ETSO Position Paper on Locational signals and European Transmission Charging

Prepared for the Regulators forum In Rome

October 17-18, 2002

Introduction

1. One of the objectives of ETSO is to promote an efficient IEM market on a sound economic and technical basis.

2. The following principles were determined at the 8th Florence Forum:

"3. The CEER and the Commission restated and clarified the principles for the inter-TSO compensation mechanism to enter into force in 2003. These principles were previously discussed with TSOs and network users and received the support of the Forum:

- *costs and benefits from cross-border flows, covering in principle losses, new investments, and appropriate levels of existing investments, will be compensated via an inter TSO mechanism based on physical flows;*
- *the inter TSO mechanism includes all EU countries plus Norway. Switzerland will be included on the basis of agreed TPA principles;*
- *the incorporation of accession countries into the mechanism needs to be envisaged in the near future. Consideration also needs to be given to other countries participating in the UCTE organisation;*
- *cost calculations should be standardised, transparent and based on real flows;*
- *the net costs or incomes for TSOs from the compensation mechanism should be transferred to the domestic transmission tariffs;*
- *cross-border congestion costs are in principle not included in transmission tariffs.*

The CEER presented a possible detailed algorithm to deal with the first two issues mentioned under point 2. An alternative approach was presented on behalf of the Belgian Regulator and the Swiss Federal Office. Both algorithms seek to accurately establish the amount of and responsibilities for transit flows on the basis of actual physical flows, established on the basis of real network models.

The Forum underlined that a more precise estimate of the extent to which different generators and loads are likely to generate transit flows – on the basis of real network models - is necessary in order to come closer to cost-reflectiveness and to the right locational signals. The transmission system operators were furthermore invited to collect and exchange relevant data for the purpose of better calculation of compensations in order to improve the efficiency and fairness of the inter-TSO mechanism.

The Forum invited ETSO, in collaboration with the CEER, the Commission and other stakeholders, to further analyse, on the basis of real network flows available algorithms, and to make this analysis, as well as the relevant data used for this analysis, available and to put

forward, by 1st September 2002, a concrete proposal for the implementation of the new mechanism to be put into effect on 1st January 2003. The new mechanism needs to take an appropriate balance between simplicity and cost-reflectiveness. The Forum underlined the importance of providing adequate perspectives for the rapid participation of accession countries in the 2003 mechanism.

4. The Forum recognised that as a complement to the inter-TSO payment mechanism further work has to be done on network tarification structures. The Forum invited the CEER, in close collaboration with the Commission, Member States, Switzerland, ETSO and other relevant stakeholders, to continue this work on the basis of the following principles:

- *transmission tariffs shall consist of input and exit charges (G and L) and shall be independent of commercial transactions;*
- *there shall be no extra tariffs for import, export or transit, providing that appropriate and efficient locational signals are in place;*
- *tariff harmonisation should be pursued, including with regard to G and L charges in national tarification systems (tariff structure).*

The CEER was invited to put forward further detailed work in this respect by 1 September with the aim of putting it into effect on 1 January 2003."

3. In addition to these general principles aiming at a more permanent mechanism, ETSO members have also to take into account the existing differences between Member States with respect to:

   - tariff structures,
   - technical standards,
   - historical development of the electrical system due to geographical influences such as availability of energy resources, population density, etc.
   - accounting rules, regulation rules, etc.
   - co-operation rules and agreements for countries with more than one TSO,
   - national / regional incentives to promote rational energy consumption, renewable energy sources or efficient cogeneration, and
   - last but not least, practical feasibility of the mechanisms under consideration.

4. As the TSOs are responsible for the reliable operation of their network, ETSO is also especially mindful of short term ***and*** long term consequences of economic signals provided by tariffs. Its prime concerns relate to the creation of adequate incentives that favour financing of new transmission infrastructure as well as ensuring short and long term adequacy of the European electrical system (i.e. European wide transmission capacity allowing safe operation of networks taking into account increasing distance between generation and consumption as well as the crucial availability of the ancillary services needed on a local basis). The internalisation by TSOs of costs related to the "wrong" location of generators with respect to the consumption areas would send undoubtedly inappropriate signals to the market with the consequence of a potential degradation of reliability.

5. Among the criteria put forward by ETSO in its vision are:

   - open trade for the whole internal electricity market
   - level playing field
   - reliable and efficient use of existing and future transmission network
   - cost reflective tariffs

- non-transaction based mechanisms
- simplicity and transparency.

6. Since the 8th Florence Forum, the determination of locational signals has become a major area of interest for all stakeholders. This results from the minutes where it is stated: "there shall be no extra tariffs for import, export or transit, *providing that appropriate and efficient locational signals are in place*". In order to clarify the concept of "efficient locational signals" with respect to the development of the IEM market, ETSO has prepared this position paper for the 9th Regulators Forum to be held in Rome.

7. This note outlines a potential structure with which to frame further discussions on how transmission charging and locational signals in the European energy market could be developed. It firstly sets out what transmission costs constitute, and which of these costs are influenced by cross border European trade. It then outlines the objective pursued by ETSO members in implementing efficient locational signals and harmonising the tariff charges for the IEM market. Depending on which route the European energy market is going to take, it then sets out some potential options to be considered in determining more harmonised transmission charging arrangements.

Transmission Costs

8. Figure 1 shows a representation of transmission costs. Transmission costs can be summarised as follows:

Asset Costs

a. Capital Investment costs

Assets can be subdivided into:

- Infrastructure Network (used by all national Users)
- Connection Network (used solely by a subset of national Users).
  - Infrastructure Network could be subdivided into a Horizontal Network being that part of the infrastructure network shared by national and international users

b. Operation and Maintenance Costs of these Transmission Assets
   - Includes repair, maintenance and corporate overheads

System Operation Costs

- Provision of Balancing Services such as energy balancing, response and reserve, black start capability (ancillary services)
- Costs of resolving transmission congestion
- Costs of covering transmission losses

Transmission Costs affected by cross border trade

9. Figure 2 shows the potential division between those elements, which are affected by cross border trade. In general terms, cross border trade (CBT) includes imports,

exports and transits. For reasons of simplicity and/or with the aim of reducing the transmission costs involved, the transmission costs affected by cross border trade can be limited to transits. ETSO members have selected this last option since their first proposal of an inter-TSO compensation mechanism in 2000.

10. The figure shows that connection asset costs are the only costs, which could be identified as relating solely to national Users alone. All other costs have some relationship with international trade. However, if CBT is limited to transit, the balancing costs (fig 2) will not be affected by CBT.

Objectives of setting locational signals

11. The objectives influenced by efficient locational signals reflect a total system view, covering the whole range of generation, transmission and consumption. The aim is to create the incentives that will ensure a reliable and efficient development of the IEM.

12. It implies both long-term incentives (or 'siting signals') for the location of new production units and short-term incentives to optimise the load flows on a European grid that was primarily developed, and is presently mainly used, for national trade. The increasing presence of congestion due to trading activities in past years confirms this concern.

13. Besides these objectives, there are expectations from market players which concern harmonisation, i.e. the compatibility of national and international implementation of locational signals. There are also concerns about the stability of locational signals as a base for long-term investment; equally, doubts exist about the objectivity of national implementation, which may contain hidden subsidies.

Fundamental Question

14. The sections above show that nearly all transmission costs are affected and hence have some causation arising from the existence of international trade. Costs relate both to the internal technical and commercial rules but also to the type of energy market in place. Therefore in considering a harmonised and consistent approach for Europe, it must be decided whether the aim is to move directly to:

(a) a Single European Market?

or to move first to:

(b) a set of linked local Markets?

and then to a fully integrated single market

15. If these options become confused then it will be virtually impossible to have any meaningful debate on potential solutions to this problem.

16. A local market could be defined as having the characteristics of:

- A single harmonised Transmission Pricing system covering the whole market or at least compatible Transmission Pricing systems avoiding market distortion,

- Common Wholesale electricity trading arrangements
- Unbundling of network activities
- Common regulatory regimes or at least compatible regulatory regimes

A local market could consist of one country but also could consist of more than one if the criteria above are developed. Indeed this is what has been developed in Scandinavia and what is progressively occurring in Iberia, Benelux and Great Britain and Ireland.

The question therefore is whether it is possible to create Europe as one single market in one step or whether it is better to develop national markets into a number of local markets as a steady progression towards a single European local market.

The boundaries of a local market should ideally reflect the geographical limits of congestion between the local market and the other local markets. Market power in the local market should be as low as reasonably achievable so as to ensure a local competitive market. In this case, the locational signals would also contribute to reduce the congestion between local markets while contributing to the reliability of the system wide market. Unfortunately, both conditions are not met in respect of the geographical borders of the Member States.

Options under a Single European Market (or for a defined local market)

17. Figure 3 shows the potential decisions with regard to charging that need to be made in determining a harmonised charging methodology assuming a single European energy market is defined. It also holds for any local market that is defined as a subset of the total European energy market.

18. The main point is that transmission charges should reflect the costs on the entire European network of injecting or offtaking at a particular point. We are effectively talking about assuming Europe is one transmission system with one charging regime.

19. This requires as a minimum:

- One approved tariff structure or, at least, compatible tariff structure avoiding market distortion
- All TSO costs to be available for European tariffs to be calculated
- Common access and congestion management techniques
- A common regulatory regime or, at least, compatible regulatory regimes

20. In terms of designing this uniform charging regime there are the usual questions that would currently need to be answered in developing any national tariff. For example what is the best way to reflect the costs on the transmission system whilst ensuring competition in generation and supply is facilitated and reflecting the conditions of the energy market in place.

Short Run System Operation Costs

21. If short run (real time operation) costs are important then economic theory suggests a Short Run Marginal Costing (SRMC) route should be pursued.

22. Short Run Marginal Costs can take many different forms. In the European context these could be seen as

- Prices emerging from auctions for access across particular interconnections over short time periods (auctions need to relate to each other if they are affected by general flows, i.e. be co-ordinated)

- Locational Prices emerging from Market Splitting once congestion occurs (NordPool model)

- Marginal loss factors at injection- and withdrawal nodes. This requires these factors to be referenced to a European hub.

- An ex-post (or ex ante) locational marginal price at each entry / exit point on the European Grid. A nodal/zonal marginal price relates the effect on the total congestion and losses costs on the whole European network due to an injection / offtake at that node (can be positive or negative). This will involve the definition of a European hub to which prices can be referenced. This is similar to the PJM model in the US but relies on a Pool type arrangement, including a central dispatch, being in place for the energy market. Obviously, this needs a close to perfect harmonisation and requires a huge technical effort. This can be considered as an alternative to the all of the bullets above.

23. These short term signals will provide some long term incentives however they are all calculated based upon a fixed transmission system at the time. They do not take account of how the transmission system may develop through investment. In order to tackle this issue, short term signals (such as nodal pricing) need to be complemented by some form of transmission (tradable) rights on a IEM wide basis (e.g. some form of generalisation of the system contemplated for UK market).

24. Usually to complement SRMC charges, sunk transmission investment costs are charged on a flat postage stamp basis to all Users, i.e. socialised. This could be on a harmonised basis (in terms of revenue recovery). Where specific users can be identified to be benefiting from a particular investment, the costs could be identified and charged solely to these Users.

25. Market based congestion management will give locational signals. In an area where there is a structural export congestion there will be a signal that there is excess capacity of generation. Where import congestion occurs, the signal is that more generation should be established.

Presently, congestion management mostly aims at allocating capacity in a transparent and efficient way when demand for capacity is higher than what is commercially available. The resulting short term locational signals are usually not part of a harmonised tariff structure. As such, they can hardly be considered as achieving long term objectives. Ideally, market based congestion system should be part of the harmonised tariff structure.

Besides providing “siting” signals, locational signals aim is to reflect the transmission costs incurred by users behaviour. Also, a system without congestion could also be the sign of over investment.

Long Run Investment Decisions

26. If longer term investment signals are deemed to be more important, then a more long run marginal pricing (LRMC) approach is likely to be more appropriate:

27. Long Run Marginal Cost calculations can also take a number of forms:

- Ex ante scenario based calculation of investment requirements
- Investment Cost Related Pricing (England & Wales model) or Reverse MW miles (Ireland model)
- Long Term auctioning of access to the system

28. In this world the LRMCs would reflect the additional or saved transmission costs of injecting / withdrawing at a particular node. In theory, transmission costs for this calculation would ideally include investment, congestion and losses.

29. Operational costs that occur in real time (congestion / losses) could be charged out on a flat basis to avoid distorting the locational signals given by the LRMC charges. They could be allocated on a usage-based algorithm to apportion the costs. Again the recovery of these charges could be harmonised for G and L in terms of the level of recovery of charges from Generators.

30. Long term locational signals are well described by the term 'siting signals'. Included in grid tariffs, they should not only limit or direct load flows but also stabilise the system by influencing the siting of new generating units. This includes also keeping those in place, which are beneficial for the system security. Masking these transmission costs would also mask the real cost of consumed energy (by real cost, it is meant the cost of generation and transmission as well as system services needed locally such as reactive power that cannot be transported over long distance).

31. Besides these economic aspects, the development of the electrical system should take into account potential real-time instabilities for areas remote from generation.

Options under a set of linked local Markets

32. Figure 4 shows the potential decisions that need to be made in determining a harmonised charging methodology assuming that separate local or regional markets remain with subsidiarity over their form.

33. Cost reflectivity through marginal forward looking costs is not possible in this world as this requires:

- Tariffs all referenced to a European hub (i.e. a common tariff structure)
- Unified access rules and congestion management methods

34. What we are looking for is a way of linking a number of separate mechanisms. To do this, it can be thought of that the charges for transmission are made up of:

1. A Local Entry (G) or Exit charge (L)
2. An additional non transaction based charge for transmitting across from one local/regional market to another

35. This means that the emphasis should be on apportioning costs incurred in transmitting between one local/regional system and another. It will also need to be considered if it is appropriate to have a compensation mechanism for transit between the different areas.

36. Charges could take the following forms:

- Local G and L in each local market for injecting / offtaking determined by subsidiarity
- Some form of "transmission fee" between one local market and another

37. To define the latter charge, the following steps are required

a. Decide what costs are to be included (sunk investment, losses, congestion, operation and system services).

b. Determine what part of these costs should be assigned to cross border trade

c. Determine who causes the costs

d. Determine a mechanism for obtaining Funds and transferring to the local market which incurs the costs.

38. Step (a) is a high level fundamental question. In theory the answer should be that all of the costs are affected in some way by cross border trade. However, it may be decided that some costs should be excluded in order to minimise charges to traders engaging in cross border trade, i.e. to stimulate the level of trade. For example, transits only may be considered as it is presently the case for the ETSO mechanism.

39. Steps (b) and (c) can be combined if a common model is used to define a proportion of a network assigned to a particular node (i.e. an incremental approach). This would identify who has caused the costs and would logically define who should be charged based on their usage.

40. If this is not possible or desirable, steps (b) and (c) could be undertaken separately.

41. Step (b) would identify the costs to be recovered. This could be done in a number of ways:

- Identify horizontal network cost
- Apply a cross border trade key

42. Step (c) would then consider who should be charged, options include:

- Socialised in the local market charges of the local markets identified as undertaking cross border trade.
- Defining a matrix showing costs of transmitting from one local market to another
- Defining a European wide Postage Stamp (€/MWh) paid by all cross border traders

43. Step (d) would involve making a decision as to whether there is a need to set up an inter TSO compensation mechanism which is then mirrored through to charging Users or whether charges could be collected directly from Users by a central agency.

44. For costs not included in the "transmission fee", it would be assumed that these are recovered from local users within the local market.

45. One example of a specific "transmission fee" might be the charges that are implicit in cross border auctions. If it is possible to define clear links, which are used by a subset of Users, then they could be auctioned and charged to those users. However, it may be considered that congestion, which occurs within a country/control area, should be charged for under the local market charging mechanism.

46. Complete Harmonisation of G and L will not be possible, as numerous different tariff structures will exist. Any harmonisation be it level of G tariff, revenue recovery from G, % of charges levied on G, or charges levied as cost recovery for transmitting from one local market to another will be pointless unless the tariff structures are similar. For example, they all are based on kWh or kW or a mixture.

Reality and pragmatic aspects

47. Locational signals as part of the local tariff system are already in place in some European countries, namely in England and Wales, Sweden, Norway, etc. Discussion and analysis show that in these countries conditions favourable for a geographically differentiated tariff system exist. There are dominant load flow patterns, a homogeneous market environment and relatively weak connections to the central European grid. Therefore the experience of these countries is relevant but their approach cannot necessarily be transferred to the 'continent' with its differing market structures, generation mix and often changing load flows.

48. The question is therefore: first, can an appropriate system for the implementation of locational signals in the IEM or in different local markets be identified; second, can it be implemented in a harmonised way? The ongoing discussion shows that little progress has been made on this point. An initial step in this respect is that underlying mechanisms must be defined and simulated. These will necessarily require a large amount of data not previously needed before on a IEM wide basis. The determination of load flow data, especially for the export/import balance with an appropriate time precision are required to record fluctuations over the year.

    The major challenge is however harmonised implementation. This is a major challenge for the Regulatory authorities, given that the TSOs operate under different regulatory models.

49. The formulation of the CBT-mechanism provides the highest degree of transmission tariff harmonisation reached so far in the IEM. But its implementation by the countries/TSOs shows still certain diversity. Consistent implementation on equal terms of a more sophisticated system could require a high degree of harmonisation.

50. In a process that aims at promoting the IEM by the creation of common rules, deficiencies in the national implementation leading to market distortion could lead to unexpected consequences within a matter of a few years

51. The efficiency of different Gs is difficult to assess as long as other factors such as incentives to rational use of energy, renewable energies, etc. are not harmonised between Member States. In order to influence the siting of new generation, the differences in Gs would have to be sufficiently important to prevail over other factors such as labour cost, fuel costs (including transportation), Kyoto requirements, etc. which directly affect production and location decisions. This difficulty should not be a reason for the Commission, Regulators and Member States to investigate a harmonised tariff structure for G. On the contrary, as the efficiency of the Gs can only be ensured on the long term, it requires a long term goal at the IEM level, including stability as well as transparency. In addition to this long term objective, unharmonised Gs will undoubtedly distort the short term efficiency of the IEM market. Inconsistency between Gs, will affect the efficiency of the IEM electrical system. The calibration of any locational signals will have short term as well as long term effects that need to be carefully analysed based on real scenario's observed on the whole European network. Besides providing "siting" signals, locational signals aim is to reflect the transmission costs incurred by users' behaviour.

Conclusions

52. The aim for the European Energy Market needs to be established before any sensible conclusions can be reached on appropriate enduring transmission charging arrangements. This will be determined by wider issues than just charging and interacts with the access arrangements, market competition and congestion management methods.

53. If a route of creating a single European market (one local market for Europe) is pursued, a number of different options for designing a uniform tariff structure have been identified. The choices, for tariffs, could depend on whether it is short run system operation costs which are important to target with cost reflective signals or whether it is more important to give longer term investment signals to ensure generation, load and transmission investment occurs optimally. In addition, provided the other conditions for a single local market hold, then harmonising can be developed.

54. If a route of a European market consisting initially of a number of linked local markets is pursued, then the objective would be to develop effective local markets, which have the criteria where harmonisation is possible. The complete tariff structure would then consist of harmonised tariffs within the local market plus a separate, non transaction based, tariff(s) compensating for transit flows between local markets. The decisions in this case relate to what costs it is felt appropriate to target at those parties engaged in trade between local markets and what mechanism is used to charge them. In addition, the different local market arrangements in terms of the firmness of the transmission access offered and the workings of the energy market need to be assessed in order to ensure the cross local market trade tariffs do not distort behaviour in the local markets.

55. Looking at the above options, it is clear that discussions to date have clearly been mixing the two routes, hence perhaps why little agreement has ensued. The definition of what constitutes a local market needs to be established before any European charging schemes can be further developed.

Figure 1

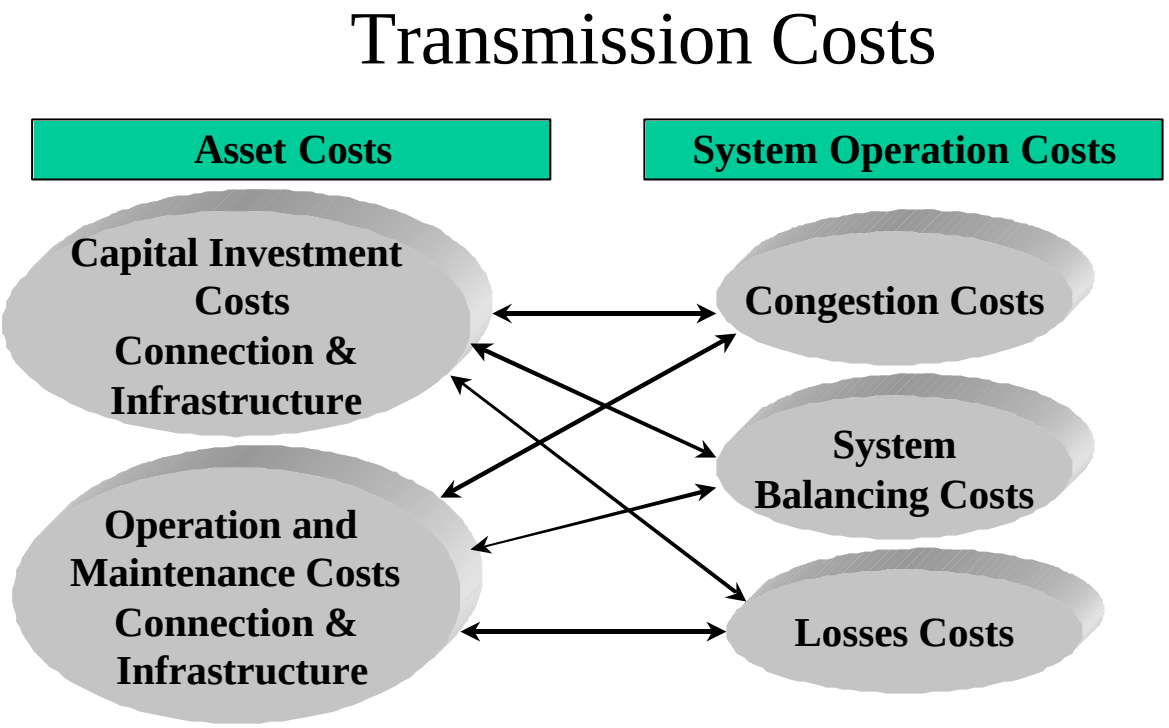

Figure 2

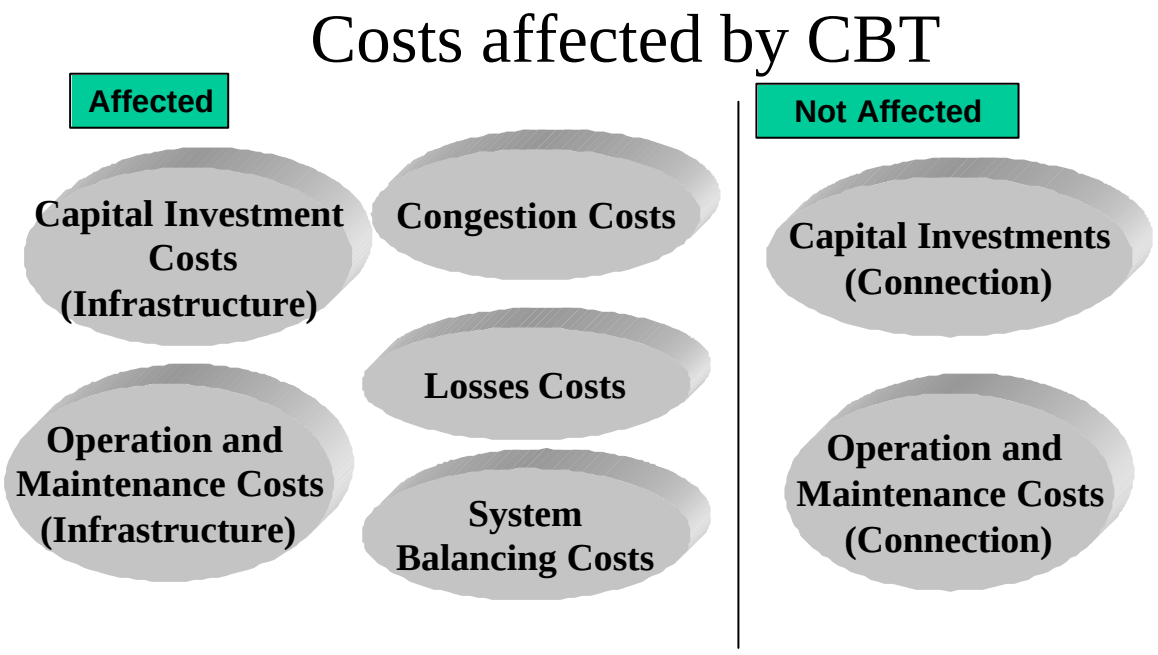

Figure 3

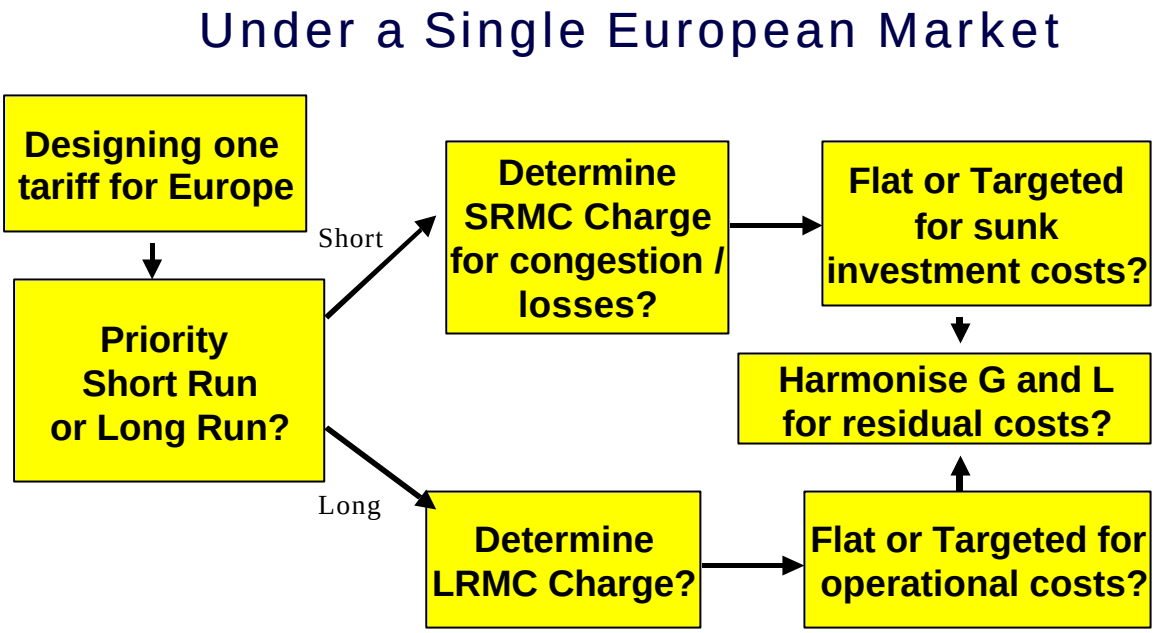

Figure 4