Baltic regional gas market study

Final Report

8th April 2016

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Summary of conclusions

With regard to **zone design**, we conclude that on the basis of overall welfare for the region, a single zone is likely to bring benefits that exceed those related to separate zones.

- Significant physical congestion in the region is unlikely, and as such the benefits can be summarised as follows:
  - The principal benefit from merging zones relates to an efficiency gain related to the removal of IP tariffs and the harmonisation of rules and regulations. This leads to an improvement in the efficiency with which interconnectors are used, enhances liquidity, and reduces the overall cost of meeting demand in the region.
  - In addition there are benefits associated with the reduction in the number of transactions for shippers, and potentially small improvements in security of supply due to improved coordination between TSOs and market liquidity. Changes in administration costs associated with the setting up and operation of the single zone are likely to be important but not significantly different between separate and single zones.
- As a result of low congestion, the costs from a single zone are likely to be small:
  - Reduced static efficiency (because the TSO has to redespatch gas) and increased TSO administration costs from running the redespatch market, are unlikely to be important given the small size of the redespatch market.
  - Reduced dynamic efficiency (diminished locational signals) is unlikely to be significant since it is less important where new sources of supply or load locate.
- If physical congestion were to materialise then consideration of potentially larger liquidity benefits from removing 'contractual congestion', and offsetting inefficiencies need to be considered. For the Baltics, we conclude the benefits are still more likely to outweigh the costs.

Summary of conclusions

- There are important **distributional impacts** to consider from a single zone:
  - In a single zone, a single wholesale price will lead to increases in wholesale price in some countries and reductions in others, although, given the low likelihood of congestion, prices are also likely converge (except for the IP tariffs) on most days with separate zones.
  - While our tariff numbers are indicative, a fully harmonised approach to entry and exit tariffs appears likely to create unacceptable distributional concerns.
- There are **alternative tariff regimes** which can be used to mitigate these distributional impacts.
  - By harmonising entry tariffs across the region but allowing exit charges to vary nationally, allowed revenues can be recovered for each country, but efficiency benefits from a single entry tariff retained.
  - This would also reduce the need for significant harmonisation of allowed revenue calculations.
  - However, the need for **inter-TSO transfers** cannot be eliminated entirely. For example, if a single zone changed the pattern of flows over Russian entry points because it no longer matters where in the region they enter, then an inter-TSO scheme can be used to mitigate these impacts.
- However, the final methodology and approach will need to be considered and **set by NRAs once the Tariff Network Code is finalised**.

Summary of conclusions

- In relation to **other market design issues**, we:
  - We recommend a full market merger with a single balancing zone and complete harmonisation of balancing rules. A new market area manager will need to be established – either as a jointly owned company by the TSOs or an existing TSO - to manage all of the zone's balancing and settlement. This is similar to models in Germany and the Belgium-Luxembourg zone.
  - We provide further recommendations on other building blocks e.g. developing a transitional balancing model and hub design.
  - We suggest the costs of (new and existing) infrastructure can be more efficiently collected from all countries across the region (not just the country in which the infrastructure is operating) by taking into account the distribution of benefits rather than directly from users.
- In relation to the **roadmap**, we have set out the steps that need to be taken towards the development of a single zone.
  - We recommend that moving straight to a single zone for is the least costly route for Estonia and Latvia. Given the uncertainty over the construction of the Balticconnector Finland should complete the development of its own zone.
  - The single zone will begin to function once the market rules are in place i.e. the network code. And it is the market rules where the highest degree of harmonisation is required. To implement the rules, we set out the implications for legislators, NRAs and TSOs, and present a high-level sequencing of the important steps that need to be taken.
- **Harmonisation issues** are likely to be limited and concentrated on the development of a market area manager and the creation of a single network code. The creation of a market area manager will require new IT systems to be established.

Introduction

1. Gas Target Model and the development of a regional market model

- In this report we outline the key components or "building blocks" of the Gas Target Model of relevance for the development of the regional market in the East Baltic Region.
- We develop each "building block" in depth, ensuring that options are consistent with European legislation and network codes.
- We evaluate each of the key design choices for the region against a set of criteria, in particular focusing on the efficiency and distributional impacts of design choices.

2. Overview of the evaluation and recommendations

- We draw the "building blocks" together and develop an overview of the key decisions and our recommendations for implementing the Gas Target Model.

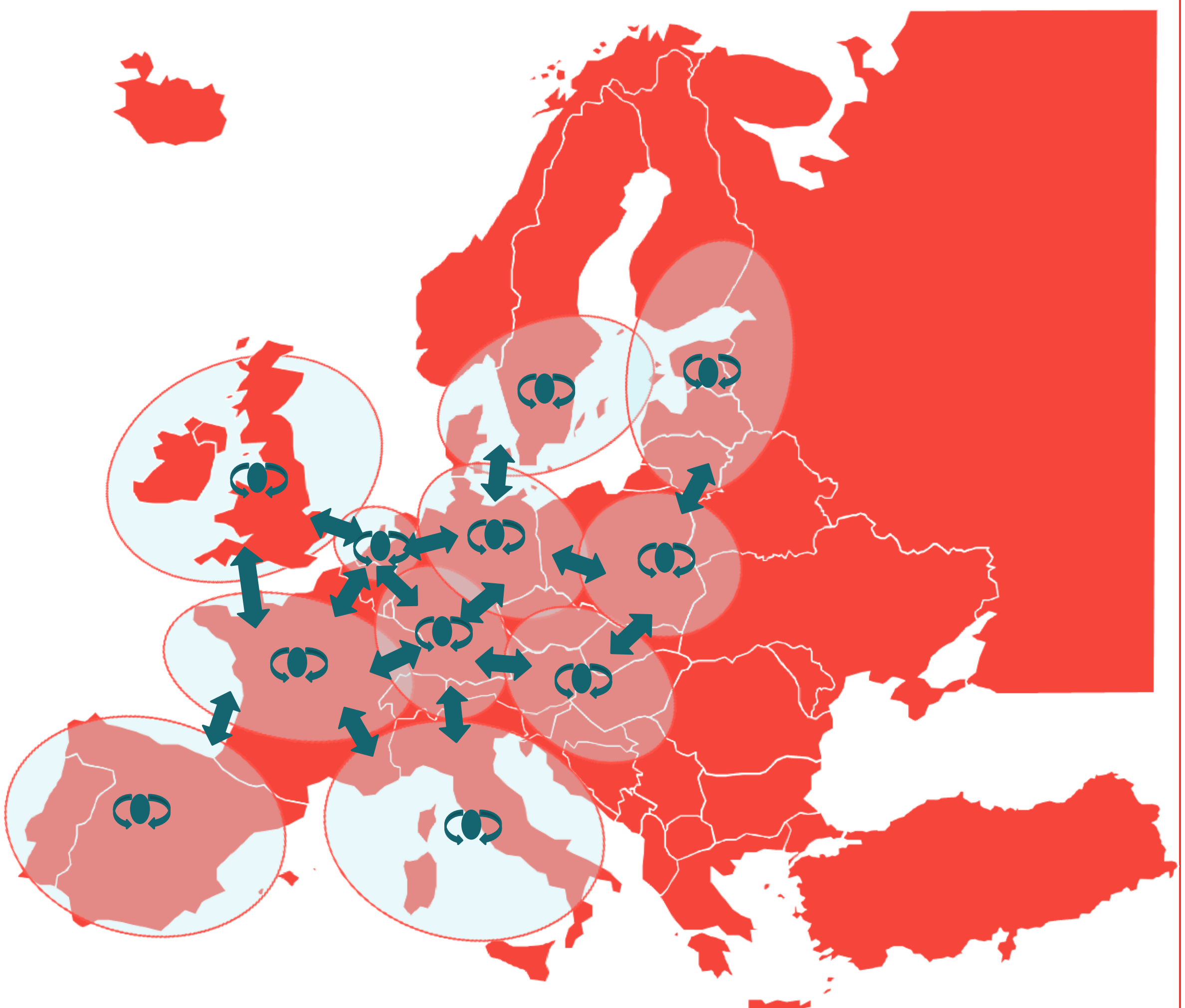
3. Roadmap and harmonisation issues

- Finally, we consider at a high-level the steps that need to be taken to implement the recommended model, and consider any harmonisation issues that need to be addressed.

A vision for the Gas Target Model…

GTM objectives

- The GTM focuses on efficient use of infrastructure between large Entry-Exit zones – which do not necessarily correspond to Member States.
- By making gas available on hubs to be traded by 3rd parties, consumers should face more competitive retail prices.
- Through transparent market based valuation of gas on traded hubs, TSOs should be able to understand the value of network reinforcements.



…liquid hubs and efficient use of gas infrastructure

Important definitions

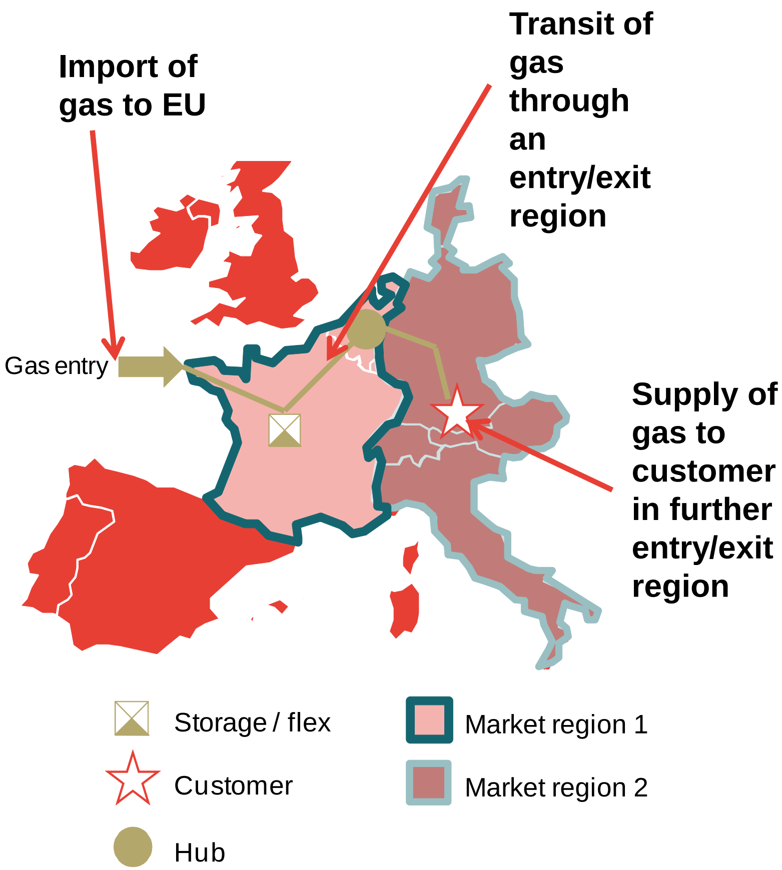
Entry-Exit zone

- A single entry-exit zone has a single wholesale price e.g. GB is a single entry-exit zone and has a single wholesale price set at a trading hub (the NBP price), or the Netherlands (the TTF price).
- At present price zones are generally national or sub-national in scope. *Lithuania is currently the only Baltic State operating as an entry-exit zone.*
- Gas can move freely around the zone in which it enters without payment of further tariffs.
- This is a general improvement on a point to point trading model, providing more flexibility for network users, non-discriminatory access, and aiding competition.

Interconnection Point

- Physical or virtual points connecting adjacent entry-exit systems or connecting an entry-exit system with an interconnector, in so far as these points are subject to booking procedures by network users.
- These can be distinguished from exit points to end consumers and distribution networks, entry points from LNG terminals and production facilities, or entry-exit points to or from storage facilities.

Stylised wholesale market gas transaction can shed light on what GTM really means



This transaction would involve the following arrangements:

- access to the entry point and pipeline network in the first market region;
- access to liquidity at a traded market point in the first region (and/or access to physical storage or other sources of flexibility in the first region);
- access to cross-border capacity between the two regions;
- access to exit capacity to the final customer in the second market region;
- effective balancing of the network in the second region to the extent that the customer's demand differed from the injections nominated into that region at the cross border point; and
- effective settlement arrangements to address the financial consequences of differences between aggregate injections and withdrawals.

From this transaction can be derived the following building blocks of a GTM…

Building blocks interpreted from the GTM and applied to the Eastern Baltic region:

1. What should be the geographic market definition? (size of entry-exit zone)
2. How should transmission capacity be allocated and priced? (access to entry-exit capacity)
3. How should cross-border transmission capacity be allocated and priced? (access to cross-border capacity)
4. How can market participants access liquidity? (temporal market definition and hub structure)
5. How should balancing and settlement arrangements be organised?
6. How should efficient exchange of gas between transmission networks be ensured? (network interoperability)

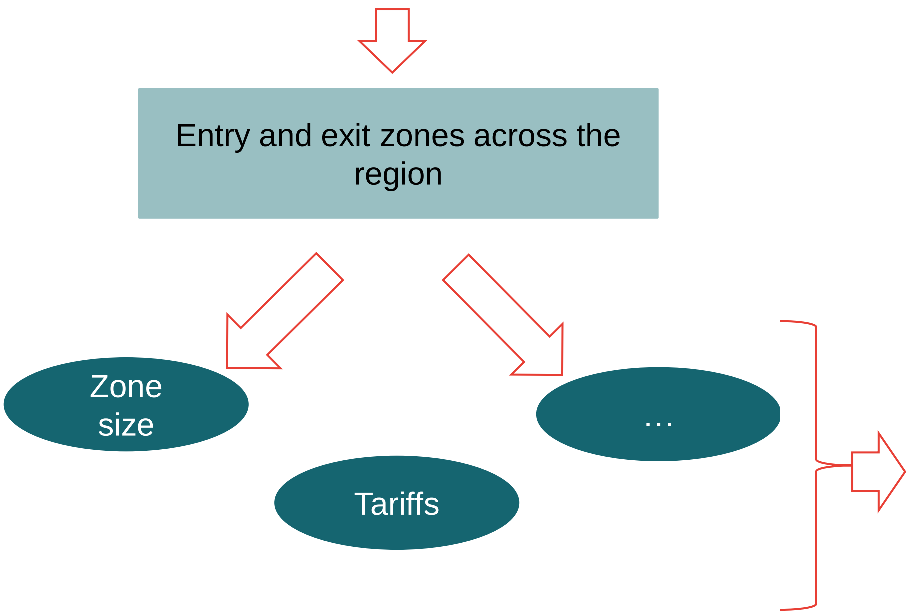
And some aspects of design important for the Baltics which the GTM is relatively less clear on:

7. How should access to storage and LNG be organised and priced?
8. How should long-term contracts be treated in the liberalised market?

… we consider each block in turn and evaluate any potential choices

The evaluation makes the assumption each state has converted to separate entry-exit zones…

Current legal and regulatory framework



Approach

- It is important to note that we do not evaluate whether a particular option is better or worse relative to what is experienced today in the Baltic region. Rather we compare it against alternative choices which are consistent with the GTM.
- So we evaluate the impact of each of the design choices in the context of country entry-exit zones. As a result, some changes experienced in the region will take place irrespective of the design choices we evaluate, and so these effects will not form part of the evaluation. For example, the most significant price convergence and tariff changes may take place due to the setting up of entry-exit zones in the first place, rather than the result of specific design choices we evaluate.
- We evaluate all options **qualitatively**, and where possible add **quantitative analysis** e.g. in relation to distributional issues of tariff design, and expected levels of congestion in the region.

…we then evaluate the options which are available according to the GTM

There are four main criteria against which the design options are evaluated

Efficiency	● Meeting consumer demand at the least cost. This could take the form of : ▪ *static efficiency* e.g. by ensuring the most efficient signals for despatch of sources of gas; or, ▪ *dynamic efficiency* e.g. the location of new sources of supply, and minimising transaction costs. ● Promoting effective competition between different sources of gas in the whole sale and retail markets and increased market liquidity and promoting new entry. ● Minimising transactions costs
Security of supply	● A key aim for the Baltics is to improve their economic independence by reducing their reliance of a single source of supply. ● Does it provide a secure regime to support new investments and cost recovery of assets?
Admin/legal burden	● The need for legal and regulatory change, and the level of regional harmonisation required. ● The need for institutional and IT related change to facilitate the model.
Distributional effects	● An increase in overall welfare does not necessarily mean everyone is better off – the allocation of welfare determines that. ● What is the impact of the option on **1. <u>TSO revenues</u>**, **2. <u>Costs to consumers,</u>** and, **3. <u>Costs to producers (i.e. shippers)</u>?**

The focus of the GTM is on well-functioning markets

The most recent guidance on the Gas Target Model evaluates zone size based on certain metrics, rather than targeting a specific level of demand.

The optimal size of the zone should be determined by assessing how the zone size in the 'status quo' *(which for the Baltics will be 4 separate entry-exit zones)* scores in **two key areas**:

Meeting participants' needs

Products and liquidity are available such that effective management of wholesale market risk is possible

Market health

The market area is demonstrably competitive, resilient and has a high degree of Security of Supply

- Specific thresholds are set out for metrics within each group
- Metrics benchmarked against the two best performing hubs in Europe, NBP and TTF (in the UK and Holland)

Metrics are set out to examine the health of the market and how well participants' needs are met

Our evaluation framework picks up on the underlying principles of these metrics, by considering the impact of zone design on competition, liquidity and efficiency etc. and sets them in a framework of the wider costs and benefits we set out earlier.

Meeting participants' needs

For day-ahead, front month and forward products each:

1. **Order book volume** in MW on each bid- and offer- side
2. **Bid-offer spread** in % of bid-price
3. **Order book price sensitivity** in % price distance between average price for 120 MW and best price
4. **Number of trades** per day

Market health

Together for spot, prompt and forward market:

1. **Herfindahl-Hirschmann Index**
2. **Number of supply sources**
3. **Residual supply index**
4. **Market concentration for bid and offer activities**
5. **Market concentration for trading activities**

These metrics are difficult to assess in mature markets, where there is existing liquidity and an understanding of shipper behaviour, but it will be even harder in the Baltic context.

So assessing metrics themselves is not very helpful. In this report we focus on the impact of zone design on the underlying principles behind the GTM metrics of competition, liquidity and efficiency etc.

In doing so, we are ensuring we assess options in ways which are likely to move in the direction of meeting the GTM criteria without actually referring to the detailed criteria themselves.

There are recommended options when market outcomes fall short

The GTM recognises that even when all the best practice requirements are implemented, the zone might not satisfy the metrics of a well-functioning market.

Structural reforms are required in such cases. The GTM explicitly recognises three options (though list is not exhaustive and other options can be explored e.g. market coupling):

Market merger

- **Fully merge** two or more adjacent markets
- Merged trading points and integrated entry-exit system
- One unified balancing zone

Trading region

- **Partial merger** of adjacent zones
- Merged trading points and integrated entry-exit system
- End-user balancing remains separate for each participating market

Satellite market

- Low liquidity market **linking off** an adjacent functioning market via an uncongested interconnector
- Linked to the lead market's trading point
- Separate entry-exit system and balancing zone

Market merger / Trading region:

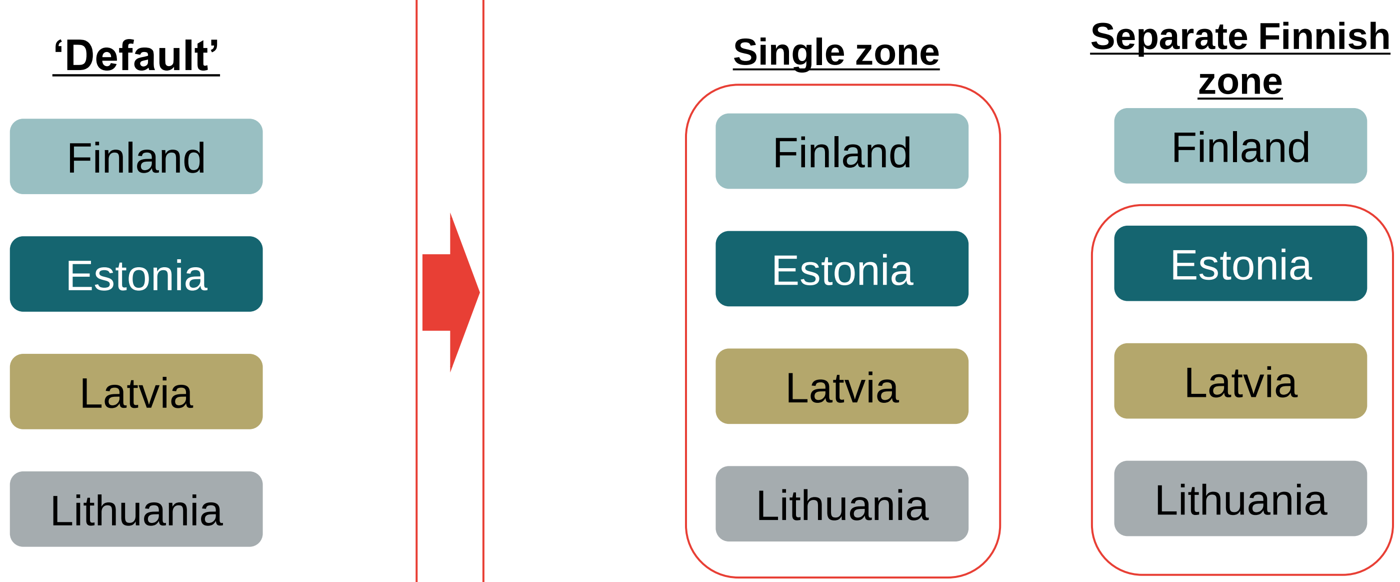
- We do not distinguish between these in our evaluation of a single zone. Once a high-level decision on a single versus separate zones has been taken, then there are sub-choices on the exact degree of harmonisation between transmission networks. We consider this distinction further under balancing and settlement later.

Satellite market:

- This is an issue of hub design i.e. is a separate hub needed in each zone should they be separate? We discuss under hub structure later.

Four separate e-e zones do not yet exist in the Baltics, but they will be 'default' zonal configuration for the region…

Each of the Baltic States will need to convert to an entry-exit zone to be compliant with the EC Directives, which only Lithuania and Finland (planned) have done. This could be an unnecessary step if alternative larger zones are preferred.



Separate national zones, where Estonia and Latvia also convert to e-e zones

This is effectively the option of a 'single zone' if Balticconnector is not built.

…therefore we assess whether there is a benefit of moving from four separate zones to a larger single zone

At a high-level we consider the following benefits and potential drawbacks from forming a single zone

In the following slides we consider a range of different benefits and costs. As part of the discussion, we conclude that congestion in the region is unlikely, which affects the relative importance of different impacts. Given this, our assessment of the overall impacts on welfare are summarised below.

Benefits

At a high-level our assessment of the benefits from merging of a single zone covers the following issues:

- The most important efficiency gain is likely to arise from the **removal of IP tariffs**. This leads to an improvement in the efficiency with which interconnectors are used, enhances liquidity, and reduces the overall cost of meeting demand in the region (slide 22, 26).
- **Reduction in the number of transactions** reduces administrative costs for shippers (slide 22).
- There could be limited improvements in liquidity where 'contractual congestion' limits trade in the region with separate zones. Given the low level of congestion expected in the region this is unlikely to be an important benefit. (slide 22-24).
- Small improvement of **SoS** due to better cooperation and higher liquidity (slide 38).
- There is a balance between benefits and drawbacks to **admin/legal** costs (slides 38).

Drawbacks

Our assessment of the costs includes the following:

- Reduced static efficiency (because TSO has to redespatch gas) is unlikely to be important given the low level of congestion expected (slide 27-28).
- Reduced dynamic efficiency (diminished locational signals) (slide 27-28) which is also unlikely to be important given the low level of congestion expected.
- Increased TSO costs (due to managing a redespatch market) (slide 27-28).

If the market merger increases the number of competing supply sources, it could reduce prices…

Improved competition

- A market merger will not, in the first instance, result in a change to the physical supply or transportation infrastructure associated with the two markets.
- **With separate zones**, supply sources can compete across country borders, except to the extent:
  - cross border points are physically congested.
  - border tariffs take them out of the market (e.g. because despite being cheaper, when combined with transport costs, they are more expensive than domestic sources in a neighbouring zone – this is inefficient if transport costs are not cost-reflective).
  - differences in market rules and regulations create barriers to trade.
- **After a merger**, there would be two key changes:
  - cross border capacity will no longer be a constraint on volumes (though if "market determined" flow is greater than capacity, constraint costs will be incurred, most likely to be socialised across all participants).
  - there will be no border tariffs, and so no cost barrier to competition and market rules will need to be fully harmonised. This could lead to a more efficient use of the interconnector.
- As a result, there is at least potential for increased competition between sources, particularly from the exporting to the importing market.

Reduction in transaction costs

- Reductions in the number of transactions needed by shippers to flow gas to different locations on the network results in a direct administrative saving to those participants.

…the increased size of the market zone should result in increased liquidity

Liquidity will tend to increase in a single zone

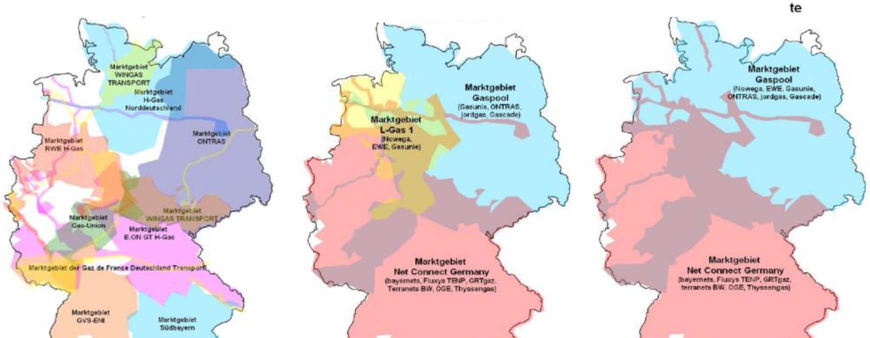
- Factors driving liquidity:
  - Number of supply sources and storage facilities with different costs
  - Number of suppliers and shippers with different positions, risk preferences and views of market fundamentals
  - Size of physical market
  - Variation in physical market (demand and supply)
  - Cost of trade (liquidity attracts liquidity)

- **With a single zone,** effects leading to increase in liquidity compared to separate zones are:
  - Greater volume of gas physically delivered within the merged zone, compared to any of the separate zones
  - Greater number of supply sources within the merged zone
  - There may be an increase in the number of shippers active in the zone
- However, there may be a small offsetting effect due to the variation in demand *relative* to average demand being reduced across the larger single zone. For example, imagine a shipper with a portfolio of contracts previously spread across two separate zones. They would need to trade to manage variations in demand from customers in each zone. In a single zone, where changes in customer demands vary in opposite directions, they can simply be netted off against each other, reducing the need to trade.
- It is unclear whether merger would reduce or increase the amount of transit gas relative to demand within the zone.
- Increased liquidity will further increase liquidity.

There is precedent for liquidity benefits from zone mergers in Europe

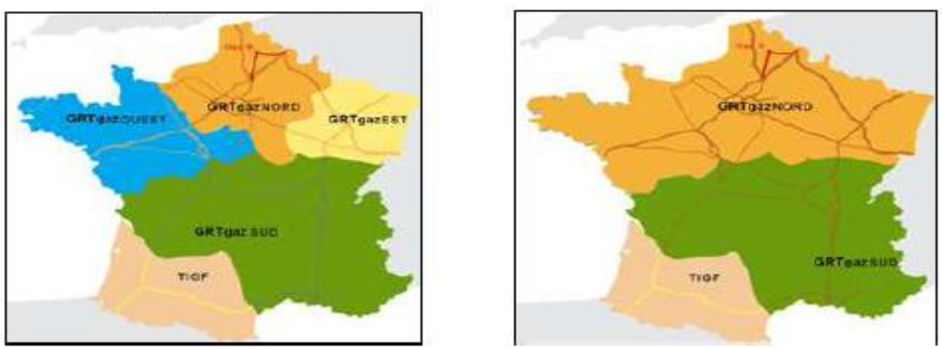
There is evidence of liquidity improvements from European gas zone mergers in France and Germany, however, it is hard to disentangle other effects and definitively attribute all improvements to the merger. The liquidity improvements should be viewed as upper bounds.

1 German transition from 19 entry-exit zones to 2



10/2007 – 19 zones | 04/2011 – 3 zones | 10/2011 – 2 zones

2 PEG Nord zone in France was created in Jan 2009 by merging three smaller zones



- Evidence suggests potential for significant increases in churn rates following German zone mergers, potentially up to +75% over a few of years.
- Equally bid-ask spreads reduced over the period (between -25% and -50%) though volatility in spreads makes the results less clear.
- The French merger was widely commented on by the French NRA (CRE) and other stakeholders as having facilitated the increase in liquidity in PEG Nord e.g. churn rate increased by 50% albeit starting from quite low levels.
- However other drivers were also identified as supporting liquidity in the period, including the launch of a new exchange.
- In each of these merger cases the primary motivation was the removal of IP tariffs and transaction costs, rather than physical congestion. Though in the case of Germany, contractual congestion was common, the removal of which in merged zones was also an important driver of liquidity. However, contractual congestion could also have been tackled by implementing the Congestion Management Procedures (CMP) NC under separate zones.

A single zone can lead to efficiency gains in both congested and uncongested scenarios…

Merged single zone

Congested scenario

Competition could be hampered significantly in separate zones, suggesting there are potential benefits from merging zones with congestion.

Congestion over IPs

No limits on competition

Commercial flows can exceed the capacity over the interconnector, so there is no limit on participation in the wholesale market for sources of supply across the region.

No limits on competition

Commercial flows can exceed the capacity over the IP, however given the limited congestion this rarely happens. Main effect on competition due to removal of IP tariffs.

Limits on competition due to congestion

Participation in wholesale market of a country limited by capacity of IP. Therefore some gas sources may be prevented from participating in neighbouring market, hampering competition and liquidity.

Limits on competition due to IP tariffs

Participation across national borders not limited by IP capacity, so no hampering of potential competition due to congestion. Here IP tariffs distort gas flows leading to sub-optimal use of interconnectors.

Limited congestion across IPs

Uncongested scenario

There is no gain to competition from allowing commercial flows to exceed physical capacity in a single zone. The main benefit comes the removal of the IP tariff and making better use of the interconnectors (this is set out in more detail on the next slide)

Separate national zones

…though the reasons for the efficiency benefit are different

Where congestion is limited competition can be enhanced if IP tariffs are removed

IP tariffs can be restrictive for trade over borders, potentially pushing trade below efficient levels and raising overall costs. A single zone removes the tariffs and therefore the inefficiency, reducing overall cost of meeting demand for the region.

Efficiency gain arises due to uncongested IP…

- The removal of IP tariffs can remove distortions to flows across the region, and allow the region's demand to be met by the cheapest available sources of gas.
- This gain rests on there being spare capacity across the IP, enabling an increase in use of the interconnector i.e. this benefit coincides with scenarios of limited congestion.
- Provided this spare capacity exists, removing the IP tariff allows cheaper sources of gas to compete in a neighbouring market, when previously they were "priced" out of the market by the IP tariff.

…and IP tariffs that are not cost-reflective under separate zones

- This efficiency gain rests of the assumption that under separate entry-exit zones, tariffs are not cost reflective i.e. they were above the short-run marginal cost of the flows over the IP.
- The inefficiency from IP charges could *in theory* be removed in a model of separate zones, if IP charges were made to be cost reflective e.g. by setting a zero reserve price in the auctions, uncongested IPs will lead to tariffs close to zero.
- However, this is prevented in the tariff network code since the IP reserve price must be equal to the estimated reference prices. These are typically set based on the recovery of allowed revenues (i.e. full capital and operational costs for the zone).

It is therefore likely that the removal of IP tariffs will lead to an important efficiency gain in a single zone when there is limited congestion.

However, a market merger could lead to static and dynamic inefficiencies…

Reduced static Efficiency

- We have already noted that a market merger will not, in the first instance, result in a change to the physical supply or transportation infrastructure associated with the two markets. In a single zone constraints are managed by the TSOs.
- **With separate zones**, the market despatches gas over IPs through competitive allocation processes (as set out by CAM).
- **After a merger**, while the physical flows are the same, where congestion arises, they may be despatched less efficiently, for example because:
  - the TSO is a less effective purchaser of gas; and/or,
  - is vulnerable to market power in the redespatch market e.g. because they have to operate on shorter timescales, or purchase specific products where liquidity is poor such as locational products.

Reduced dynamic Efficiency

- Over the longer term a merger could reduce locational signals for new sources of supply or demand, and lead to increased infrastructure costs.
  - **With separate zones**, new sources of supply/demand are incentivised through higher wholesale prices, and avoided transport costs over IPs, to locate closer to demand.
  - **After a merger**, market participants are indifferent to the location of their connection within the newly enlarged zone. This is because they don't face transport charges within the zone, and there is a single wholesale price. Constraint costs due to TSO redespatch are likely to be socialised.

Increased TSO transaction costs

- Alongside the potential inefficiencies there are direct administrative costs associated with the transactions for constraint management.

…these inefficiencies in a single zone are only significant with congestion

It is only in this quadrant where significant inefficiencies materialise, suggesting there could be costs associated with a single zone with congestion

Merged single zone

Congestion over IPs

Limited congestion across IPs

Separate national zones

	Congestion over IPs	Limited congestion across IPs
Merged single zone	**Significant redespatch costs for TSO, with potential for large static inefficiency**	**Limited congestion requires minimal redespatch by TSOs**
Merged single zone	**New sources indifferent about location, potentially increasing future congestion and redespatch and network investment costs.**	**New sources indifferent about location, but given lack of congestion limited impact on future network and redespatch costs**
Separate national zones	**Congestion leads to separate national wholesale prices, with market allocating IP capacity, minimising need for TSO redespatch.**	**National prices converge, with minimal need for TSO redespatch.**
Separate national zones	**New supply sources incentivised to locate where prices are highest, minimising future network investment costs.**	**New sources indifferent to location due to convergence of wholesale prices in each country.**

In summary, the size and nature of efficiency impacts will be linked to the scale of physical congestion between countries

Without congestion between separate entry-exit zones, then there is likely to only be a limited impact on static and dynamic efficiency, and competition benefits will be driven by the removal of the IP tariff.

If there is no congestion (or limited congestion) between zones moving to a single zone leads to:

- **Minimal redespatch efficiency losses** given the TSO will not be required to redespatch gas.
- **Minimal inefficient siting decisions** - without congestion the requirement for a locational signal to locate new sources of gas on a particular part of the network is reduced.
- **Competition benefits due to removal of IP tariffs:**
  - Competition in two separate markets can also be effective where they are connected by an uncongested interconnector, since supply sources are able to compete cross-border, and wholesale prices are able to converge.
  - Therefore the main competition benefit is from removing cost barriers created by IP tariffs and differences in rules and regulations across markets, meaning there could potentially still be improved efficiency of use of the interconnector reducing overall costs of meeting demand in the region.

So it is only in the case where there is likely to be congestion that the relative size of these costs (losses in efficiency) need to be balanced against the potential benefits (improvements in competition).

To assess the likelihood and location of congestion in the region we have developed a set of flow scenarios

We have identified the building blocks of the scenarios and combined them into a set of internally consistent scenarios with associated unconstrained and constrained flows.

Demand (& storage)

Remaining low/falling demand – we model 3 representative demand days within a year (14 day winter peak average, end of heating season, typical summer day). Each day has associated flows in and out of storage. We assume inflows on the winter and end of heating season days, and outflows in the summer.

Commodity merit order

- **High LNG prices**
- **Low LNG prices – GIPL inflows**
- **Low LNG prices – GIPL outflows**

Infrastructure

- **Base case, including GIPL and Incukalns upgrades**
- **Balticconnector**
- **Balticconnector & LNG Estonia**

Zone design

- **Separate national markets**
- **Single zone**
- **Finland as a separate zone**

Separate national markets:

- The commercial flows are constrained by auctions for capacity over IPs and represented by **constrained** flows

Single zone / Finland as a separate zone:

- Where country zones are merged, commercial flows are represented by **unconstrained** flows i.e. they are not constrained by technical capacities.
- Redespatch actions by the TSOs to manage congestion result in **constrained** flows, which in theory are the same physical flows as those produced by separate markets.

We go on to present the results of the modelling i.e. the unconstrained and constrained flows

We have set out full details of the flow simulations and underlying assumptions in Annex A.

We examined the following set of scenarios

In the flow simulations we have considered 9 commodity and infrastructure scenarios. These scenarios are examined for congestion [and later in the report in relation to tariffs]. We first produced unconstrained flows, before applying a linear programme to create constrained flows, based on the least cost gas sources according to the assumed commodity merit order in each scenario.

Flow simulation scenarios

	Commodity merit order	Infrastructure
A	LNG high	Base case (with GIPL and Incukalns upgrades)
B	LNG low – GIPL inflows	Base case (with GIPL and Incukalns upgrades)
C	LNG low – GIPL outflows	Base case (with GIPL and Incukalns upgrades)
D	LNG high	Base + Balticconnector
E	LNG low – GIPL inflows	Base + Balticconnector
F	LNG low – GIPL outflows	Base + Balticconnector
G	LNG high	Base + Balticconnector + Estonian LNG
H	LNG low – GIPL inflows	Base + Balticconnector + Estonian LNG
I	LNG low – GIPL outflows	Base + Balticconnector + Estonian LNG

We have set out full details of the flow simulations and underlying assumptions in Annex A.

The flow simulations illustrate a range of outcomes in terms of congestion…

Patterns of congestion are similar between the winter and end of heating season days

14-day winter peak average

Scenario	LNG price	GIPL	Infrastructure	Balticconnector EE -> FI	Balticconnector FI -> EE	Karksi LV -> EE	Karksi EE -> LV	Kiemenai LT -> LV	Kiemenai LV -> LT
A	High	Zero	Base case	0	0	40	0	21	0
B	Low	Inflows	Base case	0	0	40	0	21	0
C	Low	Outflows	Base case	0	0	40	0	21	0
D	High	Zero	Base case & Balticconnector	0	2	37	0	18	0
E	Low	Inflows	Base case & Balticconnector	**97**	0	**136**	0	**117**	[illegible]
F	Low	Outflows	Base case & Balticconnector	28	0	67	0	48	[illegible]
G	High	Zero	Base case & Balticconnector & Estonian LNG	0	1	37	0	18	0
H	Low	Inflows	Base case & Balticconnector & Estonian LNG	**159**	0	66	0	47	0
I	Low	Outflows	Base case & Balticconnector & Estonian LNG	**101**	0	8	0	0	11
			Capacity of IP:	86	86	74*	74*	67	65

The highlighted cells illustrate where the unconstrained flows exceed the capacity over the border point.

End of heating season

Scenario	LNG price	GIPL	Infrastructure	Balticconnector EE -> FI	Balticconnector FI -> EE	Karksi LV -> EE	Karksi EE -> LV	Kiemenai LT -> LV	Kiemenai LV -> LT
A	High	Zero	Base case	0	0	24	0	7	[illegible]
B	Low	Inflows	Base case	0	0	24	0	[illegible]	[illegible]
C	Low	Outflows	Base case	0	0	24	0	[illegible]	[illegible]
D	High	Zero	Base case & Balticconnector	5	0	29	0	13	0
E	Low	Inflows	Base case & Balticconnector	**109**	0	**133**	0	**116**	0
F	Low	Outflows	Base case & Balticconnector	37	0	61	0	44	0
G	High	Zero	Base case & Balticconnector & Estonian LNG	6	0	29	0	12	0
H	Low	Inflows	Base case & Balticconnector & Estonian LNG	**137**	0	33	0	16	0
I	Low	Outflows	Base case & Balticconnector & Estonian LNG	**114**	0	4	0	0	12
			Capacity of IP:	86	86	74*	74*	67	65

Assumed storage extractions are not displayed here, but they contribute to the flows from Latvia to Estonia.

Notes: 1. All flows are reported in GWh/day.

2. Capacity of Karksi IP is 105 GWh/day in the scenarios where Balticconnector is built (scenarios D-I).

… but some patterns of congestion emerge across all days

Typical summer day

Scenario	LNG price	GIPL	Infrastructure	Balticconnector EE -> FI	Balticconnector FI -> EE	Karksi LV -> EE	Karksi EE -> LV	Kiemenai LT -> LV	Kiemenai LV -> LT
A	High	Zero	Base case	0	0	0	0	11	0
B	Low	Inflows	Base case	0	0	5	0	**136**	0
C	Low	Outflows	Base case	0	0	2	0	49	[illegible]
D	High	Zero	Base case & Balticconnector	3	0	3	0	12	0
E	Low	Inflows	Base case & Balticconnector	34	0	38	0	**147**	0
F	Low	Outflows	Base case & Balticconnector	12	0	14	0	53	0
G	High	Zero	Base case & Balticconnector & Estonian LNG	3	0	2	0	12	0
H	Low	Inflows	Base case & Balticconnector & Estonian LNG	31	0	0	85	66	0
I	Low	Outflows	Base case & Balticconnector & Estonian LNG	36	0	0	93	20	0
			Capacity of IP:	86	86	74*	74*	67	65

In the summer, Latvian-Lithuanian border is the most congested IP

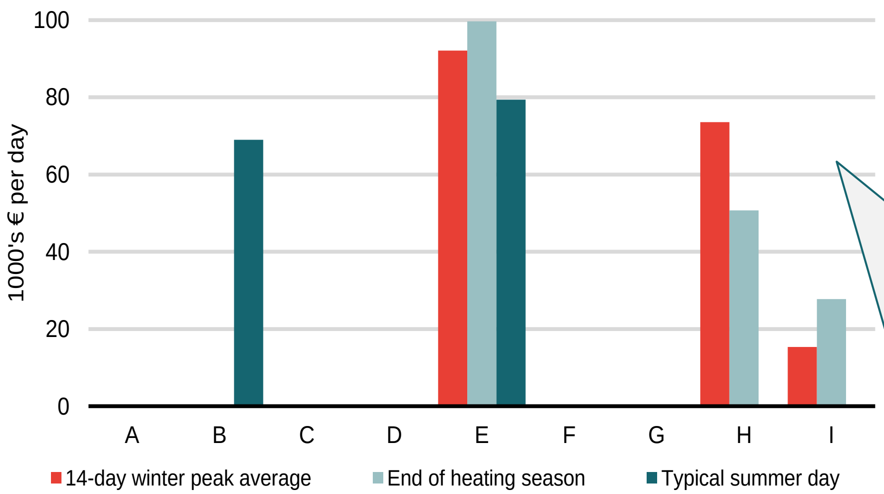
- In the winter, there is congestion with gas flowing from South to North.
- In the summer, congestion arises from flows coming into Latvia – due to assumptions on storage injections in the summer.
- The scenarios where Russian gas is cheaper than other sources, there is no congestion – this is because flows across borders (IPs) are limited in these scenarios, since typically we would expect gas to be supplied directly from Russia into each country.
- Congestion increases when gas flows in from GIPL, as compared to the case with zero or negative flows.
- It is only in scenario E – where Balticconnector has been built, and LNG is cheap with GIPL inflows – that congestion occurs on all 3 representative days, suggesting it is the only scenario where congestion will be prevalent throughout the whole year.

Notes: 1. All flows are reported in GWh/day.

2. Capacity of Karksi IP is 105 GWh/day in the scenarios where Balticconnector is built (scenarios D-I).

Some scenarios exhibit significant congestion requiring redespatch by the TSOs

Daily cost of redespatch across the scenarios for each representative day



- In the scenarios with non-transient congestion we would expect a commercial arrangement to be put in place – redespatch. Later on we set out a recommendation for a single market area manager to be set up to redespatch the market.
- In these scenarios, LNG is cheap, so we assume that the TSOs “sell back” LNG, and “buy back” more expensive Russian gas, making a loss equal to the spread between the two sources.
- This is not the only commercial mechanism available to TSOs, but we are using it to give an illustration of scale.
- As a illustration we have assumed a spread of €1 which is multiplied by the volume of flows to be redespatched.
- These costs should always be compared to the cost of infrastructure to remove the congestion, and will form part of the case for new investment.

- **In scenario E,** there is significant congestion on each representative day, suggesting a high-level of congestion throughout the year.
- We discuss later that this scenario is unlikely, with transient periods of congestion, if anything, being more realistic. Taking the extreme assumption that congestion occurs on every day of the year, and based on the average cost from the 3 representative days, the annual cost of redespatch is equal to €33m. Any static inefficiency however, only represents a small share of this cost. And to the extent that the TSO redespatches the same gas sources as the market would have done under separate zones, this cost is entirely a transfer rather than an efficiency loss.
- In reality it is unlikely to be this high even in this scenario, if LNG terminals (the main source of congestion) for example, are not able to maintain the maximum flows assumed in the scenarios throughout the year..

If Russia remains the dominant gas source, then there is likely to be limited congestion

Across the scenarios and the modelled days, the level of congestion varies significantly. However, we are able to identify key drivers/assumptions which are important for understanding the level of congestion.

Relying on existing capacity will largely avoid congestion

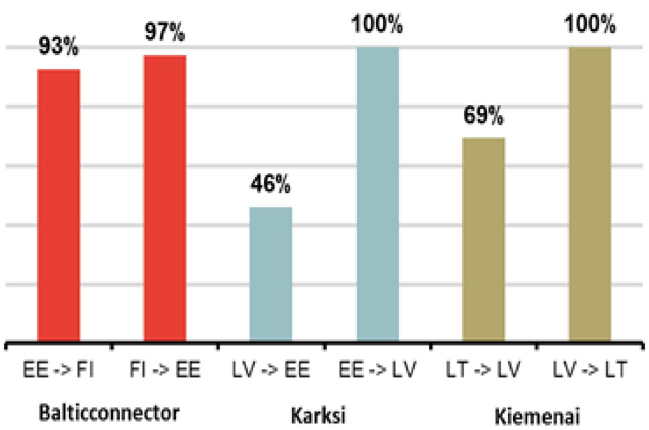
- In the majority of situations, existing capacity is expected to be sufficient, even when LNG is the cheapest source.
- If only baseline infrastructure is built, then this holds across all scenarios/days/IPs, except over Kiemenai on the summer day, where large flows into storage from LNG cause congestion.

If Russian gas remains the cheapest source then flows from Russia can easily be accommodated to meet the assumed levels of demand:

- In all scenarios, no matter the infrastructure or representative day, where Russian gas remains the cheapest source, then there is no congestion expected anywhere on the network.

Spare capacity

Across the infrastructure scenarios with RU gas as cheapest source, spare capacity on IPs is very significant. [Chart shows minimum spare capacity across 3 representative days and infrastructure scenarios.

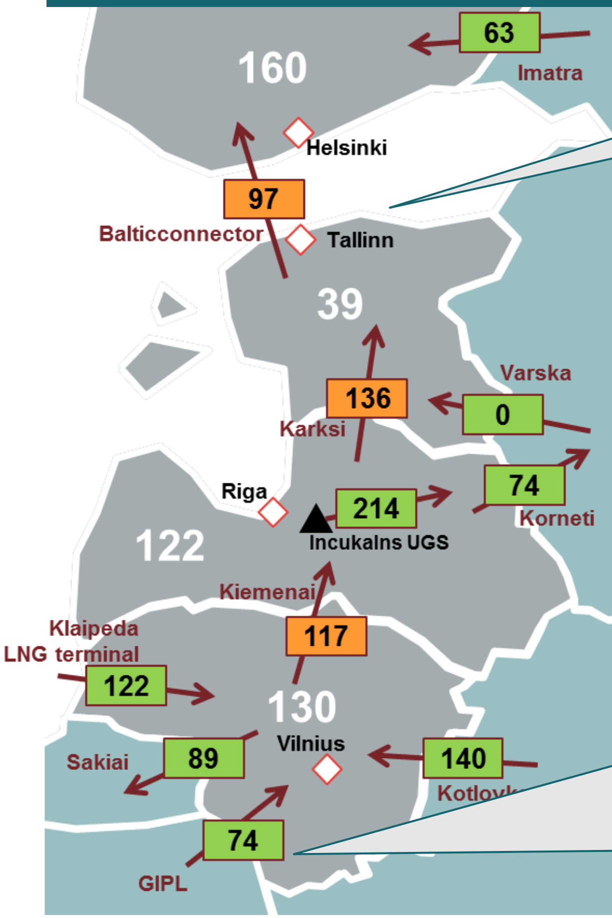


This conclusion is not surprising, given the existing infrastructure has been built largely with significant flows from Russia in mind. **It is changes to the status quo which are likely to lead to congestion.**

The most significant congestion arises in the winter, with gas flowing in South-North direction

Unconstrained scenario E:

LNG cheap, inflows from GIPL,
Base case + Balticconnector



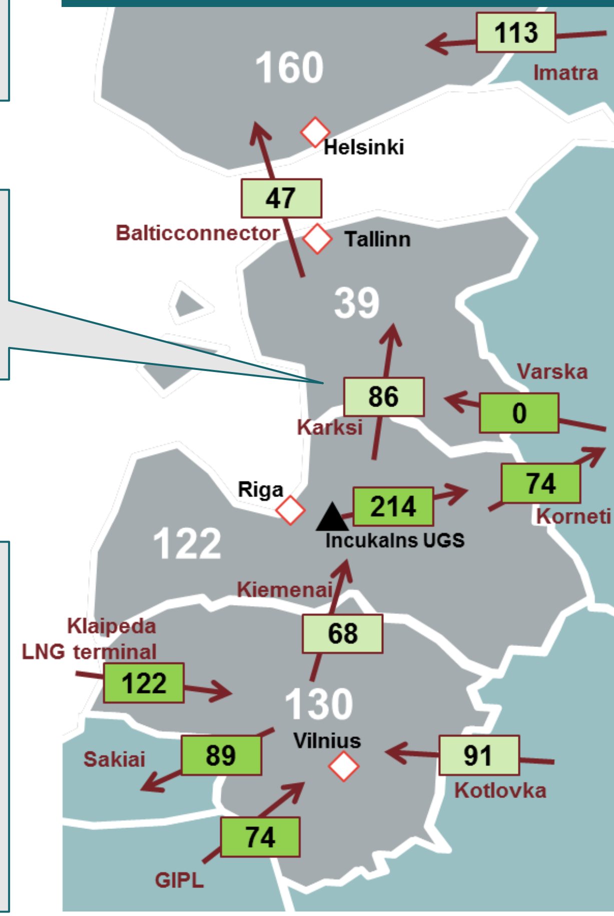
Congestion arises on each internal Baltics IP with gas flowing northwards

The flows in the constrained scenarios are reduced to the capacity of the IP

The assumptions in this scenario (cheap LNG, inflows from GIPL) imply that a very high quantity of gas enters Lithuania, which then needs to be transmitted to the other countries

Constrained scenario E:

LNG cheap, inflows from GIPL,
Base case + Balticconnector



Note: These flows refer to the 14-day winter peak average, all flows in GWh/day

Congestion is focused on scenarios with cheap LNG, and flows in from GIPL

Congestion arises in winter where LNG is cheap and there is a need for large flows from the south to the north of the region in Finland i.e. due to Balticconnector being built. In summer, congestion is focused on large flows of LNG into storage from Lithuania

The pattern of congestion is similar over the **winter 14 day average** and **end of heating season** days, though to a different degree driven by the overall level of demand. Congestion occurs where:

- LNG is cheap, gas from GIPL is flowing into the region, and the Balticconnector, but not the Estonian LNG, is built.
- All the cheapest sources of LNG (followed by GIPL) enter into the south of the region (i.e. Lithuania), and travel north all the way to Finland, creating congestion on each IP on route.
- If GIPL is outflowing then there is not enough LNG to meet all of Finnish demand, increasing flows from Imatra, but in turn reducing congestion on the Balticconnector.
- If the Estonian LNG terminal is built this relieves the problem on all borders except over the Balticconnector, where there is congestion whether GIPL flows in or out. It is no longer necessary to send LNG from the south of the region to the North.

In the summer, congestion is focused on the Lithuanian border.

- Since demand is low enough in Finland and Estonia for flows not to be needed from Lithuanian LNG or GIPL, and there are large flows from LNG and GIPL going into storage.
- Building the Estonian LNG mitigates congestion by reducing flows from Lithuania, and outflows from Estonia to Latvia can be more than accommodated by the expanded capacity at Karski following the Balticconnector.

Implications of the flow simulations

We have identified scenarios with and without congestion, and varying degrees of congestion across border points and representative days. We have not assigned probabilities to different scenarios, however it is helpful to describe the key features of the 'state of world' in which congestion occurs, to test its likelihood.

On the basis of the analysis in the scenarios, for significant congestion to materialise, there are a set of fundamental beliefs that need to be true:

i. **New supply infrastructure, in particular the Balticconnector, will be built** - in a world of flat (or potentially falling demand), existing infrastructure is adequate to supply the region without significant congestion. New infrastructure will therefore need to be justified on the basis of ensuring security of supply, or improving competition. Without the Balticconnector it is highly likely congestion will be low.

ii. **LNG to be cheap on a consistent basis –** relative price changes could be more transient in nature, for example due to lags in the long-term contract pricing formulas, suggesting a movement between scenarios throughout the year is more likely.

iii. **GIPL inflows throughout year** – in a scenario with cheap LNG, then the key question is whether European LNG will be imported via GIPL, or will the Baltic LNG be able to compete and supply Poland via GIPL? Inflows may be true for periods of the year, but are unlikely to be consistently flowing into the region.

iv. **Limited Russian response –** Russia will remain a major player in the region's gas market, so response from Russia to this scenario is likely**. T**his could simply be in terms of pricing, or on the basis of contracts if the 'take or pay' levels remain higher than would be required if LNG was cheap.

Each of these represent a significant change from the 'status quo', and while we do not know the probability of each, it is unlikely that all will be true at the same time, making non-transient congestion unlikely.

Increases in demand above that assumed in our simulations, could also drive higher levels of congestion. However, large increases[1] above the levels assumed are unlikely to create congestion in new scenarios given the high level of spare capacity in most scenarios i.e. the beliefs set out above still hold. Therefore, we do not believe increases in demand would change our assessment of the likelihood of congestion. In any case, while uncertain, there are also significant pressures in the region pushing down on demand.

It is on this basis that we believe a scenario of significant congestion across the year is unlikely, and therefore consider zone design on the basis of limited congestion. However, we recognise significant congestion cannot be ruled out so consider how robust zone design is likely to be in the Baltics.

[1] A range of scenarios beyond those modelled in this report can be tested using the flow simulations tool. We tested demand 20% higher in each country and did not identify additional scenarios as congested.

Moving to a single zone could also have further impacts on security of supply and administrative costs

Small improvement in security of supply

- Security of supply is not fundamentally affected unless the zone configuration leads to new investments which would not have otherwise taken place.
  - **With separate zones** signals for investment in cross-border networks will be provided by the spread in wholesale prices between zones.
  - **In a single zone**, the cost of TSO redespatch actions can equally provide a strong investment signal i.e. high redespatch costs associated with a particular border point within the zone could signal the need for network enhancement at that point.
- To the extent that a larger single zone enhances liquidity, this will have knock-on benefits for security of supply.
- The principle difference in security of supply stems from the improved coordination between TSOs in times of system stress in a merged zone.

Limited differences in admin/legal costs

- There are potentially significant administration and legal costs associated with the setting up of both a single zone or separate market zones. On balance, it is difficult to identify whether one option which will be significantly more expensive than the other. Generally a single zone should benefit from on-going operational savings, though it may suffer from greater up front costs to harmonise the markets:
- Relative to separate market zones, moving to a single zone:
  - avoids administrative costs associated with Estonia and Latvia converting to a separate entry-exit zones, but imposes costs on all countries to convert to a single zone.
  - reduces the number of IPs from four (assuming the Balticconnector is built) with separate zones, to only one over GIPL significantly reducing the burden of applying the CAM and CMP Network Codes in a single zone.
  - harmonisation of IT infrastructure will likely lead to on-going savings in the operation of trading and balancing markets, however, there is likely to be an upfront cost from the need to harmonise legislation and administrative processes.

Given an expectation of limited congestion, a single zone is likely to be the best option in terms of overall welfare

In a scenario of limited congestion:

+/-

- The benefits associated with enhanced liquidity and the costs associated with static and dynamic inefficiencies in a single zone are likely to be small, and therefore less important for the zone design question (as explained on slide 29).

The decision for zone design is therefore focused on the following impacts:

1 +

- There is likely to be an efficiency gain from the removal of IP tariffs and differences in rules and regulations on cross-border flows [although these will be limited if Russia remains consistently the cheapest source]. This will reduce the overall cost of meeting demand in the region.

2 +

- There will be reductions in transaction costs – shippers in a single zone need to make fewer transactions.

3 +/-

- There will be changes in administration costs associated with the setting up and operation of a single zone, however, these are likely to be not significantly different from those in separate zones.

On this basis the balance of benefits and costs appears positive, suggesting **that in a world of limited congestion, a single zone should be the preferred choice** [This would include Finland if the Balticconnector was built].

It is worth noting, that taking a staged approach where each market converts to an entry-exit zone first, will reduce risks and allow evaluation of each separate zone, however, it is a more costly if a single zone is likely to be preferred. This will be discussed as part of the Roadmap.

But if significant congestion does materialise, there are risks, but they are likely to be limited

In a situation where congestion does materialise to a significant level across the year, then there are potentially larger liquidity benefits but static and dynamic inefficiencies to consider. However, there are good reasons to believe that the static and dynamic inefficiencies could be relatively small.

1 +

There are likely to be benefits to liquidity, although as we have seen from previous case studies it is not always easy to quantify the impact that a merger might have on liquidity. Liquidity benefits could also be expected to be higher in less mature markets with low liquidity.

2 -

Static inefficiencies could be relatively small – if TSO buys and sells gas as efficiently as the market then there is not a welfare loss from redespatch only a distributional impact. While this is unlikely, any inefficiency from the TSO despatching the market will only be a small % of the total redespatch cost (illustrated on slide 34).

3 -

Dynamic inefficiencies may be of less concern in the Baltic region - given congestion, locating of new supply sources and demand is potentially important. However, in the region there is likely to be limited scope for new supply sources to choose sites. Industrial demand is potentially flexible, although there are few major consumers in the region, and most will be driven by product transport costs to market, rather than their gas costs for production. Gas fired plants are potentially an exception, however, their locational choices will be driven by a multitude of factors including the structure of electricity transmission between countries and local planning constraints.

Other factors are likely to have a small and largely neutral effect. The efficiency gain from removing IP tariffs (leading to more efficient use of interconnectors) will only occur on days without congestion. Reduced transaction costs for shippers will be offset by transaction costs for the TSOs. And admin costs remain largely balanced.

Distributional impacts

- From a welfare perspective we have conducted a qualitative evaluation and concluded that a single zone is likely to be the best choice given the low probability of the network in future being congested.
- We now go on to consider the distributional impacts of a single zone and how they could be managed. Specifically we look at:

Distributional impacts

- TSO revenues in each country
- Consumers in different countries
- Consumers vs. Producers

There are important distributional impacts on TSO revenues…

Network charges on IPs are removed in a single zone changing the allocation of revenues between TSOs

- After merging the zones, changes to network tariffs will result in a different way of collecting TSO revenue.
- **In separate zones**, revenue is collected from all entry and exit points in each zone, which includes the IPs.
- **In a single zone**, the same revenue needs to be collected but will likely lead to:
  - a need to increase tariffs at domestic exit points and the remaining entry points. *[Note: this loss of revenue is relative to a situation of four separate entry-exit zones. It does not compare to today where most states do not collect IP revenue.]*
  - distributional impacts between countries within the newly formed zone, since charges are set on the basis of all entry and exit flows and total revenue to recovered – so previous charges in separate zones will be averaged across the new single zone.
- There may also be impacts on where the costs are recovered. For example, with single zones, gas transiting from Lithuania, through Latvia onto Estonia, will pay entry and exit charges to Latvia. In a single zone, charges are only collected in Lithuania and at the exit points to consumers.
- These impacts do not depend on the level of physical congestion present in the region. These effects raise questions about inter-TSO transfers.

We have investigated the distributional impacts on TSO revenues

We have used the flow information from the simulations, combined with allowed revenue estimates provided to us by the TSOs, to assess at a high-level, how entry-exit tariffs could change in a single zone relative to separate ones, and what the implications might be for revenue recovery by each TSO

Separate zones

- In separate zones, each TSO can fully recover their allowed revenue, using country specific tariffs.
- The tariffs will be set based on capacity bookings on all entry and exit points in the country.
- This will lead to different charges in each zone.

Single zone

- In a single zone, there will no longer be charges from IPs.
- Tariffs will be set only for entry and exit points to the wider zone.
- The tariffs will be the same across the countries in the zone, and set based on total revenue to be recovered from region.
- The total allowed revenue will be recovered at the regional level, but not at the country level [We explore variations on this later in the report].

- It is important to note that the tariffs produced are not meant to be a forecast, but instead a way to provide an indicative view of potential distributional issues.
- We explore the different tariff options in more detail in the next section. In this illustration we assume a ‘postage stamp’ capacity based charge.

The results of this analysis are closely related to the allowed revenues to be collected in each country

We have been provided with estimates of the allowed revenue to be collected in each country. However, not only are there differences in regulatory regimes, there are likely to be differences in what is included in the allowed revenues. It is important to be aware that differences exist, however, they shouldn't undermine the high-level conclusions of the exercise, though ultimately agreement will need to be reached.

Definition of transmission according to the Directive 2009/73, for purposes of tariffication

'transmission' - the transport of natural gas through a network, which mainly contains high-pressure pipelines, other than an upstream pipeline network and *other than the part of high-pressure pipelines primarily used in the context of local distribution of natural gas,* with a view to its delivery to customers, but not including supply;

Allowed revenue assumptions

Finland - 87m euros	Estonia - 9.5m euros
Lithuania - 30.5m euros	Latvia - 26.5m euros

This definition has not been applied in all of the allowed revenue estimates

- **Lithuania**, following the Directive definition, only include costs associated with the 'main' transmission grid which could be used for both cross-border and domestic needs. They have excluded the 'regional network' which can only be used for domestic flows, which accounts for more than 40% of revenues. These costs will be collected separately on exit.
- **Estonia, Latvia, and Finland** have not made this adjustment leading to higher allowed revenue estimates.

- How the Directive is interpreted may vary, however, the most important point is that all countries in the Baltics will need to agree an approach if harmonising tariffs in a single zone. We test the sensitivity of our conclusions to this assumption by adding back in the allowed revenues assigned to the "regional network" for Lithuania later in this section.

N.B. Given the illustrative nature of the tariff analysis, and the uncertainty over the exact level of allowed revenues to be included, we have fixed the allowed revenues across scenarios - so they do not change based on recovering the costs related to new investments e.g. network costs associated with Balticconnector.

All the tariff calculations in this report are capacity based charges using a ‘postage stamp’ methodology…

1. Postage stamp annual tariff

Tariffs are calculated using the postage stamp methodology, as set out in the draft TAR network code. No secondary adjustments, as permitted in the code have been applied.

Annual entry (exit) tariff

Euros/MWh/day – the purchaser of capacity is entitled to flow 1 MWh of gas per day, every day of the year

=

Allowed revenue

Estimated by the TSOs for 2030

✖

Entry-exit split

can vary but we have assumed 50% to be recovered from each

———

Annual booked capacity at entry (exit) points

The TAR code methodology uses booked capacity. We do not have estimates of booked capacity, so we have used peak flows as a proxy. This implicitly assumes that all capacity is booked on an annual basis. In the next slide we explore assumptions for relaxing this to take account of some level of short-term bookings.

This is based on the **sum of the highest flows on each entry (exit) point across the three representative days**. E.g. if on one entry point the highest flow is on a winter day, and on another is on a summer day, then these are summed to estimate the total peak flows in the calculation.

We explain this in more detail in the annex.

…we have adjusted the basic approach to take account of short-term bookings

A postage stamp tariff should be calculated based on 'booked capacity' or a best forecast of it – which in theory should include all annual capacity, monthly and daily capacity. Here we make assumptions on the quantity of short-term bookings, and given all the monthly and daily capacities are based on multiples of the annual capacities, the annual postage stamp charge can be derived.

Approach

To illustrate the impact we have made the following assumptions:

- **Split between different products** - 80%/15%/5% annual/monthly/daily split .
- **Number of days daily products booked for** - Shippers book daily capacity for 20 days of the year, with a short-term multiplier of 3 (multipliers are discussed in the next section under tariffs).
- **Number of months monthly products booked for** - Shippers book monthly capacity for 3 months with a multiplier of 3.

From this we can convert the assumed daily /monthly bookings, into an equivalised annual booking in terms of revenue recovery. So on these assumptions monthly bookings are equivalent to 3/4 of an annual booking *(monthly booking is 1/12 of the cost of the annual booking multiplied by the short-term multiplier of 3 and the number of months we have assumed it is booked for of 3)*

Implications

Including short-term bookings in the calculation increases the annual tariff. This is because less revenue is recovered from short-term bookings relative to an annual booking, meaning more needs to be recovered from the annual tariff.

Our central assumptions in effect mean the revenues need to be recovered from 92% of the peak flows, instead of 100%. If we assume:

- multipliers of 1, this would further reduce the revenue from short-term bookings, leading to the highest tariffs.
- Multipliers of 3 and bookings for 4 months of the year, would be equivalent to the cost of the annual tariff, with no effect on tariff levels. Shippers would also choose to buy the annual tariff.

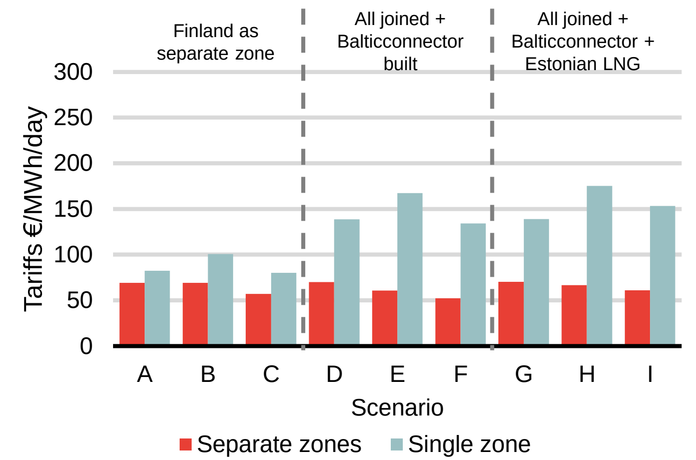
There is no information on which to base these calculations in the Baltic Region, but we have chosen some reasonable assumptions to illustrate the impact.

Across the scenarios we have derived the following entry tariffs…

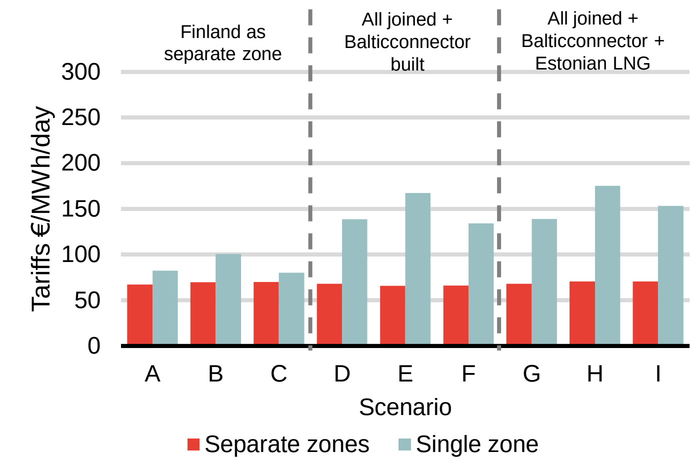
1 Size of entry-exit zone

These charts compare tariffs under separate zones with a single zone assuming a fully harmonised tariffs

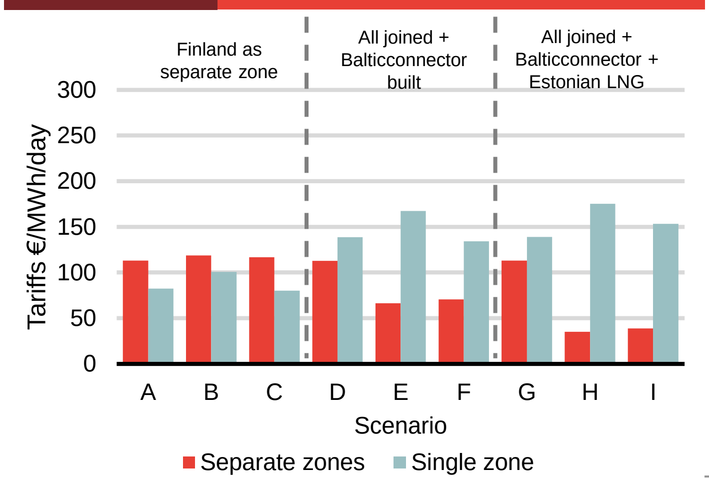
Lithuania | **Allowed revenue: €30.5 million**



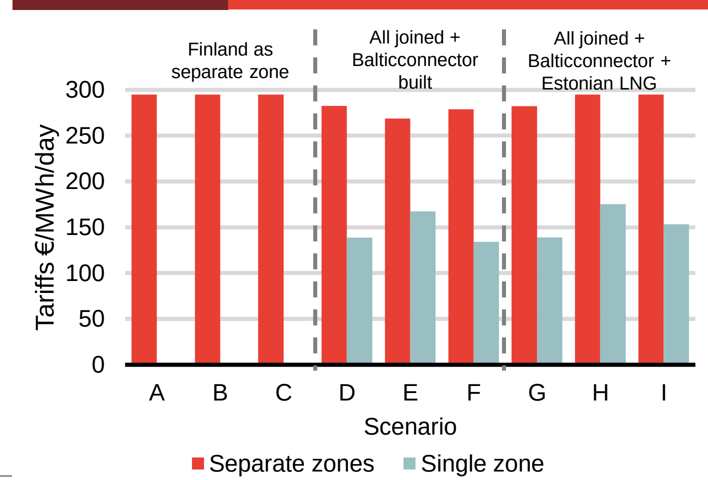
Latvia | **Allowed revenue: €26.5 million**



Estonia | **Allowed revenue: € 9.5 million**



Finland | **Allowed revenue: €87 million**



Overall the average tariff in a single zone has to be higher, given fewer flows (due to the loss of IPs) over which to collect revenue.

However, they could rise or fall in different countries depending on the level of their tariffs under separate zones relative to others.

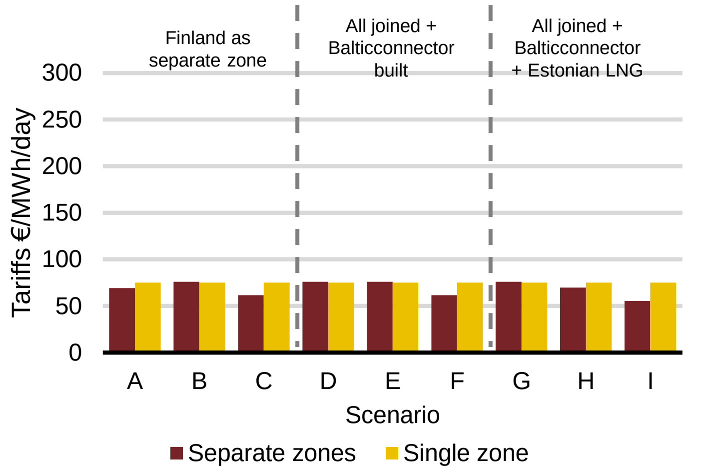
On the basis of this illustration when Finland is included in the zone, they rise in all countries except Finland.

Without Finland, tariffs rise in Latvia and Lithuania but fall in Estonia.

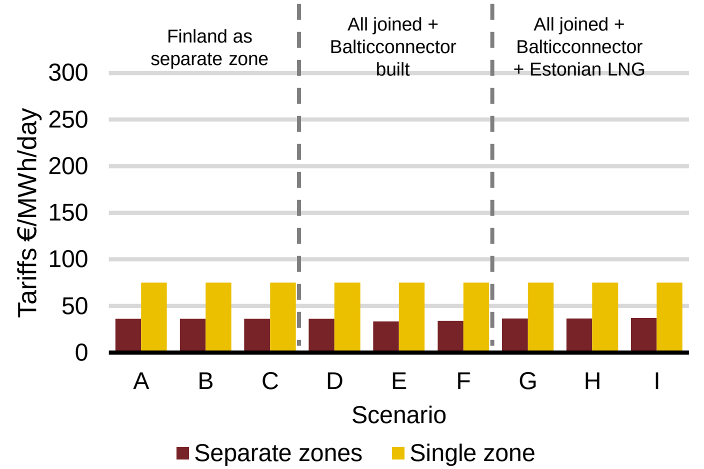
N.B. all scenarios assume Misso-Korneti is the Russian entry point to the single zone, rather than Misso-Izborsk in Estonia

…and the following exit tariffs

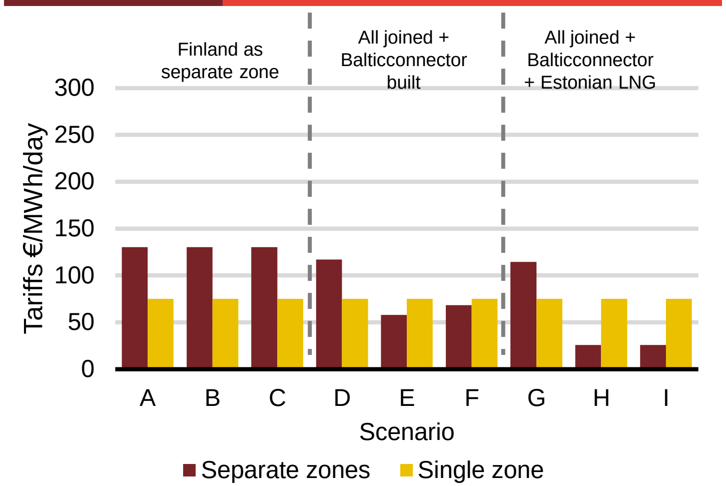
Lithuania | **Allowed revenue: €30.5 million**



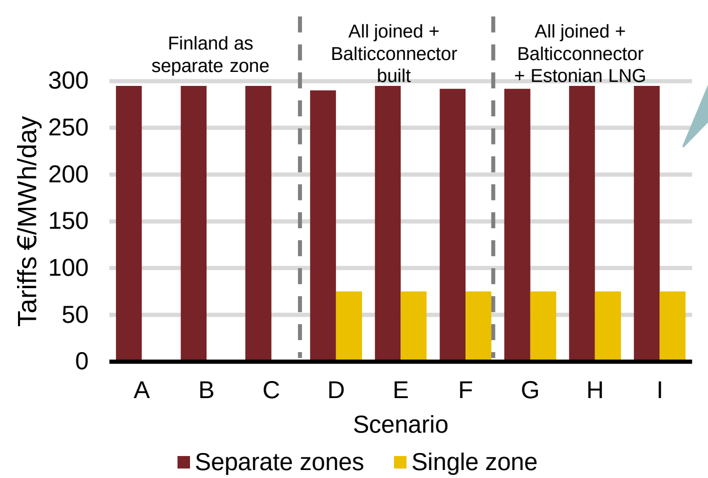
Latvia | **Allowed revenue: €26.5 million**



Estonia | **Allowed revenue: € 9.5 million**



Finland | **Allowed revenue: €87 million**

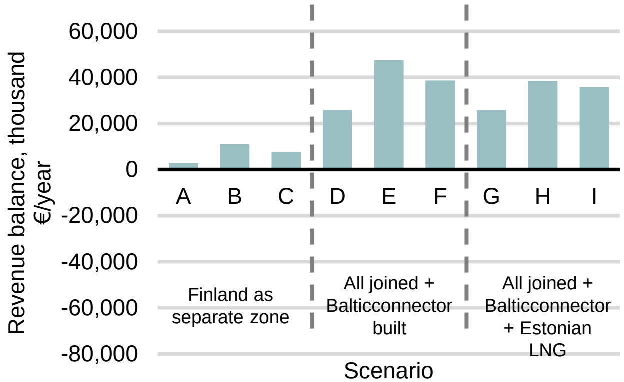


A single zone significantly reduces Finnish exit tariffs

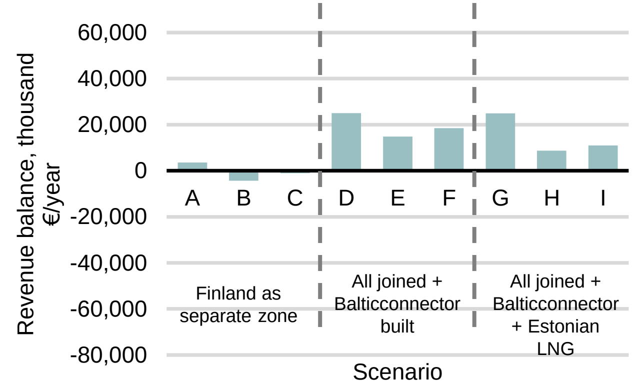
The degree of redistribution depends on whether Finland is part of the single zone

1 Size of entry-exit zone

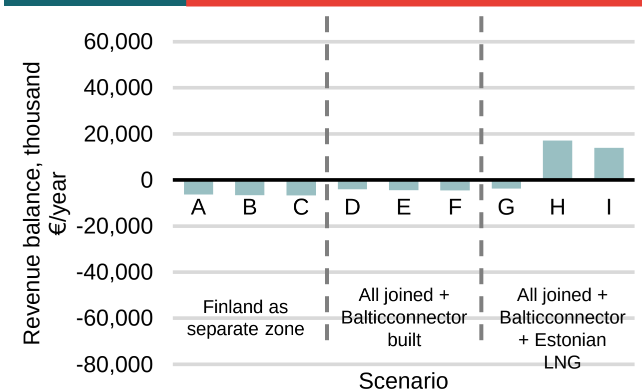
Lithuania | Allowed revenue: €30.5 million



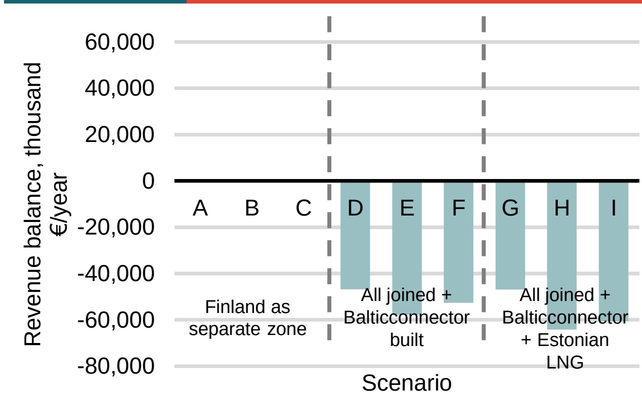
Latvia | Allowed revenue: €26.5 million



Estonia | Allowed revenue: €9.5 million



Finland | Allowed revenue: €87 million

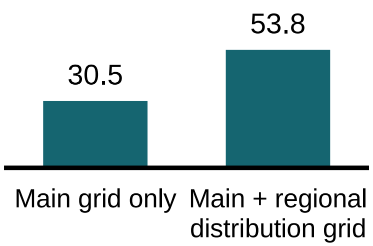


The charts illustrate the change in revenue collected under a single zone with a single regional tariff, relative to separate zones (where each country's revenue requirement is met).

In scenarios A, B, C Finland is a separate zone because Balticconnector has not been built.

We have also estimated tariffs in an alternative case where all assets are included in the TSO allowed revenues…

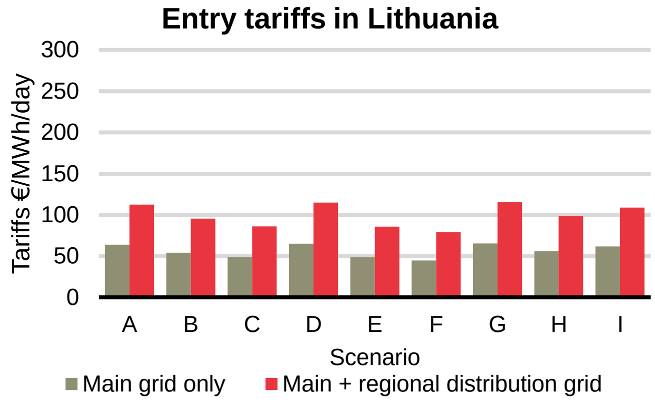
The Lithuanian NRA has approved allowed revenue for the TSO that strips out 40% of costs as "regional distribution grid" and not to be recovered from these estimated entry/exit charges. While the correct approach for the region will need to be determined, this sensitivity calculates tariffs assuming this adjustment in Lithuania has not been made.

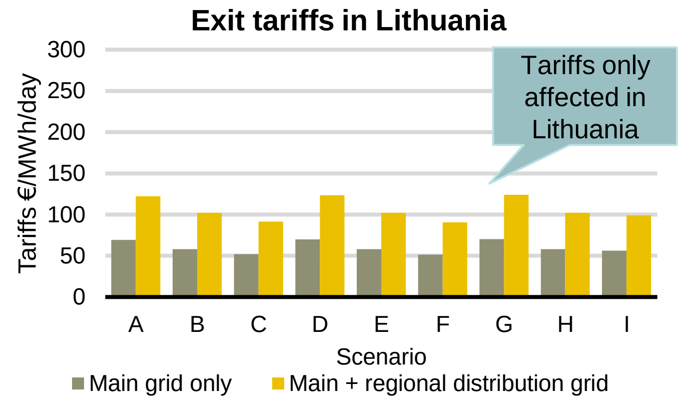


Lithuanian TSO allowed revenues, in million €

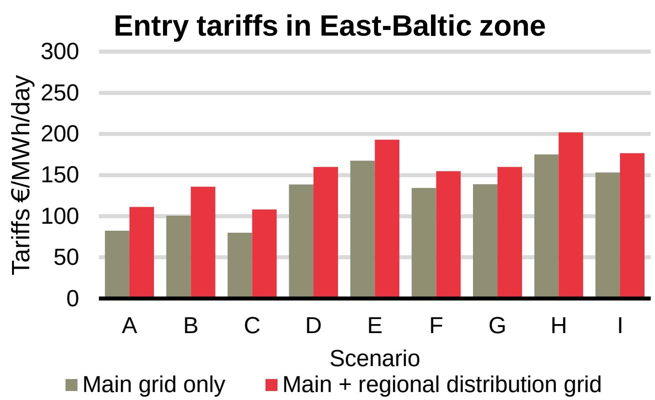
- When tariffs are calculated using the "main and regional grid" definition of assets, entry and exit charges are higher in Lithuania
- The separate zone tariffs in Lithuania increase proportionally to the revenue increase, while in **single zone** with a single regional tariff this effect is diluted and the change in a tariff is smaller

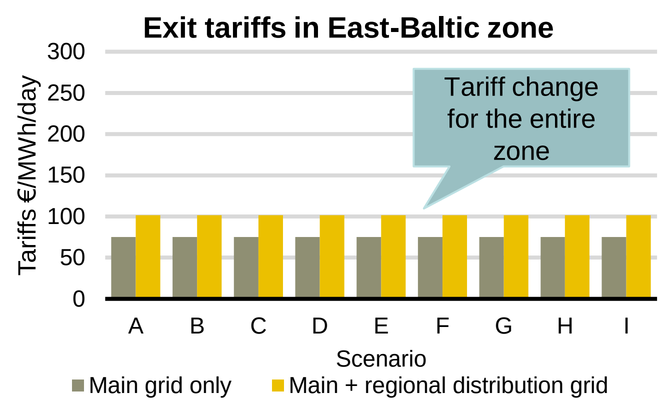
Separate zones (Lithuanian tariffs)





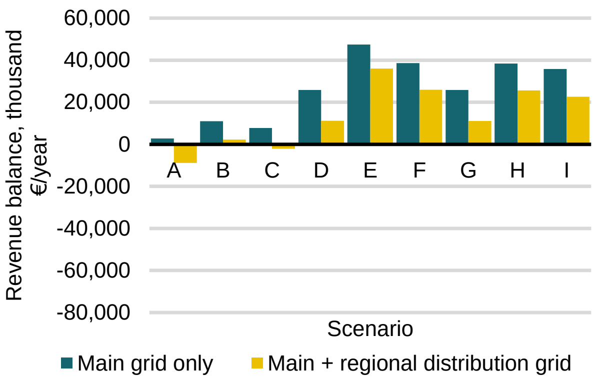
Single zone



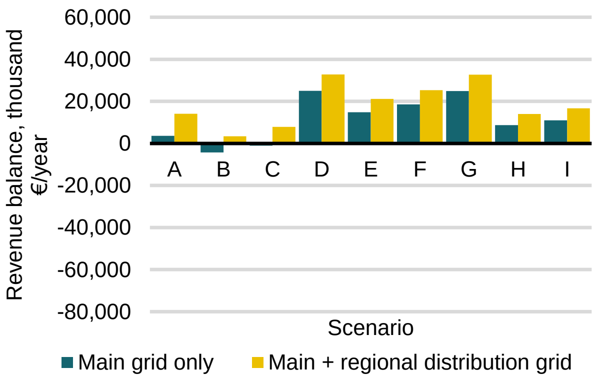


…the changes in tariffs have a small impact on the revenue distribution between the TSOs

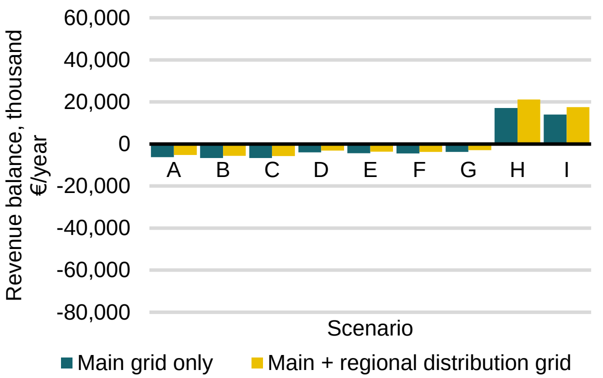
Lithuania



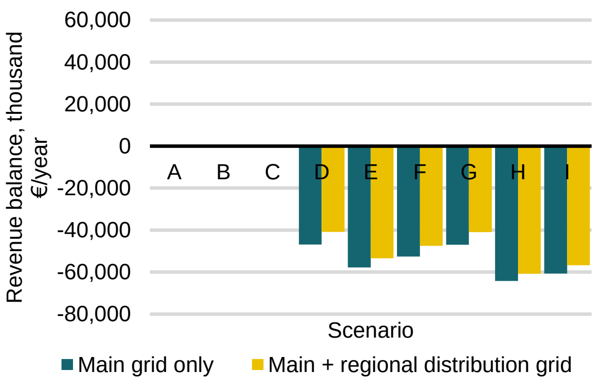
Latvia



Estonia



Finland



- By adding in the regional distribution grid to Lithuanian allowed revenues, Lithuania still over-recovers revenue though to a smaller extent. This is because there is more revenue to recover in Lithuania, and while the single zone tariff has increased slightly it does not offset the increase in allowed revenues.
- In the other countries, the revenue to be recovered stays the same while tariffs slightly increase, leading to a higher recovery balance
- While this change is important, its effect is relatively small. The main driver of the redistribution remains i.e. allowed revenues relative to total capacity bookings. This is explored more on the next slide.

Conclusions from distributional analysis of TSO revenues

The distributional impacts on TSO revenues of a single harmonised tariff in a single zone, are driven by the relative size of the allowed revenues to be collected against the given level of capacity bookings i.e. in effect the Postage Stamp tariff under separate zones.

- The illustrations of distributional impacts on TSO revenues presented so far are very much a product of the input assumptions provided.
- These assumptions are likely to change, potentially considerably, if movement towards a harmonised single tariff is decided upon. An agreement across all countries in the zone would need to be reached on the specific costs to be included.
- However, despite the uncertainty in the numbers, it is clear that **the distributional impacts are driven by the relative size of the allowed revenues to be collected against the given level of capacity bookings, which is a function of demand in each country but also transit flows and storage flows.**
- On the basis of the numbers provided the tariffs were lowest in Lithuania and Latvia in most scenarios, and highest in Finland. It therefore follows that more revenue is recovered in Lithuania and Latvia and not enough in Finland when moving to a single zone.
- The low tariffs in Lithuania under separate zones in this analysis were driven by the relatively low level of allowed revenue given the assumption excluding the regional distribution grid, and the significant transit flows across to Kaliningrad, and in some scenarios from GIPL across to Latvia. Including back into the calculations the costs of the regional distribution grid, does raise the Lithuanian separate zone tariffs significantly, however they still remain relatively low compared to the Finnish tariffs.
- Tariffs are a lot higher in Finland in part due to the high allowed revenues but also due to the fact that flows across Finland are limited only to the level of domestic demand – there are no transit flows in any scenario we have investigated.
- Even if allowed revenues were made consistent across all countries relative to domestic demand, countries with significant transit/storage flows will be able to set lower tariffs, and will therefore recover more than their allowed revenues under a single zone.

Each entry-exit zone has a single wholesale gas price

Prices will converge in a single zone leading to winners and losers

- Wholesale gas prices **in separate zones** can converge when connected via an IP, as the country with lower gas prices is able to sell excess gas supplies to its neighbour. This raises the price in the exporting country and lowers it in the importing country.
- Where the IP is **uncongested** prices can converge to a single price. Transport costs over the IP will maintain some degree of price difference even when there is no congestion.
- Price differences will remain in those days where **congestion** limits cross-border trade. In our scenarios congestion typically occurs when cheap LNG flows from Lithuania and GIPL, suggesting that prices would be lower in the south of the region than the north.
- **In a single zone**, transport costs over the IP are removed, and single wholesale price is formed irrespective of whether the IP is physically congested or not.
  - For example, if prices in Latvia were higher than Lithuania with separate zones i.e. as implied by our scenarios, merging of the zones would lead to a single price lower than the previous Latvian price and higher than the Lithuanian price all else being equal. As set out earlier the exact change in welfare is a function of the level of the IP tariff, and the resultant impact on prices is a function of prices. With a relatively flat supply curve in the region, the price impacts will be quite small.
  - Physical congestion in a single zone leads to TSO redespatch, with the TSO's costs recovered via a socialised charge on all consumers in the zone. For example, congestion over Kiemenai flowing towards Latvia, could be relieved by selling back the cheaper gas to the shipper in Lithuania, and buying more expensive gas to replace it in Latvia i.e. from Russia. In this example, Lithuania will pay for a share of the redespatch, as well as higher wholesale prices. So in addition to any efficiency loss (e.g. due to static inefficiency) the distribution of costs between consumers in each country could change.

Changes to tariffs and wholesale prices lead to consumer impacts

Prices and transport tariffs will converge in a single zone leading to winners and losers

- **Consumers** in countries with low prices when zones are separate pay more for gas in a single zone, while those in high price countries pay less, leading to a redistribution of wealth.
  - **If there is no physical congestion**, then prices are likely to converge in separate zones anyway - so there will not be an impact on consumers from the merging of the zones, other than to remove transport costs paid by consumers in the importing country. **Therefore, based on the flow simulations, limited redistribution between countries seems likely**.
  - **With physical congestion**, the most likely driver being large south to north flows of cheap LNG from Lithuania, then with separate zones prices were likely to be lower in Lithuania and higher in other countries. A single zone will therefore increase prices in Lithuania and reduce them elsewhere, in particular in Finland.
- From the modelling we can see clearly that in a single zone the **harmonised tariffs imply very large transfers between consumers** in different countries. On the basis of these allowed revenue numbers, these transfers will be from consumers in Lithuania, Latvia and Estonia towards Finland.
- **The degree to which changes in tariffs affect consumers, differs by entry and exit.** Changes to exit tariffs will directly affect consumers, but changes to entry tariffs will indirectly affect consumers through their affect on the wholesale price for gas in the region i.e. the impact of the tariff change will depend on whether the entry charge increases or decreases for the marginal price setting source of gas.

Changes to tariffs and wholesale prices lead to producer impacts

Prices and transport tariffs will converge in a single zone leading to winners and losers

- **Producers** *(shippers)* in the low priced country are now able to access a wider market to sell their gas, displacing more expensive producers.
- However, where there is congestion, any commercial trades made above the capacity of the IP, they will 'buy-back' in the redespatch market, leading to no change in physical flows. As a result the main advantage to shippers in a low priced country under a single zone is to be able to sell more volumes across borders due to the removal of tariffs on IPs.
- The degree to which changes in tariffs affect producers will depend on the flow through of tariffs into the wholesale price of gas. The price of gas will change between single and separate zones if the entry tariff changes for the marginal source of gas. So all producers whose entry tariff increases by more than the increase in the wholesale price (due to the entry tariff of the marginal source) will absorb the impact instead of consumers.

TSO revenue impacts could be managed through inter-TSO transfer mechanism, though this is not straightforward

If transfers are required they are likely to be needed on an enduring basis and will require independent validation of costs. There are significant complications that will require agreement between countries.

One-off transfers are unlikely to be suitable…

- There is precedent for making one-off transfers to support new infrastructure where the benefits are cross-border – the cross-border cost allocation (CBCA).
- However, these are unlikely to be suitable in this instance given the distributional impacts could take place each year, and do not link to the costs of new investment.
- CBCA process may be more appropriate to support investment in new LNG terminals or storage infrastructure.

…an **enduring transfer system** will need to be established making annual reconciliation payments.

- An independent audit of costs in each country will be required, given there may be concerns about incentives to overstate costs.
- New network investments made in individual countries that increase the revenue requirement will also need regional approval given their impact on future transfers.
- Harmonisation of regulatory processes e.g. WACC, depreciation etc. helps improve transparency, and fairness to consumers across the region, though this will not remove fundamental differences in costs still to be recovered.
- There is also a question about whether redespatch costs are included in such a scheme, or treated separately.
- We are only aware of Inter-TSO transfer schemes existing in Germany, where it is made easier by a single regulator. There is not an Inter-TSO transfers in Belgium and Luxembourg, with impacts managed through tariff changes.

This scheme could ensure cost recovery for TSOs, but does not prevent potentially large transfers between consumers of different countries (e.g. Finnish allowed revenues will be paid for by a combination of Finnish and other countries' consumers) and there are significant complications that need to be overcome.

We investigate alternative tariff approaches to mitigate the need for inter-TSO transfers in the next section.

Key messages: Zone design – overall welfare impacts

With regard to **zone design**, we conclude that on the basis of **overall welfare** for the region, a single zone is likely to bring benefits.

- Significant congestion in the region is unlikely, and as such, the principal benefit from merging zones relates to an efficiency gain due to the removal of IP tariffs. Removing IP tariffs allow spare capacity on interconnectors to be used more efficiently, supporting liquidity and reducing the cost of meeting the region's overall demand.
- Scenarios with significant congestion, require the Balticconnector to be built, cheap LNG supplies and GIPL inflows. These also require a significant reduction in flows from Russia without pricing responses or 'take or pay' limits being hit in long-term contracts. It is more likely that these conditions lead to congestion on a transient basis.
- If congestion were to materialise, then consideration of potentially larger liquidity benefits and offsetting inefficiencies need to be considered. For the Baltics, we conclude these benefits are still more likely to outweigh the costs.

Key messages: Zone design – distributional impacts

There are important **distributional impacts** to consider from a single zone:

- In a single zone, a single wholesale price will lead to increases in wholesale pries in some countries and reductions in others, although, given the low likelihood of congestion, prices are also likely converge (except for the IP tariffs) on most days with separate zones.
- If congestion were to materialise, likely driven by large south to north flows from Lithuania when LNG is cheap, wholesale prices will likely be lowest in Lithuania, and highest in Finland with separate zones. In which case, a single zone, with a single wholesale price is therefore also likely to lead to redistribution from Lithuania to other countries, in particular Finland.
- While our tariff numbers are indicative, a fully harmonised approach to entry and exit tariffs appears likely to create unacceptable distributional concerns.
- There are large differences in the allowed revenues in each of the countries, which in this analysis lead to significantly different tariffs if set under separate zones, and hence large distributional impacts when converting a single zone with a single tariff. The underlying driver is variations in the costs to be recovered per unit of expected gas flow over the network.
- These differences will need to be explored in detail if pursuing a single zone tariff. In the next section we explore ways of designing tariffs to mitigate these impacts from converting to a single zone, and avoiding the need for harmonisation of allowed revenues and an inter-TSO transfer scheme.

- Executive summary
- Introduction
- Regional model development
  - Approach to market design development
  - Market design requirements
    - Size of entry-exit zone
    - Access to entry-exit capacity
    - Cross-border access
    - Temporal market & hub definition
    - Balancing and settlement
    - Network interoperability
    - Access to LNG and storage
    - Treatment of long-term contracts
- Summary and recommendations
- Roadmap and harmonisation issues
- Annexes

The GTM is most prescriptive in relation to pricing and allocation of capacity at interconnection points (IPs)

The EC sets out rules for pricing of all entry and exit capacity including IPs…

- The pricing of all entry points from Russia, new LNG sources and any IPs including via GIPL will need to adhere to the **Network Code for Harmonised transmission tariffs (this is still a draft code).**
- Tariff structures need to be efficient and non-discriminatory
- Tariffs should also reflect the underlying infrastructure costs.

…but is only clear about how capacity should be allocated over IPs.

- This is set out in the **Capacity allocation mechanisms (CAM)** and the **Congestion management procedures (CMP)** Network Codes.
- **CAM** determines that TSOs apply harmonised auctions ensuring third party access to IPs in a fair and transparent way.
- **CMP** aims to maximise efficiency of cross-border gas transmission networks by making capacity that is booked but underused available to third parties.

The importance of these codes will depend on zonal configuration. For example CAM and CMP will only apply over GIPL if the Baltic Region forms a single entry-exit zone, which in itself is a benefit of a single zone.

The TAR Network Code offers a reasonable degree of flexibility in choosing tariff methodologies

The tariffs are set on the basis of a cost allocation methodology. The code gives freedom to choose a methodology, and the latest guidance suggests CDWA is the benchmark against which other methodologies should be compared. There is freedom to apply secondary adjustments should it be justified. The methodology sets the 'reference price' at each entry and exit point.

Cost allocation should be:

- Mainly on the basis of a capacity charge (as opposed to commodity), unless:
  - used to recover flow based costs
  - related to cost recovery for specific infrastructure or services.
- Split 50:50 between entry and exit charges, unless can be shown to fit better with EC objectives.
- Be based on a methodology approved by the NRA, but the same must apply to all entry and exit points on the same entry-exit system.

Primary price methodology

Capacity-weighted distance approach is the benchmark: The share of the allowed revenue to be collected from each point should be proportionate to its contribution to the cost of capacity on the system.

Postage stamp approach is an alternative: The same reference price at all entry points and the same at all exit points. The total revenues of all entry/exit points are divided by forecasted booked capacity of all entry/exit points to calculate the price.

Other methodologies are also permitted: Any other methodology can be applied if it can be justified.

Secondary adjustments

Equalisation: applying the same reference price for several points on the basis of their contribution to security of supply, security or competition in the market.

Benchmarking: decreasing tariffs at a given entry/exit point on a case-by-case basis so that the resulting value meets the competitive level of transmission tariffs.

Storage adjustment: prices for entry/exit points of storage facilities have to be adjusted for the net benefits they provide, and to promote efficient investment and cross-border trade.

The resulting reference price should be used as a basis to price different products

Reference price

Value of **annual** capacity product for each entry and exit point calculated after the application of the cost allocation methodology.

The reference price is:

- A reserve price where auctions are used.
- A regulated price for capacity where no auctions are used for annual capacity products.
- Multipliers are applied to convert the reserve price into non-annual standard products e.g. daily, monthly or interruptible products.

In determining reserve prices the NRA should consider:

- The balance between encouraging short-term trading and efficient revenue recovery and long-term signals for efficient investment;
- Interruptible tariffs should reflect the probability of interruption;
- And short-term products should not face arbitrarily higher or lower tariffs.

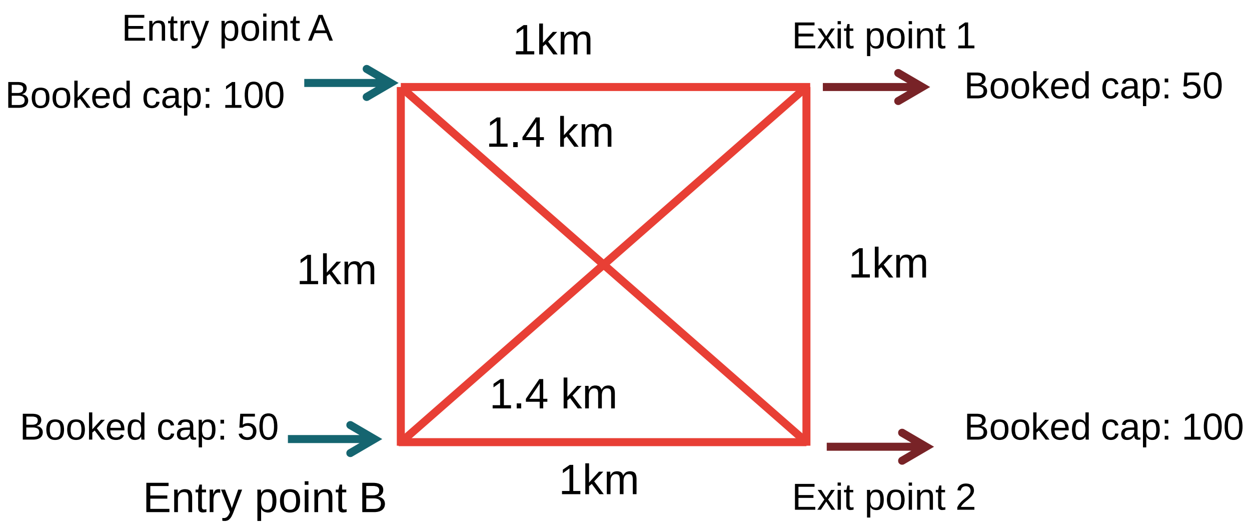
Short-term prices are proportionate to the annual product price, times a multiplier[1] which is between:

- 1 and 3 for daily and within-day products
- 1 and 1.5 for quarterly products

Interruptible capacity should be offered at a discount to firm capacity that reflects the likelihood and length of interruptions.

[1]Seasonal factors can also be applied to vary the charges over the course of the year

The easiest way to consider the methodologies is with reference to a simple worked example



The postage stamp tariffs are straightforward to calculate.

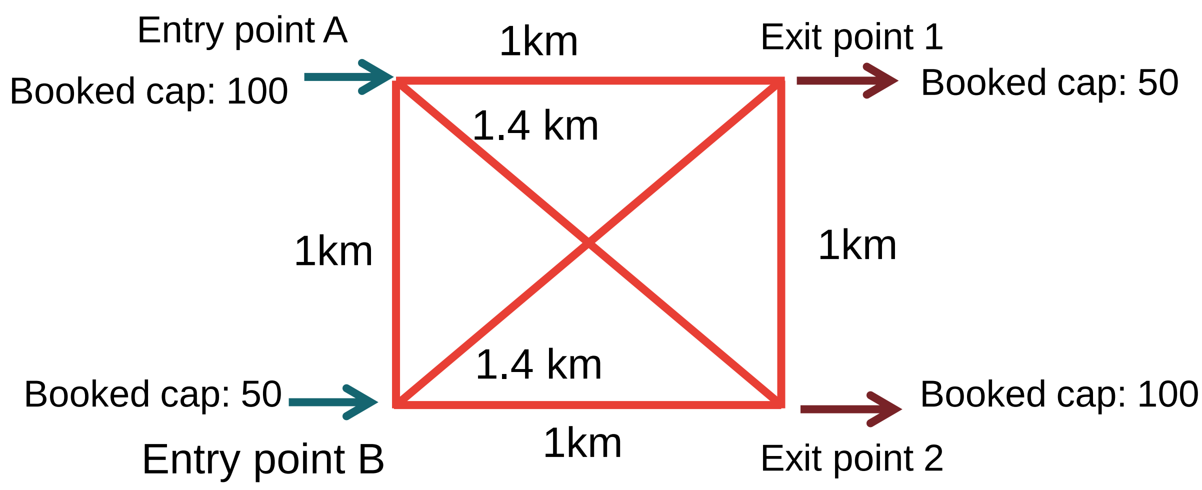
- With an entry-exit split of 50:50, to collect 2,000 euros, are as follows:
  - Annual Entry tariff (50%) = 1,000 euros / (150 booked capacity) = **6.67**
  - Annual Exit tariff (50%) = 1,000 euros / (150 booked capacity) = **6.67**

But, there are three mechanistic steps to the CDWA which we work through on the following slides

1. Calculate capacity-weighted distances
2. Calculate weights by using the product of the capacity weighted distances and forecasted bookings
3. Use weights to distribute allowed revenue over the exit and entry points

N.B. these calculations assume booked capacity is known. In the earlier tariff calculations peak flows were used as a proxy for booked capacity.

Capacity weighted distance approach

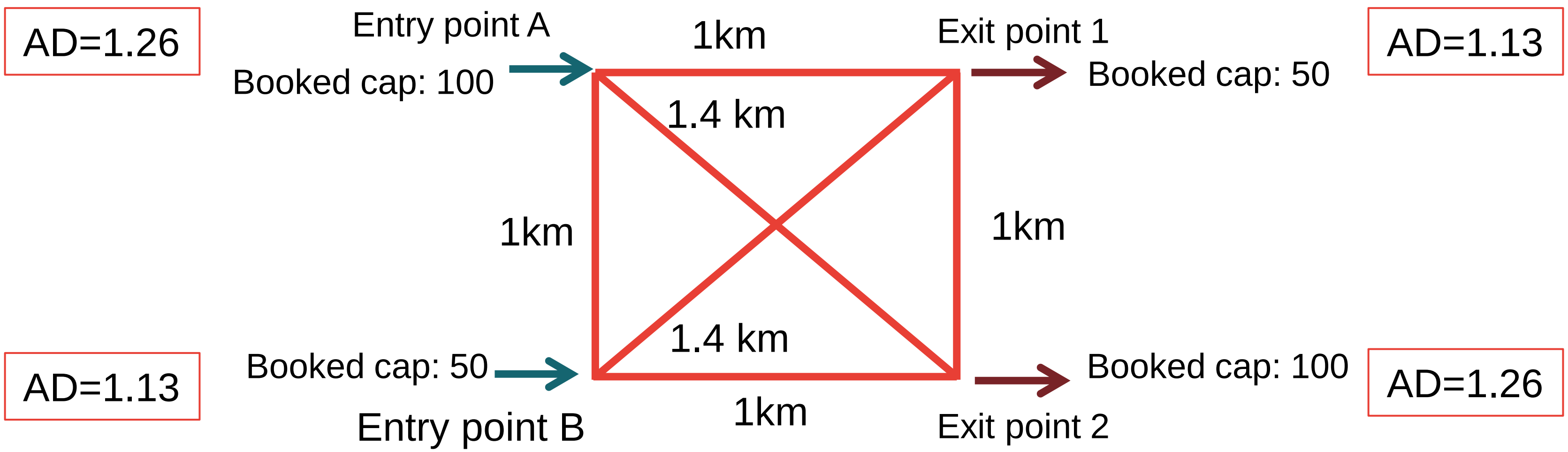


1. **First, calculate proportions of entry capacity at each point (repeating for exit)**
   - prop EpA = 100/150 = 66.7%
   - prop EpB = 50/150 = 33.3%
   - prop Xp1= 50/150 = 33.3%
   - prop Xp2 = 100/150 = 66.7%

2. **Second, calculate distance between points, weighted by proportion of capacity**
   - AD EpA = 1*(50/150) +1.4* (100/150) = 1.26
   - AD EpB = 1*(100/150) +1.4* (50/150) = 1.13
   - AD Xp1= 1*(100/150) +1.4* (50/150) = 1.13
   - AD Xp2 = 1*(50/150) +1.4* (100/150) = 1.26

The weights for entry are based on exit point capacity and visa versa.

Capacity weighted distance approach



3. Third, calculate the weight of each point by multiplying the weighted distances with the booked capacities, and the sum of this for entry, respectively exit points.

- W EpA = (1.26*100)/(1.26*100+1.13*50) = 69%
- W EpB = (1.13*50)/(1.26*100+1.13*50) = 31%

- W Xp1= (1.13*50)/(1.13*50+1.26*100) = 31%
- W Xp2 = (1.26*100)/(1.26*100+1.13*50) = 69%

4. Fourth, set tariffs to recover the proportion of allowed revenue from that point

point	Weight	Total Budget	Bookings	Tariff
EpA	69%	€1000	100	**€6.9**
EpB	31%		50	**€6.2**
Xp1	31%	€1000	50	**€6.2**
Xp2	69%		100	**€6.9**

Choosing a primary methodology - Postage stamp vs CDWA (1)

Recommendation: A postage stamp based approach is a simple method which will allow flexibility to mitigate some of the distributional impacts from zonal choice and address issues related to the transit flows. The alternative CDWA is a mechanistic approach based on average costs, and is unlikely to lead to efficiency gains in the region.

Efficiency	• In principle, approaches based on the distance of the entry point from demand could send a locational signal which could lead to more efficient siting decisions for new supply in the long-run. • However, the CDWA proposed by the EC is a relatively simplistic charging methodology, that does not send efficient signals for flows. For example, it is based on average costs of flows at a particular point, rather than marginal costs of additional flows i.e. it is a backward looking measure. • If the market was expected to be congested in future, and there was flexibility as to the location of new sources of supply, then a methodology focused on long-run incremental costs of flows would be efficient and preferable to a postage stamp approach. This however, is not the CDWA method. • With limited regional congestion, which is the more likely outcome, expectations of falling regional demand, and a limited ability for new sources of supply to choose location to connect to the grid, attempting to send a locational signal is probably of limited importance for the Baltic region. • Postage stamp prices may also be simpler and easier to forecast, facilitating new entry by smaller players.

Choosing a primary methodology - Postage stamp vs CDWA (2)

Security of supply	• The choice of charging regime is unlikely to have any effect on security of supply, as there is no expected impact on the connection of, or siting of new sources of supply.
Admin/legal burden	• Postage stamp prices are simpler to develop (requiring less data inputs) and administer than a CDWA model though both methods will require the creation of a charging methodology with regular updates.
Distributional effects	• Postage stamp prices will lead to uniform prices across all entry points, and across all exit points within a zone (or within national boundaries depending on the approach taken – see next slide). A CDWA approach will lead to significant distributional impacts with unique charges for each entry or exit point. • **TSOs** – Required revenues can be recovered through both methodologies, but postage stamp prices provide greater flexibility to manage distributional impacts on TSO revenues from moving to a single zone. The choice of CDWA tariffs should be motivated by sending a locational signal rather than managing distributional impacts, so it would not make sense to choose a CDWA tariff and then adjust the tariffs to remove distributional impacts on TSO revenues. • **Consumers** – the impact on consumers will firstly depend on their location – so a CDWA creates range of locational charges as opposed to a uniform exit charge under the postage stamp. • **Producers** *(shippers)* – the distribution of entry charges between consumers and producers may differ under each methodology. For example, if the CDWA charge on the marginal source of gas which sets the wholesale price is higher than the postage stamp charge, then wholesale prices will rise making a transfer from consumers to producers.

There are variations (“models”) on a postage stamp methodology which could be applied in the region

Redistribution less likely required

With separate zones…

1 Postage stamp applied to four separate zones	**With separate zones**, the postage stamp methodology can be applied to recover the nationally based network infrastructure costs across all entry and exit points in the country including IPs. *[This could include varying the entry-exit split e.g. 100% on exit]*

But in a single region…

2 Nationally applied postage stamp	**In a single zone**, entry and exit tariffs could still be set on a national basis. The postage stamp methodology is applied to all entry and exit points in the countries. Charges increase due to the removal of IPs. *[This could include varying the entry-exit split e.g. 100% on exit]*
3 Harmonisation of entry tariffs	**In a single zone**, entry tariffs could be harmonised, for example, based on the lowest or highest country based entry tariff (from 1 – above). The unrecovered revenue in each country is then recovered via the exit charges – this will imply different entry-exit splits in each country.

Redistribution certainly required

4 Fully harmonised postage stamp approach	In a single zone, a fully harmonised approach involves setting of the tariff on the basis of the total revenues to recover and total peak flows across region. This implies methods for redistribution will be required

- *Inter-TSO transfer scheme*
- *Adjustments to entry-exit split*
- *Secondary adjustments to homogenous groups*

We have calculated the entry and exit charges for each of these “models” to understand their implications

In the following slides, we estimate Postage Stamp entry and exit tariffs for one of the infrastructure scenarios, across each of the commodity merit orders, and in each of the “models” presented on the previous slides. We use the same tariff methodology in the previous section with 50:50 entry-exit split.

	Commodity merit order	Infrastructure
D	LNG high	Base + Balticconnector
E	LNG low – GIPL inflows	Base + Balticconnector
F	LNG low – GIPL outflows	Base + Balticconnector

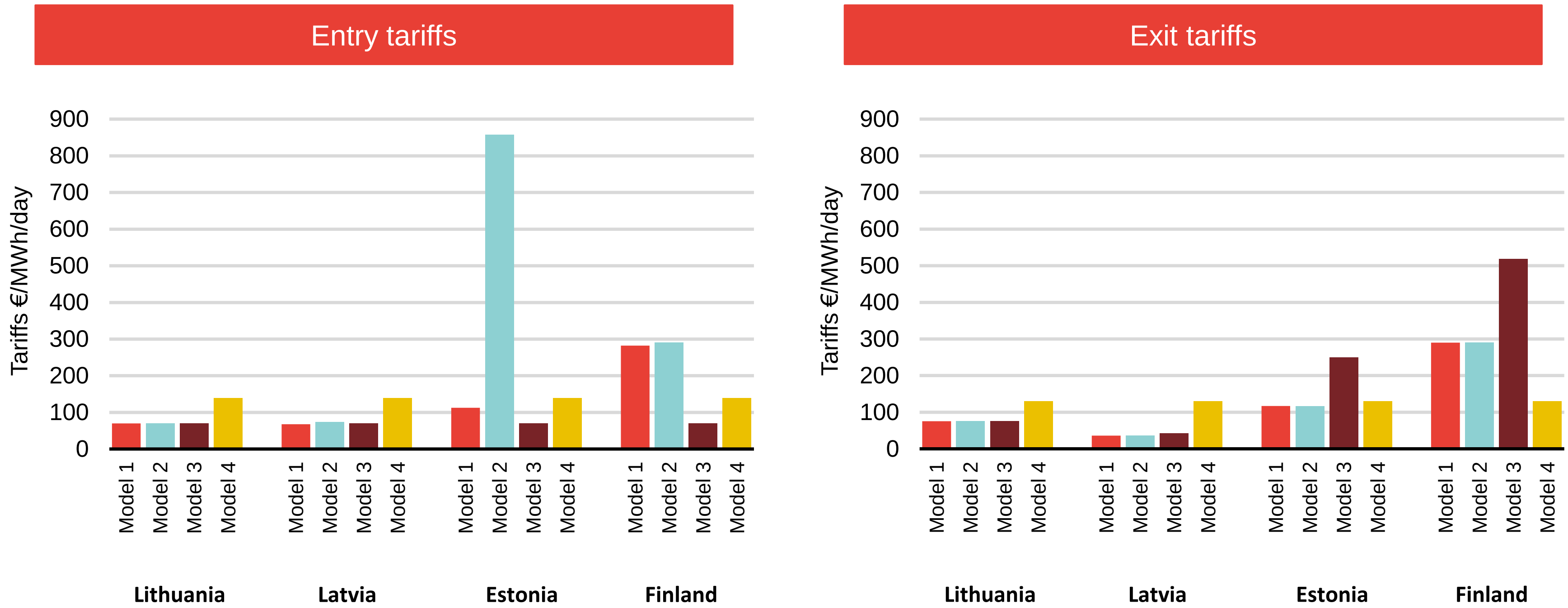
- The model contains results for all scenarios, however, we choose to present these as they represent a range of likely scenarios, with two uncongested (D,F) and one congested scenario (E).

For each of the 3 scenarios we then consider the four models:

Zone design	All separate	Single zone
	Model 1: Separate national uniform tariffs	Model 2: Nationally based tariffs
		Model 3: Harmonised entry tariffs to the lowest in zone
		Model 4: Harmonised single entry and exit tariff

Entry and exit tariffs – "LNG Expensive"

N.B. these refer to scenario D



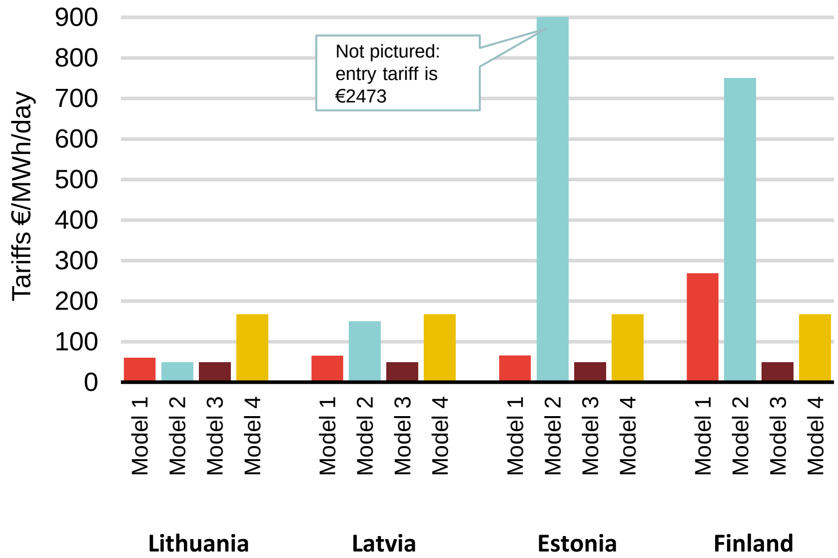
Model 1:	Separate national uniform tariffs	Model 3:	Single zone, harmonised entry tariffs to the lowest in zone
Model 2:	Single zone, nationally based tariffs	Model 4:	Single zone, harmonised single entry and exit tariff

Note: For borders between two zones within the EU where there are multiple IPs, a virtual IP should be implemented. This could in theory apply to the Russian border, though it is not required as they are outside of the EU. The approach would be consistent with harmonised entry and exit tariffs in a single zone (model 4) i.e. tariffs would be identical on all Russian IPs.

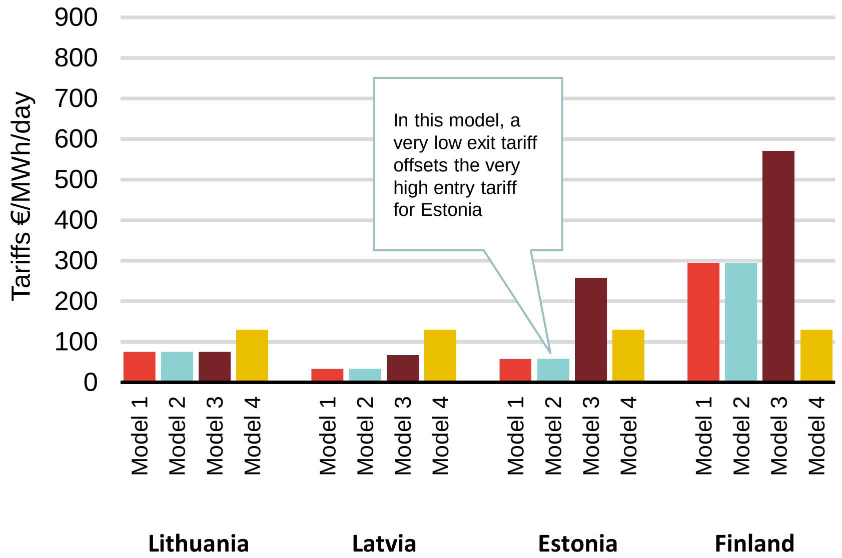
Entry and exit tariffs – "LNG Cheap – GIPL inflows"

N.B. these refer to scenario E

Entry tariffs



Exit tariffs

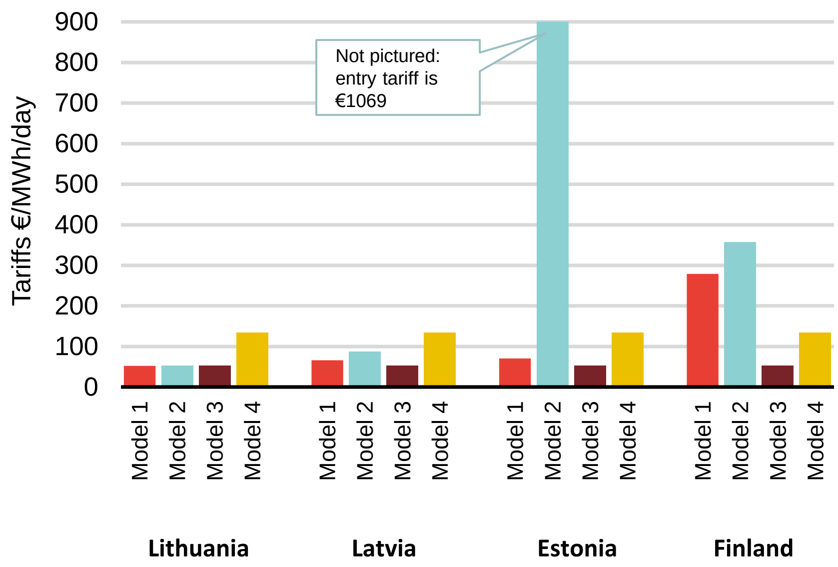


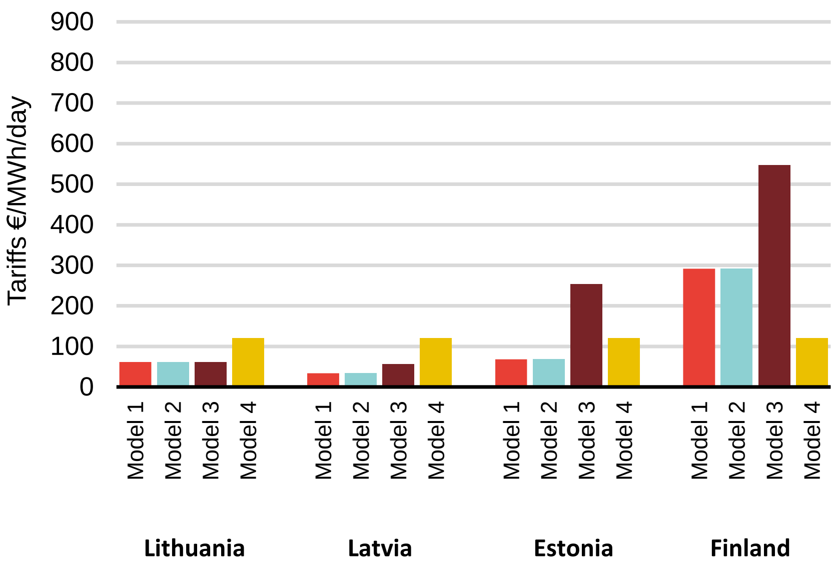
Model 1:	Separate national uniform tariffs
Model 2:	Single zone, nationally based tariffs
Model 3:	Single zone, harmonised entry tariffs to the lowest in zone
Model 4:	Single zone, harmonised single entry and exit tariff

Entry and exit tariffs – "LNG Cheap – GIPL outflows"

N.B. these refer to scenario F

Entry tariffs	Exit tariffs





Model 1:	Separate national uniform tariffs	Model 3:	Single zone, harmonised entry tariffs to the lowest in zone
Model 2:	Single zone, nationally based tariffs	Model 4:	Single zone, harmonised single entry and exit tariff

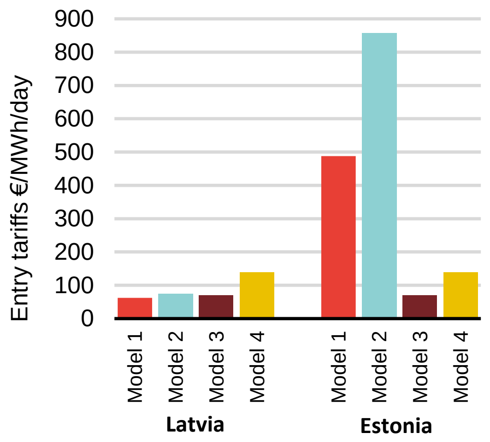
Tariff calculations – country messages

Lithuania	▪ Lithuanian entry and exit tariffs are at a consistently low level across the models (1-3) where tariffs are not fully harmonised. ▪ The impact of moving to a single zone is to lose IP revenue from Kiemenai, and when tariffs are fully harmonised (model 4), the relatively low allowed revenues mean that tariffs rise in Lithuania. ▪ Full harmonisation leads to much higher charges, meaning Lithuanian consumers will be paying a share of network costs from other countries, although part of this can be explained by different approaches to estimating allowed revenues.
Latvia	▪ For Latvia (based on 80% storage discount) – the loss of IP revenue from Kiemenai and Karksi, in a single zone pushes up entry charges when still set nationally (model 2) and when charges are fully harmonised (model 4).
Estonia	▪ For Estonia, the loss of IP revenue from Karksi and Balticconnector is significant, as the entry charge (model 2) is based on low summer inflows into Estonia from Russia. The very high charge in this case could be mitigated by changing the entry: exit split. This result would also look very different if Estonian LNG was built.
Finland	▪ For Finland, loss of IP revenue from Balticconnector pushes up entry charges (model 2) as it is only based on Imatra entry. This effect is even more dramatic if LNG is cheap since flows from Russia will be reduced. ▪ If harmonised on the lowest entry charge (model 3), exit charges have to increase significantly to cover the high Finnish allowed revenues. We investigated harmonising on the highest entry charge i.e. Finland, but this leads to negative exit charges in the other countries (this could be mitigated with a much higher entry-exit split in Finland for example).

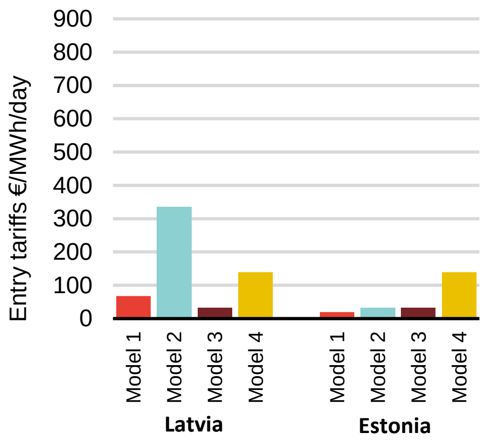
Tariffs will also depend on how Misso entry/exit points in Estonia are treated

- Our analysis so far has assumed that Korneti is the entry point into the single East-Baltic entry/exit zone from Russia to Latvia.
- In reality, gas first enters Estonia at Misso-Izborsk and is then transmitted to Misso-Korneti entry/exit point between Estonia and Latvia.
- In separate zones, Estonia gains an additional entry and exit point.
- In a single zone, if revenues for gas entering the zone are collected at Misso-Izborsk, then the entry-point moves from Latvia to Estonia, affecting tariffs and revenue distribution. We investigate this as a sensitivity.

No entry point at Misso-Izborsk



Sensitivity - Entry Point at Misso-Izborsk



Typically the impact of creating an entry point at Misso-Izborsk is to reduce Estonian tariffs and increase Latvian tariffs (models 1 and 2) .

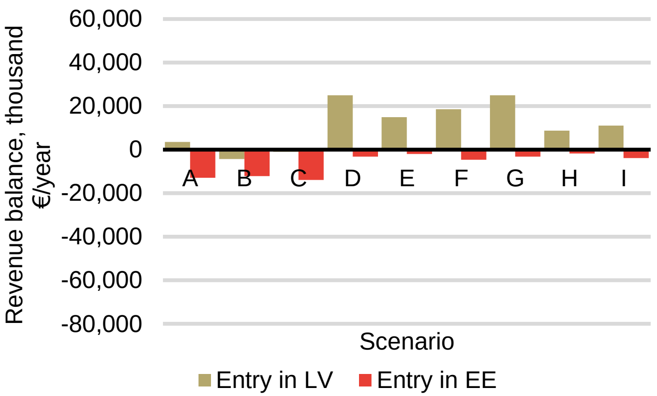
Where tariffs are harmonised in a single zone (models 3 and 4), revenue recovery will fall in Latvia and rise in Estonia (see next slide).

- **Model 1** – no change in Latvian tariffs due to no effect on assumed booked capacity in tariff calculations. In Estonia however, including additional entry flows over Misso-Izborsk lead to lower tariffs.
- **Model 2** – Latvian tariffs rise due to loss of IP at Korneti, Estonian tariffs fall since entry point to zone now in Estonia.
- **Model 3** - Tariffs are harmonised on lowest tariffs, which are now in Estonia due to additional entry flows at Misso-Izborsk.
- **Model 4** – all tariffs are the same in both scenarios since no change in overall flows and revenues to be recovered.

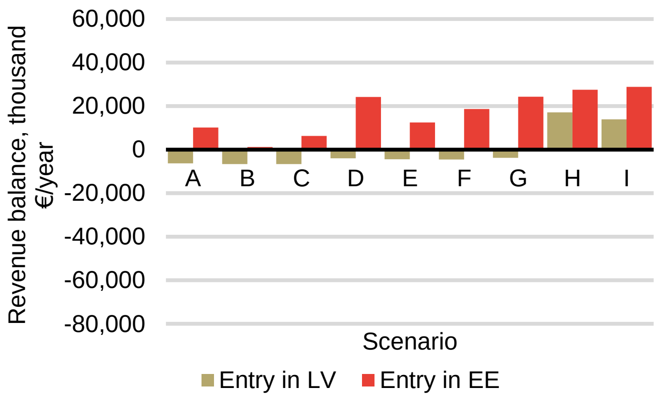
Note: illustrations are for scenario D

Definition of Misso IP will also affect the revenue balance between the TSOs

Latvia



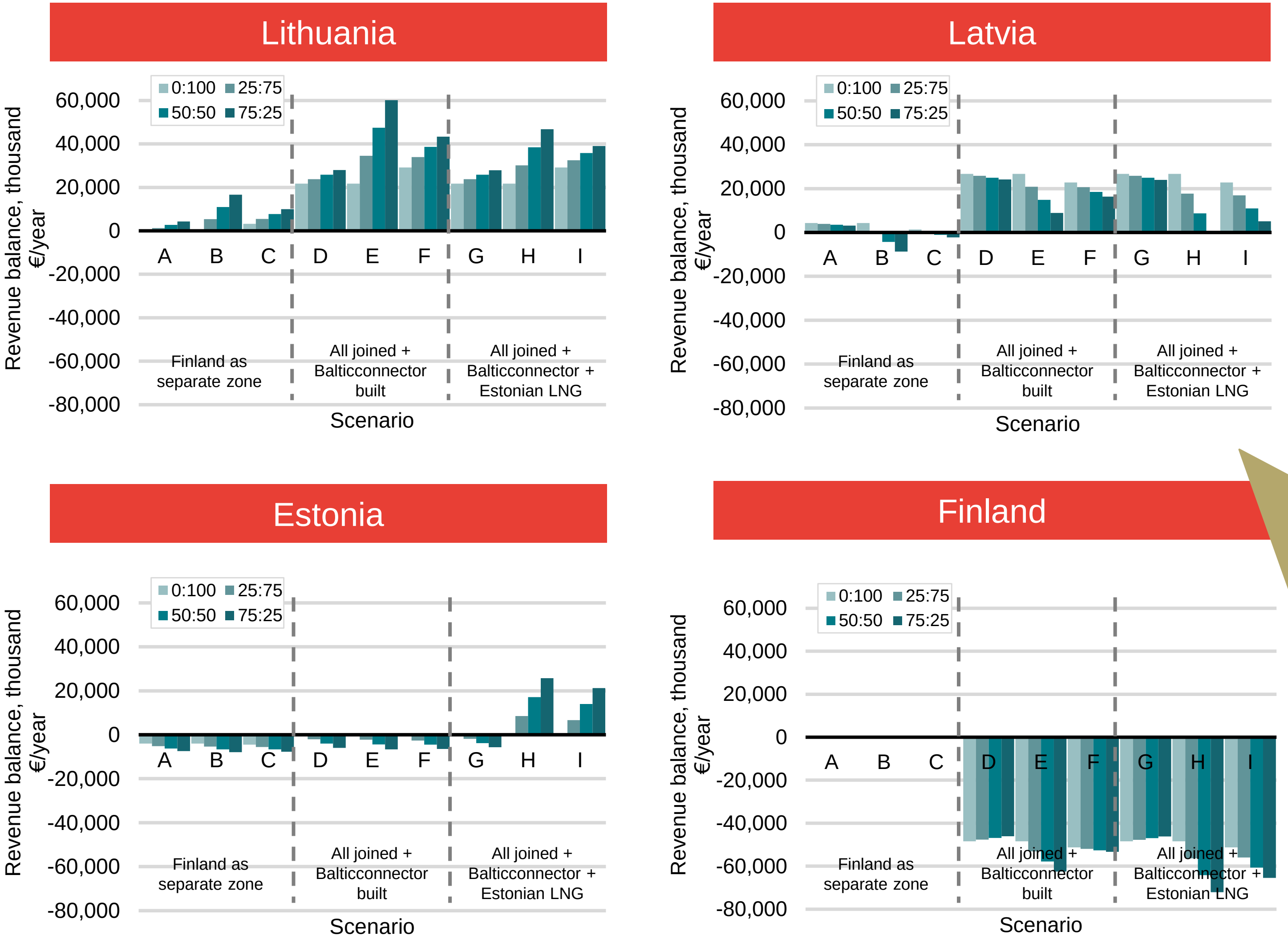
Estonia



Each country recovers more of its allowed revenue within a single zone when it has more entry capacity within its territory

The decision of whether revenue should be collected at Misso-Izborsk or Misso-Korneti has large implications on the tariffs and revenues in both Latvia and Estonia

The entry:exit split can be a useful tool to manage the distribution of TSO revenues with fully harmonised tariffs



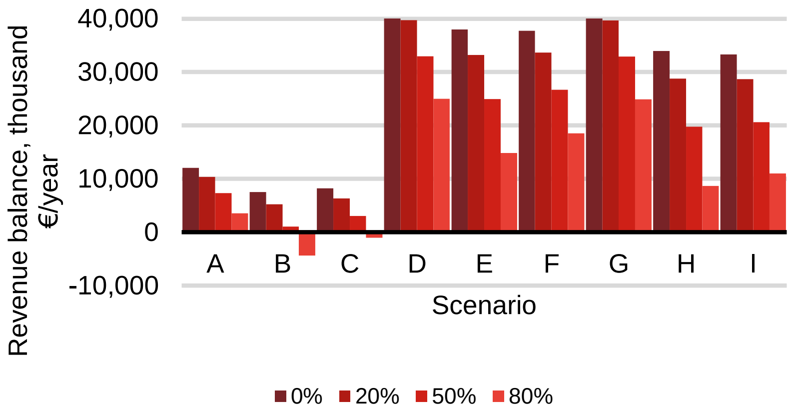
The charts illustrate that in a single zone without Finland and with fully harmonised tariffs (model 4), a higher share on exit charges, reduces the redistribution between the three Baltic countries, suggesting the entry-exit split is a useful tool in this scenario.

The impacts are not so clear when Finland is included.

N.B. ratios are written as entry:exit, so 0:100 refers to 100% exit charges

Network revenues in Latvia are closely related to the levels of entry and exit charges to Incukalns

Latvian TSO revenue balance by storage discount assuming a fully harmonised tariffs in a single zone



- This chart illustrates the Latvian TSO revenue balance assuming a fully harmonised approach to tariffs in a single zone.
- Latvian network revenues are sensitive to the storage discount. Although in most scenarios it earns more than needed to cover its network costs, even with an 80% discount on storage.
- Further any loss on network charges may lead to increased storage revenues if capacity is competitively allocated.

- There is an allowance within the TAR code for a secondary adjustment to the storage tariff. The numbers we have presented so far assume an 80% storage discount on entry and exit.
- There is a rationale for a discount because network tariffs push the cost of using it above its short-run marginal cost reducing the efficiency with which it will be used. The same argument applies for supporting the fixed costs of storage infrastructure (as well as LNG) through socialised charges across the region, which we set out later. However, this may mean that Russian flows pay less for accessing the network than previously.
- If charges are based on our recommended approach to tariffs (model 3) then the storage discount will lead to increased exit charges, including on the Russian border with Latvia, which in effect is a charge on the Russian use of storage as most flows are for that purpose. If the entry point to the zone is designated to be in Estonia rather than Latvia, then a high storage discount will require Latvia to recover most of its revenues on Latvian domestic exit points. This is an example where inter-TSO transfers could be important to mitigate this effect.

Applying a Postage Stamp "model" in a single zone (1)

Recommendation: The answer to which approach to take will be linked to the choice of zone. Efficiency impacts are likely to be relatively small, however, distributional impacts potentially large. If a single zone with all four countries is chosen that would suggest a lower degree of harmonisation (model 3). But if the zone only contained Estonia, Latvia and Lithuania, then model 4 could be preferable.

Efficiency	• The different approaches to setting entry and exit charges in a single zone will affect the degree of harmonisation of tariffs. • Harmonised tariffs will prevent distortions to the merit order of gas sources entering the zone, suggesting models 3 and 4 which harmonise entry tariffs are the most efficient. • Differential tariffs could lead to a cheaper source of gas becoming more expensive than an alternative source with a cheaper entry charge. This is inefficient if a locational signal is not being sent by the network charge. • If charges are differentiated, for example, by setting them entirely on a national basis (model 2), then sources of gas connecting in Finland will be charged more compared to other sources within the region.
Security of supply	• Unlikely to be affected.
Admin/legal burden	• All the options are variations on the postage stamp. Only the fully harmonised approach (model 4) is consistent with the primary reference price methodology in TAR, however, the variants would be allowed given the freedom in the code to choose alternative methodologies. • A fully harmonised approach will potentially require a inter-TSO compensation mechanism to be set up.

Applying a Postage Stamp "model" in a single zone (2)

Distributional effects

- **TSOs** – there are only likely to be significant distributional impacts for TSOs if a fully harmonised tariffs approach is adopted in the single zone (model 4). An inter-TSO compensation mechanism makes the TSO whole, but there are distributional impacts on consumers and producers as a result. If distributional impacts are low and could be managed through an inter-TSO transfer scheme then model 4 should be favoured.
- **Consumers:**
  - consumers in countries with high network costs to be recovered will pay lower charges in a fully harmonised single zone (model 4) – for example, high Finnish costs will be recovered from consumers and producers in other countries.
  - distributional impacts are lower in a smaller merged zone of Estonia, Latvia and Lithuania, and there is the potential to get closer to a situation where TSOs are made whole and there are not large distributional impacts on consumers between countries by adjusting the entry:exit split.
  - consumers will bear the greatest share of the costs in the options with the highest exit charges.
- **Producers** – producers are able to pass on changes in tariffs through to consumers via the wholesale price, but only at the level which the marginal producer faces. Other producers with higher (lower) charges will lose (gain).

Products - short-term multipliers (1)

Recommendation: In the context of potentially falling demand in the Baltic States, concerns about cost recovery of investments will be important. Therefore we recommend higher multipliers for products of less than a year to mitigate these concerns.

Efficiency	
	• Network owners typically recover the cost of their investment by selling long-term access to their network. Then to make efficient use of the network, short-term access when available is sold at the short-run marginal cost of capacity i.e. a cost close to zero, which does not reflect the fixed costs of the investment. This short-term capacity is important for managing congestion and facilitating new entry. This approach to network charging would entail a low short-term multiplier – the lowest allowed by TAR is 1 i.e. a daily product can be no more than (1*annual charge/365). • However, this approach to short-term multipliers, encourages network users with a high peak but infrequent usage to buy much cheaper capacity in short-term markets avoiding a charge more closely related to the long-run marginal costs of the investment. Higher multipliers mitigate this problem to a degree, making the charge closer to the long-run marginal cost of the capacity they require, although they are capped in the current draft of TAR at low levels. • This is an issue is Western Europe with increasingly intermittent running of gas generators that have high peaks but infrequent running hours. In the Baltic States, falling demand, and low levels of congestion may encourage participants to only buy short-term capacity, limiting cost recovery. Lithuania has chosen to use higher multipliers following first-hand experience of lower multipliers leading to declining demand for annual capacity contracts.

Products - short-term multipliers (2)

Security of supply	• Higher multipliers are more focused on cost recovery than efficiency, and therefore will be important for supporting new investments, which will potentially enhance security of supply.
Admin/legal burden	• Unlikely to be significant differences between multipliers in terms of admin or legal burden. The options being considered are allowed by TAR.
Distributional effects	• **TSOs** – higher multipliers ensure greater cost recovery lowering their cost of capital. • **Consumers** – potentially prevents more efficient use of the networks, facilitating entry, but in the long-run could reduce the cost of capital associated with network investment reducing bills. • **Producers** – By applying higher short-term multipliers, network users with a high peak but infrequent usage will be paying a cost closer to the long-run marginal cost of the capacity they require. Low multipliers focus the cost recovery on users with high commodity usage throughout the year.

The charging of transit flows will also need to comply with TAR

There are significant transit flows across the region. The charging of these flows will need to comply with TAR, however, the 'cost allocation test' provides some flexibility to ensure a 'fair' distribution of charging.

- Transit flows across the region are significant. We have identified flows from GIPL to the north of the region as an important driver of potential congestion in the region in future. And flows across Lithuania to Kaliningrad range between 61% and 72% of demand in Lithuania.
- It is therefore important that charges for these flows are cost reflective.
- Adjustments to charges at border points need to be applied to all flows (domestic and transit) and will affect the efficiency with which network is used. For example, in a system with low congestion, uniform tariffs would be preferred. Adjustments to recover more costs from transit flows could lead to distortions on flows within the region.
- However, it could be possible to adjust the exit tariff to Kaliningrad without causing wider distortions to the region. The cost allocation provides a tool for making adjustments to better account for the cost of transit flows.

Cost allocation test

- Article 16 of the draft TAR sets out the 'cost allocation test'.
- The test is designed to demonstrate the degree of cross-subsidisation between domestic and cross-border network users based on the proposed reference price methodology.
- If the ratio of the revenue recovered from domestic users relative to specified cost drivers differs significantly from that of transit flows, then there is a justification to amend the tariffs. E.g. the exit tariff to Kaliningrad could be adjusted.
- Methodology depends on the identification of different cost drivers for domestic and transit flows, which in practice will be difficult, and therefore offers flexibility in the approach to doing so.

Key messages: Tariff design

- In the Baltic region we recommend a **postage stamp based methodology**, because it is simple and enables flexibility in its design to mitigate potential distributional impacts related to the movement to a single zone. Given the low level of expected congestion in future, a methodology based on the long-run incremental costs of flows is unlikely to bring significant efficiency gains.
- However, the final methodology and approach will need to be considered and **set by NRAs once the Tariff Network Code is finalised**.
- .There are **alternative tariff regimes** based on the postage stamp which can be used to mitigate these distributional impacts.
  - By **harmonising entry tariffs** across the region but allowing exit charges to vary nationally, allowed revenues can be recovered for each country, but efficiency benefits from a single entry tariff retained.
  - This would also reduce the need for significant harmonisation of allowed revenue calculations.
  - However, the need for **inter-TSO transfers** cannot be eliminated entirely. For example, designating the Russian entry point to the zone in Estonia or Latvia can have a significant impact on exit tariffs faced by consumers in either country. Alternatively, patterns on Russian entry points could change in future once it no longer matters where in the region they enter. An inter-TSO scheme can be used to mitigate these impacts.
- In the context of potentially falling demand in the Baltic States, concerns about cost recovery of investments will be important. Therefore we recommend **higher multipliers for products of less than a year** to mitigate these concerns.

Cross border (IP) capacity must be allocated and used in an efficient manner

The importance of this to the market design in the Baltics will depend on zonal configuration. With a single zone the only IP will be over GIPL. NRAs could decide to implement on borders with third countries e.g. Russia, however given the single supplier on the border auctions will be unnecessary.

Capacity allocation mechanisms (CAM)

- Prior to the implementation of CAM, allocation of free capacities, if available, was mostly done via First-Come-First-Served principle
- Players with an information advantage get all the capacities
- CAM aims to regulate how capacity is made available to market
- This is done mostly through *explicit* auctions of capacity. *Implicit* auctions, where capacity is allocated to energy trades simultaneously in a single auction, is consistent with the code, could be used, although there are no examples in EU gas markets currently.

Set rules for TSO to allocate capacity in a fair manner

Congestion management procedures (CMP)

- Capacity at Interconnection Points is often fully booked but not used
- CMP aims to free up unused capacities to improve efficiency of gas flows
- Any capacity reallocation needs to be consistent with the overall Capacity Allocation Mechanism (CAM)

Set procedures for TSO to release unused capacity

Capacity allocation mechanisms (CAM)

The CAM network code defines standardised products to be auctioned at specified intervals at all IPs.

Defined capacity products

- Unallocated firm capacity, including capacity re-offered in accordance with CMP, has to be offered in the form of defined products (yearly, quarterly, monthly, daily, within-day) and through specified auctions (annual yearly and quarterly, rolling monthly and day ahead, intraday). These products should be made available via online booking platforms, held at the same time with the same rules.
- The GTM makes reference to market coupling. No European country has adopted this approach for gas trading where gas commodity and IP capacity are traded simultaneously. This requires the coupling of exchanges over IPs and the development of an algorithm to allocate capacity.

Interruptible capacity products

- Interruptible capacity (IC) shall be offered at interconnection points where firm capacity has been sold out.
- It is to be allocated via auctions except within-day. The order of interruptions for IC is based on the time stamp of the IC transport contract coming into force (earlier contracts prevailing over later ones).

Bundled products

- Capacity offered at both sides of an IP shall be bundled and offered as a single product by both TSOs and shipper can make a single nomination.
- This therefore requires shippers to buy fewer products in order to flow gas from one market to another, and eliminates the risk of a shipper being stuck with capacity rights for just one side of an IP.

All provisions apply as of 1 November 2015. However, capacity bundling is only required for new capacity contracts.

The GTM sets out four congestion management procedures (CMPs) to ensure efficient use of capacity

1 Oversubscription (OS) and buy-back

- TSOs are required to determine the amount of technical capacity which is likely to be physically unused at IP and then offer to network users as firm capacity in addition to the technical capacity.
- If the use of the additional OS capacity affects system integrity (i.e. turns out to be used by existing capacity holders), TSOs shall apply market-based buy-back procedures.
- TSOs then need to recover the cost of the buy-back

2 A firm day-ahead use-it-or-lose-it (UIOLI) mechanism

- Network user's use of contracted capacity may be restricted by TSOs if:
  - it holds more than 10% of available capacity; and
  - on the basis of monitoring reports demand for capacity exceeds offered capacity at the respective IP for either the current or one of the two subsequent years according to specified thresholds, or if no firm capacity product is offered at the IP.

The GTM sets out four congestion management procedures (CMPs) to ensure efficient use of capacity (2)

3 Long Term UIOLI (LT UIOLI) provisions for contracted capacity

- TSO obligation to monitor use of capacity and to report to NRAs. NRA withdraw systematically underutilised contracted capacity from capacity holders and make it available to market.
- Capacity underutilised if use is below 80% of contracted capacity; or network user systematically nominates close to 100% of capacity and renominates downwards later (to avoid ***firm day-ahead UIOLI***).

4 An option for network users to surrender contracted capacity

- TSOs have to accept firm capacity surrendered by network users.
- Those surrendering capacity retain all rights and obligations under their respective capacity contracts until the relevant capacity has been reallocated.
- Such reallocation would only take place after all other available capacity has been allocated.

The GTM sets out a clear model for capacity allocation and for congestion management

Cross-border access rules

- **All capacity on IPs** must be allocated via auctions with standardised products. Interruptible contracts and bundled products must be available. These rules apply to the initial capacity allocation and the capacity allocated under CMP.
- **There are four procedures for determining which capacity should be reallocated. They are all required to be implemented by CMP.**
- Note - the relevant NRA can also decide whether to apply the options to entry-exit points to third countries e.g. in this case Russia.

1 Procedure 1	2 Procedure 2	3 Procedure 3	4 Procedure 4
Oversubscription and buy back	Firm day ahead use-it-or-lose-it mechanism	Long Term use-it-or-lose-it provisions for contracted capacity	An option for network users to surrender contracted capacity

These options are not mutually exclusive - they are solving different problems. For example, 1 and 2, solve short term inefficiency of use of infrastructure (only allocating newcomers rights very short term), and 3 and 4, tackle hoarding of long-term rights.

- Executive summary
- Introduction
- Regional model development
  - Approach to market design development
  - Market design requirements
    - Size of entry-exit zone
    - Access to entry-exit capacity
    - Cross-border access
    - Temporal market & hub definition
    - Balancing and settlement
    - Network interoperability
    - Access to LNG and storage
    - Treatment of long-term contracts
- Summary and recommendations
- Roadmap and harmonisation issues
- Annexes

The organisation of the market place, or "hub structure", will be important to consider

GTM requires a **"virtual trading hub" to be located within each entry-exit zone** for trading to take place. The hub serves as a single point with no specific geographic location in the zone, and gas traded on the hub is treated the same irrespective of where it is injected or exited within the zone.

The important question is – what is the nature of the market places that make up the virtual hub? The "hub structure" could comprise some combination of OTC, exchanges, and TSO trading platforms.

	Over the counter (OTC) sales	Exchanges	TSO trading platforms
Market place	• Bilateral contracts between suppliers and large buyers are common • Tend to not reveal the market price thus deterring new market participants from entry	• Set up by commercial operators to facilitate trading by reducing search costs or by the regulator to promote trading • Reveal market price for energy which guides planning and investment decisions of energy suppliers	• To facilitate trading, to allow the TSO to ensure the continuity of supply, to determine the price to apply to imbalances • Tend to be centrally funded short-term exchanges and tenders for annual supply of flexible gas
Time dimension	• Common for forward transactions	• Both forward and spot transactions	• Typically set up for balancing transactions
Product type	• Physical and derivative trades	• Physical and derivative trades	• Physical trades

The choices on hub structure will be linked to zonal definition

GTM requires a "virtual hub" located within each entry-exit zone for trading to take place. But the nature of the market places that comprise each virtual hub, may depend on whether the Baltics and Finland, form a **single zone** or **separate zones**.

Single zone

- **In our recommended approach of a single zone, the key question is whether existing market places are sufficient to serve the new single "virtual hub"?**
- Zone hub could piggyback on existing market places / trading platforms from Lithuania / Finland (if included within the single zone).
- Two market places could co-exist selling products for the "virtual hub", although in time competition will drive liquidity to likely focus on one hub.
- With a single market place serving the hub, there will be a question about what regulatory supervision should apply to exchanges to mitigate concerns about marker power. This applies not just to gas but all traded exchanges.

Separate zones

Are existing market places in the region sufficient to serve "virtual hubs" in each country zone?

Yes – link to existing hubs i.e. the GTM "satellite markets" option

- Liquid market places serving existing hubs (Lithuania and Finland) determine base price for the region.
- Other zones link off the central hub.
- Price in each zone equals base price + transportation costs
- Requires the grid to be relatively free of congestion

No – need multiple hubs

- Separate market places required to serve the "virtual hub" in each zone, with separate prices across zones.
- Requires a sufficient number of traders in each zone.
- In this case how will new hubs form – by regulation or led by commercial players?

In a single zone, there are a range of possible outcomes for hub structure

Given there are two existing trading platforms, when a single zone forms, if it is left to the market to organise itself, then we have identified three potential outcomes. In the end perhaps the most likely is a single market place serving the hub, leading to a requirement for regulatory oversight.

1 Existing platforms co-exist and differentiate

- It is possible for hubs to specialise in different products.
- For example, one on short-term products and one longer-term products.
- This is the case in the Nordic electricity market, where Nord Pool manages the physical market and Nasdaq the longer term derivative market.
- The search for profitability may lead to inevitable competition between hubs e.g. the volumes in short-term trading alone may be insufficient.

2 Coexist and compete

- Alternatively, they could compete in the same product types, and since liquidity breeds liquidity, if one of the exchanges is a lot more liquid, it will tend to grow at the expense of the other one.
- This second potential outcome one may naturally, lead to the existence of a single platform serving the market.

3 Single market place

- Single trading platform will hold a monopoly position, so some form of regulation will be required to ensure fees are reasonable.
- This applies not just to gas but all traded exchanges.

We understand this is likely given an intention by GET Baltic (Lithuania) and Finland's exchange to merge if Balticconnector is built.

If separate zones were to be considered, then existing trading platforms could support “satellite markets”

A separate market adjacent to a very competitive price zone can enjoy the benefits of competition. For example Latvia could benefit from a liquid Lithuanian hub. There are analogous situations in Ireland and in the US (Henry Hub).

Country A (e.g. Latvia):

Few (or no) sellers of gas; competitive retail

Uncongested interconnector

Country B (e.g. Lithuania):

Many buyers and sellers with efficiently priced gas

Although there is not a competitive wholesale market in country A, the benefits of competition can spread across the interconnector to create a competitive retail market in country A.

- **Example 1**: This situation occurs in **Ireland** is similar to “Country A” - it is connected to the GB market by an uncongested interconnector.
- Retailers in Ireland can either buy gas at NBP (plus a factor for transportation over the interconnector) or from an indigenous producer at a price indexed to NBP.

- **Example 2: Henry Hub (HH) in the US** could be likened to “Country B”. Regional US gas prices are simply spreads relative to the HH price, where the spread represents a cost of transport. Relatively stable spreads help regional market competition.

This scenario works on the basis of a stable cost of transportation over the interconnector. In the case where there is a degree of congestion it will lead to a more volatile price for interconnector capacity, and hence increase the ability of the indigenous producer in country A to earn excess profits. The uncertainty will also make new entry more difficult for retailers.

…competition can be strong with separate price zones

With separate zones, should there be a trading hub in each zone?

Recommendation: In the case of separate zones, and limited congestion significant cost can be avoided by linking prices in neighbouring zones to a single liquid hub.

Efficiency	• In a scenario with multiple entry-exit zones in the region, the GTM envisages a trading hub within each zone. This makes sense where liquid markets exist with many buyers and sellers. • However, it is not a pre-condition for a competitive market, and could result in markets with poor liquidity and low levels of competition. • In situations where there are a limited number of buyers and sellers, it can more efficient for smaller markets to link off a large, liquid hub.
Security of supply	• The choice of trading regime is unlikely to have any effect on security of supply, as there is no expected impact on the connection of, or siting of new sources of supply.
Admin/legal burden	• It will be more expensive to set up multiple hubs, as the regulatory structures will need to be replicated in each zone. • From a political point of view, it might be preferable to have a separate hub in each country. For an entry-exit zone to link off a foreign hub, it must have confidence that the goals of the gas market in the zone housing the hub is aligned with its own. This seems not to be a serious problem in the Baltics as they have a united gas market strategy.
Distributional effects	• Trading at a single more liquid and more competitive hub brings about competition benefits that in theory should benefit consumers. • Regardless of whether the Baltics form a single zone or multiple, a single liquid hub is likely to benefit consumers more than multiple hubs.

The GTM requires rules for balancing and settlement of the system by the TSO

There will always be forecast errors by market participants, so some kind of balancing and settlement regime will be required.

The size of the balancing zone will depend on the zonal choice, although, there is an option under the GTM to have separate balancing zones within a single trading zone i.e. a “trading region”.

Balancing

- Participants inform the TSO of their proposed injections and withdrawals from the network within the region; and where the TSO assesses this will lead to a demand supply imbalance or congestion, they buy and sell gas to balance supply and demand.
- Different balancing regimes are barrier to cross-border trade and, thus, segment markets.

Rules for the buying and selling of gas by the TSO and a platform will be required.

Settlement

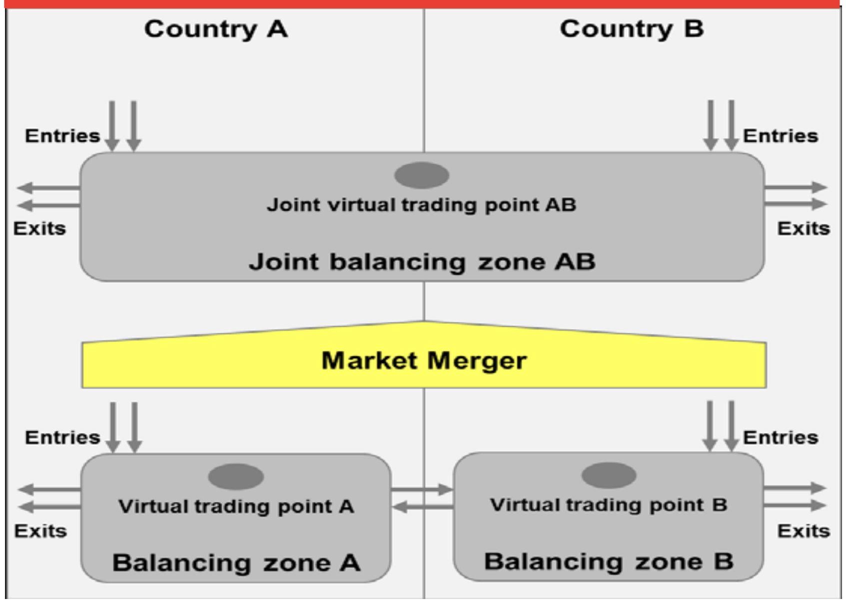
- If market participants are short against their contracted volumes, they should be charged for the residual gas consumed by customers which will be bought by the TSO. If they are long, they should be paid for the gas they effectively ‘sell’ back to the TSO.
- These payment flows need to be recovered from the market in such a way as to incentivise parties to be in balance.

Rules to encourage market participants to balance their portfolios.

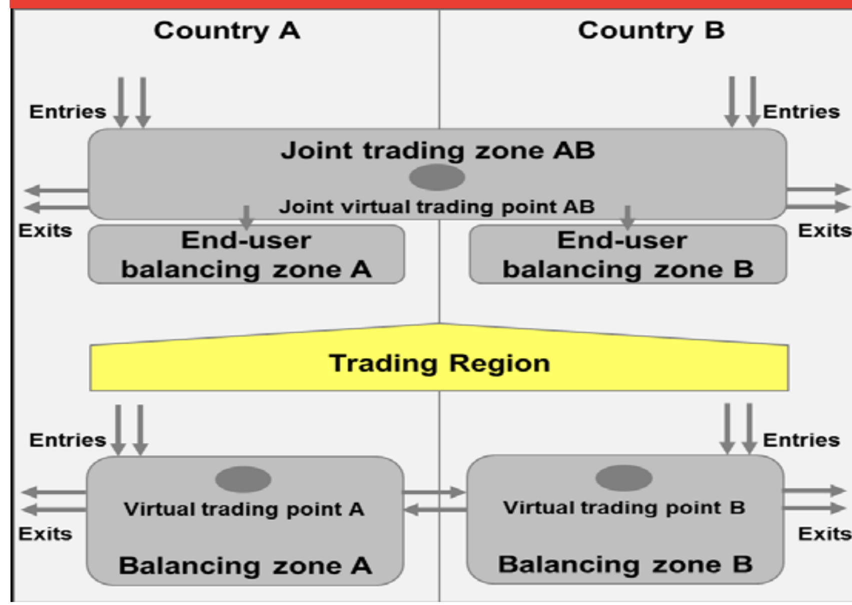
In this section of the report, we first consider options for the size of balancing zones and institutional arrangements within a single trading zone, and then consider the nature of a GTM consistent balancing and settlement regime.

The GTM sets out two options for the management of balancing in a single zone

Single zone – “market merger”



Single zone – “trading region”



- **This model implies a single balancing regime with overarching coordination of balancing between TSOs.**
- In other countries such as Germany, Switzerland (proposed), and in the Belgium Luxembourg merger, a market area operator was created as a separate company owned by all the TSOs. In this report we refer to this institution as a **‘market area manager’**.
- Network users therefore primarily interact with this company to buy and sell balancing gas. TSOs remain in operational control of the networks, but are directed by market area manager based on the outcome of the balancing market.

- **This model implies a single trading region but countries retain control of balancing.**
- Network users potentially must interact with multiple TSOs, and face different imbalance prices depending on their imbalances within each TSO area.
- Alongside each buy and sell trade flows will need to be allocated by shippers to the imports or loads within each balancing area. This could lead to a situation where a shipper is balanced in aggregate across the zone, but they may have imbalances within each balancing area.

A full market merger is likely to be more efficient…

Separate balancing areas for each TSO within the single zone are likely to increase static inefficiencies related to TSO balancing in a single zone

TSO coordination inefficiencies

- With each TSO conducting its balancing activities separately, it is possible that there will be missed opportunities for coordination.
- For example, if one country needed to increase gas supply in their area, while their neighbour needed to decrease it, then in aggregate no action may be required to balance the overall system.
- Failure to coordinate could therefore lead to unnecessary balancing actions being taken increasing overall costs to consumers.

Perverse commercial incentives

- Network users may also face perverse incentives when it comes to minimising imbalance costs.
- Although each TSO will need to design a balancing regime consistent with the Bal NC, differences could remain between balancing areas.
- To the extent that this leads to penalties being more severe in one balancing area compared to another, then network users may focus their attention on minimising their imbalances in one balancing area affecting flows across the region.

- There are administrative costs associated with setting up balancing regimes consistent the Balancing network code for a full “market merger” and a “trading region”.
- A single balancing regime (“market merger”) is therefore likely to be the least cost option, with the “trading regime” representing a back-up option if agreement cannot be reached on a single balancing regime.
- To pursue a full market merger, a ‘market area manager’ will need to be established to manage balancing and settlement. This could be a new organisation jointly owned by the TSOs, or alternatively an existing TSO could assume this role for the region.

we recommend establishment of a ‘market area manager’

Within each balancing zone, the GTM sets out clear rules for balancing and settlement

The Balancing Network Code has been finalised and sets out clear design principles but creates some flexibility about the exact design and the timing of any transition.

Nominations and renominations

The TSO can specify the periods in which shipper nominations and renominations can take place:

- nominations until 13:00 UTC (winter time) or 12:00 UTC (summer time) one day before the gas day.
- renominations from 15:00 UTC (winter time) or 14:00 UTC (summer time) one day before the gas day until the time no later than three hours before the end of the gas day.

Balancing

- Network users shall be responsible for balancing their own portfolio to minimise the need for the TSO to undertake balancing actions.
- The TSO undertakes balancing actions to maintain the system within operational limits by trading short term contracts on a trading platform or using non-standard balancing services.

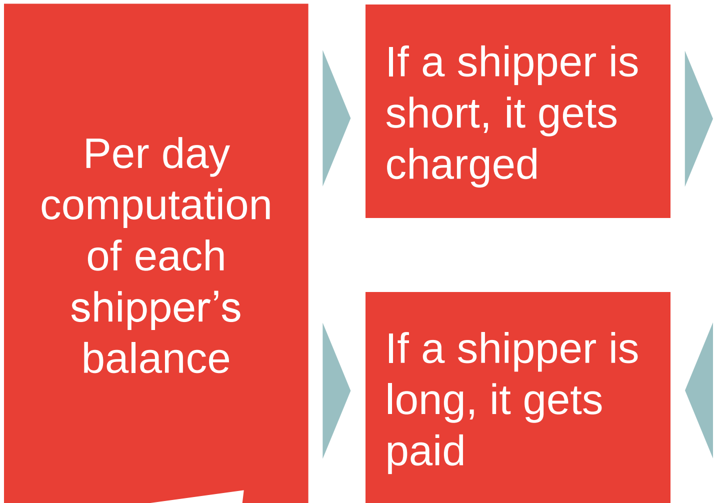
Daily imbalance charge

- Network users shall pay or receive daily imbalance charges in relation to their daily imbalance. The imbalance charge shall be cost reflective, taking account of the marginal prices of the TSOs balancing actions, while providing an incentive for network users to balance.

Interim measures

- Where liquidity is poor, the TSO may apply interim measures for balancing, but for no longer than 5 years after BAL NC comes into force.
- Measures could include: establishment of a balancing platform whereby the TSO is counterpart to all balancing trades or the TSO enters into contracts for balancing services, using an administered price for setting imbalance charges and cashing out daily imbalances within a tolerance at an average price.

Settlement is clearly defined, with only limited scope for design choices



- Imbalances are calculated over the period of the day, however, hourly adjustments can be justified. There will need to be a consistent approach across a single zone. LT, LV and EE use daily balancing, and FI is moving from hourly to daily.

Pure Marginal Pricing

For all imbalances, prices relate to the System Marginal Price:

- **If the shipper is short**, they pay the higher of the System average price (SAP) derived from daily trades or the System Marginal Price derived from TSO actions (SMP buy).
- **If the shipper is long**, they are paid the lower of SAP and SMP sell which is derived from the lowest price of any TSO sales.

Adjustments to the 'pure' approach

- The imbalance quantity could take account of a linepack flexibility service, for which a market participant has paid. So rather than the TSO owning the linepack and using it as a 'cushion' before having to take balancing actions, gas shippers are allocated (via a market mechanism) a piece of linepack which effectively creates a tolerance for their imbalances. So if a shipper is short their linepack storage is diminished, but they do not face an imbalance charge.
- The SAP could be adjusted by a small adjustment factor (up to 10%) to make the prices sharper to incentivise balancing.

There are a number of options for a transitional model

Balancing platform

- Where there are concerns that the short-term gas market has insufficient liquidity for the purposes of TSO balancing, then a balancing platform should be established for the purpose of TSO balancing. This could be joint with adjacent balancing zones.
- Where it can be shown that a balancing platform will not lead to efficient balancing by the TSO, then an alternative, such as the procurement of balancing services is possible. This needs to be approved by the NRA.

Interim imbalance charge

- Concerns about liquidity may also lead to the need for an administered imbalance price as a proxy for a market price or a price derived from balancing platform trades.

Tolerances

- Tolerances can be applied in cases where network users do not have sufficient access to liquid short-term markets, information about their inputs and offtakes, or gas required to meet short-term fluctuations in demand or supply.
- They should be applied to shippers' daily imbalance quantity on a non-discriminatory basis, and only to the extent necessary and for a minimum duration required. They should not unduly increase the cost of TSO balancing actions,

A model similar to Ireland could offer a transitional measure for up to 5 years

Per day computation of each shipper's balance

If a shipper is short, it gets charged

If a shipper is long, it gets paid

The charge or payment depends on how much the shipper is in imbalance.

- For imbalances inside of a pre-set tolerance level (the Irish entry tolerance = 1.5%), the prices applied are related to the euro equivalent UK OCM System Average Price.
- For imbalances outside of tolerance prices relate to the UK OCM System Marginal Price Sell Price (SMPsell) or the UK OCM System Marginal Buy Price (SMPbuy):
  - **If the shipper is short**, the higher of 1.05 times SAP and SMPbuy, plus transportation costs is charged.
  - **If the shipper is long**, the lower of 0.95 times SAP and SMPsell, minus transportation costs is paid.

Transitional model

Recommendation: The use of a transitional model will allow the market to get used to the new balancing rules, develop the commercial use of linepack, and allow market liquidity to become established in the new zone which is important for imbalance price formation.

Efficiency	• An effective balancing regime requires cost reflective imbalance prices. An important step in developing these is a liquid market which may take time to develop in the Baltic region. Imbalance prices based on illiquid market prices could send inefficient signals to participants of the value of ensuring their portfolio is in balance, unnecessarily increasing costs, or raising security of supply risks. • It will also take time for a commercial market for linepack flexibility to develop, which is an option that could be implemented. In the absence of this service, it is sensible to implement tolerances where imbalances are only charged at a system average price, in reflection of the limited impact of small imbalances on system security. • A transitional period will also help new entrants to the market get used to the system, by potentially limiting their exposure to risk.
Security of supply	• Cost reflective imbalance prices are important for incentivising security of supply and should be implemented as soon as possible. However, if implemented too early, imbalance prices may not be cost reflective and potentially weaken the incentive for market participants to remain in balance.
Admin/legal burden	• This requires the implementation of a transitional balancing regime, as well as the final regime increasing administration costs. However, an immediate movement to marginal imbalances prices could be unpopular as it will take the market time to get used to the new market signals.
Distributional effects	• Overall the implementation of a transitional period has the potential to transfer risk of imbalances from market participants if the transitional regime limits the cost reflectivity of pricing. TSO balancing costs may be higher as a result, and these additional costs are likely to be socialised across all consumers.

Integrating the East Baltic gas markets requires establishing common rules

TSOs at each Interconnection Point have to establish an **Interconnection Agreement (IA)** that sets out the terms and conditions with respect to:

Rules for flow control	▪ Aligning the flow over IP with the result of the matching process ▪ Agreeing on the role of each TSO in this process
Measurement of gas quality and quantity	▪ Description of the equipment requirements and responsibility over it ▪ The parameters and volumes to be measured, and the allowed measurement error ▪ Calculation of parameters not measured directly ▪ Validation and correction of measurements ▪ Action in case of equipment failure
Matching process	▪ Matching the quantities to network users of the two sides of IP to reach identical quantities ▪ Ensure appropriate data exchange ▪ Agreeing on the role of each TSO ▪ Agreeing on rules for the timing of matching processes
Allocation of gas quantities	▪ Use of an operational balancing account or other rule to ensure that quantities are matched either side of the IP
Communication in exceptional events	▪ Establishing a fast and simultaneous communication procedure ▪ Agreeing on the information to be communicated, e.g., quantity and quality effect and timing
IA processes	▪ Rules for setting of disputes under the IA ▪ Amendment process for the IA

… a template for the Interconnection Agreement has been published by Entsog.

The Network Code also sets out the requirements for units, gas quality and data exchange

Common set of units		▪ Adjacent TSOs must establish details of measurement standards applicable at IPs. ▪ Measurement equipment at an IP shall take into account the technical requirements imposed by national regulation on the adjacent TSO. ▪ TSOs must agree on principles that include the units and measurement standard used and what conversion factors are applied.
Gas quality and odourisation	Measurement principles for gas quality	▪ Gas quality requirements are currently harmonised between Estonia, Latvia and Lithuania, but might need to be further aligned with Finland. ▪ The Network Code sets out that an amount of gas should be expressed in energy units.
Gas quality and odourisation	Managing cross-border trade restrictions due to gas quality and odourisation differences	▪ TSOs shall coordinate to avoid restrictions to trade due to gas quality and odourisation differences. ▪ TSOs can undertake operations to level the quality of gas. This can be done using standard operations such as co-mingling and swapping where TSO mixes two types of gas to achieve desired level of quality. ▪ Differences in odourisation can be addressed via flow commitments or swapping.
Gas quality and odourisation	Monitoring of gas quality	▪ The Wobbe-index and gross calorific value for gas entering the system at each IP must be published hourly on TSOs' websites. ▪ Entsog publishes a long-term outlook for gas quality, identifying any potential new sources of different quality gas.
Data exchange		▪ The Network Code sets out the protocols and data formats to be used ▪ Every TSO has to ensure security and availability of its data system

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The development of Klaipeda provides a model for new LNG in the region

The LNG access pricing to the network is clearly defined by TAR (e.g. postage stamp charge), however there is less guidance on LNG terminal capacity allocation, terminal charges, and cost recovery. The terminal charges are separate to network tariffs and therefore separate from the TSO business.

Capacity allocation

- Network charges for LNG terminals do not have to comply with CAM and CMP, although, this does not prevent their application.
- However, given the terminal is unlikely to be constrained (because entry capacity is sized to maximum daily flow rate) and, the number of participants low, an auction is unlikely to be sensible. Prices should therefore be set at the reserve price.
- The current model at Klaipeda could be applied more widely to any new LNG where capacity is allocated on a first come first serve basis.

Cost recovery and terminal charges

Merchant development

- Under this model the owner of the LNG terminal would sell capacity long-term to finance the investment, and/or set usage charges above the short-run variable costs, to recover the fixed costs of the investment.

Regulated cost recovery

- More regulated approaches could be required, with the Klaipeda model as a potential example.
- Terminal usage charges likely to reflect the short-run variable costs of the terminal, with the fixed costs socialised across all users of the network, based on their peak demand.

A key question will be whether costs are socialised across all countries. This would involve the setting of a **specific charge on the exit tariff applied in each country** designed to recover these costs. This would require the setting up of an inter-TSO transfer scheme. This does not require harmonisation of regulatory regimes, however, it may require a wider regional approval of project costs.

A similar approach based on the socialisation of costs could be adopted for storage

Alternative regulatory/cost recovery models	Assessment of risks for the storage owner
Fully merchant model requires the selling of access rights (usually long-term) at competitive prices to recover the costs of the investment.	The storage owner faces **volume and price risks**. They can adjust prices to maintain volumes but ultimately are exposed to **revenue risk**
Fully regulated (RAB) – charges for the use of storage are set based on recovering the investment costs across estimates of demand for the use of storage.	**This is designed to provide revenue certainty** for the storage owner, by removing volume and price risks. **However,** there is volume risk if charges are sett too high, making the cost of storage uncompetitive against alternatives such as LNG. Falling demand for storage would in turn lead to higher charges, and again falling demand for storage. **This creates revenue risks.**
Hybrid model– an alternative approach is to auction rights for the use of storage competitively, and then socialise the residual cost not recovered across the rest of the market. This is still a RAB based model. **A key question is over what area are the costs socialised? There is a potential concern that Russia does not pay a 'fair' price for its usage.**	In this model the allowed revenue is still based on the RAB, however, **revenue risks are removed**. It ensures the price of storage is determined by the market, while allowing regulation of the asset base to encourage investment/avoid stranding.

Socialising the costs of new and existing LNG and storage

Recommendation: Socialisation of the costs of infrastructure, on the basis of the benefits it provides to the region, may be politically difficult to implement, but it should be more efficient and increase the likelihood projects of benefit to the region can be financed.

Efficiency	▪ Where new and existing infrastructure, such as an LNG terminal or storage facility, is financed by a regulated charge on consumers (for example, the 'hybrid' model we set out storage), it is efficient for consumers who benefit from the increased security of supply and diversification benefits that may result from a supply source, to contribute to the costs of a terminal. ▪ Given the interconnected and likely uncongested nature of the region, all countries are likely to benefit in terms of security of supply from the existing terminal at Klaipeda and possibly a new LNG terminal connecting in Finland or Estonia. Therefore, there is a strong rationale for spreading the cost more widely than the country where the infrastructure is located. This result would apply irrespective of the decision on zonal choice.
Security of supply	▪ There is the potential that new investments will not go ahead potentially not adding to security of supply if the costs of infrastructure are concentrated on a smaller pool of demand.
Admin/legal burden	▪ The political acceptability of paying a charge to support alternative sources of supply in an adjacent country will be difficult where there are separate zones. If there is a single zone, infrastructure charges could still be directed towards one country, however, socialisation more widely may be easier.
Distributional effects	▪ Spreading the cost of an LNG terminal across all countries, will reduce the burden on any single country. ▪ These investments are outside of network issues so TSOs may not be directly affected, although there could be knock-on impacts for flows.

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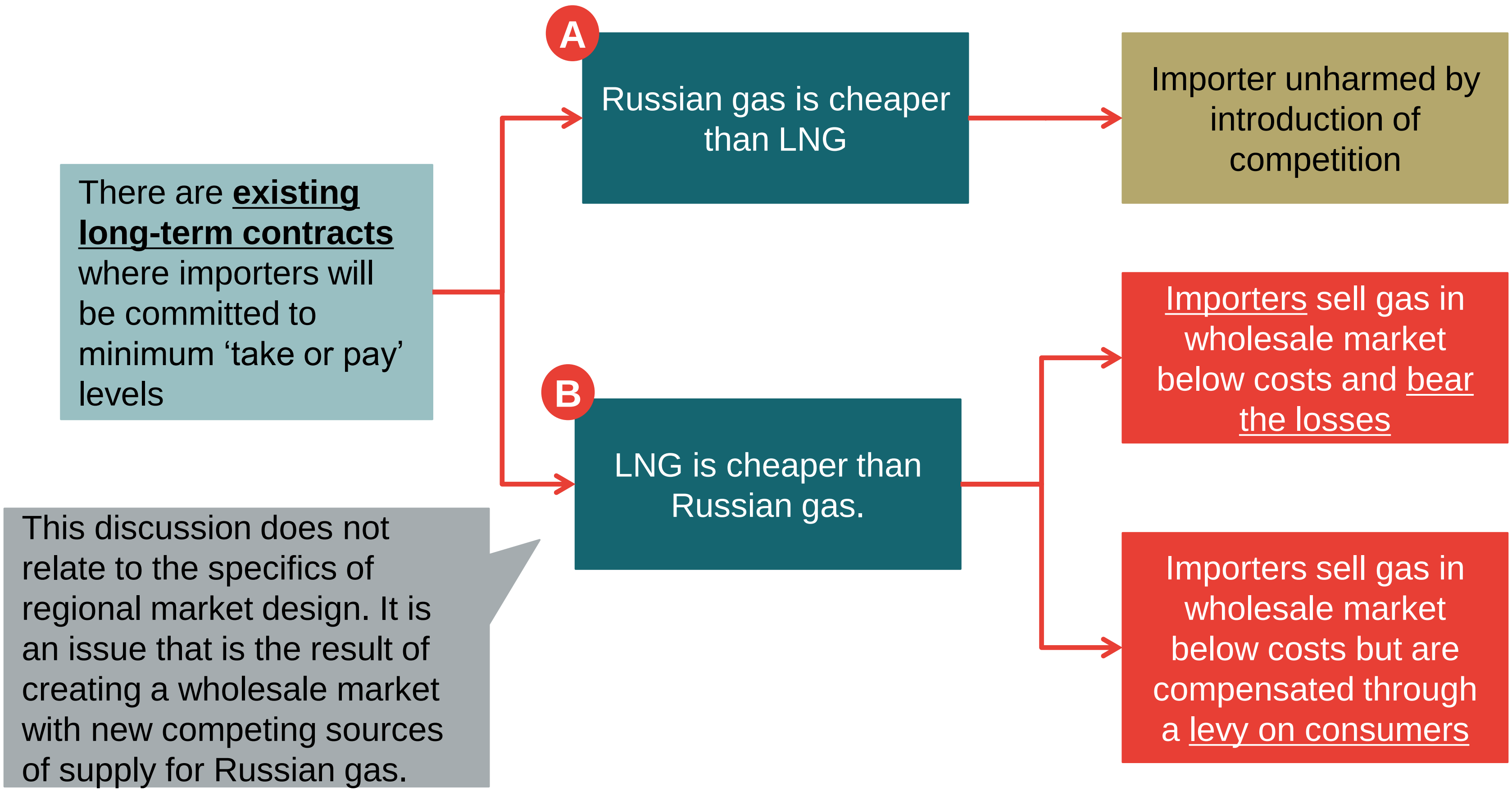
Treatment of long-term contracts

The opening up markets in the East Baltic region to competition through new sources of supply, creates potential risks for the importers of gas from Russia under long-term contracts. Where losses arise there are two potential options.

Scenario



There is precedent in Europe to either compensate for stranded costs or prevent them from being stranded…

- The EC approved, as transitional measures, arrangements to provide for stranded cost compensation in a range of countries in relation to electricity liberalisation.
  - These included Germany, Austria, Spain, the Netherlands, Greece and Italy.
  - Long term purchase contracts were seen as a valid form of stranded cost.
  - To qualify, the contracts "*must consequently become non-economical on account of the effects of [liberalisation Directive] and must significantly affect the competitiveness of the undertaking concerned*"*
  - A reset clause is envisaged as a way to avoid costs: transitional measures should take "*into account the most economic solution (in the absence of any aid) from the point of view of the undertakings concerned. This may involve, among other things, the termination of commitments or guarantees giving rise to stranded costs*"*

Compensate for stranded cost

- The Third Package recognises that access to the system may be refused were it to result in serious economic or financial difficulties with take or pay contracts that were entered into before the process of liberalisation commenced.
- Although this may not work if the importer is unbundled from the network.

Allow diminution of competition to avoid stranded cost

* Commission Communication relating to the methodology for analysing State aid linked to stranded costs

…there are also cases where importers have renegotiated contracts

British Gas in the 1990s

- In the mid-1990s, British Gas, the incumbent gas supplier in Britain, procured gas mostly through a network of contracts, with different particularities but with a common set of characteristics:
  - take or pay conditions
  - fixed price, or a price that is indexed on parameters with no link to the actual value of the product
  - very long term contracts
  - minimal break clauses
- The downstream market was then opened to competition, earlier than anticipated
- British Gas continued to procure its gas through these "take-or-pay" contracts, but new entrants could procure gas more cheaply via the market, leading BG to a competitive disadvantage
- A settlement was reached between British Gas and the producers without legal proceedings being initiated (without this, Centrica would have been in financial difficulties). Between late 1996 and October 1999, Centrica renegotiated 20 deals with third parties*

* The renegotiations involved up front payments for price reductions. Payments totalled £1.2bn (Ofgem, 1999)

Recommendations for building a GTM in the East Baltic Region (1)

Here we return the "building blocks" of the GTM which we set out at the start of the report and summarise our main recommendations for developing the regional market.

1 Size of entry-exit zone	With regard to **zone design**, we conclude that on the basis of overall welfare for the region, a **single zone** including all four countries is likely to bring benefits. ▪ Significant congestion in the region is unlikely, and as such, the principal benefit from merging zones relates to an efficiency gain related to the removal of IP tariffs. Removing IP tariffs allow spare capacity on interconnectors to be used more efficiently, supporting liquidity and reducing the cost of meeting the region's overall demand. ▪ If congestion were to materialise, then consideration of potentially larger liquidity benefits and offsetting inefficiencies need to be considered. For the Baltics, we conclude these benefits are still more likely to outweigh the costs. There are important **distributional impacts** to consider from a single zone, particularly in relation to TSO revenues that will need to be managed in developing the single zone.
2 Access to entry-exit capacity	▪ For **access tariffs** we have recommended **postage stamp** pricing, and high short-term multipliers. And through this tariff regime there are ways to mitigate the distributional impacts on TSO revenues. We recommend **harmonised entry tariffs with nationally determined exit charges** to mitigate distributional impacts on TSOs while maintaining efficient entry signals. ▪ Adjusting the entry:exit split could also be a useful lever in mitigating small distributional impacts. ▪ However, the final methodology and approach will need to be considered and **set by NRAs once the Tariff Network Code is finalised**.
3 Cross-border access	▪ There is a clear design of **capacity allocation** via auctions and **congestion management procedures** set out which will need to be implemented. Given our recommended approach of a single zone, these will only need to be applied over GIPL.

Recommendations for building a GTM for East Baltic Region (2)

4	Market liquidity	▪ Given the existence of two trading platforms within the region, these could form the market places for the virtual hub in the single zone. ▪ We identify a range of outcomes for how the **hub structure** could develop, but recognise that the most likely outcome will be the existence of a single trading platform. ▪ A single trading platform will hold a monopoly position, so some form of **regulation** will be required to mitigate against market power.
5	Balancing and settlement	▪ To pursue a full market merger a **'market area manager'** will need to be established as a to manage balancing and settlement. This could be a new company jointly owned by the TSOs, or an existing TSO could assume this role for the region. ▪ A **balancing regime** requires TSO trades on a transparent platform, with imbalance prices reflective of marginal costs faced by the TSO. ▪ We recommend a **transitional model**, e.g. administered prices or tolerances for imbalances within a certain band, to allow the market to get used to the new rules and develop liquidity.
6	Interoperability	▪ Countries will need to **develop common rules**, and these will need to be coordinated with Baltic states as well as with Poland.
7	Access to LNG and storage	▪ We have set out 'hybrid' models for regulating storage and LNG, and recommend **socialising the cost** of these investments (new and existing) over the wider region depending on the benefits they provide.
8	Long-term contracts	▪ Existing long-term contracts could face losses in a scenario with cheap LNG. These losses could either be borne by importers of placed on consumers via retail levy. There is precedent in the EU for compensation and leaving importers to renegotiate.

Next steps towards forming a single market zone in the Baltics

In this final section of the report we consider the following:

1 Roadmap	▪ We set out the steps that need to be taken to implement the single zone, including roles and responsibilities for those roles, and highlighting any key decisions regarding sequencing.
2 Harmonisation issues	▪ Through the discussion of the Roadmap harmonisation issues are identified. We summarise the key aspects of harmonisation related to the building blocks e.g. regulatory/legal/institutional.
3 Infrastructure recommendations	▪ On the basis of our flow simulations we consider the implications for infrastructure investment in the region.

An overarching legal and regulatory framework for a market zone…

The typical overarching legal framework for an energy market comprises three main components: legislation, regulatory regime, and the market rules for trading. By considering each of these we can identify the steps that need to be taken in relation to each to move towards the recommended market model.

Legislation	▪ It provides the legal framework for the market, in particular sets out the roles and responsibilities of the key market participants and institutions – a key one being the NRA. ▪ There is a question as to the degree of harmonisation required in legislation across each of the countries merging zones. This will likely depend on the level of harmonisation in activities by the NRAs. National specifics can remain, as long as the institutions which are required to support the operation of the single zone have their roles and responsibilities set out.
Regulatory system (based on licenses)	▪ The licensable parties and their activities will need to be defined by legislation, and may need to be updated when moving to a single zone. These licenses tell the parties what they can and can't do, which can have broader aspects to them (e.g. accounting and network regulation) which are not harmonised.
Market rules (network code)	▪ The *network codes* are the main basis for setting out the market rules which market participants have to follow, including access to the network, balancing and trading. **The rules are the most important part to harmonise across the countries in the zone.** ▪ The codes comprise a legal and contractual framework to supply and transport of gas. They are a common set of rules for all industry participants. ▪ The authority of the code is provided for by legislation, and enforced by the regulator. ▪ All licensees, including shippers, network owners must sign up to the code.

…with market rules in place zone can begin to function

We consider the main market rules with respect to the roadmap towards a single zone

In the main part of the report we have set out high-level recommendations for the key building blocks of a new market design which are largely guided by network codes. Here we return to some of the main issues covered by network codes and set out the issues/questions that need to be considered on the path to implementing a single zone.

Zone design	Transition to a single zone	Should countries move straight to a single zone, or set up national e-e zones first?
Balancing	Define institutional arrangements for TSO cooperation	How should TSOs cooperate across borders to balance the system?
	Define balancing and settlement regime	The network code needs to establish design of transitional and enduring balancing regime and formation of *virtual trading point*.
Tariff design	Tariff regime and socialisation of infrastructure	The design of a tariff regime needs to be agreed, taking into consideration the socialisation of infrastructure costs.
	Setting of allowed revenues and calculation of tariffs	Coordination required between NRAs in setting tariffs consistent with agreed model, and development of inter-TSO scheme.
Capacity allocation	Design of GIPL capacity auction/UIOLI arrangements	Auctions and UIOLI arrangements over GIPL will need to be coordinated with Polish NRA.

We consider each in more detail in the following slides, in particular what needs to be implemented, and what are, if any, the regulatory and legislative requirements.

The exact nature of changes will depend on whether the region moves straight to a single zone…

The countries in the region have a choice whether to complete the formation of national e-e zones i.e. in Latvia, Estonia and Finland, or move straight to a single zone. Here we set out the pros and cons for consideration

Benefits of completing the switch to national e-e zones first

- This could be achieved more quickly than developing a single zone, bringing the benefits of trading and competition more quickly to the region.
- Finland has already begun the process of creating an e-e zone, and, it is still unknown whether the Balticconnector will be built. The case for completing the national e-e zone first in Finland is therefore stronger than in the other countries. They could join the single zone later if the Balticconnector is built.

Costs of completing the switch to national e-e zones first

- There is a greater period of instability, as movement to a single zone will be delayed by the need to implement national e-e zones first, with an evaluation of their performance.
- There is an increase in administration costs due to converting to national zones then on to a single zone e.g. CAM auctions must be designed for all IPs, and then removed for all except GIPL.
- There are a greater number of winners and losers – those first from conversion to national e-e zones, and then a new set of winners and losers when a single zone is formed.

- The choice ultimately comes down to how firm the decision to move to a single zone is in the region. If it is widely agreed this is the end destination, then costs can be minimised by bypassing the conversion of Latvia and Estonia to national entry exit zones.
- This decision is less clear for Finland given the uncertainty around the construction of the Balticconnector. Given this uncertainty, it is sensible to complete the creation of the national entry-exit zone.

…if wide agreement on a single zone, least cost path is to move straight there

The network code forms the basis on which the single zone can operate…

Prior to implementation of network code legislators will need to establish in law the ability of the TSOs to establish a 'market area manager', as part of fulfilling their balancing obligations. In setting up the market area manager, the TSOs will need to either create a joint-owned company, or nominate an existing TSO to take the role.

Balancing code triggers trading within the zone…

- The network code creates a system of daily balancing across the whole zone, where all shippers nominate their entry and exit flows on a daily basis.
- Establishment of the 'virtual trading point' (VTP) does not set up the platforms or the contracts on which trades take place, however, it defines the area over which participants will face imbalance charges, and hence the basis on which trades are made.
- The network code creates system of daily balancing and therefore the need for a short-term traded market. And, from this market liquidity can develop for contracts traded at the VTP.

…it is likely to require a single balancing network code to be adopted across all countries in zone

- A single network code is important to create a fully merged trading and balancing zone. This will need to be consistent with the EU network codes.
- Alongside, a governance process would need to be established for updating the code i.e. an inter-NRA coordination process.
- An approach could be to implement an *amended* Lithuanian network code. This code already exists and could be updated to suit the needs of the whole zone. This approach was adopted in the UK when Scotland adopted amended English and Welsh codes when their electricity markets formed a single zone in 2005.
- It would in theory be possible for each country to have their own version of the code for the single region, as long as there was a high degree of consistency, which would need to be maintained overtime via a regional governance process. This is likely to raise administration costs and risks for market participants.
- If separate network codes were kept in each country, and large differences remained, then this is likely to lead to a situation of a "trading region" where there are separate balancing zones within the single zones as opposed to a single harmonised balancing zone.

A consistent approach to entry and exit tariffs needs to be adopted in each country zone

Regulators will need to adopt the agreed tariff policy for the region, ideally introduced alongside the balancing code. In this report we have set out high-level recommendations for tariff policy, however, final methodology and approach will need to be considered and set by NRAs once Tariff Code is finalised.

Timing

- Entry and exit charges must be approved by regulators in each country. So once the network code is in place, and the zone begins to operate, it is the responsibility of each NRA to implement the charging methodology into the country's tariff code[1].
- In theory, single zone could operate using existing tariff methodologies for a transitional period, with only the removal of IP tariffs.
- However, in practice the calculation of tariffs based on old methodologies may be difficult because necessary flow information for their estimation may not be readily available in a single zone i.e. specific flow path information is no longer needed once the zone is formed.
- Therefore, there are good practical reasons for simultaneous introduction of the balancing code and new tariff methodologies.

Process

- Introduction requires an agreement to be made between NRAs on a consistent approach. This could be on a voluntary basis, or set in legislation to bind NRAs e.g. each country amends legislation so that NRAs are required to set entry charges in line with the agreed zonal tariff model.
- Each country TSO needs to set reference prices based on the agreed approach to tariffs, followed by the product terms, estimates of capacity bookings, and tariffs set.
- Given the recommended approach to tariffs, a high degree of harmonisation of network regulation is not required. However, there may still be a need for some inter-TSO transfers to address impacts on the charging base for different TSOs as a result of changes in flows in the single zone.

[1]The tariff code could be a separate document or it could be incorporated into the network code.

Lithuania will need to lead the development of allocation processes over GIPL with Poland

The regulators in Lithuania and Poland will need to cooperate to establish auctions consistent with CAM and CMP processes over GIPL

IP tariffs

- Auctions and UIOLI arrangements that are consistent with CAM/CMP will need to be designed for the only IP with another EU country (GIPL).
- Entry/exit revenues will be received in Lithuania so a bilateral agreement between Lithuania and Poland needs to be secured e.g. with regard to revenue sharing from the auction of bundled products.
- Need to define bi-directional capacity quantities, develop standard bundled products to be offered on annual, quarterly, monthly, daily and within-day auctions.

Roles and responsibilities

Legislators

Finland should continue with the implementation of the entry-exit zone if uncertainty remains over BC.

In other Baltic States, legislation will need to be amended so that:

- NRAs are obligated to coordinate in management of the zone and develop balancing and tariff policy.
- There is an option to implement a 'market area manager' that is obligated to balance and settle the zone.
- TSOs will be obligated to implement the codes.
- Market participants are obligated to adhere to the codes.

NRAs

Establishment of NRA coordination group for single zone development.

- Rules governing operation of 'market area manager', any necessary amendments to existing TSO licenses, as well as providing on-going oversight of regional balancing.
- They must approve the network codes, and provide overall governance for any updates to codes.
- Establishment of rules for inter-TSO compensation in relation to any requirement to redistribute tariff revenue.

Each NRA will need to define allowed revenue (though given revenue model, not changed particularly from now)

Lithuanian engagement with Poland to establish CAM/CMP mechanisms over GIPL.

Once the zone has commenced operation, NRAs will need to monitor the market and coordinate with financial regulators. This includes both potential regulation of market trading platforms, and market participants e.g. through REMIT.

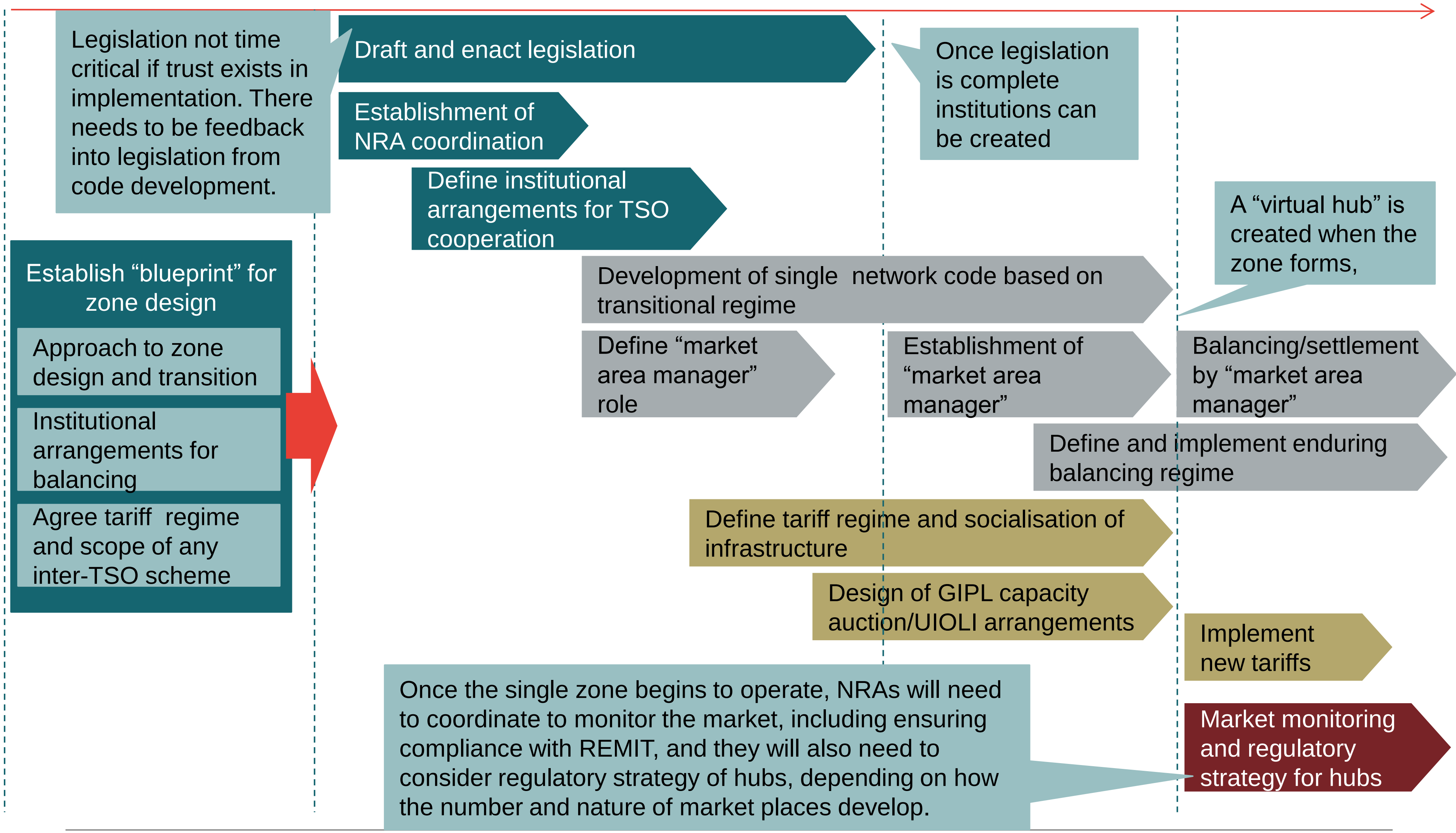
TSOs

- Work with NRAs to establish if creation of the 'market area manager' is the most effective way of meeting obligations to balance the zone.
- If required, create 'market area manager' as a joint owned company, or nominate existing TSO.
- Drafting of network codes.
- Implementation of network code.
  - New process and systems to implement e.g. settlement systems
  - Shipper engagement on design of the code.
- Implementation of tariff policy as directed by the NRAs.
- Implement auction on GIPL.

On the next slide we consider the timeline for key activities, though we can only lay out the process and likely ordering. A more detailed timeline will depend on how countries decide to cooperate and who needs to be consulted at each stage. These slides can start to facilitate the discussion of designing that process.

Indicative timeline for creation of a single zone

Here we have set out an indicative sequencing of things that need to take place before a single zone begins operating and key points afterwards. This is based on the roles identified in the previous slide. This would change if countries all chose to set up national e-e zones first, and then merged zones.



Harmonisation issues from recommended model are likely to be limited

Gas market legal frameworks

- Significant harmonisation of legislation is not required. Overall legal framework constrained by requirements of EU Third Package.
- We have identified through the discussion of the Roadmap the key areas of legislation that require harmonisation. Principally it is about the creation of potential new institutions (e.g. a market area manager) and consistent definition of market roles for NRAs and TSOs.

Regulatory frameworks

- Harmonisation of regulatory frameworks would be desirable (necessary), if fully harmonised entry and exit tariffs were chosen e.g. in relation to existing and new infrastructure or cost approvals.
- However, since a tariff model based on collecting revenues nationally is recommended for a single zone this is less critical.
- Though some harmonisation will be required given some shared costs (e.g. congestion management) and some need for inter-TSO transfers, which need to be allocated.

Market and access rules

- Within a single zone, with fully harmonised balancing, harmonisation of market rules (market timelines, nomination, balancing and settlement rules) will be difficult to avoid.
- These will be defined by the establishment of a single balancing code.
- Harmonisation of access rules is a function of the choice of tariff model. NRAs will need to apply consistent tariff policy.

Institutions and IT platforms

- Key institutions (TSO, NRA) likely to remain national, though a harmonised approach to balancing may require a system of greater cooperation e.g. an overarching TSO body. The most significant need for new IT systems will be for the market area manager to handle balancing and settlement e.g. (e.g. nominations, settlement).
- TSOs will also need to collect data and calculate tariffs which will require new systems and processes for establishing these.

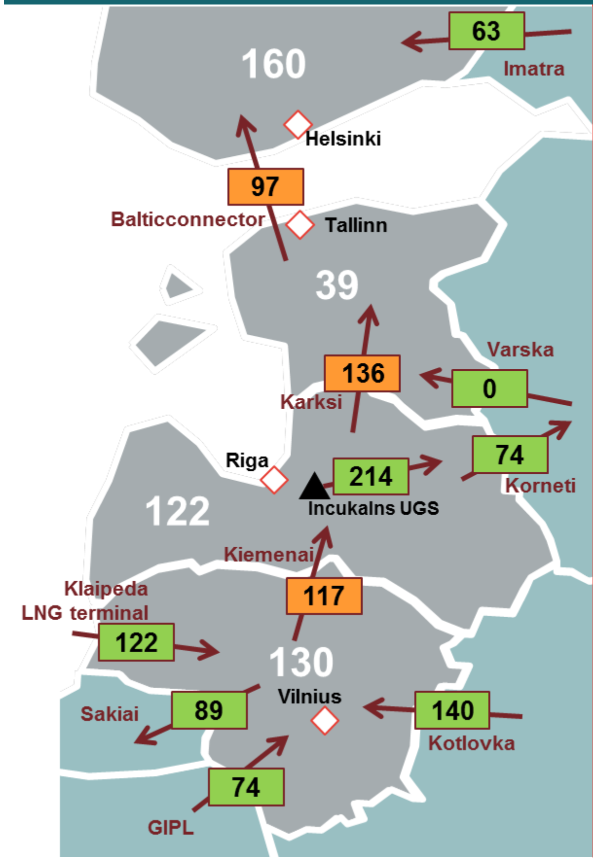
Given nationally based tariffs remove the need for significant regulatory harmonisation, the most important issue is likely to relate to the degree of harmonisation required for balancing...

Infrastructure recommendations – Balticconnector/Karksi

There is a limited amount that can be said from the simplified modelling of the region included in this report. From a pure market perspective the case for new infrastructure is reasonably weak given low levels of congestion expected, however this does not take into account other considerations such as security of supply.

Unconstrained scenario E (winter):

LNG cheap, inflows from GIPL, Base case + Balticconnector



- The Balticconnector (BC), if built, would connect two markets between which there is currently no flow, and on the basis of modelling we have undertaken, it could be used to displace Russian flows into Finland over Imatra when LNG is cheap. The proposed expansion at Karksi would also facilitate these flows. This was particularly evident in scenario E from the flow simulations. In addition, the enhancement of capacity on Latvia – Lithuania border would further alleviate congestion.
- However, as described earlier in the report, these scenarios where LNG is cheap are most likely to be transient in nature, suggesting market revenues for BC will also be transient as well.
- **So while the pure market case is not likely to be strong, there are other potential benefits which could form the key drivers of an investment case.**
- *First*, security of supply could be enhanced since it provides the option of an alternative source of gas to Russia in Finland, and similarly provides an additional source of gas to Estonia from Finland.
- *Second*, if the terms of the Russian supplies to Finland and Estonia were significantly different, it would allow competition between different contracts for Russian gas. This could include optimisation of:
  - geographical differences in prices (to the extent they remain);
  - or take or pay levels across the region e.g. without the Balticconnector, take or pay levels in the Finnish import contract would need to be met by use in Finland. With the Balticconnector, these could be met through demand across the Baltic.

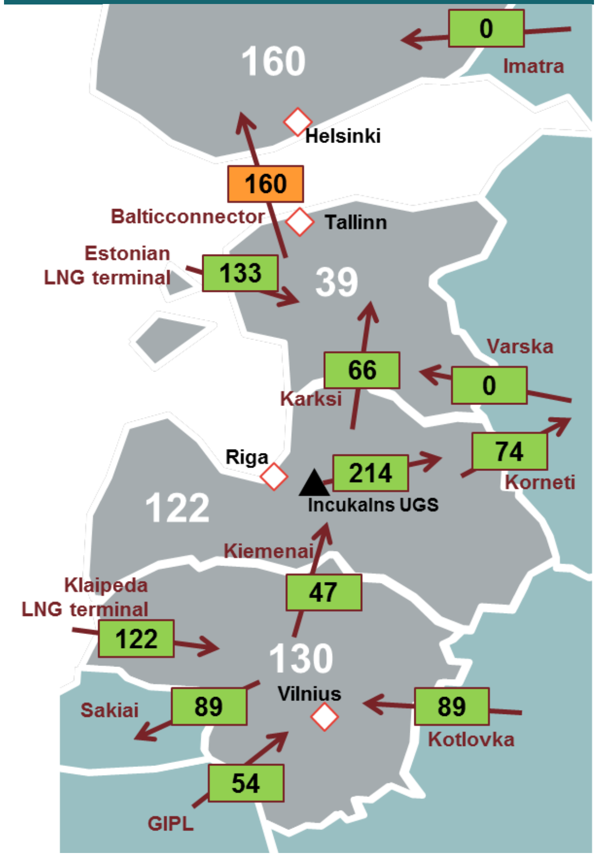
Note – there could also be a case for further investment in Incukalns, however, our flow simulations assume fixed flows in our and out of storage. We therefore cannot comment on future potential upgrades.

Infrastructure recommendations – Estonian LNG

Again, the pure market case for building a new LNG terminal in Estonia is likely to be weak. However, it could enhance security of supply since it creates the potential to supply the whole region without Russian gas, and reduce flows (and hence congestion) from Lithuania to Finland when LNG is cheap. It should be compared to alternative network reinforcements which could be more economic.

Unconstrained scenario H:

LNG cheap, inflows from GIPL, Base case + Balticconnector + Estonian LNG



- In our flow simulations we have considered scenarios where Estonian LNG is built in addition to the Balticconnector (BC). This creates the potential to supply the whole region using LNG, GIPL inflows and storage outflows. This reduces to need for any Russian gas to supply the region, with the only inflows on a transit basis to Kaliningrad.
- The inflow of LNG into Estonia also reduces flows from Lithuania to Estonia when LNG is cheap (as is the case in scenario E), and hence reduces congestion.
- As noted on the previous slide, these scenarios where LNG is cheap are likely to be transient in nature, and Russia is unlikely to tolerate a situation with very low gas flows to the region, so in the same way as for BC, the pure market case for a new LNG terminal is likely to be low.
- Regional security of supply could be enhanced by a new terminal by providing an additional source of LNG to the region, which enables to region to continue without Russian gas.
- However, this investment should be compared against alternative investments in network reinforcements further south in the region between Estonia and Latvia, and between Latvia and Lithuania. Also, if capacities of interconnections are enhanced because of other reasons (e.g. security of supply), it should be taken into account. This will allow more LNG and GIPL flows to move north in the region, and would avoid the risk of significant spare LNG capacity in the region.

- Executive summary
- Introduction
- Regional model development
  - Approach to market design development
  - Market design requirements
- Summary and recommendations
- Roadmap and harmonisation issues
- Annexes

Annex A: Flow simulations

1. Assumptions

Commodity merit order	Infrastructure	Demand + storage
▪ **LNG high** – expensive LNG and flows from GIPL close to zero ▪ **LNG low, GIPL inflows** – LNG is cheap and Polish gas is competitive ▪ **LNG low, GIPL outflows** – LNG is cheap and can be exported from the Baltics	▪ Infrastructure scenarios developed by agreeing on the most plausible options for year 2030 with the TSOs ▪ Only infrastructure that has the potential for having a significant effect on cross-border flows and congestion is considered	▪ **National demand** is assumed to be constant and based on TSO's projections for 2030 ▪ **Storage inflows and outflows and demand for exports to Russia** is assumed to be constant at the current levels

	Commodity merit order	Infrastructure
A	LNG high	Base case (with GIPL and Incukalns upgrades)
B	LNG low – GIPL inflows	Base case (with GIPL and Incukalns upgrades)
C	LNG low – GIPL outflows	Base case (with GIPL and Incukalns upgrades)
D	LNG high	Base + Balticconnector
E	LNG low – GIPL inflows	Base + Balticconnector
F	LNG low – GIPL outflows	Base + Balticconnector
G	LNG high	Base + Balticconnector + Estonian LNG
H	LNG low – GIPL inflows	Base + Balticconnector + Estonian LNG
I	LNG low – GIPL outflows	Base + Balticconnector + Estonian LNG

Each scenario is modelled for **3 representative days**

- 14-day winter peak average with outflows from Incukalns
- End of heating season day with low flows from Incukalns
- Typical summer day with inflows to Incukalns

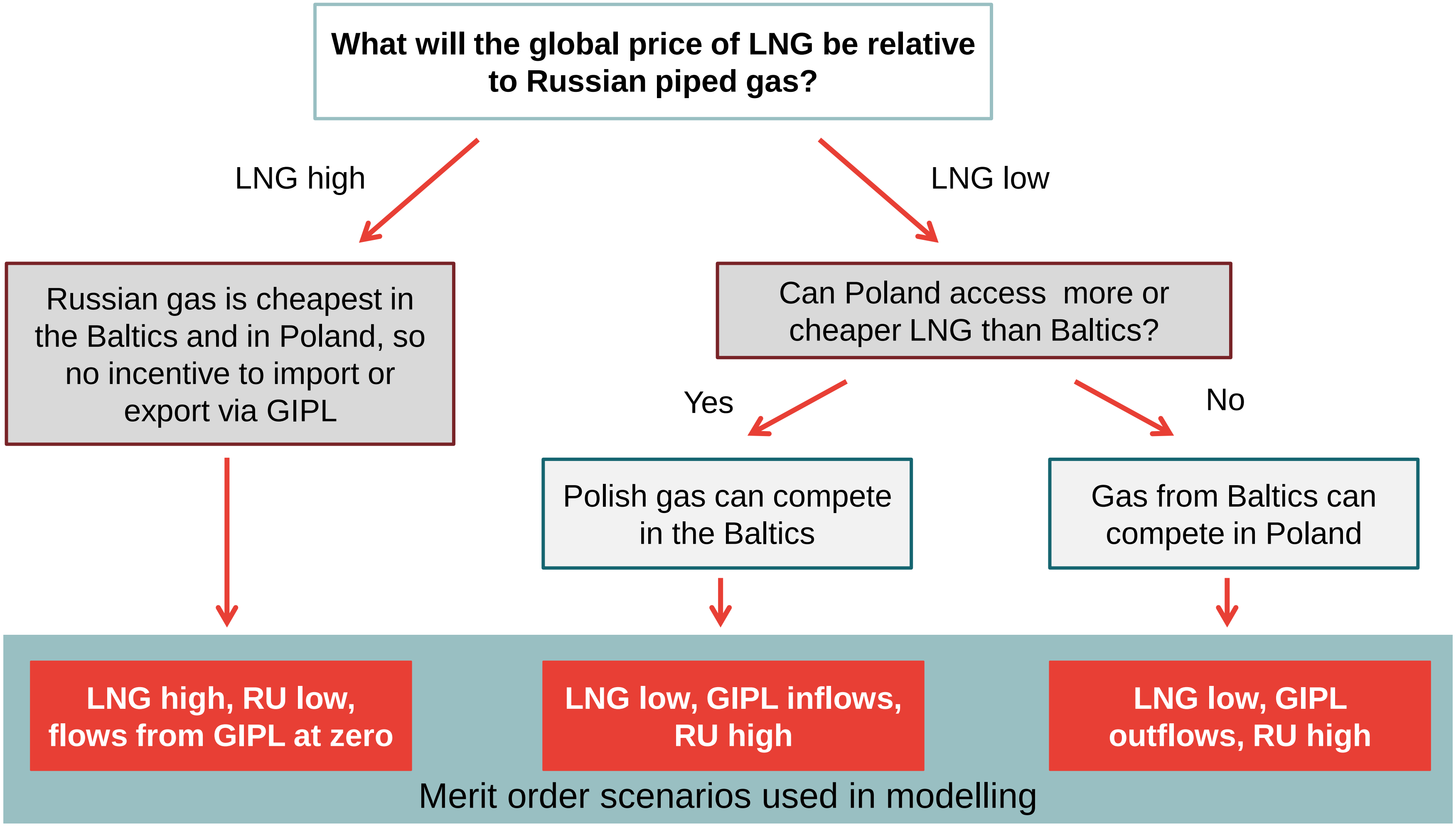
[See Annex A.4 for actual assumptions]

N.B. In actual fact, the Incukalns upgrades do not affect the results since the assumed storage flows do not exceed current capacity.

Annex A: Flow simulations

1. Assumptions

The commodity merit order assumptions are derived going through the following thought process on plausible scenarios.



Annex A: Flow simulations

2. Modelling unconstrained flows

In each scenario, gas flows are modelled by following a set of rules based on the merit order

LNG

- Flows from LNG sources are set to minimum required capacity if LNG is expensive
- Set to maximum capacity if LNG is cheap

GIPL

- Flows from GIPL are set to zero when LNG is expensive
- Set to maximum capacity in the direction PL -> LI in the scenarios with cheap LNG and GIPL inflows (Polish gas is competitive in the Baltics)
- Set to maximum capacity in the direction LI -> PL in the scenarios with cheap LNG and GIPL outflows (Baltic gas is competitive in Poland)

Russian piped gas

- In the winter days, gas flows into Varska are set to zero because Russia is not expected to export gas from the North-East regions
- In the winter days, gas flows from Korneti are set equal to the assumed demand from Russia.
- In the scenarios where Balticconnector is not built, demand in Finland is met through Russian gas.
- After applying the rules above, the remaining entry/exit points from Russia are used to meet the residual demand in the Baltics. Flows at each entry/exit point are calculated to be proportional to the national demand for consumption (incl. storage) in that country.
- On a summer day, it is assumed that there is a minimum import level required from Russia within take-or-pay contracts, 40% of demand. Proportional imports from Russia are adjusted so that each country meets its take-or-pay level.

If supply exceeds demand after the application of these rules then:

- If LNG is expensive, keep LNG at minimum and GIPL at zero. Scale down Russian imports.
- If LNG is cheap and GIPL flowing into Baltics, keep Russian imports at their minimum level. Reduce the inflows from GIPL. If GIPL is set to zero and there is still excess supply, scale down LNG imports proportionally to each terminal’s capacity
- If LNG is cheap and GIPL flowing out of Baltics, keep LNG at maximum and GIPL at maximum outflow and scale down Russian imports.

Annex A: Flow simulations

3. Modelling constrained flows

- In a world of separate zones, the calculated unconstrained flows are not feasible. Cross-border flows need to be limited to the capacity of the interconnection points.
- We developed an optimisation program in Excel that constrained the flows

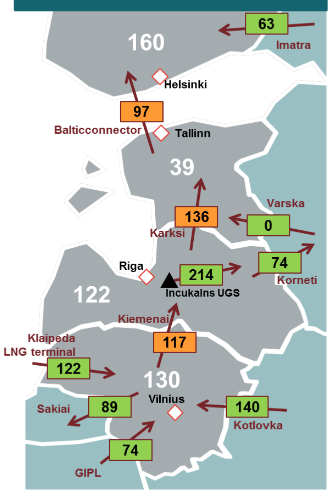
The linear program takes the following steps in order to constrain the gas flows:

1. Take the results of flows developed in the previous section
2. Apply a strict constraint that the flow through each IP is limited to its capacity
3. Within each country, demand and supply is balanced:
   - If supply exceeds demand, the supply from the most expensive gas source is reduced
   - If demand exceeds supply, the supply from the cheapest gas source (or from the only alternative available) is increased
   - This is done following the merit order and the rules for unconstrained flows

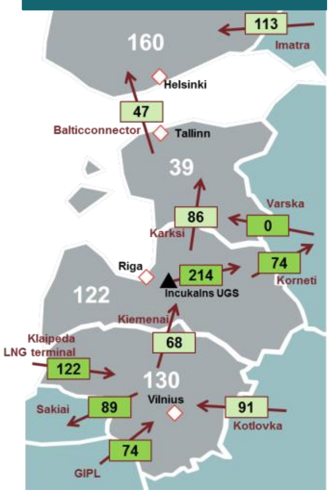
Example: scenario E (LNG cheap, GIPL inflows + Balticconnector built)

- Unconstrained scenario E is developed with a large quantity of gas flowing into Lithuania from cheap LNG and GIPL, resulting with congestion going from South to North
- The flows are then constrained to IP capacity, resulting in fewer Russian imports in Lithuania (reduced supply from an expensive source) and more Russian imports in Finland (increased supply from the only alternative source)

Unconstrained scenario E



Constrained scenario E



Note: These flows refer to the 14-day winter peak average, all flows in GWh/day

Annex A: Flow simulations

4. Results – **unconstrained flows**

Day	Scenario	Klaipeda LNG	GIPL PL -> LT	GIPL LT -> PL	Paldiski LNG	Piped gas at Kotlovka (LT) excluding	Piped gas at Korneti (LV) LV -> RU	Piped gas at Korneti (LV) RU -> LV	Piped gas at Varska (EE)	Piped gas at Imatra (FI)	Balticconnector EE -> FI	Balticconnector FI -> EE	Karksi LV -> EE	Karksi EE -> LV	Kiemenai LT -> LV	Kiemenai LV -> LT	Storage extraction	Storage injection	Consumption in LT	Consumption in LV	Consumption in EE	Consumption in FI	Transit to Kaliningrad	Consumption in Russia (via Korneti)
		Flows at entry/exit points															**Demand assumptions**							
Day 1: 14-day peak average with high outflows from Incukalns	A	16.52	0.00	0.00	0.00	133.88	73.50	0.00	0.00	159.34	0.00	0.00	39.62	0.00	20.69	0.00	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	B	122.10	28.29	0.00	0.00	0.00	73.50	0.00	0.00	159.34	0.00	0.00	39.62	0.00	20.69	0.00	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	C	122.10	0.00	51.07	0.00	79.36	73.50	0.00	0.00	159.34	0.00	0.00	39.62	0.00	20.69	0.00	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	D	16.52	0.00	0.00	0.00	131.57	73.50	0.00	0.00	161.64	0.00	2.30	37.32	0.00	18.39	0.00	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	E	122.10	73.92	0.00	0.00	51.03	73.50	0.00	0.00	62.69	96.65	0.00	136.28	0.00	117.35	0.00	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	F	122.10	0.00	51.07	0.00	107.11	73.50	0.00	0.00	131.59	27.75	0.00	67.37	0.00	48.44	0.00	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	G	16.52	0.00	0.00	1.78	130.78	73.50	0.00	0.00	160.66	0.00	1.32	36.53	0.00	17.59	0.00	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	H	122.10	54.43	0.00	133.20	0.00	73.50	0.00	0.00	0.00	159.34	0.00	65.77	0.00	46.83	0.00	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	I	122.10	0.00	51.07	133.20	47.34	73.50	0.00	0.00	58.16	101.18	0.00	7.60	0.00	0.00	11.33	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
Day 2: End of heating season with low flows from Incukalns	A	16.52	0.00	0.00	0.00	90.97	36.75	0.00	0.00	136.50	0.00	0.00	24.05	0.00	7.29	0.00	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	B	107.49	0.00	0.00	0.00	0.00	36.75	0.00	0.00	136.50	0.00	0.00	24.05	0.00	7.29	0.00	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	C	122.10	0.00	51.07	0.00	36.46	36.75	0.00	0.00	136.50	0.00	0.00	24.05	0.00	7.29	0.00	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	D	16.52	0.00	0.00	0.00	96.29	36.75	0.00	0.00	131.18	5.32	0.00	29.37	0.00	12.61	0.00	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	E	122.10	73.92	0.00	0.00	20.31	36.75	0.00	0.00	27.66	108.84	0.00	132.88	0.00	116.13	0.00	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	F	122.10	0.00	51.07	0.00	73.22	36.75	0.00	0.00	99.74	36.76	0.00	60.81	0.00	44.05	0.00	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	G	16.52	0.00	0.00	1.78	95.54	36.75	0.00	0.00	130.16	6.35	0.00	28.62	0.00	11.86	0.00	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	H	116.69	0.00	0.00	127.30	0.00	36.75	0.00	0.00	0.00	136.50	0.00	33.25	0.00	16.49	0.00	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	I	122.10	0.00	51.07	133.20	16.83	36.75	0.00	0.00	22.93	113.57	0.00	4.42	0.00	0.00	12.34	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
Day 3: Typical summer day with inflows to Incukalns	A	16.52	0.00	0.00	0.00	68.17	0.00	149.85	5.94	50.84	0.00	0.00	0.44	0.00	11.49	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	B	122.10	73.92	0.00	0.00	13.53	0.00	29.75	1.18	50.84	0.00	0.00	5.20	0.00	136.35	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	C	122.10	0.00	51.07	0.00	51.58	0.00	113.38	4.49	50.84	0.00	0.00	1.88	0.00	49.41	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	D	16.52	0.00	0.00	0.00	69.05	0.00	151.78	6.02	47.96	2.88	0.00	3.24	0.00	12.37	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	E	122.10	73.92	0.00	0.00	23.95	0.00	52.64	2.09	16.63	34.21	0.00	38.50	0.00	146.77	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	F	122.10	0.00	51.07	0.00	55.35	0.00	121.67	4.82	38.44	12.40	0.00	13.95	0.00	53.18	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	G	16.52	0.00	0.00	1.78	68.60	0.00	150.80	5.98	47.65	3.19	0.00	1.82	0.00	11.92	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	H	109.56	0.00	0.00	119.52	29.28	0.00	10.08	2.55	20.34	30.50	0.00	0.00	85.19	65.64	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	I	122.10	0.00	51.07	133.20	21.88	0.00	48.10	1.91	15.20	35.64	0.00	0.00	93.09	19.71	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00

Note: congestion is highlighted in orange

Annex A: Flow simulations

4. Results – **constrained flows**

Day	Scenario	Klaipeda LNG	GIPL PL -> LT	GIPL LT -> PL	Paldiski LNG	Piped gas at Kotlovka (LT) excluding	Piped gas at Korneti (LV) LV -> RU	Piped gas at Korneti (LV) RU -> LV	Piped gas at Varska (EE)	Piped gas at Imatra (FI)	Balticconnector EE -> FI	Balticconnector FI -> EE	Karksi LV -> EE	Karksi EE -> LV	Kiemenai LT -> LV	Kiemenai LV -> LT	Storage extraction	Storage injection	Consumption in LT	Consumption in LV	Consumption in EE	Consumption in FI	Transit to Kaliningrad	Consumption in Russia (via Korneti)
		Flows at entry/exit points															**Demand assumptions**							
Day 1: 14-day peak average with high outflows from Incukalns	**A**	16.52	0.00	0.00	0.00	133.88	73.50	0.00	0.00	159.34	0.00	0.00	39.62	0.00	20.69	0.00	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	B	122.10	28.29	0.00	0.00	0.00	73.50	0.00	0.00	159.34	0.00	0.00	39.62	0.00	20.69	0.00	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	C	122.10	0.00	51.07	0.00	79.36	73.50	0.00	0.00	159.34	0.00	0.00	39.62	0.00	20.69	0.00	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	D	16.52	0.00	0.00	0.00	131.22	73.50	0.00	0.00	162.00	0.00	2.66	36.96	0.00	18.03	0.00	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	E	122.10	73.92	0.00	0.00	1.07	73.50	0.00	0.00	112.64	46.70	0.00	86.32	0.00	67.39	0.00	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	F	122.10	0.00	51.07	0.00	106.04	73.50	0.00	0.00	132.66	26.68	0.00	66.30	0.00	47.37	0.00	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	G	16.52	0.00	0.00	1.78	130.42	73.50	0.00	0.00	161.02	0.00	1.68	36.17	0.00	17.24	0.00	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	H	112.97	0.00	0.00	123.24	0.00	73.50	0.00	0.00	73.53	85.82	0.00	2.20	0.00	0.00	16.73	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
	I	122.10	0.00	51.07	133.20	31.98	73.50	0.00	0.00	73.53	85.82	0.00	0.00	7.76	0.00	26.69	214.23	0.00	129.70	121.80	39.62	159.34	88.80	73.50
Day 2: End of heating season with low flows from Incukalns	**A**	16.52	0.00	0.00	0.00	90.97	36.75	0.00	0.00	136.50	0.00	0.00	24.05	0.00	7.29	0.00	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	B	107.49	0.00	0.00	0.00	0.00	36.75	0.00	0.00	136.50	0.00	0.00	24.05	0.00	7.29	0.00	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	C	122.10	0.00	51.07	0.00	36.46	36.75	0.00	0.00	136.50	0.00	0.00	24.05	0.00	7.29	0.00	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	D	16.52	0.00	0.00	0.00	95.43	36.75	0.00	0.00	132.05	4.46	0.00	28.50	0.00	11.74	0.00	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	E	122.10	45.49	0.00	0.00	0.00	36.75	0.00	0.00	76.40	60.10	0.00	84.15	0.00	67.39	0.00	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	F	122.10	0.00	51.07	0.00	72.35	36.75	0.00	0.00	100.61	35.89	0.00	59.94	0.00	43.18	0.00	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	G	16.52	0.00	0.00	1.78	94.67	36.75	0.00	0.00	131.02	5.48	0.00	27.75	0.00	10.99	0.00	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	H	92.45	0.00	0.00	100.85	0.00	36.75	0.00	0.00	50.69	85.82	0.00	9.01	0.00	0.00	7.75	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
	I	117.51	0.00	51.07	126.86	0.00	36.75	0.00	0.00	50.69	85.82	0.00	0.00	17.00	0.00	33.76	103.91	0.00	100.20	50.40	24.05	136.50	72.60	36.75
Day 3: Typical summer day with inflows to Incukalns	**A**	16.52	0.00	0.00	0.00	67.78	0.00	150.19	5.98	50.84	0.00	0.00	0.39	0.00	11.10	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	B	111.31	0.00	0.00	0.00	29.28	0.00	96.05	3.84	50.84	0.00	0.00	2.54	0.00	67.39	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	C	122.10	0.00	51.07	0.00	51.20	0.00	113.79	4.46	50.84	0.00	0.00	1.98	0.06	49.03	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	D	16.52	0.00	0.00	0.00	68.19	0.00	150.67	6.14	49.80	1.04	0.00	1.28	0.00	11.51	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	E	111.31	0.00	0.00	0.00	29.28	0.00	110.79	4.42	35.51	15.32	0.00	17.28	0.00	67.39	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	F	122.10	0.00	51.07	0.00	54.93	0.00	121.56	4.79	39.01	11.83	0.00	13.42	0.00	52.77	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	G	16.52	0.00	0.00	1.78	68.19	0.00	150.70	6.01	48.12	2.71	0.00	1.31	0.00	11.51	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	H	109.57	0.00	0.00	119.50	29.28	0.00	10.08	2.55	20.34	30.50	0.00	0.00	85.17	65.65	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00
	I	122.10	0.00	51.07	133.20	29.28	0.00	34.92	2.55	20.34	30.50	0.00	0.00	98.87	27.11	0.00	0.00	135.70	73.20	25.20	6.38	50.84	45.30	0.00

Annex B: Tariff calculations

1. Postage stamp annual tariff

Tariffs are calculated using the postage stamp methodology, as set out in the draft TAR network code. No secondary adjustments, as permitted in the code have been applied.

Annual entry (exit) tariff

Euros/MWh/day – the purchaser of capacity is entitled to flow 1 MWh of gas per day, every day of the year

=

Allowed revenue

Estimated by the TSOs for 2030

×

Entry-exit split

can vary but we have assumed 50% to be recovered from each

÷

Annual booked capacity at entry (exit) points

The TAR code methodology uses booked capacity. We do not have estimates of booked capacity, so we have used peak flows as a proxy. This implicitly assumes that all capacity is booked on an annual basis. In the next slide we explore assumptions for relaxing this to take account of some level of short-term bookings.

This is based on the **sum of the highest flows on each entry (exit) point across the three representative days**. E.g. if on one entry point the highest flow is on a winter day, and on another is on a summer day, then these are summed to estimate the total peak flows in the calculation.

We explain this in more detail in the annex.

Annex B: Tariff calculations

2. Estimating annual booked capacity

Tariffs have to be based on the peak capacity requirements at each entry/exit point over the year. We estimate this by using the expected peak flow at each IP over the 3 representative days.

Example of estimating annual peak entry and exit capacity for Estonia in scenario A:

Commodity merit order

Estonia	Commodity prices	Zone design	Infrastructure	1	2	3
Scenario A	LNG high	All separate	GIPL & Incukalns upgrades	RU	GIPL	LNG

		Winter peak (14 day average) flows:	Summer flows:	Maximum flow per IP:
Entry	Varska (RU -> EE)	0	20.17	20.17
	Karksi (LV -> EE)	39.62	0	39.62
	Total	**39.62**	**20.17**	**59.79**
Exit	Karksi (EE -> LV)	0	13.79	13.79
	Domestic consumption	39.62	6.38	39.62
	Total	**39.62**	**20.17**	**53.41**

This capacity is used to calculate the entry tariff

This capacity is used to calculate the exit tariff

On the peak day of the year, flows in each individual entry and exit point add up to the same total sum

On a summer day, some IPs experience a higher flow than they do on the overall peak day of the year

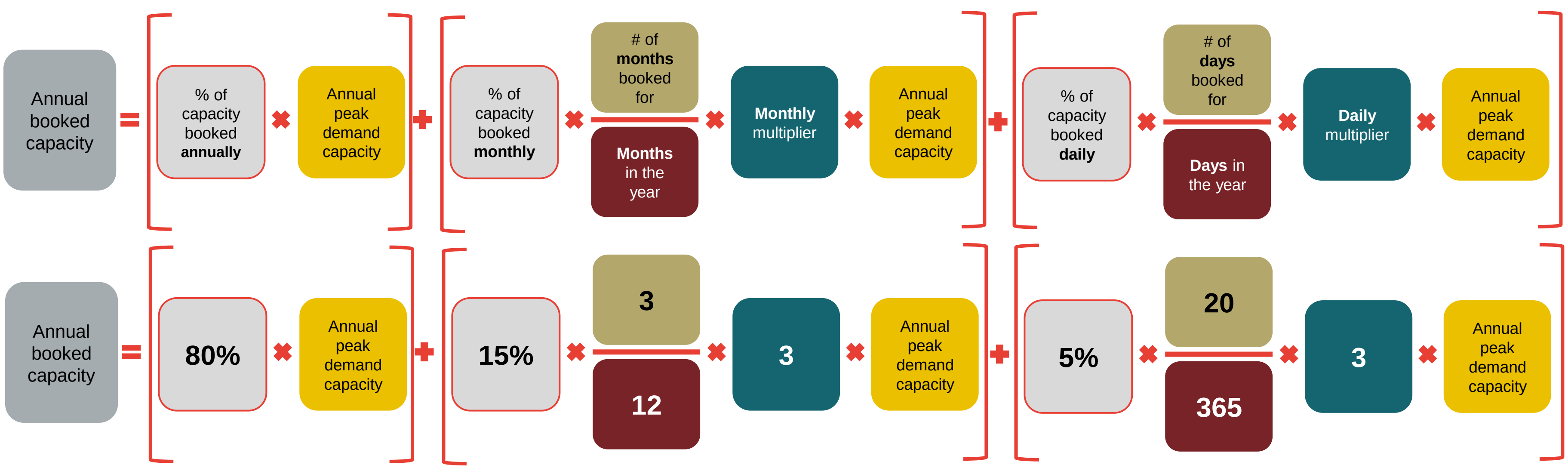
The sum of maximum flow per IP gives different total capacity needed for entry and exit

Annex B: Tariff calculations

3. Converting short term products to annualised capacity products

Capacity is expected to be sold in annual, monthly and daily products. In effect, we estimate based on assumptions…

Annual booked capacity	Capacity used in the postage stamp calculation	# of **months (days)** booked for	The average number of months (days) short-term product is booked for. We have assumed 3 months and 20 days
% of capacity booked **annually, daily, monthly**	We have assumed that 80% of capacity is booked annually, 15% monthly and 5% daily	**Months (days)** in the year	Short-term capacity is calculated as a fraction of annual capacity, taking into account the number of months and days in a year
Annual peak demand capacity	Sum of the highest flows on each entry (exit) point across the three representative days	**Monthly (daily)** multiplier	Multipliers are applied to short term products to disincentivise their use. We have assumed multipliers of 3 for both monthly and daily products



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