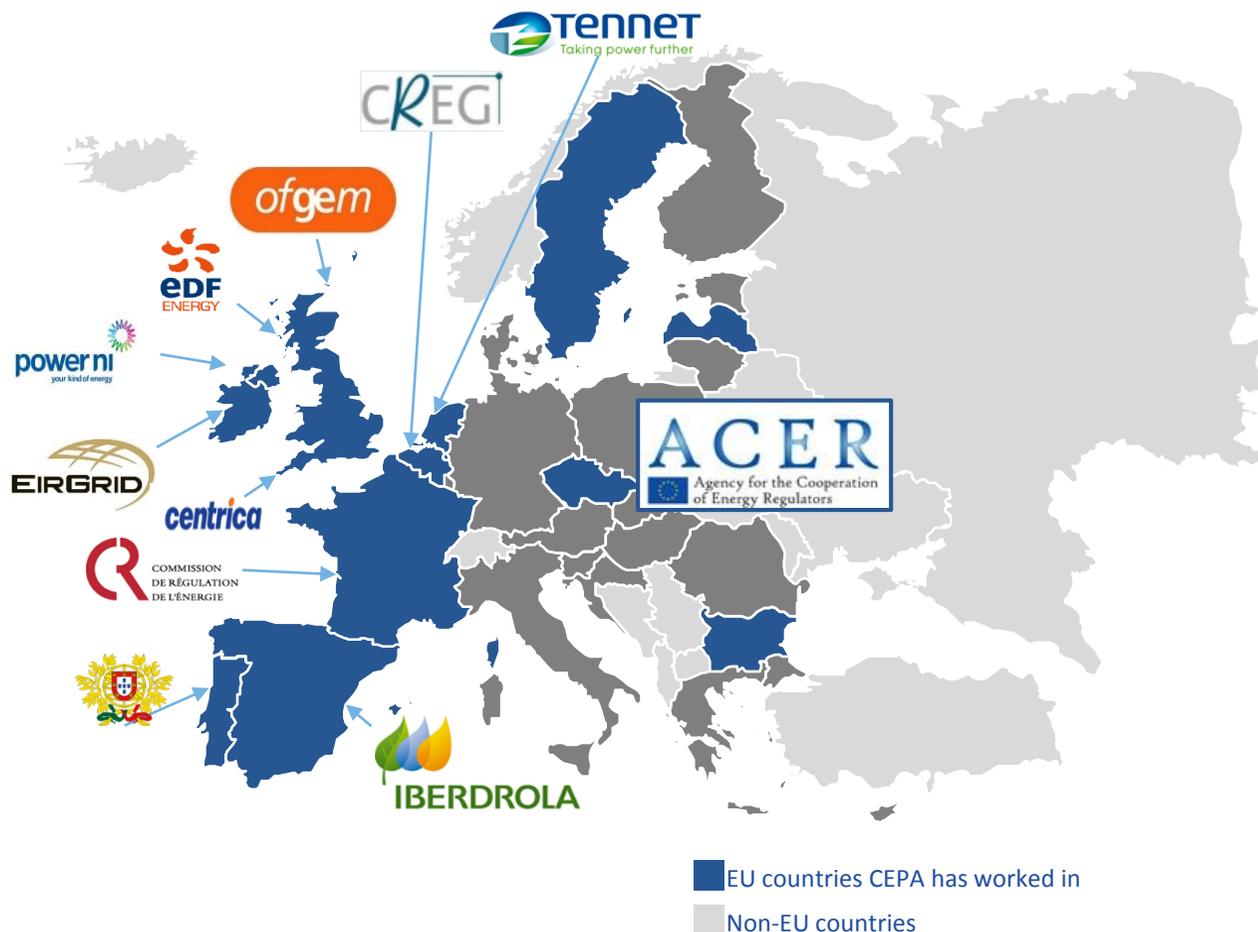
24 March 2015





We are an economic and financial policy consulting business

- Our energy practice is involved in many of the issues that affect energy production, transportation and distribution
- We have worked across Europe for NRAs, governments, producers, network companies, suppliers and investors
- Our staff have worked extensively on electricity transmission pricing, competition and wholesale market design issues across Europe and internationally



Agenda



The agenda for this afternoon is:

1. Context and Objectives for the Study Ian Alexander
2. Current tariff structures Patrick Taylor
3. Initial stakeholder feedback Andrei Vladareanu
4. Emerging themes Attila Hajos & Patrick Taylor

Our approach to today



We would like participants to:

1. Ask clarification questions as we go along but save comments and more significant questions for the end of each session – time has been allowed for Q&A
2. Treat this workshop with Chatham House rules i.e. no comments made today by participants are attributable to those individuals/institutions



1

CONTEXT AND OBJECTIVES FOR STUDY



What are transmission tariffs?

- Electricity transmission tariffs are used to recover the costs of providing electricity transmission services
- Internationally, many different systems of electricity transmission pricing and associated tariff structures are applied
- In the electricity industry, there is a close interaction between the approach to transmission pricing and wholesale market arrangements
- Both can be used to achieve some of the principal policy goals and objectives for the electricity industry



Historically transmission tariff structure choices in European countries have had a national focus...

Choice of tariff structure and pricing regime reflect:

- Different **features** of each national market (e.g. the location and mix of generation and planned future network investment)
- Different **physical properties** of transmission networks
- **Emphasis** individual Member States (and neighbouring countries such as Norway) choose to place on achieving **policy objectives**
- Need for design of transmission tariff structures to support the national focus of the design of **wholesale electricity markets** within European countries

...and as a result we observe differences in transmission tariff structures today



The Internal Electricity Market (IEM) introduces a new perspective to the optimal design of transmission tariff structures across Europe...

Increasing emphasis on European electricity market integration:

- Day-ahead market coupling achieved from Finland to Portugal
- Further expected growth in cross-border trade
- Transnational focus of generation and network investment decisions
- Level playing field to support single market competition

... and understanding the impacts on electricity market outcomes and electricity market participant behaviour of current national choices on transmission tariff structures has become an important regulatory issue

Purpose of study



European transmission tariff structure study

Purpose of the study is to:

- Assess whether increased harmonisation of electricity transmission tariffs structures would be beneficial; and if this is the case
- Recommend the most appropriate policy option(s)

The focus of the study is to:

- Analyse the extent to which current tariff structures enable or impede market integration, effective competition and effective functioning of the internal European electricity market
- Identify and develop proportionate policy options to address any shortcomings that may be identified with current tariff structures and assess implementation feasibility

For clarity

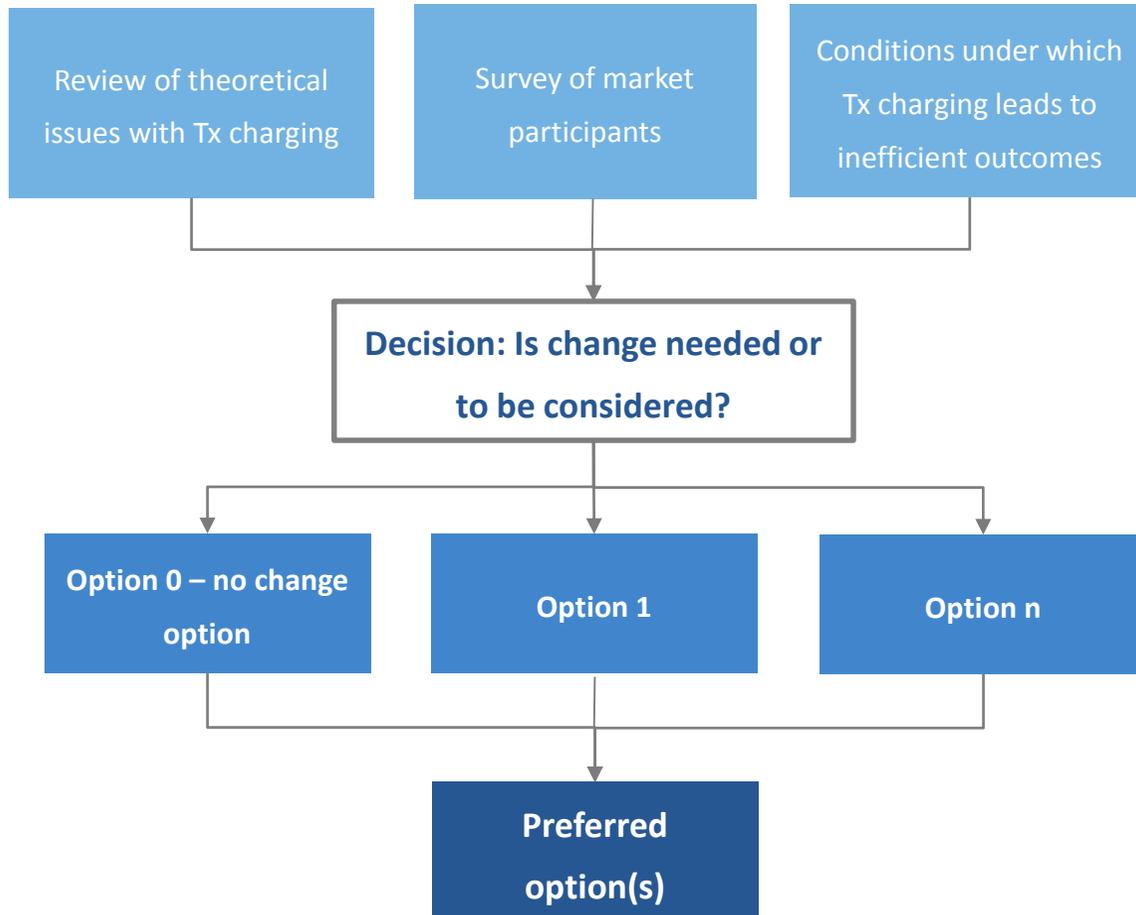


To reiterate and ensure no misunderstanding

This study is about structures – NOT levels

We have not been asked to look at, or expect to consider, options that would harmonize tariff levels

Study methodology



Assessment of the strength of case for change: Likelihood of inefficiency arising
Scale of inefficiency, etc

Determine the universe of feasible options for addressing the inefficiency

Assess the ability of the options to overcome the inefficiency and lead to an incremental improvement

Assess the implementation feasibility, distributional impacts of preferred option(s)

Our objectives for the day



What do we want to achieve today?

There are really three main aims for us:

- 1. To introduce the study and explain what we are seeking to do**
- 2. To report back on our initial findings from the survey and academic literature review**
- 3. To encourage greater discussion of evidence of the impact of heterogeneous transmission tariffs**



Any questions?



2

CURRENT TARIFF STRUCTURES



Different European countries apply many different transmission tariff structures

Different approaches are applied to:

- the allocation charges between generation and load (G-L split)
- tariff levied on a capacity (MW) or energy (MWh) basis
- locational differentiation of tariffs
- time differentiation of tariffs
- scope of services and costs recovered through the transmission tariff
- cost concepts used to determine tariffs

Transmission tariffs are levied for use/access to the transmission system but there are interactions between use of system, connection charges and market based costs

Who pays transmission tariffs?



Different users bear the costs of providing transmission services across Europe

In some European countries:

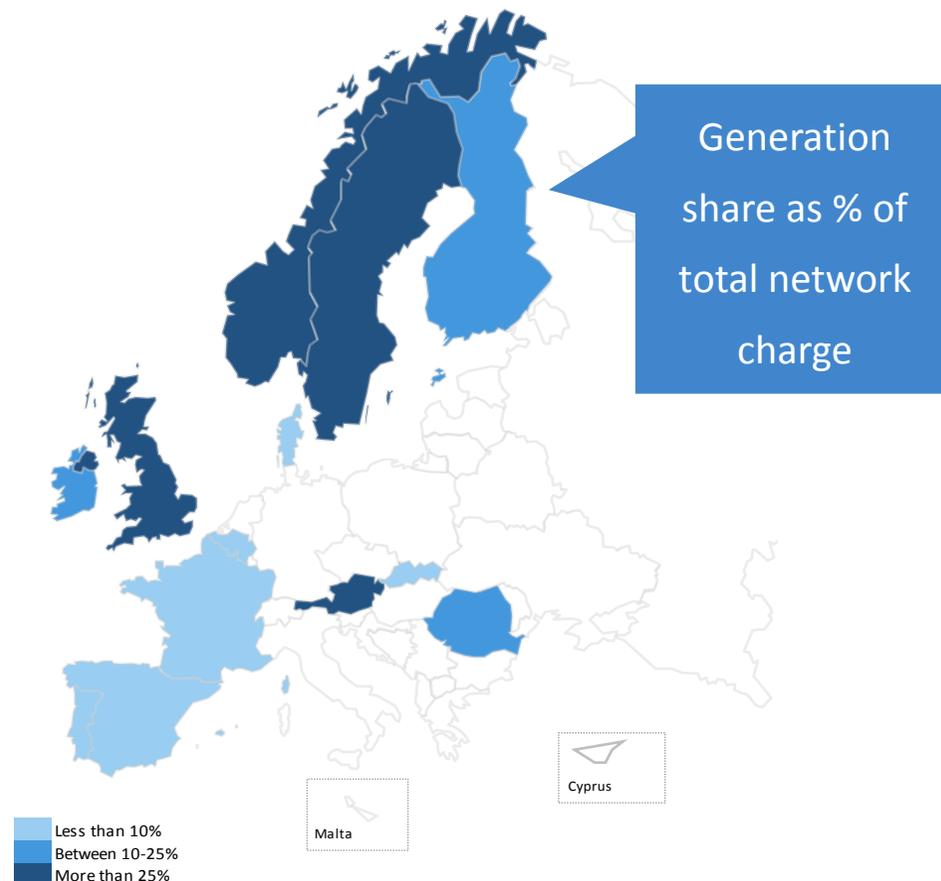
- Transmission tariffs are paid only by L (e.g. Germany / Netherlands)

In other countries:

- Transmission tariffs are paid by L & G (e.g. GB, Sweden)

Generation/Load split:

- Therefore different G / L splits are observed across Europe¹



Application of generation tariffs



The basis on which generation tariffs are applied across Europe differs by country

- In some European countries, transmission tariffs are applied on an energy (i.e. volume of energy injected) basis - €/MWh
- Other European countries apply capacity based (€/MW) transmission tariffs to electricity generators
- Some countries apply both, depending on the type of cost being recovered through the component of the TSO tariff structure
- Whilst Regulation No 838/2010 provides a definition of “G-charge” a comparison of generation tariffs across European countries can be confusing due to the different types of costs being recovered through TSO charges

For this study we define “G-charge” to include tariffs that recover fixed network costs and charges related to ancillary services and losses (unlike Regulation No 828/2010)

Examples of charges levied on generation in Europe



Country	Generation tariff?	Type	Costs recovered
GB	Yes (locational)	Capacity	TNUoS ¹ charges recover the costs of providing and maintaining the grid. BSUoS ¹ charges cover operational costs (e.g. balancing)
Romania	Yes (locational)	Energy	Recovers fixed and variables costs of the TSO
France	Yes (for high voltage levels)	Energy	Costs of the Inter-TSO Compensation Mechanism
Norway	Yes (locational)	Energy (fixed and variable component)	Fixed component based on long-term average energy production recovers historical network costs. Variable energy component reflect marginal loss rates of each user.
Finland	Yes	Energy	Flat charge (0.5€/MWh)
Sweden	Yes (locational)	Capacity	Recovers a share of the total (capital and operational) costs of the TSO
Belgium	Yes	Energy	Ancillary services

Locational signals



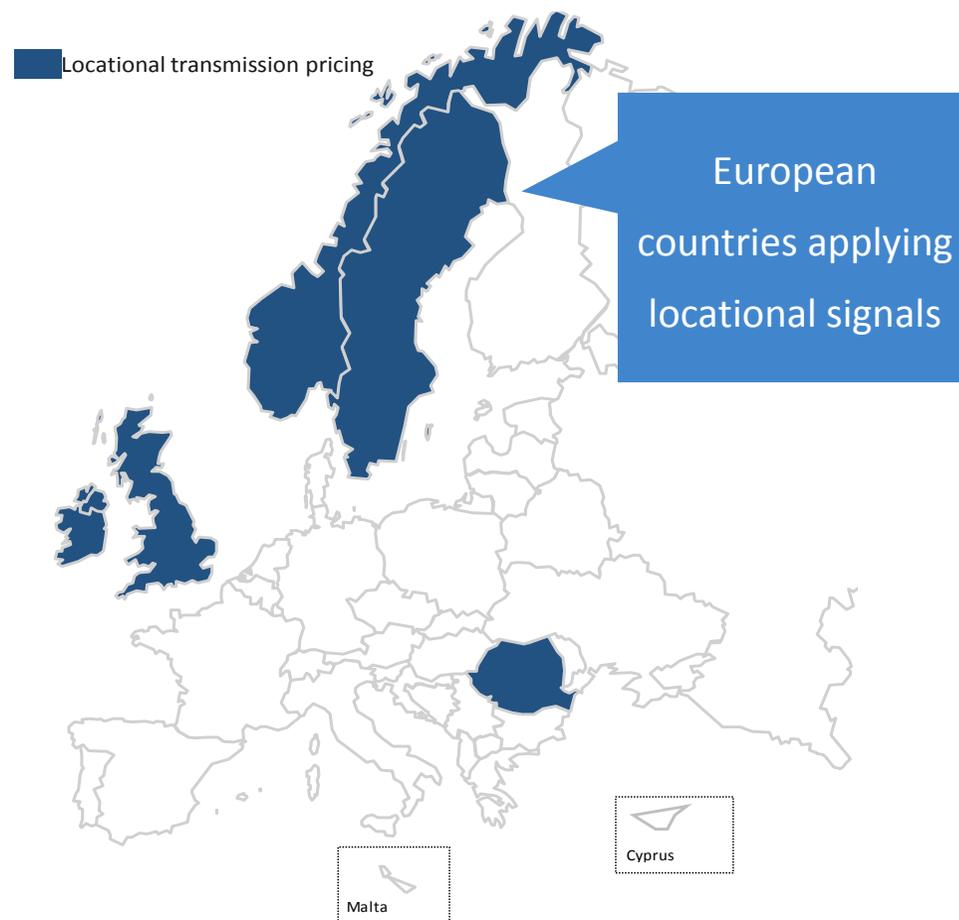
Only a subset of countries incorporate locational signals in the tariff structure

Locational signals apply in:

- GB, Ireland, Norway, Sweden and Romania

Other European countries have no locational signal

The basis on which locational signals are determined differs by country



Strength of tariff signals



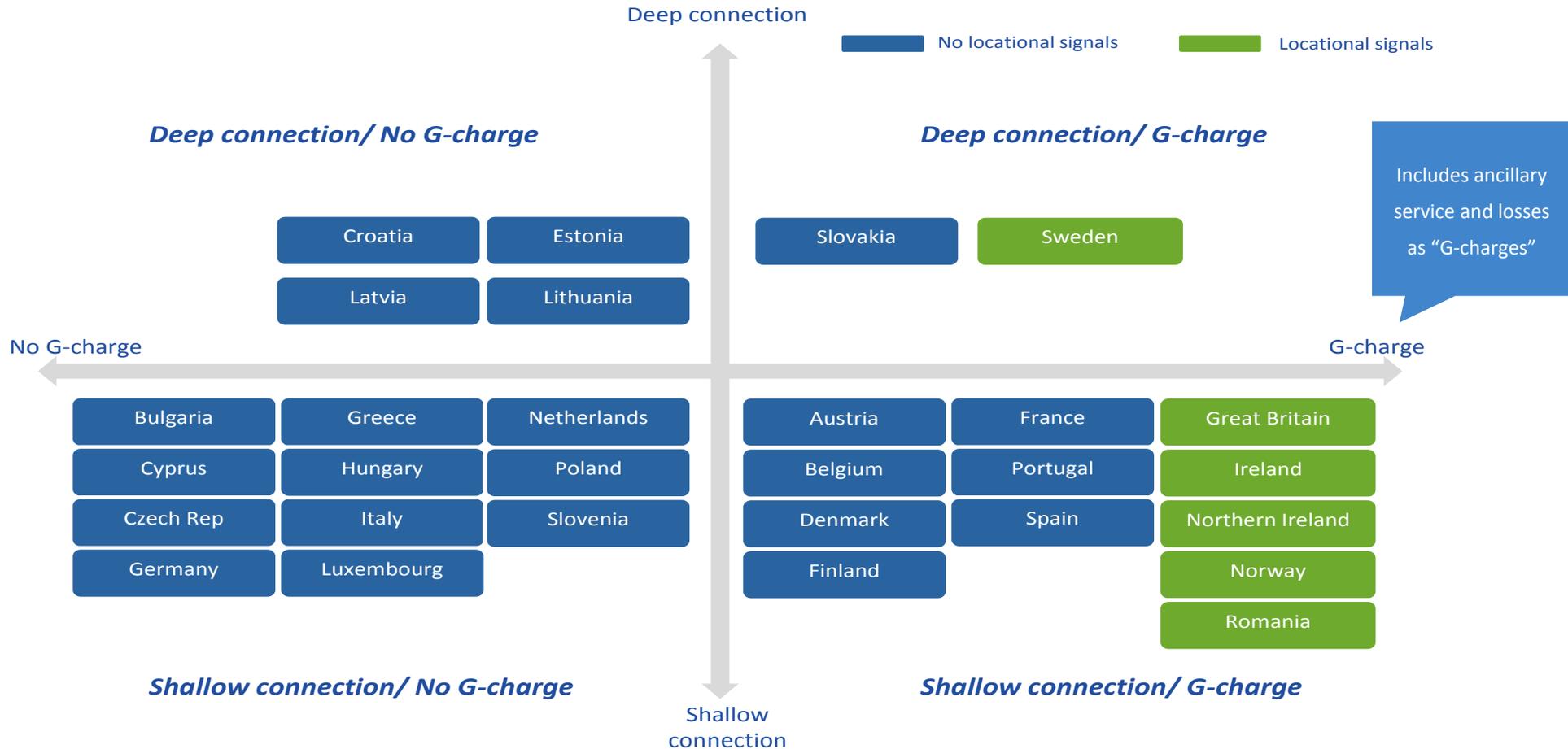
Use of system tariffs are not the only way users contribute to the recovery of the costs of the transmission system

- Connection charges also determine what proportion of the investment costs of the network are covered by individual users and how much is socialised
- Different European countries currently apply different connection charging (e.g. deep vs. shallow) as well use of system tariff regimes
- Connection charges can provide a strong locational signal to generators and transmission connected loads as well as access charges
- Therefore, it is important to compare the strength of locational tariff signals holistically between European countries

Locational signals



Generation tariffs vs. connection charging regime¹



Note 1: Deep vs. shallow country classification based on ENTSO-E transmission tariff synthesis (2014)

Time of use signals

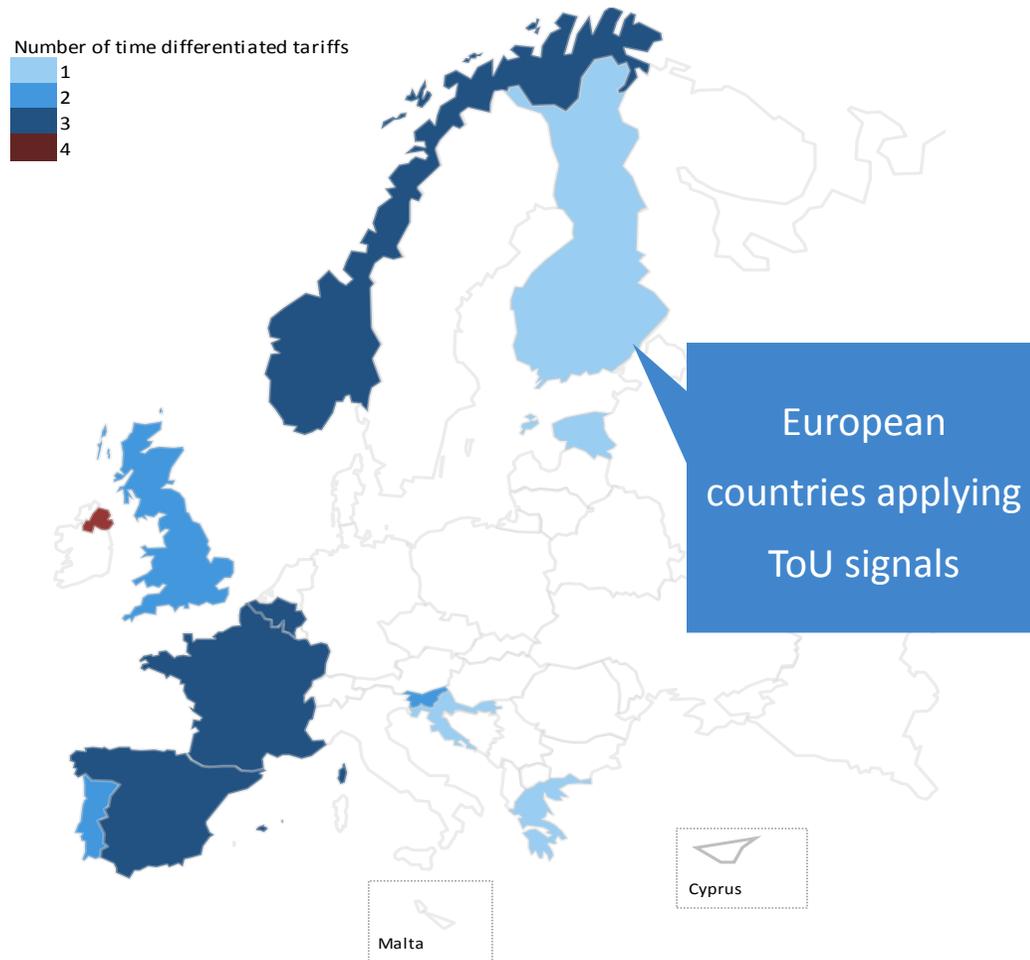


Time of use signals are more widespread across Europe

ToU signals can help ensure that transmission tariffs are more cost reflective

Transmission tariff structure differs depending on:

- whether time of use signals are applied or not
- the number of time differentiated tariffs



Cost types and concepts



Different European countries recover different costs through use of system tariffs

Transmission (and connection) charges recover the fixed costs of the network

Losses

- In some countries losses are also recovered in the transmission tariff (whilst in other countries they are recovered through the energy market)

Ancillary Services (AS)

- In most cases AS are included in the transmission tariff but some countries recover these costs either through separate tariffs or through the energy market

Cost concepts

- Average vs. marginal costs

Summing up



Key themes from comparison of current practices

1

Different European countries currently apply many different transmission tariff structure schemes.

2

European countries differ both in the share of costs that are recovered from generation and load and the basis on which those tariffs are determined.

3

Many neighbouring (and interconnected) European countries currently apply different approaches / principles for charging generation.

4

Comparing the strength of signals provided by use of system tariffs between European countries must be considered holistically with connection charges.



Any questions?



3

INITIAL STAKEHOLDER FEEDBACK



Questionnaire has gathered views on:

- The relevant **objectives** for electricity transmission tariff structures, when considered from an IEM perspective.
- The actual or potential overarching **problems** (if any) within identified current practice(s) that are or might be causing regulatory/market failure(s).
- The **impacts** of current transmission tariff structures on market integration, efficient functioning and effective competition in the internal electricity market and other relevant aspects (e.g. adequate investment levels).
- The potential **policy options** to address actual or potential overarching problems or failures (if any) with current arrangements.

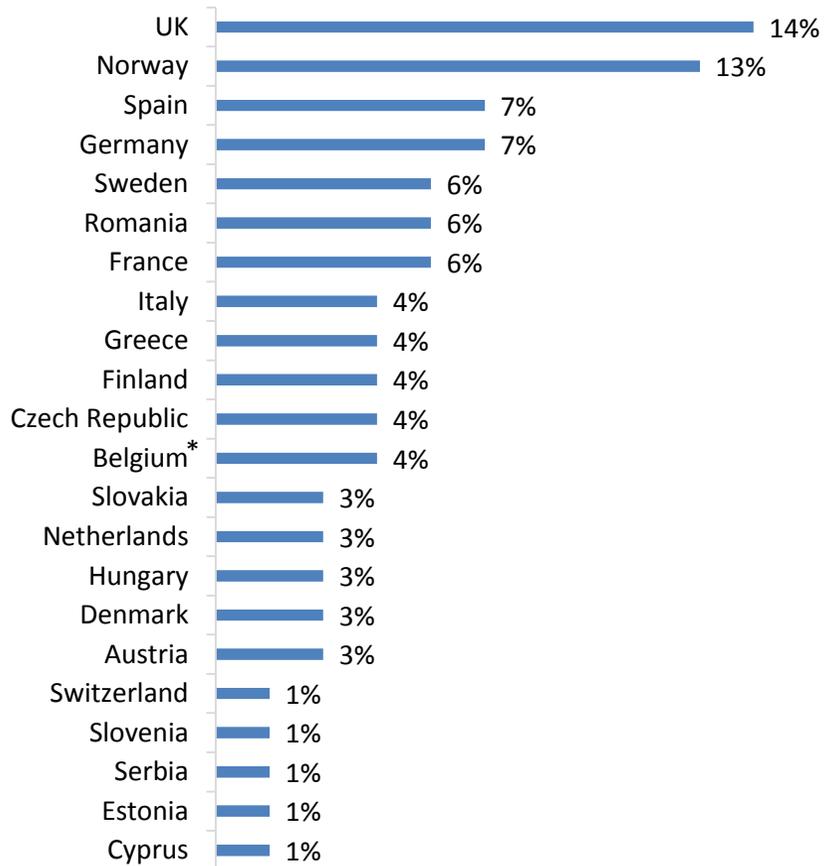
We requested background information on survey respondents

Survey Answers



Organisation Background: By Region

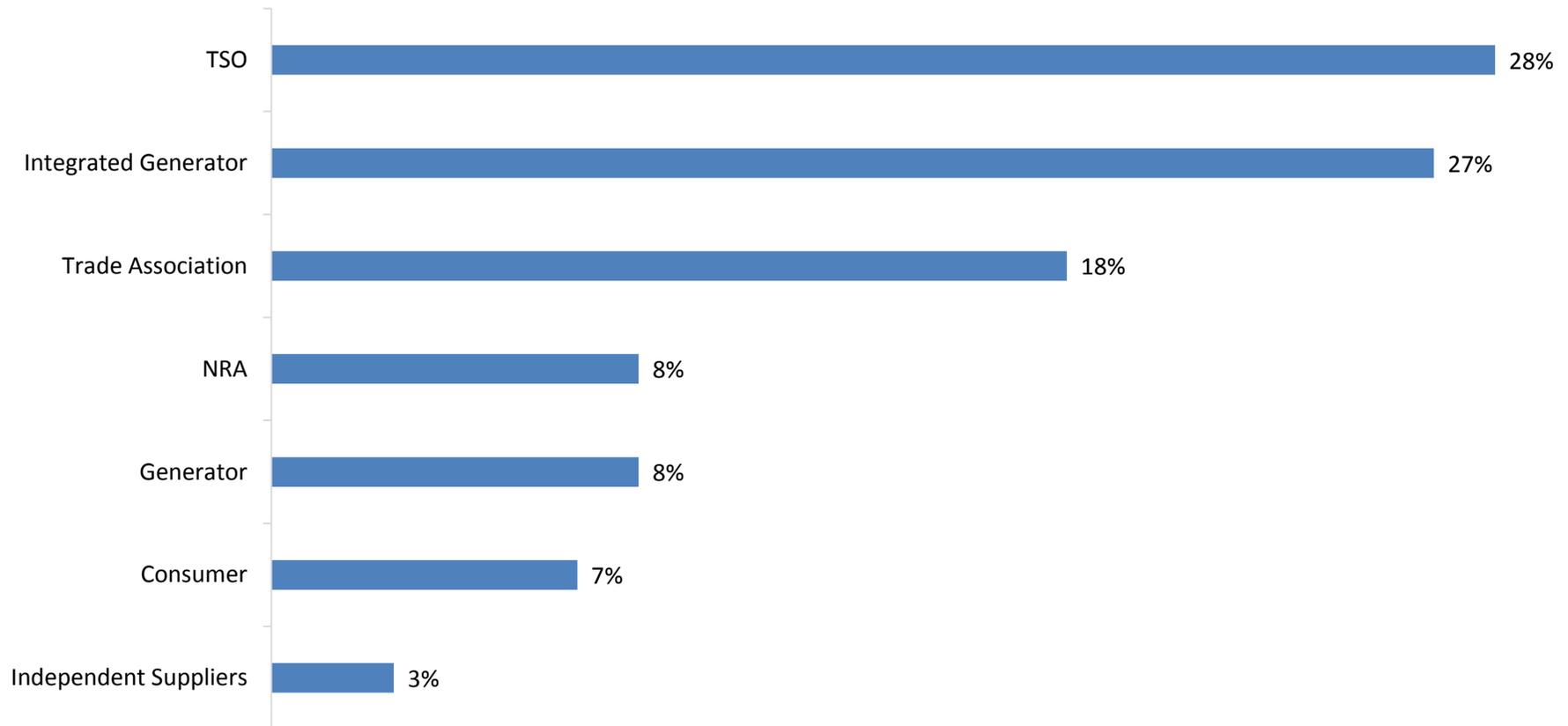
Total number of respondents: 71



*Respondents shown as Belgium are European level associations such as IFIEC and EWEA



Organisation Background: By Type



Internal European electricity market impacts



Q09 - Do differences in the transmission tariff structures that apply in European countries currently impact on the efficient functioning of the internal electricity market?



Of those that answered, 63% provided a comment.

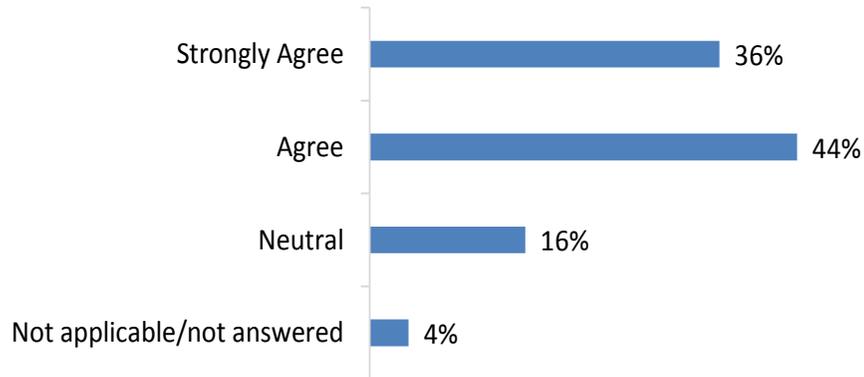
- Those that have **agreed or strongly agreed**, argue that differences in transmission tariff structures, and notably differences in G-charges, currently impact on (i) competition, (ii) operational and investment decisions, thus hindering market functioning, market integration.
- Those that remain **neutral**, agree with some of the potential impacts but point to a lack of evidence or argue that the impact is marginal.
- The majority of those that **disagree**, argue that tariffs are not a significant factor in generation and load decision making, therefore the impact is marginal.

Internal European electricity market impacts

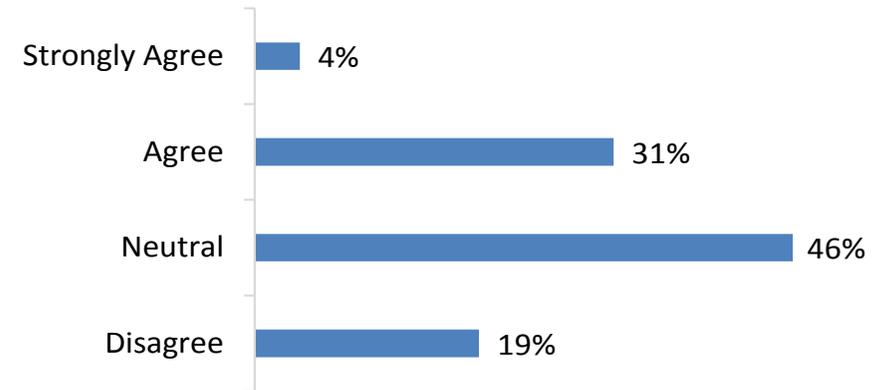


Generators were the stakeholder group who argued most strongly that current tariff structures impact on the efficient functioning of the IEM

Generators



TSOs & NRAs



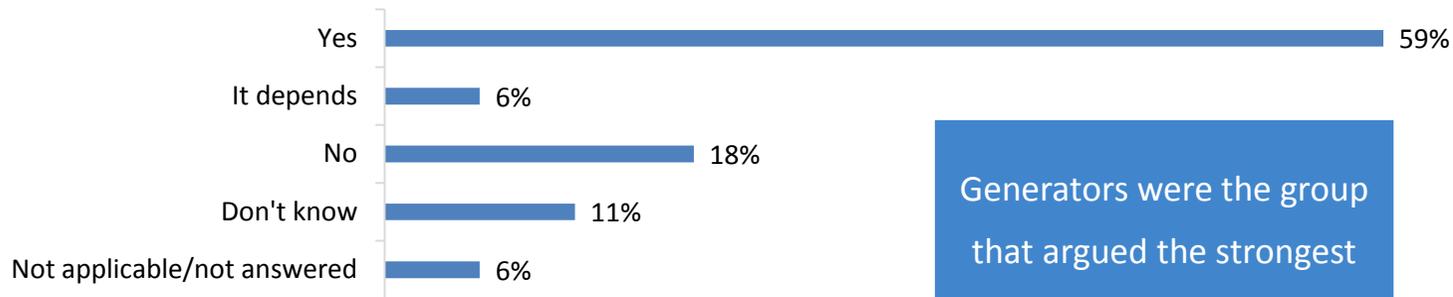
Whilst generators tended to agree that current arrangements impact on the efficient functioning of the IEM, the views of other stakeholder groups more mixed.

Internal European electricity market impacts



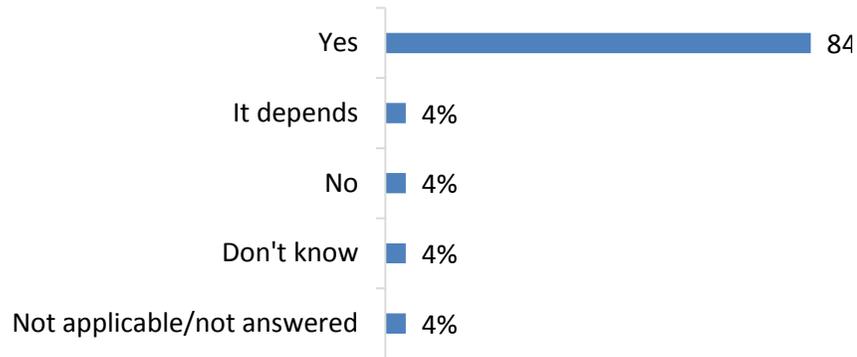
All respondents

Q11 - Is heterogeneity of electricity transmission tariff structures amongst European countries a problem – i.e. a source, or a potential source, of regulatory and market failure for the internal electricity market?

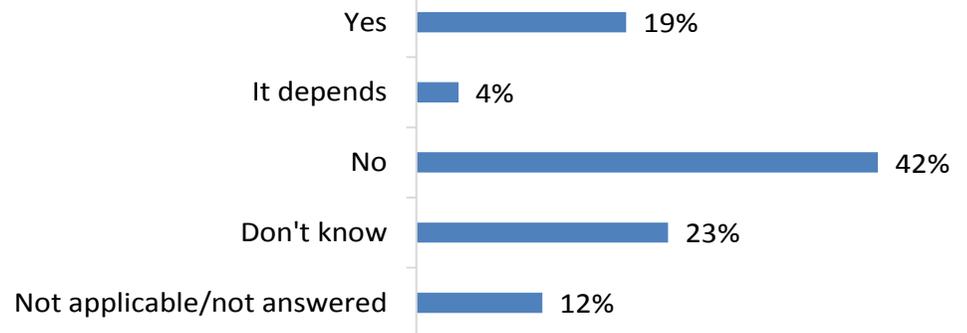


Generators were the group that argued the strongest that current arrangements are a problem

Generators



TSOs & NRAs

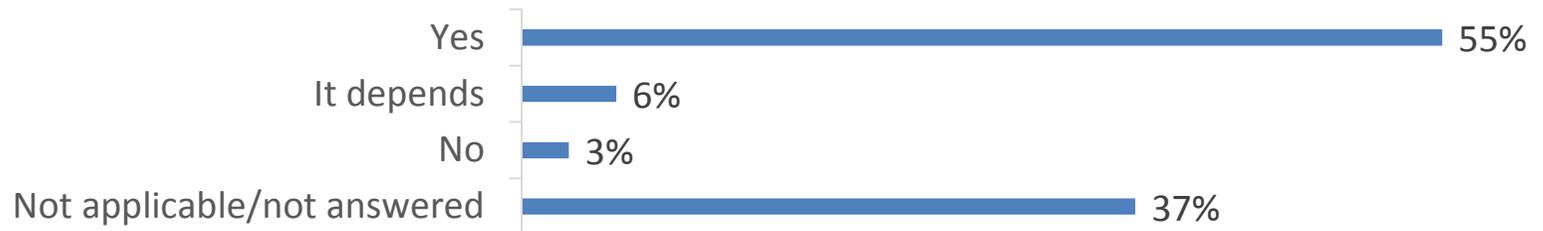


Internal European electricity market impacts

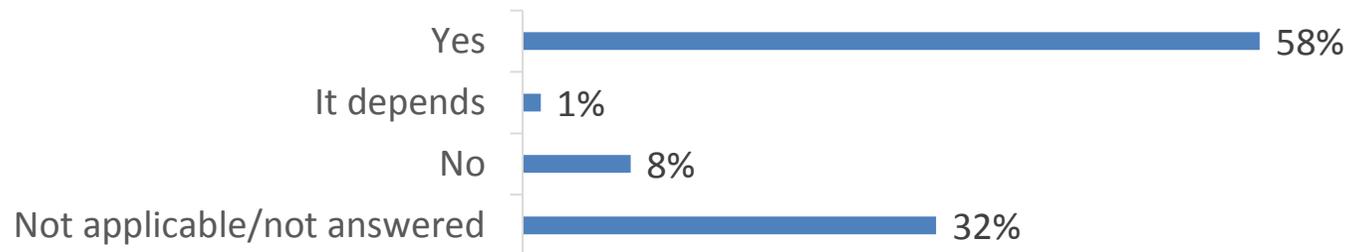


For those respondents who agreed or strongly agreed with Question (9), we asked what impacts does heterogeneity in transmission tariff structures currently give rise to in the IEM?

Q10a - Altered operational decisions of generation?



Q10b - Altered investment decisions of generation?

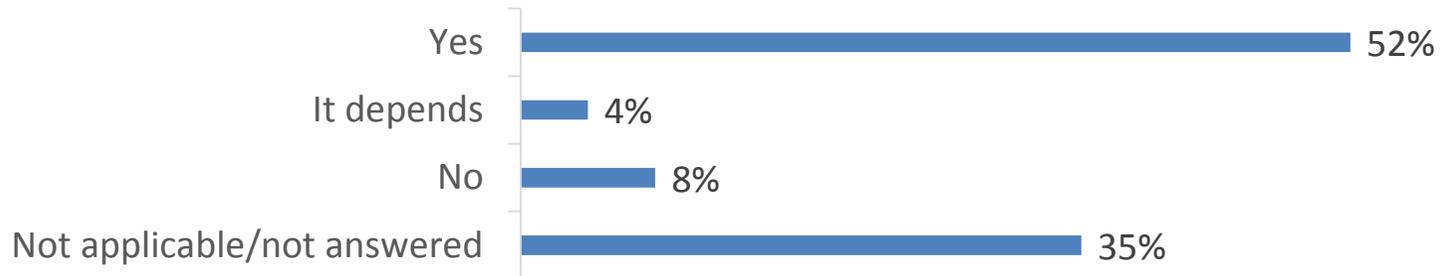


Internal European electricity market impacts



For those respondents who agreed or strongly agreed with Question (9), we asked what impacts does heterogeneity in transmission tariff structures currently give rise to in the IEM?

Q10c - Financing of generation?



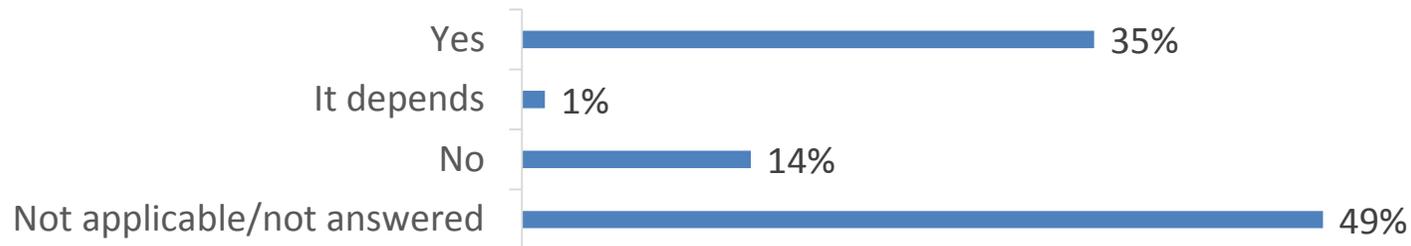
For the majority of respondents who agreed current tariff structures impact on the efficient functioning of the IEM, a majority also stated there were operational, investment and financing effects.

Internal European electricity market impacts

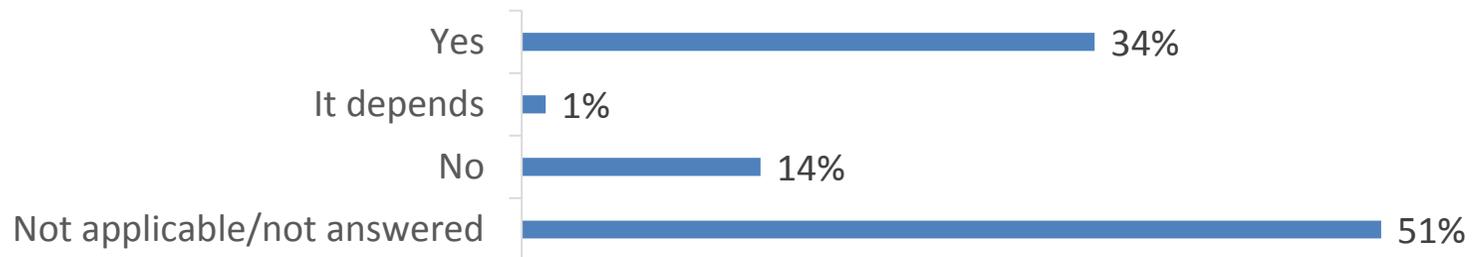


For those respondents who agreed or strongly agreed with Question (9), we asked what impacts does heterogeneity in transmission tariff structures currently give rise to in the IEM?

Q10d - Altered investment decisions by end consumers?



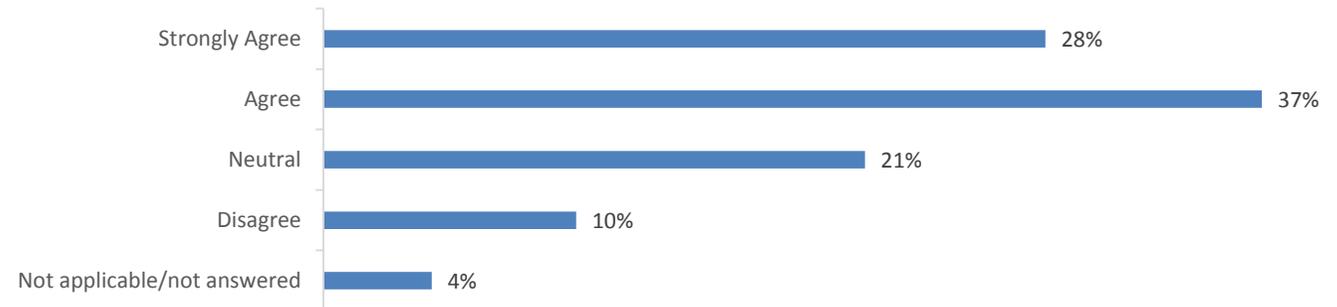
Q10e – Altered operational/consumption decisions by end consumers?



Internal European electricity market impacts



Q17 - Do you expect differences in the electricity transmission tariff structures that apply across European countries to impact on the efficient functioning of the internal electricity market in the future?



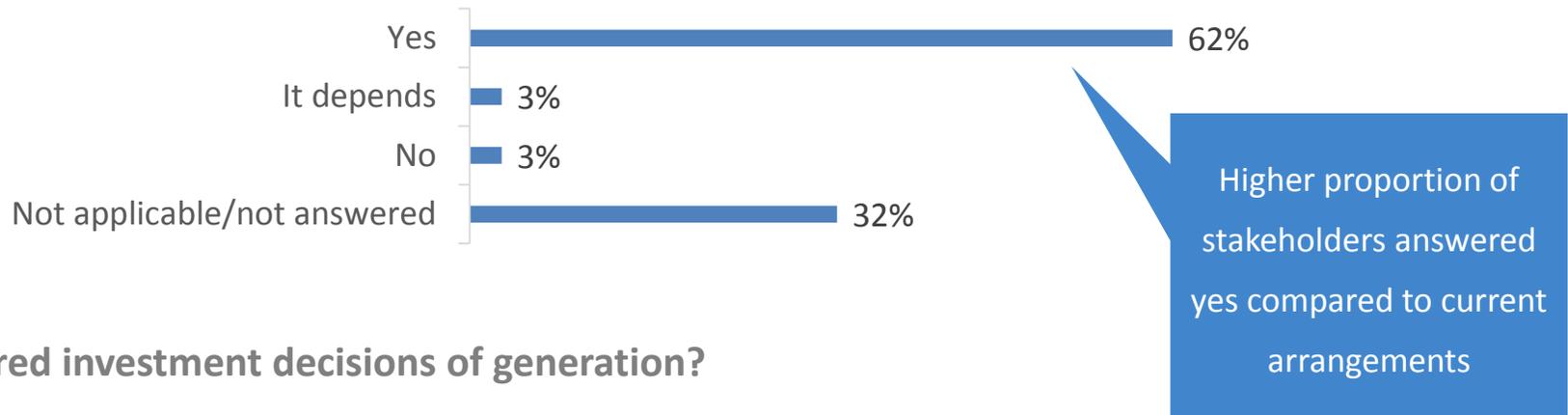
- Those that answered **strongly agree or agree**, a majority of respondents were concerned with increasing pressures on investment decisions and increased interconnection of European markets. Others pointed to future competitive issues and trade inefficiencies hindering the development of the single electricity market.
- Those that remain **neutral**, acknowledge the risk for future competitiveness and trade in theory but point to the lack of evidence or indicate that the future impact is marginal, since other factors are more significant.
- The majority of those that **disagree**, argued that the impacts would be marginal and argued that so long as there is little difference between the average cost recovered from generators in different markets, then trade between market areas should not be detrimentally affected.

Internal European electricity market impacts

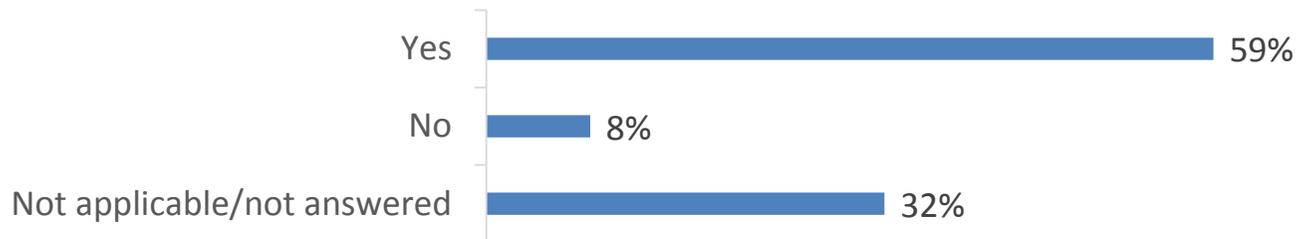


For those respondents who agreed or strongly agreed with Question (17), we asked what impacts could heterogeneity in transmission tariff structures give rise to in the IEM in the future?

Q18a - Altered operational decisions of generation?



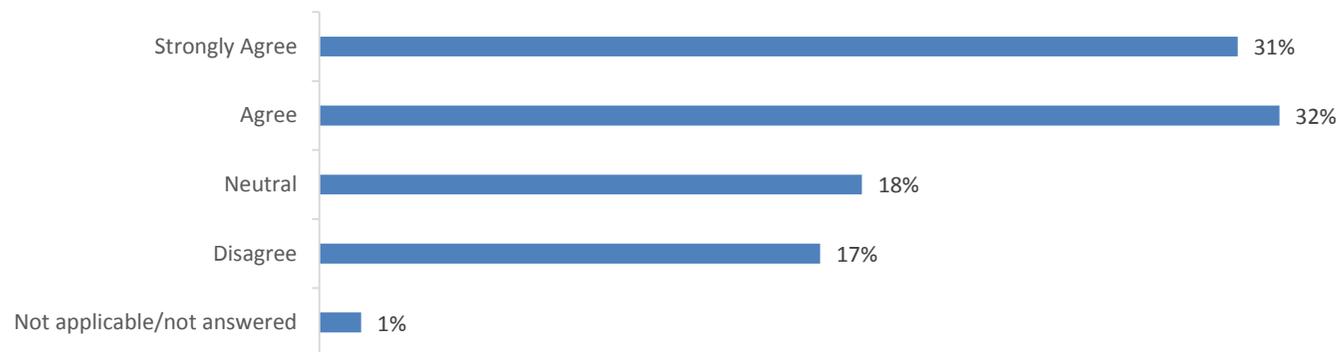
Q18b - Altered investment decisions of generation?



Cross Border Trade and Market Integration



Q21 - Does the heterogeneity in electricity transmission tariff structures between European countries, in your opinion, hamper cross-border electricity trade and/or electricity market integration?



- Those that **strongly agree or agree**, tended to argue that heterogeneity in tariffs affects cross-border trade for the same reasons as identified in the previous questions.
- Those that remain **neutral**, think that in theory there may be impacts, but argue there is not enough evidence. Some stakeholders pointed to issues, such as subsidy schemes, as having a more significant impact.
- The majority of those that **disagree**, argued that tariff structure are a small portion of generation costs and the end-use consumer electricity price. Several point that persistence of cross-border bottlenecks, through lack of investment in interconnectors, are more likely to hamper cross-border trade and electricity market integration.



Key themes from stakeholder questionnaire

1

A majority of stakeholders consider current transmission tariff structures impact on the efficient functioning of the IEM, today and in the future.

2

The impacts of generation charges in Europe were identified as the primary source of inefficiencies/impacts in efficient market functioning.

3

However, a number of large transmission connected customers (e.g. aluminium producers) indicate that transmission tariffs can alter their investment decisions.

4

Although there was a strength of opinion expressed that current arrangements may be a problem, in general limited evidence was provided to support these assertions.



Any questions?



4

EMERGING THEMES



Feedback from stakeholders indicates:

- Current heterogeneity of transmission tariffs *could* impact on the efficient functioning of the IEM, today and in the future.
- Although there were mixed views of how material an issue this could be today and in the future within the IEM.

How might current lack of harmonisation impact market efficiency?

- As identified by the questionnaire that may in theory be impacts on investment decisions and operational decisions of both generation and load.
- Given stakeholders have identified generation tariffs as the primary source of inefficiencies, this would suggest negative effects (if any) are supply-side impacts.



Investment effects

Theory: transmission tariffs and tariff structures theoretically have the capacity to influence investment decisions of generation and large (transmission-connected) loads. In the case of generation, differences in transmission tariffs could in theory distort the siting of electricity generation plant between countries and bidding zones resulting in European countries investing larger resources in generation to meet demand.



Discussion: true, but the counterfactual we compare against is not easily identifiable. A number of conditions also need to hold for impacts to occur in practice. For example, neighbouring countries and bidding zones must be physically interconnected, differences in transmission tariff structures must be more important than any other factor (e.g. capacity payments) affecting investment decisions. Do we observe these conditions in practice in the IEM or particular regions of the IEM?



Operational effects

Theory: operational effects may arise from a distorted dispatch of generators due to differences in non-cost reflective generation charges between countries or bidding zones. From the perspective of economic efficiency, it is most efficient to dispatch the least-cost set of generators to meet the demand for electricity. Non-cost reflective charges could lead to distorted dispatch decisions.



Discussion: true, but again a number of factors need to hold for distortions to operational decisions to occur in practice in the IEM. For example, neighbouring countries or bidding zones that levy tariffs on generation must be physically interconnected. Differences in generation tariffs must also be sufficiently large to change the merit order and differences in G-charges must not reflect actual differences in marginal costs. Do we observe these conditions in practice in the IEM or regions of the IEM?



Financing effects

Theory: differences in transmission tariff structures increase investors' perception of regulatory risk leading to higher financing costs for electricity generation.



Discussion: possibly, transmission tariffs can have a material NPV effect on investments and realised investor returns. Regulatory risk is certainly a real phenomenon that is likely to be reflected in investors cost of capital. However, the factors such as the level of support provided to generation through capacity remuneration and renewable support mechanisms are likely to be much more significant sources of regulatory risk. If there is a financing effect, it is likely to be observed in very marginal projects.



Where might we observe such conditions?

Stakeholders highlighted various examples in their responses:

- For example, the recent introduction of a G-charge in Slovakia and an ancillary services related generation tariff in Belgium.
- One stakeholder argued that the generation tariff applied in Spain impacts on cross-border trade with neighbouring countries.

The Netherlands may be a good case-study for further investigation:

- It is interconnected with a number of European countries and *“functions as a hub for the surrounding countries, importing from Germany and Norway and exporting to the UK.”*
- The Netherlands appears to apply transmission tariffs only to load, but neighbouring (interconnected) markets currently apply G-charges.



Key themes / issues for further investigation

1

Economic theory supports the view that the heterogeneity of transmission tariffs *could* impact on the efficient functioning of the IEM, today and in the future.

2

However, whether these impacts occur in practice depends on a number of conditions and assumptions to hold.

3

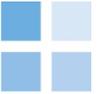
We propose to investigate whether these conditions hold today or may in future in the IEM or particular regions of the IEM in evaluating the case for further harmonisation.

4

Feedback from stakeholders and theoretical consideration of the issues, suggests that harmonisation options should at least be compared to status quo arrangements.



Any questions?



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