A Contestable Approach to Financing Critical Interconnection Across Europe at the Scale and Pace Needed

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Summary

A robust and secure transmission network, with strong interconnection between Member States, is crucial to the effective operation of a single European electricity market. Adequate levels of interconnection will allow cross-border trade to take place efficiently and without constraint, enabling the use of the lowest-cost resources and allowing Europe's businesses and citizens to minimise their electricity costs. Interconnection will also contribute to achieving security of supply in the most cost-effective fashion, evening out the capacity surpluses and deficits that exist across Europe. Europe's renewable targets will also be achieved more cost-effectively through the exploitation of areas of high-quality renewable resources and reduced curtailment, while the ability to balance energy and demand over wider areas will ease the integration of renewable capacity.

The European Commission has recognised the value of increased interconnection, and Member States are required to ensure interconnection capacity with neighbouring systems of at least 10 percent of installed generation capacity by 2020. However, achieving this target will require a step-change in investment for many Member States and, despite measures taken by the Commission to encourage investment, it is not clear that the TSOs concerned have the capability to respond to the challenge given all the other calls on their resources. Similarly, privately funded merchant-exempt projects, which effectively depend on continued market separation to recover costs, are unlikely to provide the interconnection capability required.

In order to bridge this investment gap, RAP proposes a fully contestable approach to interconnector and other transmission investment. Private investors would compete with established transmission system operators (TSOs) and bid an income stream to build and own transmission assets that the evolving European transmission planning process identifies as being necessary. Projects would be funded by regulated transmission charges on users as now and, all else being equal, the lowest bid would win. This approach would ensure that transmission assets are provided at the lowest costs to consumers and, importantly, would introduce new sources of capital to help bridge the investment gap. While the bidding process and additional interfaces associated with a contestable approach would introduce some additional cost and complexity, international experience suggests that these disadvantages would be substantially outweighed by very significant reductions in overall project costs and the accelerated implementation of projects that otherwise might not be undertaken.

The Need for Increased Interconnection Between Member States

The integration of Europe's electricity markets is delivering tangible results. Over the period from 2008 to 2012, average wholesale electricity prices fell by around one-third, and more progress can be expected with the continued introduction of integrated day-ahead and intra-day electricity markets.[1] However, realising the full potential of market integration and making progress in decarbonising the electricity sector will depend in no small measure on the availability of a strong, suitably interconnected, European transmission system.

The European Commission has recognised this fact, and Member States are required to achieve interconnection capacities equivalent to 10 percent of their installed generation capacity by 2020. The Commission has also committed to increasing that target to 15 percent, to be achieved by 2030. Some Member States, such as Germany, are already well connected with their neighbours. But many others are not, and greater efforts are required to ensure that Europe has the necessary infrastructure capacity in place to support the efficient operation of the single electricity market and to achieve Europe's renewable energy goals. The need to increase interconnection capacity between Member States features prominently in the Energy Union vision and, in addition to adopting interconnection targets, the Commission has signalled its intention to introduce various other initiatives to ensure that those targets are met.[2]

The increase in interconnection capacity between Member States envisaged by the Commission will bring a variety of benefits. By promoting cross-border trade, increased interconnection capacity will enhance social welfare and continue the reduction in the cost of electricity seen by consumers through increased liquidity and the utilisation of the cheapest sources of generation. In addition, supply reliability will be enhanced both collectively and within individual Member States through mutual support during periods of generation capacity shortage or system stress. Market liquidity will be enhanced as more energy resources have access to individual energy markets, increasing competition and exerting further pressure on wholesale energy prices. Finally, increased interconnection will enable the cost-effective integration of renewable sources by: exploiting areas of high resource quality; taking advantage of diversity among renewable technologies such as wind, solar PV, and hydro; taking advantage of uncoordinated consumption patterns between regions; and, last but not least, maximising the ability to balance supply and demand over wider geographic areas.

Various attempts have been made to estimate the value of increased interconnection, notably by the Agency for the Cooperation of Energy Regulators (ACER) in its annual market monitoring reports. Estimates vary according to the counterfactuals assumed. However, recent work by the Energy Policy Research Group (EPRG) subsists that increased trading through the day-ahead, intra-day, and balancing markets together with the avoidance of unscheduled flows and curtailment, could yield annual savings of up to €3.3 billion per year.[3]

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[1] European Commission. (2015, February). *Achieving the 10% interconnection target: Making Europe's electricity grid fit for 2020* [Energy Union Package communication]. COM(2015)82 final. Retrieved from http://ec.europa.eu/priorities/energy-union/docs/interconnectors_en.pdf.

[2] Ibid.

[3] Newberry, D., Strbac, G., and Viehoff, I. (2015, February). *The Benefits of Integrating European Electricity Markets* [EPRG Working Paper]. Retrieved from http://www.eprg.group.cam.ac.uk/wp-content/uploads/2015/02/EPRG-WP-1504.pdf.

Identifying and Funding Interconnection Projects

The Commission has responded to the need for increased interconnection by introducing a number of policy instruments and has signalled further measures in its vision for an Energy Union. Building on ENTSO-e's ten-year transmission planning process, the TEN-E Infrastructure Regulation[4] formalises the process for identifying critical transmission projects and attempts to address specific regulatory and permitting barriers. The Connecting Europe Facility (CEF),[5] European Energy for Recovery (EEPR), and European Fund for Strategic Investment (EFSI), have been established to address investment issues by mobilising Europe's financial resources. These policy initiatives have met with some success, with €650 million spent on electricity interconnection via the EEPR to date. However, significant concerns remain over the adequacy of the policy package as it currently stands and whether additional action will be necessary to achieve Europe's interconnection targets and deliver the assets necessary to support the efficient and secure operation of an integrated low-carbon electricity market.

Projects of Common Interest

Crucial interconnection projects, together with internal transmission developments that have a significant impact on cross-border flows, will be identified via the TEN-E Infrastructure Regulation as "projects of common interest" (PCIs). To be eligible for PCI status, a project must have been included in the previous ENTSO-e Ten-Year Network Development Plan (TYNDP). A developer can then submit a project to one of 12 "regional groups" established by the Regulation, who will evaluate proposals and collectively select projects for a Union-wide list.[6] Based on this assessment, the Commission will adopt a final Union-wide list via a delegated act procedure.[7]

To achieve PCI status, an interconnection or transmission project will need to satisfy certain criteria set out in the TEN-E Regulation. *Inter alia*, projects will need to increase cross-border "net transfer capability" (NTC) by at least 500 MW, while developers will need to have reached agreement about potential benefits of additional interconnection with the Member States concerned.

Funding Shortfall

The Commission estimates that the required spend on electricity projects, including those necessary to adequately interconnect Member States, will amount to some €105 billion by 2020. Available funding via the CEF is however limited to some €5.6 billion, including that allocated to gas projects. While CEF funding may be used to leverage other investment such as project bonds and other financing routes such as the EFSI may be available in specific circumstances, it is clear that a significant gap will remain between available European funding and the level required to provide the transmission infrastructure necessary to support a fully integrated electricity market. Given the disparity between available and required funding it is clear that, to make a difference, the CEF and EFSI funding will need to focus on a small number of particularly crucial projects. All other projects—and there are

[4] Regulation 347/2013 on Guidelines for Trans-European Energy Infrastructure.
[5] Regulation 1316/2013 on Establishing the Connecting Europe Facility.
[6] Regional groups consist of representatives from competent ministries, National Regulatory Authorities, ENTSO-e & ENTSO-g, ACER and the European Commission.
[7] The first Union list of PCIs was drawn up in 2013, a second is currently being developed and will be published during 2015.

132 electrical transmission PCIs in total—will need to be entirely funded through regulated income or alternately as merchant projects funded through congestion rents or through bilateral contracts with suitable counterparties.

Funding via Regulated Income

The default position in Europe is that interconnection is developed on a fully regulated basis, with investment costs allocated between the coupled Member States and recovered via national transmission tariffs. However, overall, Europe has insufficient interconnection capacity and the failure of TSOs in some Member States to respond effectively to the investment challenge is in part due to lack of returns that are commensurate with the particular difficulties associated with developing interconnection projects. Cross-border projects tend to be difficult from a regulatory standpoint, as regulators in each Member State need to agree, and they may have different regulatory regimes and goals. Furthermore, as described above, there will be "winners and losers" associated with each project even where there is a clear overall gain in consumer welfare. It is therefore unlikely that the regulator whose consumers are disadvantaged by an interconnection project will be particularly enthusiastic about proceeding, notwithstanding any clear "European-level" advantages of doing so.

In response to the more difficult regulatory environment and complications in obtaining planning permission or permits for cross-border projects, TSOs may prefer to focus scarce capital and resources on simpler internal transmission developments. There are also concerns that, where Member States have opted for "legal" rather than "corporate" unbundling of generation and transmission, TSOs may be reluctant to promote interconnection projects that could disadvantage the generation assets owned by their parent company. In recognition of these difficulties and to encourage investment, some Member States have introduced incentives in the form of rate of return "add-ons" or investment premiums for projects that reduce congestion or increase cross-border capacity. However these initiatives are fragmented and do not necessarily align with European priorities.[8]

Even if these issues of TSO reluctance and asymmetry of benefits associated with interconnection could be overcome, it is not clear that TSOs could deliver the volume of investment required given other calls on available capital and resource. The ability of TSOs to finance projects by increasing debt is limited by the need to maintain acceptable credit ratings, while issuing additional equity is likely to be resisted by existing shareholders who will see their ownership diluted. TSOs may be prepared to enter into partnerships to develop particular projects,[9] but the need to raise the equity required to fund shared interconnector projects—in addition to that required to support internal transmission development and renewal—may well still present a significant challenge. Consequently, while TSOs will be able to fund most interconnector projects via regulated income, such funding is unlikely to provide the overall capacity required.

[8] European Commission (2011, October). *Impact Assessment accompanying the Proposal for a Regulation of the European Parliament and of the Council on guidelines for the implementation of European energy infrastructure priorities repealing Decision No 1364/2006/EC*. Retrieved from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SEC:2011:1233:FIN:EN:PDF.

[9] See the case of the Tennet & Mitsubishi partnership to develop German offshore wind connections.

Merchant-exempt Investment

"Merchant-exempt" investment currently provides an alternative to regulated investment in interconnectors.[10] Under this approach, investors fund interconnection projects in return for the rights to the revenues arising from the energy price differentials across the interconnection. Rights to utilise interconnector capacity to hedge cross-border trades against these price differentials (physical rights) or to receive the associated congestion rents (financial rights) are auctioned in advance, and the prospect of these revenues over the lifetime of the project supports the upfront capital costs. Unlike regulated projects, cost recovery risks lie entirely with investors.

In order to encourage merchant investment, the European Commission allows exemptions from the requirements of Third Party Access (TPA).[11] Without this exemption, compliance with TPA requirements would require the return of any congestion rents, to be used to either develop or maintain interconnector capacity or otherwise reduce internal transmission tariffs. In order to gain exemption, a project must satisfy a number of criteria, mostly to do with enhancing competition.

The UK and some other Member States have traditionally favoured the merchant-exempt route on the basis that the timing and sizing of interconnector projects is best defined by commercial considerations. Merchant investment also allows the direct involvement of new players and new sources of funding, which will clearly be helpful in addressing the need to increase investment in interconnection and bridging the investment gap. There is also a view that the rigours merchant investors go through in raising capital are likely to lead to more innovative and cost-efficient projects.

However, merchant investment suffers from a significant disadvantage in that projects are generally undersized. Merchant investors will focus on maximising returns from congestion rents and will be unable or unwilling to take account of the social value of additional interconnector capacity that would flow from enhanced security and resilience, increased competition and liquidity, as well as further reductions in congestion. Essentially, continued market separation rather than closer market coupling will best serve a merchant-exempt investment. This is illustrated in Figure 1, which, building on the simple example illustrated in Annex 1, shows that a merchant-exempt interconnector designed to maximise revenues is likely to have a significantly lower capacity (A) than a regulated investment. The reason for this is that the former is sized to maximise congestion rent, while the latter will be sized to ensure that the incremental annuitized investment cost equals the incremental avoided congestion cost (B). In the case of project (C), additional capacity is justified by including "external" benefits related to increased security of supply and market liquidity referred to earlier.

[10] "Merchant-exempt" investment requires exemption to be granted from either the third party access (TPA) or use of revenues requirements set out in the 3rd Package Regulations and Directives.
[11] See Regulation 1228/2003/EC.

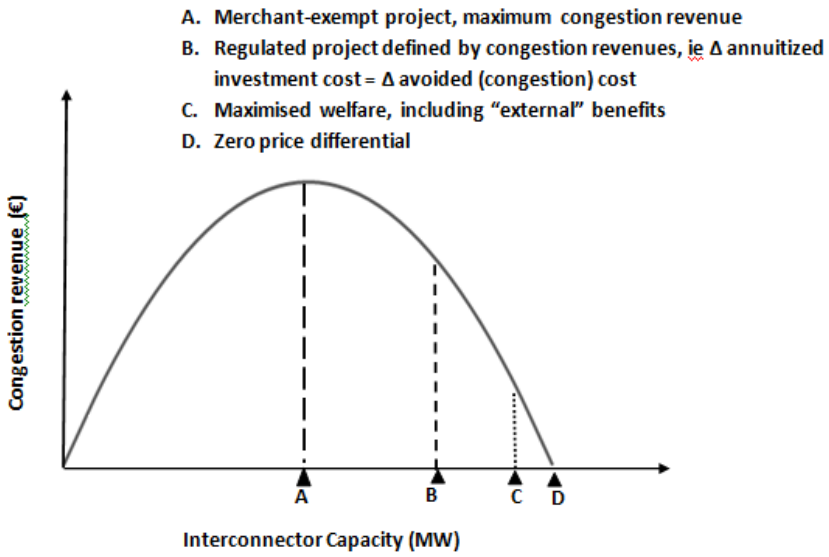

Figure 1. Interconnector Capacity, Congestion Revenue, and Welfare

Concerns over the issue of undersizing have prompted the Commission to impose strict conditions when agreeing to exemptions from the Third Energy Package requirements on TPA or use of revenues. For example, exemption for the two East-West interconnectors between the UK and Ireland was conditional on the building of an additional parallel regulated interconnector while, in the case of the BritNed interconnector between the UK and the Netherlands, a revenue cap was imposed.[12] The Commission's decision to impose conditions on the exemption from the TPA requirements for these and other merchant projects has dented confidence in the merchant-exempt approach. This, taken together with underlying concerns about undersizing, suggests that the merchant-exempt approach alone is unlikely to produce the volume of interconnection capacity required to deliver a decarbonised European power system. An additional complication is that European law prevents entities that are designated as TSOs from participating in merchant investment, and some Member States (e.g., Spain) allow only incumbent TSOs to own transmission assets.

Despite these concerns, merchant-exempt interconnection projects may still make a valuable contribution to bridging the investment gap and provide a useful option in specific circumstances—for example, where TSOs are unable or unwilling to exploit commercial interconnector opportunities. There is a strong case for developing hybrid approaches to interconnection investment, one of which would be the merchant-exempt approach, in order to increase sources of capital and development capacity, thereby maximising the chances that worthwhile projects are taken forward.

[12] See Exemption decision on BritNed interconnector at https://www.ofgem.gov.uk/ofgem-publications/41228/britned-amended-exemption-order.pdf.

A Contestable Approach to Interconnector and Transmission Investment

An additional means of addressing the funding gap between available and required financing would be to allow private companies to compete with incumbent TSOs to build interconnection and associated transmission projects identified via the PCI process. This would combine the essential elements of the regulated and merchant approaches described above and additionally exploit the potential efficiencies that a fully contestable approach to transmission development could bring.

A "Cap and Floor" Approach

In fact there has been some progress in this direction with the "cap and floor" regime adopted by Great Britain's Office of Gas and Electricity Markets (Ofgem) and the Belgium regulator (Commission de Régulation de l'Electricité et du Gaz (CREG)) for the proposed interconnector between Belgium and GB (Project NEMO). Under this regime, revenues obtained by auctioning interconnector capacity are capped and any excess revenues returned to the TSOs concerned. As a *quid pro quo*, a revenue floor is also set below which payments from TSOs to investors are triggered when congestion revenues fall in order to guarantee a minimum return on capital. Effectively, the project developer surrenders some "upside" returns associated with high congestion rents in return for a reduction in project risk through access to regulated income.

The cap-and-floor regime developed by Ofgem and CREG represents an extremely flexible approach to interconnector funding. If the cap and collar on revenues are set far apart, the regime approximates to a merchant-exempt approach. If, on the other hand, the cap and collar are set close together, the approach delivers a project that is effectively regulated. A contestable approach to interconnector (or other transmission) development builds on the concept of private investor access to regulated income but adds the additional advantages that full competition in transmission development can bring.

Essentials of a Contestable Approach

With a contestable approach, incumbent TSOs and private investors could compete in a reverse auction to develop PCIs or any other infrastructure projects identified by the evolving European transmission planning process. Once the need for a particular transmission project is identified, eligible parties would be invited to bid a regulated income stream to construct and own the associated infrastructure. All other things being equal, the lowest bid would be successful, thereby delivering the lowest-cost solution to the identified need. This would give regulators comfort that the required capacity would be delivered at least cost to customers, while the availability of a guaranteed regulated income stream over the lifetime of the project to recover investment costs would reduce the cost of project capital, again reducing the burden on electricity customers. Effectively, both incumbent TSOs and private entities would compete to be the "monopoly provider" of the particular transmission assets concerned. In doing so, costs would be reduced as competitors sought to succeed by offering the lowest prices; innovation would be encouraged as parties sought a competitive advantage; asymmetry of information would be reduced as the real costs of development were revealed; and, importantly, the range of sources of capital would be increased.

Once constructed, the relevant TSOs would operate the transmission assets as part of the integrated electricity system in accordance with agreed procedures. Returns on investment would of course need to be sufficient to attract investors, but the competitive process would allow the "optimum" rate of return to be discovered, giving national regulatory agencies (NRAs) comfort that costs to consumers have been minimised. The process would provide an alternative route for investors to invest in interconnector capacity other than through existing TSOs, while at the same time overcoming the principal disadvantage of privately funded merchant-exempt investment, namely that projects are likely to be undersized and that financially marginal projects are unlikely to be delivered.

International Experience

Contestable approaches to the provision of transmission infrastructure have been employed in several countries, including the United States, Argentina, Brazil, Great Britain[13] and, to a limited extent, India. The "allowed annual revenue" process operated by the Brazilian Electricity Regulatory Agency (ANEEL) allocates the right to construct and own approved "economic" infrastructure projects (i.e., excluding reliability or connection projects) via a reverse auction. Eligible parties bid an annual revenue stream and the successful bidder is awarded a concession for a period of 30 years. Data to 2008 suggest the average discount on the maximum permitted annual revenue (PAR) offered by private investors (31.3 percent) is higher than that offered by incumbents (26.2 percent) and, in one case, the winning bid proposed a cost 44 percent below the expected price. Unsurprisingly given these statistics, private investors have captured the majority of revenue (76.5 percent) since auctions where introduced in 1999.[14] In the United States, a contestable approach to transmission project development is reflected in the recent Order No. 1000 from the Federal Energy Regulatory Commission (FERC). This removes the right of incumbent transmission providers to claim "first refusal" in the construction of transmission facilities. Additionally, a contestable approach has been used to connect wind farms in Texas.[15]

The arrangements adopted by Brazil are in some ways similar to those adopted for the development of the offshore electricity network in Great Britain, though that regime currently focuses on the connection of generation and not interconnection between systems. Rather than extending the existing onshore regime that would have created exclusive ownership rights within defined geographic offshore areas, the British government opted for a regime that allowed parties to compete to develop and own the transmission facilities necessary to connect offshore generation. Although the Great Britain offshore regime has been criticised in some quarters for delivering "radial", rather than interconnected, solutions, this is unlikely to be an issue in the context of a contestable approach to delivering specific interconnector or associated transmission investments that the PCI process identifies as necessary.

[13] A contestable approach is adopted to offshore transmission in Great Britain, but not currently onshore transmission.

[14] Serrato, E. (2008, December). *Electricity Transmission Sector in Brazil – Analysis of the Auction Results and Public & Private Firms' Costs* [Thesis]. Retrieved from http://www.aneel.gov.br/biblioteca/trabalhos/trabalhos/Artigo_003_Serrato.pdf.

[15] Cambridge Economic Policy Associates (CEPA). (2014). *Contestability in Network Industries*. Retrieved from http://www.cepa.co.uk/corelibs/download.class.php?source=PB&fileName=sysimgdocs/docs/CEPA-Network-Contestability_pb119_1.pdf&file=CEPA%20Network%20Contestability.pdf.

While still in a "settling down" period, the Great Britain offshore regime has been successful in delivering new entrants and sources of funding, attracting £4 billion of investment appetite for the nine transmission projects included in the first tender round, worth some £1.1 billion. New entrants appear to have been successful in financing projects at a lower cost than incumbents, and a recent assessment for Ofgem estimates overall savings of between £300 million and 600 million. If a similar level of savings could be made by adopting a contestable approach to the €105 billion of transmission investment the Commission and others estimate to be required by 2030, then the benefits seen by Europe's electricity consumers would clearly be considerable.

Despite these potential benefits, a contestable approach to interconnector and transmission development would introduce some additional cost and complexity. Developing a contestable regime would involve one-off set-up costs, while additional costs would be incurred every time a competitive tender was run. Individual bidders would also incur costs in preparing their bids and, if successful, in obtaining a transmission licence. Managing the additional interfaces between TSO and potentially numerous transmission owners (TOs) would also increase complexity and cost, while there is some concern that the tendering process could introduce delays in project development.

Some estimate of the materiality of these additional costs and complexity is given in a recent report by Ofgem, who are considering the adoption of a contestable approach to onshore transmission development in Great Britain.[16] In their report, Ofgem estimate additional costs of around 3 to 4 percent over a range of project costs between £500 million and £2 billion, which is significantly less than the estimated percentage savings accrued by the Great Britain offshore regime. Ofgem also note that experience in Great Britain, which has three onshore TOs and multiple smaller offshore TOs, suggests that the additional interfaces created by a contestable approach to transmission development should be quite manageable. It should also be noted that separation of transmission ownership and operation is commonplace throughout the world, which means there are many examples of good practice to be followed.

Conclusion

In order to establish a truly integrated single electricity market and deliver its decarbonisation goals, Europe needs a robust transmission network with adequate levels of interconnection between Member States. This has been recognised by the European Commission, who have imposed a 10 percent target to be met by 2020 and are committed to achieving a 15 percent target by 2030.

However, based on performance to date and despite financial support mechanisms introduced by the Commission, it is unlikely that all incumbent TSOs will have the financial capacity to deliver those targets. Interconnector projects are problematic from a regulatory point of view and, given all the other calls on their resources, TSOs are likely to focus on less complex internal projects. Furthermore, other potential investors who may favour major infrastructure projects can only invest on a merchant basis, which depends on continued market separation to recover investment costs and is therefore fundamentally unsuited to the concept of an integrated single European electricity market.

[16] Ofgem. (2015, March). *Integrated Transmission Planning and Regulation (ITPR) project: Final conclusions*. Retrieved from https://www.ofgem.gov.uk/publications-and-updates/integrated-transmission-planning-and-regulation-itpr-project-final-conclusions.

In order to bridge this investment gap, RAP proposes a contestable approach to interconnector and eventually other transmission investment. Private investors would compete with established TSOs and bid an income stream to build and own transmission assets identified as being necessary by the evolving European transmission planning process. A contestable approach would give regulators comfort that interconnectors and other transmission assets are provided at the lowest cost to consumers. Furthermore, new sources of capital such as pension funds that value stable long-term returns would be introduced to help bridge the current investment gap.

A contestable approach to transmission development is a proven concept that has been adopted internationally. Experience shows that, while a contestable approach introduces some additional complexity, this is outweighed by very significant reductions in overall project costs. A contestable approach therefore offers a practical and proven means of delivering Europe's interconnection targets at a cost significantly below that implied by relying on incumbent TSOs alone.

Annex 1: Redistribution of Welfare Through Interconnection

The most obvious and readily quantifiable benefit of increasing interconnection capacity is the redistribution of welfare that occurs through the convergence of energy prices in the interconnected markets. As illustrated in Figure A1, interconnecting two markets, A (low price) and B (high price), will result in a flow K from Market A to Market B, resulting in some price convergence. If the capacity of the interconnector is sufficiently large, flow K will increase to the point where energy prices in the two markets equalise, i.e., PA' = PB'. In the case depicted however, inadequate interconnector capacity constrains flow K to below that necessary to achieve price convergence and a price differential remains.

The energy transfer via the interconnector has an impact on welfare in both markets. In Market A, the increase in price results in a loss of consumer surplus A+B and an increased producer surplus A+B+C, resulting in a net market welfare gain of C. In Market B, the decrease in energy price increases consumer surplus by D+E+F and reduces producer surplus by D, with a net market welfare gain of E+F. In addition to the redistribution of welfare between consumers and producers, the interconnector flow results in a congestion revenue equal to K*(PB'-PA'), because the energy flowing across the interconnector is being bought at a lower price (PA') and sold at a higher price (PB').

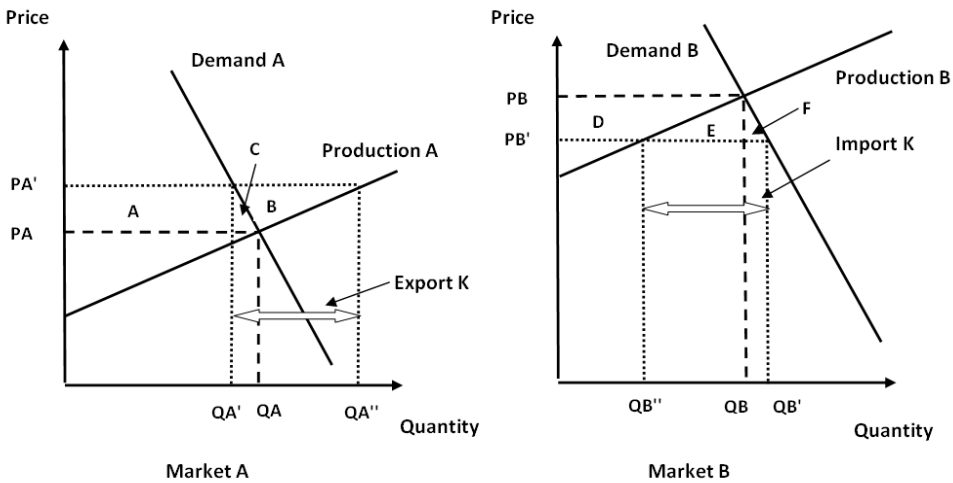

Figure A1. Depicting Transfer of Welfare[17]

This simple example highlights a number of important issues. Firstly, in order for a project to be worth pursuing, the net increase in welfare C+E+F would need to exceed the annuitized project cost. Secondly, NRAs responsible for Markets A and B, who will have the protection of national customer interests as a primary duty, are likely to take quite different views of the attractiveness of increasing interconnector capacity. Thirdly, increasing interconnector capacity will affect generators and consumers differently, and raise issues of welfare transfer between the two and between the two markets. Finally, price differentials across the interconnector create congestion income, which can either be used to address transfer of welfare issues in the case of a regulated project or to recover the capital costs where projects are developed on a merchant-exempt basis.

[17] See Turvey, R. (2006). Interconnector economics. *Energy Policy*, Vol. 34 Issue 13, pp. 1457-1472.