

REPORT TO THE COUNCIL ON EXPERIENCES ON THE IMPLEMENTATION OF THE RECOMMENDATION CONCERNING STRUCTURAL SEPARATION IN REGULATED INDUSTRIES

Introduction

1. This report reviews country experience in implementation of the 2001 “Recommendation of the OECD Council concerning structural separation in regulated industries.”

2. Separation in infrastructure industries divides a formerly integrated company into competitive and non-competitive parts. There are different types of separation that have been used, from “weak” forms, such as accounting, functional or corporate separation, to “strong” forms, such as ownership separation, club ownership, and separation of ownership from control.

3. The main body of the recommendation reads as follows¹:

When faced with a situation in which a regulated firm is or may in the future be operating simultaneously in a non-competitive activity and a potentially competitive complementary activity, Member countries should carefully balance the benefits and costs of structural measures against the benefits and costs of behavioural measures.

The benefits and costs to be balanced include the effects on competition, effects on the quality and cost of regulation, the transition costs of structural modifications and the economic and public benefits of vertical integration, based on the economic characteristics of the industry in the country under review.

The benefits and costs to be balanced should be those recognised by the relevant agency(ies) including the competition authority, based on principles defined by the Member country. This balancing should occur especially in the context of privatisation, liberalisation or regulatory reform.

4. This recommendation was accepted in 2001 after extensive discussion and called for a review after the first three years of experience with the recommendation. This report presents that review.

5. The preparation of this report incorporates:

- Submissions from Members and observers in 2004 and 2005;
- Discussions at 2 meetings of the OECD Competition Committee’s Working Party 2 in 2004;

¹ The complete text of the recommendation is attached as an appendix.

- A February 2005 Working Party 2 roundtable that specifically focused on the cost and benefits of separating railway track infrastructure from railway operations²;
- A report prepared in 2002-2003 to evaluate costs and benefits of structural separation of local loop facilities³ for the TISP Working Party; and
- Findings of a panel of academic experts that discussed their views in Working Party 2 in June, 2004.

6. Overall, the experience suggests:

- The recommendation is still important and relevant;
- Its suggestion to balance the costs and benefits of structural separation still holds, as does the view that the costs and benefits will differ based on the economic characteristics of the industry in the country under review; and
- The Council recommendation should remain in place as it is.

7. The recommendation has been applied in a number of different sectors, such as electricity, gas and railways and, in the last year, structural separation has been seriously considered in areas where it has been little considered before, including the telecommunications local loop and the postal delivery sector. Those telecommunications regulators that have considered structural separation of the local loop, however, have at this time selected solutions that did not go as far as introducing structural separation as the most preferred policy option. The differing incidence of structural separation across sectors may illustrate the fact that the calculus of costs and benefits related to structural separation differs significantly from one sector to another.

8. Substantial movements have been made in the energy sector towards structural separation. A number of notable events have occurred in the electricity sector in recent years that have slowed the movement towards restructuring, notably the California electricity “crisis,” the Great Lakes blackout of August 14, 2003, and the Italian blackout of September 28 2003. The two blackouts occurred for very different reasons from the California “crisis.” While these events are likely not caused by structural separation between generation and transmission, but rather from broader system-design and operation problems, they have given policy makers a reason to pause and ensure that any restructuring that does occur is well designed. One important observation is that the “partial” reform can engender more problems than either full reform or no reform at all.⁴

9. Experience with structural separation in railways has helped to clarify the costs and benefits that should be considered when evaluating possible structural separation. In particular, key findings include that

² For the background note that served as the basis of this discussion, please review DAF/COMP/WP2(2004)6.

³ This report is OECD (2003b) DSTI/ICCP/TISP(2002)13/FINAL.

⁴ See, for example, Paul Joskow’s commentary on the August 14, 2003 blackout:

“The wrangling between pro and anti competition forces, jurisdictional disputes between federal and state policymakers, and plenty of ignorance have led...[the U.S.] electric power system to become stuck somewhere between the old system of regulated monopoly and a new system that relies more on competitive power markets. This is a very bad place to get stuck. If we remain stuck here, there will be much more trouble with electricity down the road.”

there is a relationship between rolling stock construction and maintenance and rail maintenance that is difficult to incorporate into pricing when the rolling stock and rails are operated by different companies, that operational planning for multi-user lines (in particular, in case of delays) is extremely difficult in practice, because of the great complexity of train schedules and the fact that the rail operator likely does not know the time-value of particular trains, and that as a result, congested lines are much more difficult to price properly than less congested lines. As a result, structural separation of rail from other operational parts of a railway is more likely to be successful on less congested lines. Finally, there are substantial economies of scope in rail operation, including switching yards, so that separation can cause a loss of efficiencies related to density of operations.

10. A substantial body of work was prepared by the OECD Secretariat prior to the 2001 recommendation, and it is not the purpose of this report to repeat that work. For a more extensive discussion of principles underlying structural separation, the Working Party 2's prior work is useful, especially "Restructuring public utilities for competition."⁵

11. This report will briefly outline the potential benefits and costs of structural separation and then consider sector experience with structural separation. Among the sectors considered, particular attention will be devoted to electricity, railways, local loop and postal delivery.

Benefits of structural separation in regulated industries

12. Although most regulated industries include at least one segment that cannot sustain competition, this does not imply that every related sector in the same industry cannot sustain competition. For example, although it is not typically possible to have competition in electricity transmission, it is possible to have competition between electricity generators. When competitive and non-competitive activities are complementary and the owner of the non-competitive activity also competes in the competitive activity, the owner may have incentives to use its control over access to the non-competitive component in order to restrict competition.

13. Structural separation can then reduce the disadvantages that would otherwise exist for firms without ownership of the non-competitive activity. Different forms of structural separation differ in their effects, as shown for the "strong" forms of separation in Table 1. But broadly speaking, the main potential benefits are as follows:

- Separation limits the need for certain regulations that are difficult, costly and only partially effective;
- Separation may stimulate innovation and efficiency in the competitive services; and
- Separation helps to eliminate cross subsidisation.⁶

Costs of structural separation in regulated industries

14. While "strong" forms of structural separation have a number of pro-competitive benefits, they also include potentially significant costs, such as:

⁵ OECD (2001b) "Restructuring public utilities for competition." Paris: OECD.

⁶ For further details, see OECD (2001b) "Restructuring public utilities for competition." Paris: OECD

- Separation forces a loss of economies of scope from integrated operation;
- Transaction costs for consumers increase;
- Direct costs of separation can be high;
- System reliability may fall when investments are not made jointly; and
- Accountability for interface problems may be difficult to assign.

Table 1. Summary Assessment of the Pros and Cons of the Structural Policies for Promoting Competition

Policy	Advantages	Disadvantages
Ownership Separation	Eliminates incentives for discrimination; Allows for lighter handed regulation of downstream entities.	Potential loss of economies of scope; May require costly and arbitrary separation.
Club Ownership	Eliminates incentives for discrimination within club	Club may seek to exclude outsiders; may facilitate collusion; only effective in certain circumstances
Operational Separation	May facilitate control of discrimination and anti-competitive behaviour	Possible lack of profit motive reduces incentive to provide innovative and dynamic services

Balancing benefits and costs

15. A full analysis of whether and how to structurally separate a firm weighs the costs and benefits of various structural separation scenarios against the status quo and other possible policy approaches, such as access regulation. The potential benefits and the potential costs may not apply to all separable activities.⁷

16. Access regulation is an alternative tool to structural separation for protecting and promoting competition in the competitive part of an industry with complementary and non-complementary segments. Access regulation has extensive informational requirements, particularly with respect to costs, and requires active regulatory intervention with a need to monitor and control capacity.⁸

17. Costs and benefits differ from sector to sector and from country to country, so uniform recommendations are not possible. Similarly, the experience of one country may not be reflected in the experience of others. For example, the positive outcomes of structural separation of railways in Sweden might not be replicated in countries with greater congestion on railway lines. Balancing thus takes into

⁷ OECD (2003b), for example, argues that regulatory simplification and improved innovation and investment are not evident in the case of structural separation of the local loop because (1) while some regulatory activities would become “redundant” after structural separation of the local loop, new regulatory issues would arise, (2) investment and innovation could suffer after structural separation of the local loop.

⁸ For recent work on access pricing and other challenges of providing access, see OECD (2004) “Access pricing in telecommunications.” Paris: OECD.

account existing infrastructure and differences in production technologies and consumer tastes, as well as the factors identified above.

Sectors

18. Extensive experience with structural separation has now developed in Member countries and this experience served as the basis for the report "Restructuring public utilities for competition." (OECD(2001)) This report identifies a number of industries that feature both competitive and non-competitive components. Table 2 updates these findings to reflect current thinking. Since the time of that report, the OECD has continued its work in this area, with the publication of a report on access pricing with a particular focus on telecommunications (OECD (2004) "Access pricing in telecommunications," Paris: OECD) and co-sponsored a conference "Access Pricing and Structural Separation: A New Synthesis" in Amsterdam in November, 2003.⁹

Table 2. Industries Featuring both Competitive and Non-competitive Components

Sector	Activities which may be Non-competitive	Activities which are potentially competitive
Railways	Track and signalling infrastructure†	Operation of trains Maintenance facilities
Electricity	High-voltage transmission of electricity† Local electricity distribution‡	Electricity generation Electricity "retailing" or "marketing" activities Trading of electricity or network capacity Metering services
Postal Services	Consumer-to-consumer delivery of mail mail in residential areas (except express services)‡	Transportation of mail Delivery of urgent mail or packages Delivery of business-to-consumer and business-to-business bulk mail, especially in high-density areas
Telecommunications	The provision of a ubiquitous network Local residential telephony in rural areas‡	Long-distance services Mobile services Value-added services Local loop services to high volume business customers, especially in high-density areas Local loop services in areas served by broadband (e.g., cable TV) networks and Voice Over Internet Protocol (VOIP)

⁹ The other co-sponsors were with the Netherlands Ministry of Economic Affairs (Knowledge Center on Economic Regulation) and the University of Amsterdam's Economics Network for Competition and Regulation (ENCORE)

Sector	Activities which may be Non-competitive	Activities which are potentially competitive
Gas	High-pressure transmission of gas† Local gas distribution‡	Gas production Gas storage (in absence of network constraints that limit relevant market) Gas "retailing" and "marketing" activities Metering services Trading of gas or network capacity

Sector	Activities which may be Non-competitive	Activities which are potentially competitive
Air services	Airport services such as take-off and landing slots	Aircraft operations Maintenance facilities Catering services
Maritime transport	Port facilities (in certain cities)	Pilot services, port services

Notes:

†Scope for competition varies depending on geography and nature of demand, amongst other things.

‡Services in lower-density, lower volume residential areas are less likely to be competitive than services to high-density, higher volume commercial areas.

19. The purpose of the rest of this paper is to highlight some of the more recent separation experience in OECD Members and non-Members. Particular attention will be paid to lessons in the energy sector and railways. In addition, this report will highlight some of the most recent policy thinking in telecommunications and postal services, where attention is now being paid to balancing the costs and benefits of structural separation. This report will then summarize a number of country experiences as reported in submissions to the Secretariat.

Electricity and gas

20. Incumbent electricity operators throughout the OECD have typically retained a high degree of market power. This power could be mitigated to some extent through increasing the options for purchasers of electricity so that they can choose from among alternative suppliers. But for such a structure to develop, structural separation between transmission and generation is a likely pre-requisite, as is increasing the capacity for importing and exporting electricity. Dividing up the assets of generating firms is another important option that is particularly feasible in countries that have government-owned incumbents. Up until now, even in the federal context (such as the EU or the US) markets continue to be relatively local, though regional markets are increasingly present, as with the Nordic market and the Australian NEM.

21. Recent work of Working Party 2 has shown that market power problems are particularly serious in the electricity market and can have unexpected dimensions. The reasons for this include: (a) Demand for electricity is highly inelastic, particularly for small volume customers who are not exposed to real-time pricing, so that withholding even small amounts of output can have a very substantial impact on price; (b) Since electricity cannot easily be stored, consumption must be matched by production at all points in time; it may be necessary to distinguish separate markets for electricity delivered at different times of the day, month or year, or at peak or off-peak times. (c) When the transmission network is congested, this may create separate geographic markets for electricity in different geographic locations. Some generators may have significant market power in their local area even when electricity is traded across local areas. (d) Since generators often differ in their marginal cost, at any given point in time, some generators in the market may be operating at or near their maximum output so that they are unable to respond to an increase in the market price. Even though there are many generators active in producing electricity at any one point in time, if most of those generators are capacity constrained the remaining generators may be able to exercise significant market power. (OECD(2003a))

22. Because of these supply and demand conditions, when supply-demand balance is tight, operators without long-term contracts may have an incentive to reduce the amount of electricity they supply into a

market in order to increase the scarcity in their market in a way that can drive up prices for the electricity they provide to the daily market. Integrated operators will have an incentive to deny transmission capacity to competitors and to ensure the transmission capacity is not expanded in a way that would increase competition and reduce their own ability to price above the costs of production.

23. Given the propensity of the electricity market to market power, horizontal structural separation (or divestiture) of the generation market is a key policy tool. Some structural separation has been carried out, but on a relatively limited scale. In New Zealand and the UK, the former state-owned integrated electricity utility was separated into three competing parts. In Australia, generating capacity in Victoria was divided into five separate businesses. In Alberta the government used power purchasing arrangements (PPAs) to achieve divestiture of operational control over generation facilities. In Brazil, the privatisation process is accompanied by strict limits on the market share which can be purchased by any one entity. In the US, the state of California required the two largest privately owned utilities to divest half of their thermal generating capacity. (OECD(2003a)) Integration of transmission across markets with separate generators and previous high levels of local market power can achieve similar objectives, though the issue of local market power remains when there is inter-regional congestion.

24. Nevertheless, there remains scope for substantial further horizontal divestiture. The European Commission states that there is a “high level of market power among existing generating companies associated with a lack of liquidity in wholesale and balancing markets which impedes new entrants” and that there is “insufficient interconnection infrastructure between Member States and, where congestion exists, unsatisfactory methods for allocating scarce capacity.” (European Commission (2003)) Of 14 EU member countries (excluding Luxemburg), the capacity share of the three largest generating companies exceeds 50% in 11 countries, and 90% in 5 countries. The Commission has often required structural reforms as a condition for approval of mergers. In the US “efforts to undertake broad deconcentration of electric power markets through divestitures have not been implemented.” (Borenstein, Bushnell and Knittel (1999))

25. In the area of electricity and gas, the European Union has strengthened the types of separation that are required in new directives that were issued for electricity and gas in 2003.¹⁰ In particular, the electricity directive (96/92/EC) that was in force prior to the recommendation required simple accounting separation between the operation of generation and transmission facilities, while the 2003 directive (2003/54/EC) requires legal, organisational and other stronger forms of separation. In gas, the pre-recommendation directive (98/30/EC) required that the distribution system operator be subject to accounting separation from the rest of a vertically integrated entity. This requirement has been strengthened in the 2003 directive (2003/55/EC) to include legal, organisational and decision-making independence from the non-distribution activities of a firm. While these requirements do not extend to ownership separation, European experience does suggest that weak forms of separation, such as accounting separation, do not achieve the public policy objectives that are sought.

26. The electricity directive (2003/54/EC) states:

In order to ensure efficient and non-discriminatory network access it is appropriate that the distribution and transmission systems are operated through legally separate entities where vertically integrated undertakings exist. The Commission should assess measures of equivalent effect, developed by Member States to achieve the aim of this requirement, and, where

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Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC and Directive 2003/55/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in natural gas and repealing Directive 98/30/EC.

appropriate, submit proposals to amend this Directive. It is also appropriate that the transmission and distribution system operators have effective decision-making rights with respect to assets necessary to maintain, operate and develop networks when the assets in question are owned and operated by vertically integrated undertakings. It is necessary that the independence of the distribution system operators and the transmission system operators be guaranteed especially with regard to generation and supply interests. Independent management structures must therefore be put in place between the distribution system operators and the transmission system operators and any generation/supply companies.

It is important however to distinguish between such legal separation and ownership unbundling. Legal separation does not imply a change of ownership of assets and nothing prevents similar or identical employment conditions applying throughout the whole of the vertically integrated undertakings. However, a non-discriminatory decision-making process should be ensured through organisational measures regarding the independence of the decision-makers responsible.

27. The gas directive (2003/55/EC) states:

Where the distribution system operator is part of a vertically integrated undertaking, it shall be independent at least in terms of its legal form, organisation and decision making from other activities not relating to distribution. These rules shall not create an obligation to separate the ownership of assets of the distribution system from the vertically integrated undertaking.

28. Scarpa (2004) suggests that in the 15-European Union member states prior to enlargement, the percentage of the market that has been opened to competition for electricity and gas is similar. However, separation has been less aggressively pursued in the area of gas. National legislation has protected the gas incumbent to a greater degree than the electricity incumbent. The new directives on the energy market in Europe suggest that structural separation is increasingly gaining acceptance in these areas.

Experiences with electricity system problems

29. While the European Union has strengthened the degree of structural separation required in the electricity and gas sectors, a number of prominent negative electricity-related events have recently created a concern among policymakers that structural reforms create harm. The most important events include: the California energy crisis of 2000-2001, the Great Lakes Blackout of 2003, and the Italian blackout of 2003. As noted earlier, the blackouts occurred for reasons very different from those that led to the California "crisis." The drive towards structural reform in electricity markets has lost much force because of misperceptions about these events. While the problems did not arise from separation of generation from transmission operation, they do help to establish the importance of (1) not undertaking "partial" market reforms (2) ensuring that the incentives to build generation capacity include a clear process for approving the construction of new facilities, (3) ensuring that transmission systems are operationally integrated and (4) ensuring that both transmission owners and generators have both an incentive and an ability to build new infrastructure when appropriate. In particular, both the blackouts from 2003 likely would have been much reduced had the transmission operators (1) had a better understanding of real-time system risk on the integrated transmission network, (2) communicated more quickly with adjacent transmission operators and (3) taken the appropriate system-wide actions.

30. Both of the blackouts involved "cross-boundary" transmission failures, illustrating the importance of maintaining system operations that are seamless over the territory in which electricity is traded and produced. According to Joskow (2003) "All countries that have implemented successful electric

market liberalization programs have separated regulated transmission and distribution delivery functions from competitive generation and marketing functions and consolidated ownership of transmission assets to create seamless regional transmission companies.”

31. Each of the negative events will be described in further detail below. The separation of transmission operation from generation does not appear to have been the proximate cause of the problems that occurred. In some respects, these events may be construed, in fact, as suggesting that more reform is needed, not less. Nonetheless, it is important to note that the long-distance trading that arises in actively competitive electricity trading places stresses on the transmission system. Dimensions of system security and adequacy need to be separately understood in this context. More transmission lines will not necessarily lead to improved system security, however more capacity will improve adequacy from a trading/market perspective. Inter-regional trade, unbundling and independent, decentralized decision-making creates a far more complex and inter-dependent operating environment that must be adequately reflected in system operating rules, regulations and practices.

California electricity crisis of 2000-2001

32. The California electricity market was partially de-regulated by a 1996 bill passed by the California state legislature, with a system that began operating in April, 1998. One of the reasons for the restructuring of the market was that the California electricity prices averaged 9.7 cents per kilowatt-hour, compared with the national average of 6.9 cents. The restructured system had a number of distinctive features, including:

- A fixed retail price for electricity (which meant that wholesale market price increases would not be passed on to consumers) thus limiting incentives of customers to reduce consumption;
- Extensive reliance on day-ahead and real-time balancing markets (rather than long-term contracts or effective financial/contractual frameworks for managing and defraying risk);
- Horizontal separation of generation capacity (in which incumbent utilities sold off nearly all their gas-powered generation (producing about 30-40% of the state’s power))
- Extensive reliance on hydro-electric power

33. In the summer of 2000, a number of negative conditions combined to yield a 500% increase in wholesale prices for electricity. High prices continued until the summer of 2001. The negative conditions that helped to foster the price spike included a drought that reduced hydro-electric generation capacity compared to 1996, weather-related increases in consumption of electricity, continued regulation in many nearby electricity-producing regions that limited how much power neighboring utilities were able or willing to sell outside their service areas, a limited ability to price retail usage at rates that would reflect wholesale prices, a large increase in the price of natural gas that fueled the “marginal” generating capacity, and a large increase in the price of permits for NO_x emissions. (See Congressional Budget Office (2001)) In addition, a number of applications to build new capacity had been made prior to the onset of the crisis, but a long timetable for regulatory approvals of new generating capacity meant that the approvals to build had not been provided.

34. These conditions were likely exacerbated by a number of actions of market participants, including the withholding of supply from the market. The effect to a firm of withholding half its supply with inelastic demand conditions could lead to large increases in the prices for the remaining half of its supply. Joskow and Kahn (2002) find evidence that suppliers withheld supply from the market that would

have been profitable for price-taking firms to sell into the market. In particular, they find that in certain areas, average outage rates for generating plants whose output was not contracted forward were between 15% (August, 2000) and 23% (June, 2000). “Such rates are very high in comparison to historical average values for similar plants” which in a benchmark analysis were 7.5%. (Joskow and Kahn (2000)) There have been reports of other types of market manipulation besides unnecessary idling of capacity, such as falsely claiming that output would be sold from one region to another, in order to reduce capacity on transmission lines, or limiting capacity on gas transmission lines. Overall, “In summer 2000, wholesale electricity prices were \$8.98 billion up from \$2.04 billion in summer 1999.” Borenstein, Bushnell and Wolak (2002) find that “21 percent of this increase was due to production costs, 20 percent to competitive rents, and 59 percent to market power.”

35. Apart from the fact that market power can be used to increase electricity prices in a number of previously unexpected ways, lessons learned from the experience include the finding that long-term contracts have a valuable role to play in electricity contracting and can help to reduce incentives to idle capacity supplied to the market, retail rates should be flexible according to wholesale costs with appropriate financial market mechanisms to manage potential fluctuations, increased time-of-use pricing can be critical for making demand more elastic, incentives are needed for building a transmission grid that will better serve potential needs and have the capacity to enlarge the potential geography of generators that can serve a transmission node, and having a large reserve of generating and transmission capacity can ease the transition from regulated to competitive markets.¹¹

36. The State of California ultimately responded to the market problems by raising retail prices by 50% and purchasing over 40 billion USD worth of long-term contracts, up to 20 years in length, for electricity that locked in a high purchase price, estimated at “more than 50% above the expected future spot prices.” (Borenstein (2002))

37. The experience in California does not suggest that structural separation between generation and transmission operation was a proximate cause of the price spike in 2000-2001.

Great Lakes blackout of August 14, 2003

38. On August 14, 2003, a blackout affected large regions of the Midwest and Northeast United States and of Ontario, Canada. The affected area contained an estimated 50 million people. The cost of the blackout in the U.S. has been estimated between 4 and 10 billion USD and for Canada lost manufacturing is estimated at 2.3 billion CAD.

39. According to the joint US-Canadian report produced by the U.S.-Canada Power System Outage Task Force (2004), the first phase of problems consisted of a software problem that involved turning off an automatic operation of system evaluation software, the tripping of a generation unit in northern Ohio and the tripping of a transmission line in southern Ohio due to contact with a tree. After the generator tripped, the system became particularly unstable to any further deterioration in conditions. Soon afterwards, the computer systems of First Energy began to fail and operators were not immediately aware of this. In particular, emergency alarms that produced visual and audible triggers in response to system problems were inactive. Subsequently, three lines were tripped by tree contacts. The First Energy operators were not

¹¹ Maintaining sufficient reserve capacity to meet all potential needs is not necessarily a good policy goal, however; rather, one of the reasons for increased reliance on competitive markets is that regulated markets often overbuild capacity. (See Congressional Budget Office (2001)) More generally, the lessons here are reported in Congressional Budget Office (2001), Borenstein (2002) and Joskow and Kahn (2002).

fully aware of the unstable nature of the system and thus appropriate responses were delayed. Over a nineteen minute period, sixteen lines failed.

40. At this point, the blackout reached cascade status, meaning that the blackout would cascade across other territories outside Ohio in a way that could not be stopped by human intervention. Relays that measure low voltage and high current cannot distinguish between currents and voltages in a cascade from those caused by a fault, so that within 8 minutes of the failure of a major line in northeast Ohio, more than 508 generating units at 265 power plants had been lost.¹²

41. In reviewing the process of the blackout, one of the main factors in the early stages appears to have been that the multiple operators of transmission lines within Ohio were not integrated, so that communication between them about potential problems was highly imperfect. “Seams” between one responsible entity and another were problematic. Even within one company, operators with useful information about system problems were in imperfect communication because they were not in the same room. Greater integration of transmission operation and greater independence of oversight would significantly improve the grid’s operation. However, in a fragmented, largely privately-owned local energy supply context such as that of the U.S., the only practical method for such operations to be seamless and centralized would be through structural separation between transmission operation and investment and local generation and distribution.

42. The Task Force report cites a state regulator: “it is likely that the increased loads and flows across a transmission grid that has experienced little new investment is causing greater ‘stress’ upon the hardware, software and human beings that are critical components of the system.” One source of increased load is likely the transport required by electricity trading transactions as more generators and distant buyers enter the market. Some economists argue that “The larger number of market participants has, in turn, spurred an increase in the use of transmission grid to facilitate those transactions. Increased use of the grid means a greater probability of system disruptions. In light of these changing incentives and market realities, promoting reliability will require new policies and institutions.” (Brennan, Palmer and Martinez (2002))

Italy blackout of September 28, 2003

43. On September 28, 2003, a major blackout struck Italy. This blackout started around 3h30 in the morning and covered most of mainland Italy, as well as Sicily. Approximately 57 million people were affected. Power restoration continued throughout the day, with full restoration by 21h40. The blackout occurred on a Sunday, minimizing effects on production.

44. The Union for the Coordination of Electricity Transmission (UCTE) performed an investigation into the mechanism behind the blackout and produced a report. (UCTE(2004)) According to the report, “The sequence of events was triggered by a trip of the Swiss 380 kV line Mettlen-Lavorgo...caused by a tree flashover.” After the loss of this line, the Swiss coordination center requested to the Italian transmission operator that it reduce Italian imports, as Italy was importing “up to 300 MW more than the agreed schedule.” The reduction in imports occurred within 10 minutes and, along with internal countermeasures taken within the Swiss system, was insufficient to relieve overloads. 14 minutes after the first line was tripped, the line Sils-Soazza also tripped after a tree flashover. “This flashover was probably cause by the sag in the line, due to overheating of the conductors.” Within about 12 seconds, the Italian system was isolated from the European network. This in turn created a fast frequency drop that tripped several generation plants. Subsequently, pump storage plants were shed automatically, and then additional generating units were lost for a variety of reasons. The Italian system then collapsed 2 minutes and 30

¹² The line was the Sammis-Star 345-kV line.

seconds after the separation of the country. The situation might have been avoided had the pump storage units in Italy, close to the Swiss border, been shut down as this would have seriously reduced the load on the Swiss tie-lines to Italy.

45. The report states:

Since the first electricity Directive of 1996, the countries of the European Union have been forerunners of a transmission system model with independent Transmission System Operators (TSOs). The new Directive of 2003 has added, among others, legal unbundling and the necessity of effective TSO decision-making rights with respect to the network assets, their operation, maintenance and development.

The blackout and subsequent investigation has cast no doubt on this model in principle. On the contrary, the lack of a grid operator's empowerment and independence could be identified as a potential security risk.

A basic recommendation to be made in this respect is the fact that in a liberalised market, the interconnected countries, as far as it is not yet the case, should adopt this TSO model in order to prevent incompatibilities with possible consequences on the system operation and network security.

Concerning this broadly accepted principle of TSO empowerment to control the flows on the system, it involves several tasks for which the TSOs must be in charge in a transparent and non-discriminatory way, on the one hand vis-à-vis market participants and on the other hand vis-à-vis neighbouring TSOs. These tasks include the assessment of transmission capacity, the redispatch of generation or the activation of reserves when security is at stake, as last resort measure the management of defence plans, etc.

A clearly identified risk regarding system security is the possible lack of adequacy between generation and load, either on a general or a regional level. Although it is out of UCTE scope to give further recommendations on the actual type of market rules and incentives regarding adequacy, the necessity was clearly identified. On a general level, adequacy implies also the harmonization on several issues such as taxation, building permission and environmental constraints. Distortions regarding these elements lead to non-balanced developments, putting strains on the system and thus generating security risks. (UCTE, 2004, p.10)

46. The report on the Italy blackout thus finds no fault with structural separation between generation and transmission. Rather, the report concludes that the transmission system operator must be given clear rights of decision-making with respect to network assets, operation, maintenance and development. To the extent new cross-border capacities are needed, regulations should enable parts of the system to develop in ways that do not generate increased reliability risks.¹³

¹³

Some observers suggest that system security and reliability are fundamentally different dimensions of the reliability question. System security under the current N-1 protocol can be maintained irrespective of the adequacy of transmission capacity for inter-regional trade. Excess capacity may provide relief, but only temporarily when trade is driven by chronic price differences between trading regions. The ultimate outcome from increased capacity in such a situation is more flows in a system that still runs at the bounds of its security constraints. From a security perspective, highest rates of return may arise from investment in operator tools and operator skills.

Railways

47. The railways sector is an area where the trade-offs between structural separation and vertical integration are quite difficult to disentangle. More than half of the OECD countries have some experience with allowing independent train operators to provide services, while maintaining the incumbent operator vertically integrated. For example, Finland has fully separated train dispatching from an integrated train operator-infrastructure maintenance company and France has fully separated train operations from a train dispatching-infrastructure management company. A few countries have gone further to prevent the owner of the track infrastructure from operating trains. In the UK, responsibility for the track infrastructure was, for several years, in the hands of a private for-profit company, subject to government regulation. In the European Union, EU directives impose accounting separation between the rail infrastructure and service providers.

48. Vertical separation is a second best option to be considered only in situations where the first best, i.e. infrastructure competition, is not possible. Certain route configurations are amenable to infrastructure competition, such as those in the U.S. where different operators may have their own separate tracks for connecting major cities via different routes. Furthermore, when the service activity that is separated is not predominant, there is greater probability that the benefits of vertical integration would be minimized. In particular there may be good reasons to separate freight operations of an incumbent from its other operations in order to promote entry and competition among alternative suppliers. On the other hand it may be much more difficult to introduce competition in passenger services because, contrary to freight, passenger services are often provided through concessions rather than through multiple operators over the same route, particularly because many passenger services are subsidised.

49. Over the last few years a number of researchers have suggested that there is a need to re-assess the arguments in favour of vertical separation in the rail sector.¹⁴ The recent Working Party 2 roundtable on structural separation in railways reviewed recent developments in railways regulatory reforms. Recent research based on U.S. data on freight services presented to the working party suggested that a “fully integrated firm would have a 20-40 percent cost advantage over a vertically separated system where the operating company provided bulk and general freight services.” (Ivaldi and McCollough (2004)) While these results do not translate directly into all markets, particularly those dominated by passenger services, they do suggest that advocates of vertical separation in rail face a high burden of proof.

50. Maintaining integrated rail operators can make entry by new train operators difficult. An integrated incumbent can deter profitable entry by a newcomer in various ways, including:

- Margin squeezes (final prices too low with respect to access charges for an equally efficient competitor to enter profitably)
- Refusal to supply (e.g. for last mile services where the incumbent has a monopoly)
- Offers to make track investment in regions/municipalities which order train operations from the incumbents.

¹⁴

See for example Pfund (2002), Pfund (2003), Stagecoach (2001). “The passenger train operating companies wish to take control of day to day operations, signalling and timetabling for the part of the network for which they are responsible, although freight operators are not happy with this proposal.” (Nash, Shires and Matthews, 2004, pp. 47-48). In a recent newspaper article, several train operating companies are reported as being in favour of increased integration (Guardian, 25 November 2004 citing GNER, FirstGroup and MerseyRail).

51. Because of deterred entry under integration, in many cases incumbents remain the sole providers of rail transport services, which can lead to high retail prices, poor service and inefficient cost structures propped up by non-transparent state subsidies, to the detriment of clients, tax payers, and the inter-modal market share of rail in relation to road. In any case the market power of rail monopolies is disciplined, even though not fully, by inter-modal competition. For example, the ability of road transport to serve as an alternative for freight and passenger service, limits the ability of integrated incumbents to set unduly high prices for many services. Similarly, for certain long-distance routes, air transport may limit the ability of railways to set unduly high prices. However, even when prices are disciplined by intermodal competition, a concern often remains about quality of service and limited innovation and ability to control costs, which together can result in declining market share for rail.

Vertical separation of the rail infrastructure

52. Vertical separation makes regulation much more complex and requires new mechanisms for resolving conflicts in train path allocation decisions, for enforcing standards at the wheel-rail interface, and for determining who is to blame for delays. In addition, the regulator must ensure the provision of an efficient level of quality (including safety) of the track infrastructure and efficient and timely investment in upgrades to the track infrastructure.

53. The higher cost of regulation under vertical separation needs to be balanced with the positive effect on competition vertical separation may produce. An integrated firm will often have a strong incentive to prevent the development of competition in the provision of rail services. It can do this by increasing the access or wholesale prices relative to the end-user prices, by reducing the quality of the access service provided to the rival relative to the quality of the service it provides itself, or by in other ways, using its position as owner of the essential input to benefit its own downstream firm relative to the rival. In the absence of vertical separation, enforceable access rights combined with independent path allocation may be useful for preventing integrated companies from making questionable allocation decisions.¹⁵

Difficulties in the regulation of a vertically separated rail sector

54. The major regulatory problem with vertical separation is that it may be difficult for the rail infrastructure to cover its costs if access charges are calculated without any reference to final demand. Furthermore vertical separation may make it more difficult to deal with congestion and ensure that externalities are properly taken into account in decision making. Finally in a vertically separated rail system it may be harder to ensure the quality of the infrastructure services. Note that not all railway policy makers agree about the importance of these points; some would assert that these difficulties are of a technical nature that could be overcome by sound regulation.

1. *It may be harder for the regulator to set fully efficient prices for access to the track infrastructure when regulating the prices for the track infrastructure directly than when regulating the prices for the end-user services.*

If the track infrastructure must recover a contribution to its fixed costs through charging for some services above marginal cost, economic theory clearly demonstrates that it is efficient for the mark-up

¹⁵ For example, if an integrated incumbent cancels a service, a new entrant could have the right to take it over. If an integrated incumbent favours passenger over freight when freight has higher benefits, a regulator may be able to ensure opportunities for new freight entrants.

above marginal cost in the access charges to be related to the elasticity of demand for the end-user services produced using the access service (this is known as Ramsey pricing). But if the regulator does not know or cannot observe the precise nature of the goods or passengers carried by a train it cannot correctly relate the track access charges to the end-user demand for these services.

The 1998 OECD roundtable on rail noted: “Separation of track from [train] services will make the application of Ramsey efficient pricing very difficult, if not actually impossible”.¹⁶

The inability of the regulator to properly differentiate the track access charges may, in principle, limit the ability of rivals to compete and/or may undermine the ability of the track infrastructure to efficiently recover a contribution to its fixed costs. Since the fixed costs of the infrastructure are a larger share of total costs in rail than in other transport modes¹⁷ this is a relatively more important issue than in other transport modes. The magnitude of this concern will depend on the share of the total train traffic operated by the infrastructure owner and whether or not the infrastructure owner attempts to recover all infrastructure costs in track access charges.¹⁸

2. It may be harder to manage congestion and ensure efficient use of the available infrastructure capacity.

The addition of a new train service on part of the infrastructure may displace one or more existing services, particularly when the network is congested and/or the new service operates at a different speed to the existing services. In principle, adding a new service to an existing network is efficient only if the value of the new services exceeds the economic value of the displaced services. On an integrated rail network this analysis can be carried out as a simple internal cost-benefit trade-off. In a network in which there are a large number of independent operators, obtaining efficient use of capacity requires a mechanism for efficiently allocating scarce network capacity. Again, allocating scarce network capacity requires either prolonged and costly negotiations between the interested parties or a decision by an independent allocation authority. As before, an administrative allocation mechanism is unlikely to be able to obtain all the necessary information and make any necessary trade-offs efficiently. In some cases it is theoretically possible to allocate scarce capacity efficiently with an auction mechanism, though in practical terms this may be unlikely to succeed except on a low-volume single-track line. In practice, it is not yet possible to point to examples of the use of auctions to allocate access to track infrastructure.

“Efficient, safe, and delay-minimising utilisation of track and yard facilities by trains, cars and shipments requires close coordination in accordance with priorities that are driven by considerations of both operations and shipper sensitivities. Competing [train] operators will compete vigorously and acrimoniously over scarce or congested infrastructure facilities and constantly sorting out their claims will be important for the overall efficient and responsive operation of the rail system.”¹⁹

BTRE (2003) write: “When the railway is integrated, internal liaison between the infrastructure and train service areas is used to resolve conflicting objectives. ... With internal transactions, the firm’s broad objectives are more likely to be shared by the constituent train service and infrastructure

¹⁶ OECD (1998), page 202.

¹⁷ See Pittman (2004). In the case of UK Railtrack the fixed costs account for some 90% of total costs and about 75% in the case of the SNCF: Profillidis (2001), page 21.

¹⁸ Profillidis (2001) reports that the cost recovery of track access charges ranges from near zero in the Netherlands to 15% in Sweden and Belgium, 30% in France, 40% in Italy and 70% in Switzerland.

¹⁹ Kessides and Willig (1998), page 164.

departments. When access is mandated, a greater degree of liaison is required and objectives are more likely to differ and conflict. ... As the number of external firms rise, the contractual arrangements and the number of interfaces are multiplied. These multiple interfaces duplicate the tasks originally coordinated internally by a single group of managers. The complexity of interaction between the infrastructure manager and the train operators increases disproportionately because, as arrangements become more intricate, disproportionately more resources are required to coordinate and resolve conflicts between the extra train path market players. The potential exists therefore, that where routes or networks are approaching capacity, the level of transaction and coordination costs may exceed the benefits flowing from the access reform”.^{20 21}

As before, the magnitude of this cost will depend in part on the share of the total train traffic operated by the infrastructure manager. The larger the proportion of traffic operated by the incumbent, the smaller the likely number of train operators which are affected by any new service.

3. *It may be harder to properly control the external costs which trains may impose on other train operators, or on the infrastructure owner.*

A rail network which is operating close to full capacity is often likened to a very large machine – each component of the machine must inter-operate smoothly without inflicting harm or undue wear on other parts of the machine. At the same time each part of the machine must strictly maintain a pre-arranged schedule of movements to ensure the overall smooth operation of the machine.

A fault on one train can have significant follow-on consequences in the form of delays on other train services. In a fully-integrated rail industry the incumbent takes this “externality” into account when deciding how much to maintain the trains to prevent breakdown and delays. However, a new entrant, which only operates a small proportion of the total number of trains does not incur the full costs of delays caused by failures of its own trains – it only incurs the direct costs, so has less incentive to maintain its rolling stock. Efficient operation of the network requires, therefore, that the regulator develop mechanisms for internalising the costs of delays which train companies impose on other train operators. A mechanism of this kind was attempted in the UK.

This need to minimise the impact of delays caused by new entrants is particularly important when rail forms part of a just-in-time production process: “When rail transport is a critical element of the production process, the production efficiency may be adversely affected by mandated access. For example, if a power station operates its own coal mine and train line, then mandated access may attract third-party train operations that affect the efficiency of that ‘conveyor-belt’-like production process”.²²

As already noted, trains may not only impose costs on other train operators but also on the track infrastructure in the form of damage or wear. In an integrated rail industry these costs are taken into account with no need for negotiation or explicit incentive arrangements. However, it may be necessary to develop explicit incentive mechanisms to induce independent train operators to take into account the effects of their decisions on the design or maintenance of the rolling stock on the infrastructure.

²⁰ BTRE (2003), page 15.

²¹ Even under open access and full fragmentation, train operators can act to deter entry by competitors. In the case of coal for power stations, for example, an incumbent can purchase paths on critical routes at key times so that alternative carriers would not be able to easily fulfil the power station’s turnaround schedule.

²² BTRE (2003), page 16.

“The train operator may have less incentive than an integrated operator to introduce or maintain rolling stock that minimises wear and damage to the track. ... Further the train operator may have standards in wheel condition (and, possibly in overloading wagons) that differs from the integrated operator’s optimal wheel condition. ... More generally, to the extent that the wheel-rail interface emerges with separate train and track operations, incentives need to be set to optimise operator use or infrastructure provision. Damage to infrastructure can be considerable – especially where wheel defects lead to a derailment. Preventative maintenance and monitoring of wheel sets at terminals can minimise but not eliminate such events.”²³

As noted above, these problems may arise not just as a result of the failure to maintain the rolling stock but also in the design of the rolling stock itself. The BTRE notes that “The Chief Executive of Britain’s Network Rail apports blame for the British network’s endemic ‘gauge corner cracking’ problem (which led to the Hatfield accident in October 2000) to the stiffer suspension of new rolling stock.”²⁴

As before, it might be expected that the costs of enforcing standards requirements on train operators would increase with the share of the traffic provided by independent train operating companies.

4. *It may be harder for the regulator to ensure adequate incentives to maintain the quality of the infrastructure than for an integrated rail and rolling stock owner.*

The quality of the track infrastructure can affect the speed, safety, and timeliness of train services as well as the level of maintenance costs incurred by train operators. A key issue, therefore, is the ease of creating incentives to maintain infrastructure quality and the effectiveness of those incentives.

Creating the right incentives for a rail infrastructure owner is not always successful. In the UK, the rail regulator sought to create incentives for maintaining track quality based on a set of indicators for monitoring the quality of the infrastructure.²⁵ However, it is not clear that the overall regulatory regime was effective. Indeed the UK government notes that “the Hatfield accident in 2000 revealed the extent of [the] deterioration [in the track] and the company’s poor understanding of asset conditions ... The wholesale imposition of speed restrictions across the network caused a steep decline in reliability and required RailTrack to make vast penalty payments to the train companies”.²⁶

Furthermore, the UK regulatory regime explicitly recognised that a failure to maintain the track could lead to delays to the train operators. They implemented a system of financial incentives based on penalty payments for each minute a train was delayed. The number of minutes of delay was allocated to either a train company or to the track owner, RailTrack. In practice, however, these financial penalty payments were sufficiently large as to create substantial incentives on the train companies to seek to have the blame for delays allocated somewhere else.

²³ BTRE (2003), page 20.

²⁴ BTRE (2003), footnote 15 citing the Railway Gazette International, 2002, “Getting the network back on the rails”, December, 755-758.

²⁵ The ORR 1999 report on access charges included the following paragraph: “All track on the RailTrack network is monitored by use of a track geometry recording car. Depending upon the particular features of the unit, all relevant measures that categorise the infrastructure side of the wheel/rail interface are already measured in a robust and repeatable manner and summarised using developed analysis and reporting tools.” ORR (1999), para 171.

²⁶ UK Dept of Transport (2004), page 13.

“In the three years to 2002/03, the train companies retained between £150 and £200 million of compensation paid to them by Network Rail. This meant that in each of the three years some train companies retained more compensation than their total operating profit. This can be a substantial distraction from the real tasks of improving performance and generating genuine income for the industry, as well as encouraging companies to seek to allocate responsibility for delays elsewhere, rather than prevent them”.²⁷ “More than 300 people are employed by railway companies to argue among themselves about who is to blame for late trains and who will pay... the high cost attached to delaying trains has been linked to a rise in unsafe working practices and a decline in maintenance standards”.²⁸

Poorly maintained track can also have a direct impact on the wear on the rolling stock. “It has been estimated that between 40 per cent and 50 per cent of wagon maintenance costs and 25 per cent of locomotive maintenance costs are related to wheel maintenance”.²⁹ “One British report has noted that the access charge should reflect track quality as rough track accelerates wear on rolling stock”.³⁰ Again, these costs are internalised in an integrated operator but must be explicitly incentivised when train operations are provided by an entity other than the infrastructure owner. The importance of these incentives is larger the smaller the share of the train traffic operated by the infrastructure provider.

Not all experiences with track maintenance have been comparable to that of the UK. In particular, the UK track was already in poor condition at the time of the rail privatisation. So maintenance problems under the privatised infrastructure manager may be largely due to maintenance problems from the time of integrated, government-controlled operation combined with an unwillingness by the government to invest in railway track maintenance. Thus the UK experience does not prove the inability of structural separation to work in railways.

Problems with quality and investment in infrastructure may take many years to be revealed. BTRE note that it may not be possible to assess the success of structural reforms on the basis of changes in freight rates and the market share of new entrants. “We have a concern about the cost recovery and sustainability of the railways. The detrimental impact of mandated access may only become apparent in the longer term, due to the ability of railways to run down their assets over extended periods without materially affecting the train operations”.³¹

5. Finally, especially in Europe, the existence of country specific technical standards may strongly reduce the potential benefits of vertical separation/competition.

A further challenge with vertical separation is that competition in rail services may be difficult to come about because of technical problems. For example in the EU there are technical incompatibilities across international borders that include differences in gauge of track, differences in voltage for operations, differences in language and signage, particularly for signalling, so that drivers would have to speak the local language. While the difference in voltage is not an insuperable difficulty (because multi-voltage engines do exist) such engines cost 1.5 times the cost of a dedicated voltage engine. For example, Italy, Poland and the Slovak Republic have comparable voltage. An

²⁷ UK Dept of Transport (2004), page 19.

²⁸ Financial Times 4 June 2001.

²⁹ BTRE (2003), page 19 citing Railway Gazette International, 2003, “Knowledge of the wheel-rail interface incomplete”, July, 427.

³⁰ BTRE (2003) page 19 citing ORR (1999).

³¹ BTRE (2003), page 22.

Italian entrant seeking a used locomotive would either have to obtain rights to use a locomotive from the incumbent Italian rail company or from a company in Poland or Slovak Republic. In any of these cases, the cost of obtaining such a locomotive and transporting it to the desired location could be higher than if neighbouring countries had comparable voltage. Thus even if structural separation is fully implemented, technical differences may reduce the amount of cross-border traffic. This is why the first and second railway packages of directives for the opening of railway markets foresee a number of measures to increase interoperability of the European railway systems including a mandatory specification for high speed rail systems (adopted in 2002), a common system for safety certificates and the establishment of the European Railway Agency which, among other tasks, will establish, register and monitor technical specifications for interoperability.

55. In summary, allowing train operators access to track infrastructure owned by another company has the potential to promote competition for certain rail services and to expand the range of seamless services which any one rail company can provide. However, vertical separation may impose quite a significant burden on the regulator – as the share of the infrastructure owner in the total train traffic declines. Its incentives to maintain the infrastructure, and to invest in upgrading the infrastructure in a timely manner, also declines. The limited country experience with separation suggests that adequately replicating all of these incentives through regulatory mechanisms is difficult. More generally, the economics of railway systems in different countries can vary substantially, so chosen policy solutions should be appropriately tailored to the problems that are present.

56. According to the European Commission however, in the European Union there is no alternative to separation (and to technical convergence) in order to promote cross-border traffic. Otherwise, incumbents would have many possibilities to block or make more difficult the access to the network for their foreign competitors. According to the Commission, without such a cross-border competition developing, incumbents could keep their national monopolies and the separation of the different national markets in the EU would continue.

Telecommunications

57. The telecommunications sector is one in which the relative costs and benefits of vertical separation is still a subject of great debate. On the one hand, the Working Party on Telecommunications and Information Service Policies (TISP) produced a report that attempted to address the comparative costs and benefits of vertical separation of the local loop and suggested that vertical separation was not an option that merited implementation.³² This report suggests that the potential benefits of ownership separation, such as reduced regulation and stimulation of innovation, may not apply in the case of the local loop. On the other hand, in at least two Member countries, a form of operational separation designed to promote functional equivalence to full structural separation has recently been pursued. Effective operational separation has the potential to allay pervasive, longstanding and potentially unavoidable problems that have affected access regulation.

58. Different Member countries have made different assessments of conditions in their markets. In one Member country, for example, the government has chosen policies to promote platform competition among integrated providers, including incumbent operators, cable, and wireless. Not all countries would be equally capable of pursuing such policies, however, particularly as levels of infrastructure build-out differ across OECD countries. Some observers would suggest that rolling out a new access infrastructure from scratch has, up to this point, not succeeded fully in achieving effective competition, so the benefits of relying on platform competition may be limited in many OECD countries.

³²

This report was declassified by the ICCP Committee in October, 2003.

59. The telecom sector is somewhat distinct from the others in the sense that the non-incumbent operator seeking access and interconnection could be a competitor of the infrastructure operations of the incumbent.³³ The telecommunications infrastructure is still, however, largely characterized by legacy infrastructure built under exclusive rights that cannot be duplicated in a reasonable time period at economically acceptable conditions. This is particularly the case as regards the network that connects final consumers to the local switches, i.e., the “local loop”. In addition, given changes in technology and market entry, the need for access to the incumbent’s network may not be stable over time. For example, since IP-enabled service applications, such as VoIP, need not be tied to the platform over which they are transmitted, competition for such services can take place over any broadband connection to the Internet, and is not necessarily dependent on specific physical arrangements between the service provider and the network owner, as was the case with older technologies. VoIP providers can still be affected in their ability to compete, however, by policies concerning access to the underlying platforms and tying to the provider’s own competing services.

60. Moreover, to the extent that the telecom sector can sustain competition from alternative platforms, structural separation could adversely affect incentives for investment in new platforms. For example, in the United States, competition among separate physical platforms is developing in the market for broadband connections to end users. Alternative platform providers include cable companies and wireline telecom operators (which currently are the two most significant service providers) as well as mobile wireless 3G service providers and providers of other technologies such as fixed wireless. Availability, price and quality affect the competitive impact of the alternative platforms but cable, where it provides broadband services, has had the largest competitive impact. Given these market conditions, the U.S. FCC has designed its policies to promote investment in competing next-generation broadband platforms by eliminating or declining to impose access obligations that could deter such investment. Not all countries have the same breadth of alternative infrastructure in place as the United States, however, so these policies may not be equally applicable in other OECD countries.

61. The TISP report states that regulation to prevent monopoly pricing would remain necessary even after structural separation of the local loop. It further states that:

There are concerns over whether there will be adequate investment in network infrastructure when providers are denied the revenues and consequent incentives that flow from vertical integration. This problem is acute in the telecommunications industry, where technological change is rapid and where investment demands are pressing. Problems of co-ordinating investment between the wholesale and retail operators would also impede investment and innovation. These problems could be considerable and could serve to delay the extension of fibre closer to the customer. (OECD, 2003b, p.24)

62. The TISP report concludes with regards to local loop separation:

Vertical separation is a significant intervention in the market place with substantial and –unlike behaviour regulation which can be reversed – irreversible costs. Seemingly simple in concept, structural separation of the local loop is in practice complex with uncertain outcomes and many questions to be answered. The benefits of structural separation of the local loop are uncertain while the costs are certain and appear potentially large. There is little evidence that the benefits of structural separation of the local loop are sufficiently in excess of costs. Accordingly, it would seem more sensible to persevere with the current regulatory approach (with appropriate improvements and augmented by sanctions). Only if regulatory authorities can show that the

³³ For example, a mobile operator obtaining access to the fixed line network may compete both with the mobile operations of the incumbent and with the fixed line operations of the incumbent.

benefits are in excess of the costs, and that alternative regulatory approaches would not work, should consideration be given to the structural separation of the local loop. (OECD, 2003b, p. 32)

63. One of the arguments in the TISP report was that prior experience did not exist to establish the exact benefits of structural separation. Nonetheless, authorities can try to assess such benefits, particularly when they feel that competition is stymied in the existing framework.

64. OECD countries have treated the topic of enhancing equal access to the local loop in a variety of ways. At this point, no OECD Member has chosen to pursue structural separation of the local loop. While Australia and the UK have broached the possibility of structural separation of the local loop, both countries have ultimately chosen not to seek it. Many countries pursue weaker forms of separation, such as accounting or operational separation. The UK's recent Strategic Review of the Telecom Sector is of interest, particularly because of the decision reached to pursue functional equivalence to structural separation, without requiring an actual separation of ownership of the local loop portion of British Telecom. The experience of many other countries is identified in more detail in the section below on country experiences with the telecommunications sector.

65. In the UK, the Ofcom Strategic Review of the telecom sector (Phase 2 consultation document) suggests that enduring problems exist despite many years of regulation and different types of regulation and argues that "a continuation of the status quo is neither acceptable nor desirable." (Ofcom, 2004, pp. 11-12) The Phase 2 consultation document identified three primary options for future paths for the telecom sector in the UK. One of these three options is a referral to the Competition Commission that could, potentially, also lead to vertical separation of the incumbent telecom provider.

66. One of the challenges with a full vertical separation of telecom would be that the appropriate boundary of separation might change over time (due to the development of competitors networks and with new technologies) perhaps differs by geography and that forced separation itself could be lengthy and costly. Therefore Ofcom's document placed significant emphasis on and expressed a preference for functional equivalence, which is "The requirement for alternative network operators and service providers, in buying wholesale products from BT, to assess the same products using the same processes as BT's retail division." Ofcom states:

We believe that [tackling the problem of inequality of access] ... can be achieved without the disruption and costs associated with a move towards the structural separation of BT. Delivery of equality of access in this way has two components: equivalence at the product level, and clear behavioural changes by BT.

At the product level, equality of access implies that BT's wholesale customers should have access to:

- The same or a similar set of regulated wholesale products as BT's own retail activities;
- At the same prices as BT's own retail activities; and
- Using the same or similar transactional processes as BT's own retail activities.

This is our definition of what is often called *equivalence*. There are different models of equivalence. For all *new* regulated wholesale products and some key existing ones, we believe that a strong model is needed in which BT is required to offer exactly the same wholesale products to its wholesale customers as to its own retail activities. For *existing* products, we propose to assess each case on its merits. It may be that for some products, the costs of product and process redesign required by this

type of equivalence would not be merited given their limited lifespan. In these cases, BT should be required to offer similar but not identical products and processes.

In addition to changes at the product level, substantial behavioural changes by BT are also fundamental to solving the problem of inequality of access.

[C]ontinued complaints from BT's wholesale customers raise concerns that some types of behaviour by BT – such as inappropriate information sharing, inferior processes, and lack of priority for wholesale customers' product development – are both unfair and commonplace. The way that BT conducts its internal business creates both the incentive and the means for unfair treatment of this nature. Even where individual allegations are not proven, it is clear from the views of BT's wholesale customers that the current systems do not deliver the transparency and confidence that BT's customers require. Achieving equality of access would require:

- A significant shift in BT's behaviour at an organisational level in support of equivalence at the product level;
- Changes in management structures, incentives and business processes, which today remain as a consequence of BT's historic structure as a vertically-integrated operator;
- Information flows within BT which mirror the information flows between BT and its wholesale customers, so that its customers are able to influence BT to the same extent that different parts of BT can influence each other; and
- That this level of equivalence within the organisation can be demonstrated through transparency. (Ofcom, 2004, pp. 14-15)

67. One important point is that, within this “soft separation” framework, managerial incentives within a company can be designed and segmented so that managerial success and compensation is linked not to the overall objectives of total firm profitability but to the objectives of business units. Thus wholesale managers may be given incentives that may run contrary to the interests of their retail manager colleagues.

68. In particular, according to the Enterprise Act 2002, Ofcom on 22 September, 2005 accepted undertakings from BT in lieu of making a reference to the Competition Commission since it had “reasonable grounds for suspecting” that there were features that distorted competition but the undertakings were appropriate at addressing the concerns and offered a “comprehensive solution”. The undertakings include the following broad measures:

- Equivalence of input, as defined in the Phase 2 document, will apply to a number of identified existing and future wholesale products;
- A separate BT division, termed Access Service Division (ASD), will be set up to supply wholesale products. A number of detailed measures aim at ensuring that the ASD is an independent and functionally separated division;
- A number of other organisation provisions also aim at preventing inappropriate information flows, including a stronger organisational separation (Chinese Walls) between existing BT Wholesale and Retail Divisions;

- Wholesale products based on next generation networks (the so called 21st Century Next) will also be subject to a similar set of arrangements as existing products; and
- An Equivalence of Access Board (EAB) will be set up to ensure compliance with these undertakings and will send minutes of its proceedings to Ofcom.

Postal services

69. While telecommunications services have already benefited from competition in a number of areas and over many years now, postal services are relatively young to competition and slowly opening to new entrants. During this process, access to incumbent facilities, particularly for letter delivery, has become a key issue. While no OECD postal service has yet separated its postal delivery function from the rest of its postal operation, this possibility is now being considered by at least one OECD government. The UK's postal regulator, the Postal Services Commission (Postcomm) is involved in a Competitive Market Review of the postal market. This review is occurring in the context of increasing efforts by new entrants to compete with the UK postal service, the Royal Mail. Postcomm suggests that economies of scale are sufficiently large in some areas of postal activity that entrants cannot reasonably accomplish certain tasks at a reasonable cost in comparison to the Royal Mail. Postcomm has encouraged access arrangements to be arranged between Royal mail and access seekers. In order to improve the prospects for competition, "some stakeholders believed that more effort was needed to tackle some of the barriers to entry and innovation in the market." One of suggestions for doing so was to increase "ring-fencing and separation between Royal Mail's business units." (Postcomm (2004), p. 32)

70. In terms of "ring-fencing" and structural separation, the report states:

One approach to any ring-fencing is to require Royal Mail to introduce greater separation into its regulatory accounts. In 2003/04, Royal Mail has included basic financial data by pipeline activity to Postcomm (in a confidential annex to the regulatory accounts). This is a useful indicator of the relative costs of the different pipeline activities and therefore gives a good indication as to Royal Mail's view of the appropriate difference between retail prices and access prices.

Another solution put forward by Postwatch and other stakeholders to the problem of inferior access terms (i.e. higher prices or poorer quality of service) being offered to a rival is vertical separation of Royal Mail. This would involve the separation of Royal Mail's upstream and downstream activities into two businesses. This is an approach that has been adopted for other utilities in the UK, such as gas and electricity.

Such a step would help to reduce the incentives on the downstream business offering more favourable terms to mail being received from 'Royal Mail upstream'. Regarding price, the downstream business would simply be interested in making a profit (irrespective of where the mail came from). It is likely to need to be price controlled, but supporters of this form of separation argue that Royal Mail would have little incentive to offer anything other than the same price to any operator depositing mail with it. Equally, it would have little incentive to offer a different quality of service to different operators.

Over time, structural separation could also help reduce regulation over the postal industry. While the economies of scale in downstream operations make competitive entry more difficult in delivery, competition upstream is probably more likely. This could reduce (in the longer term) the need for regulation of Royal Mail's upstream activities if new entrants successfully win

market share from Royal Mail, reducing Royal Mail's dominance upstream. This means that regulation could perhaps be narrowed over time to just local delivery.

Structural separation has potential disadvantages. An integrated Royal Mail has obvious incentives to coordinate investment in and improve its delivery activities, in order to improve the product it can offer to its own customers. A downstream business (in a monopoly situation) could have less of an incentive to invest, other than those incentives provided by the regulator.

There are also questions as to the appropriate point in the value chain where Royal Mail could be split. If the company were split between the mail centres and delivery offices, there may be a requirement for investment at delivery offices for sorting mail. In addition, inward mail centres are usually the same as outward mail centres (depending on the time of day).

To the extent that various parts of the value chain share common and joint costs, separation may lead to an increase in total costs due to the duplication of overheads, for example.

Finally, the costs of implementing structural separation may not be trivial, especially if they require ongoing monitoring and compliance costs. (Postcomm, 2004, pp. 36-37)

71. The summaries above provide only an outline of the analysis that would need to be undertaken rather than a full analysis. However, the approach of weighing costs and benefits is consistent with the methodology of the 2001 Council Recommendation concerning structural separation in regulated industries.

Summary of country experiences

72. Up to this point, this report has considered a selected set of examples related to structural separation, but has not addressed the rich wealth of experience across the OECD as a whole. The purpose of this section of the report is to summarize the broader OECD experience, based on delegation submissions over the course of 2004-2005 that have been received by the Secretariat and that focus on structural separation.

Electricity

- Australia* The introduction of electricity-specific and gas-specific industry access codes has established a right of third parties to negotiate access to services provided by electricity and gas networks. Between 1993-94 and 2003-4, total average real electricity prices have fallen by 14.6 %. Generally, Australia considers benefits must be evaluated in the context of the overall NCP reforms and that improvements are not wholly attributable to structural separation.
- In July 2004, the ACCC considered a merger that would re-integrate generation, transmission, distribution, and retail interests. Court-enforceable undertakings were offered that would provide for the separation of the transmission and generation businesses with commitments to non-discrimination and enhanced ring-fencing.
- Austria* According to the new Austrian Electricity Act, the unbundling of the network from other parts of the distribution chain (generation, trading, and retail) is obligatory.
- Canada* The degree of electricity restructuring that has taken place varies greatly from one province to another. Ontario and Alberta have undertaken extensive pro-competitive restructuring. Both jurisdictions have central wholesale markets. However, a period of high prices in fall 2002 led the Ontario government to reintroduce price controls for household electricity customers and in January, 2004 retreated from various aspects of the initial restructuring plan. A revised market structure is in the process of being put in place.
- European Commission* Directive 2003/54/EC concerning the common rules for the internal market in electricity foresees that transmission system operators that are part of a vertically integrated undertaking shall be independent at least in terms of its legal form, organisation and decision making from other activities not relating to transmission not later than 1 July 2004. For distribution system operators the same rules apply, however EU Member States may postpone the implementation of the unbundling rules until 1 July 2007 and may decide not to apply the unbundling rules for undertakings serving less than 100.000 connected customers. The above described rules are a minimum requirement, i.e. EU Member States can opt for stricter unbundling rules. No later than 1 January 2006 the European Commission has to submit a report to the European Parliament and the Council about the progress in creating the internal electricity market. The report must cover amongst others the effectiveness of the existing unbundling rules and can propose a revision of the existing rules.
- Finland* In 1997, the main national transmission grid was separated from other electricity companies to form a public limited company also controlling the cross-border transmission network to neighbouring countries. The largest and second-largest electricity companies are largely vertically integrated. To limit abuse of dominant positions, accounting separation has been introduced for vertically integrated companies engaged in generation, transmission,

distribution, and retail/trading. Today there is also a legal separation obligation for the larger distribution network operators, or about one-third of such networks.

Hungary

The state has maintained ownership of the transmission grid and much wholesaling, while many generators and all distributors are separated from the transmission grid.

As from 2001, the electricity sector was gradually opened to competition and eligible customers above a certain level of consumption received the right to choose their suppliers. About 15% of customers switched and customers who switched early saw their prices decline by 10%, while customers who joined later could not buy at these price levels. The scope of eligible consumers was extended to all non-household consumers in 2004. Cross-border capacities for importing electricity may constitute a bottleneck.

Japan

While structural separation has not occurred since the 2001 recommendation, there was a vigorous debate about how to structure the electricity market. The scope of retail choice has been expanded for large users. Japan has chosen to implement behavioral regulations, including accounting separation, establish a neutral system organization to formulate rules on network utilization, arbitration and settlement of disputes, and abolished “rate-pancaking” in which transmission charges are imposed each time power crosses a system operator’s control area.

Korea

In April 2001, power transmission was separated from other parts of electricity company operation. The former state-owned monopoly, KEPCO, had its power generation divided into six companies. For the five steam power companies, privatization is under way. In May 2004, a guideline was introduced for the power distribution sector that would not split off power distribution and would introduce an independent business unit to consolidate internal competition. The policy to continuously spread competition is being pursued.

Mexico

There is no structural separation of the two main electricity companies in Mexico. Currently, 12.6% of electricity is generated by the private sector, and increased private sector investment may be important for meeting future demand.

A number of bills are under consideration for the electricity sector, largely differentiated by the extent and type of structural separation envisioned.

Netherlands

Regional distribution networks are owned by four major regional companies. The Minister of Economic Affairs announced that he plans to implement a split of ownership between network management and other energy activities, because network management is not sufficiently independent. Customers of one company were contacted after its liquidation by the commercial branch of the network operator’s group. This indicated that the network operator had passed on information to the commercial arm of the business.

- New Zealand* Structural separation was implemented in the mid to late 1990s separating the national grid. In 1998, the government legislated full ownership separation on lines and energy, requiring lines to be in separate ownership from generation and retailing within five years. The overall effects of separation on prices is difficult to determine because a number of other factors were also active, such as two hydro shortages, the early depletion of a major field supplying gas for electricity generation and the erosion of surplus generating capacity. The vertical integration of generators and retailers appears to have made it difficult for new standalone retail operators to enter the market. The Commerce Commission does not consider that structural separation in and of itself is a solution to abuse of market power
- Norway* The Norwegian grid and generator operators are highly dispersed and small. The competition authority considers that a higher degree of separation between grid and other activities would be desirable to prevent companies from favouring their associated suppliers.
- Portugal* The transmission system operator (TSO) is corporately separate from the main generator (EDP) but 30% owned by EDP. The TSO is required to provide third party access to its network. Interconnection with foreign markets is limited. A proposed takeover of GDP by EDP and ENI was prohibited by the European Commission at the end of 2004 on the grounds that EDP and GDP were assessed as likely competitors in the gas and electricity markets.
- Slovak Republic* The production, transfer, distribution and sale of electricity has been separated by ownership. It is still the case that one enterprise generates most of the electricity supply (about 80%).
- The Government approved the transactional documents in the year 2004 on a basis of which SE, a.s. will be privatised – the Italian company ENEL will acquire 66% of stocks. The Italian company signed the Contract on Acquisition on February 17, 2005. After fulfilling the suspensory conditions, so-called closing begins and after its successful finish, EENEL should enter SE as 66% shareholder.
- Spain* Structural separation between regulated and competitive activities was established in 1997, with the owner of the transmission network required to provide transport to private electricity producers in a transparent and non-discriminatory manner.
- Sweden* The opening to competition in 1996 has been felt to promote efficiency-enhancing structural change and contributed to lower electricity prices for both large and small customers, despite the fact that the total price has risen as a result of increased taxation and effects of the EU emission trading system.
- Switzerland* Electricity prices remain high in Switzerland, where no structural separation has occurred and a proposal for new legislation was rejected in a referendum in

2002. The electricity companies have undertaken to form a transmission company that operates through club ownership. The Swiss Competition Commission has approved its creation if, among other conditions, the company grants non-discriminatory access to third companies and ensures independence of its management.

U.K. The electricity industry was privatised in 1990 with structural separation from the outset. There has been some reversal of separation in the electricity industry with, in particular, reintegration of competitive upstream and downstream elements (generation and supply). These linkages do not affect ownership of the natural monopoly transmission elements, so the competition authority has in general approved such mergers.

U.S. Structural separation between generation and transmission has slowed in the wake of the problems in the California energy markets in the summer and fall of 2000. While California revoked its deregulation statute after these problems, it is again considering retail competition for large commercial and industrial customers.

The Federal Energy Regulatory Commission (FERC) strengthened its enforcement capability in light of the problems, establishing the Office of Market Oversight and Investigations.

The FERC continues to encourage regional transmission operators (RTOs) in which transmission owning utilities cede operation of their wires to a neutral operator unaffiliated with any generator in the region.

An international panel investigating the August 2003 Great Lakes blackout did not blame deregulation of electricity markets for the outage but rather a failure by some utilities to comply with voluntary Electric Reliability Council best practice standards. Congress is now proposing to create an organization responsible for monitoring and enforcement of the reliability of the electrical transmission grid.

Gas

Australia A gas-specific industry access code has established a right of third parties to negotiate access to services provided by electricity and gas networks.

European Commission Directive 2003/55/EC concerning the common rules for the internal market in natural gas foresees that transmission system operators that are part of a vertically integrated undertaking shall be independent at least in terms of its legal form, organisation and decision making from other activities not relating to transmission not later than 1 July 2004. For distribution system operators the same rules apply, however EU Member States may postpone the implementation of the unbundling rules until 1 July 2007 and may decide not to apply the unbundling rules for undertakings serving less than 100.000 connected customers. In addition accounting unbundling is compulsory for

storage and LNG system operators. The above described rules are a minimum requirement, i.e. EU Member States can opt for stricter unbundling rules. No later than 1 January 2006 the European Commission has to submit a report to the European Parliament and the Council about the progress in creating the internal electricity market. The report must cover amongst others the effectiveness of the existing unbundling rules and can propose a revision of the existing rules.

Finland

Currently, gas is solely imported from Russia by Gasum. Open competition is postponed until the grid has been connected to the European network. Consumers cannot import directly but a small secondary market has been established recently to trade unused gas. The 2001 Natural Gas Act requires the unbundling of supply from the grid.

Japan

In April 2004, liberalisation was provided for large customers. Behavioral regulations have been pursued, including accounting separation. Third-party access rules have been reinforced.

Korea

Since November 2004, the direct import of self-used LNG is allowed for private companies, such as certain power generation companies. This is expected to strengthen competition for the company that had previously enjoyed the import monopoly. Structural reform is expected to be implemented by eliminating entry barriers rather than splitting off or privatization.

Mexico

Regulations prevent vertical integration between distribution and transport within each geographic zone. In 2002, the competition authority actively intervened to prevent the holder of a permit for distribution in a geographic zone from transporting natural gas in that zone.

Attempts to address Pemex's substantial market power have encountered difficulties, largely because of informational asymmetric between Pemex and the gas regulator.

Netherlands

The national gas transport network is managed by a company part-owned by the state. Regional gas distribution networks in the Netherlands are owned by four main regional companies.

New Zealand

Gas has not been structurally separated, in part because of the presence of inter-fuel competition and because of the existence of long-term supply contracts in the industry.

- Portugal* One company has received exclusive rights for import, high-pressure transport and re-gasification activities. This company controls 5 of the 6 gas distributors through a subsidiary. A proposed takeover of GDP by EDP and ENI was prohibited by the European Commission at the end of 2004 on the grounds that EDP and GDP were assessed as likely competitors in the gas and electricity markets.
- Slovak Republic* One company acts for the transit of natural gas, the purchase of natural gas for domestic consumption and its distribution and sale to final customers.
- Switzerland* Structural separation does not exist. Certain facilities are operated through club ownership, so access is in theory open to large industrial clients. But gas prices are about twice the OECD average. This suggests that club ownership does not ensure access and competition. Structural separation in gas is considered lower priority than reform of electricity laws.
- U.K.* British Gas was privatised as an integrated monopoly in 1986. It internally separated its transportation and supply businesses in the mid-1990s before demerging into two companies, Centrica and BG plc, in 1997. Competition had been extended to every type of gas customer by 1998. Transco, the operator of the gas transportation and distribution networks, is a regulated monopoly. Transco is in the process of selling some of its eight gas distribution networks (DNs). Whether or not these transactions are completed, all the DNs are currently and will remain subject to regulation by Ofgem. Each DN will be subject to a regular price control review (typically once every five years) that determines the allowed revenue that can be recovered through its transportation charges. The DN licensees will also be subject to a number of statutory and licence requirements, for example to ensure no undue discrimination between users of its network.
- U.S.* The natural gas industry is now separated into clear production, transmission, distribution and sales sectors. The FERC has effectively made interstate pipelines “transportation-only” companies.

Telecommunications

- Australia* Australia has well established telecommunications specific laws which provide access to bottleneck services and prohibit anti-competitive conduct.
- A review of the telecommunications competition framework in 2005 confirmed the existing regulatory regime provided a sound basis to promote competition. Australia is currently enhancing competition measures through operational separation of its incumbent carrier Telstra. Operational separation is designed to promote equivalence and transparency for Telstra’s wholesale customers and to compliment the existing regulatory regime.

Under the new arrangements Telstra will be required to maintain separate retail, wholesale and network business units, including separate staff and premises. Equivalent standards of service must be provided for Telstra's common support functions supplied to retail business units and wholesale customers, with published internal contracts to set out the conditions upon which the network business units provide services to the wholesale and retail business units.

Telstra will be required to provide improved service access and information to wholesale customers, including regular reviews, information on network deployment, a wholesale service improvement strategy and reporting on exchange access. The competition regulator will have responsibility for ensuring compliance with operational separation requirements. A review of operational separation and telecommunications competition policy is planned for June 2009.

Austria

There is no structural separation in the telecom sector.

Belgium

The Act of 1991 states that fixed line operators are not allowed to use income from telecommunications services on markets where these operators have significant market power to cross-subsidise other telecommunications services. Such operators have to organise their accounting in such a way that the operational results regarding telecommunications services for which they have significant market power, are separated from the results regarding other telecommunications services. The Royal Decree of 4 October 1999 describes the accounting principles to be applied in order to distinguish at least the following activities in the accounting:

- The core network;
- Local access;
- Retail activities such as provision of voice telephony and leased lines;
- Other telecom activities.

The separate accounts were established by the telecommunications incumbent from 2000 onwards. The separate accounts are checked annually by independent auditors.

The Belgian telecom incumbent does not have a cable network and does not control a cable company either. The main Belgian cable operator also provides telephone services.

Canada

There has been no structural separation of the local loop and unbundling has been chosen to provide access to competitors. There has been significant dispute about whether the unbundled network elements have been defined and priced properly.

Concern regarding vertical integration of local and long distance service providers has declined with the growth of mobile wireless, cable telephony and Internet-based telephony (VOIP).

Finland

The Telecommunications Market Act (1997) obliges unbundling of network and operational services. A new law has taken effect in July 2003, the Communications Market Act, with an aim to promote technological neutrality in regulation.

Hungary

Telecom regulations contain provisions on accounting and functional separation, but structural separation has not been implemented and is not foreseen in the telecom act.

Italy

In Italy the issue of the structural separation in the telecommunication industry has been approached mainly in the light of the equal treatment and no discrimination principle, which is one of the leading principles of EU legislation. In 2000 the Italian Communications Authority (AGCom) started a preliminary investigation to assess the opportunity to take steps to ensure compliance with the requirement of internal and external treatment. Within a public consultation many contributions were provided by numerous competitive fixed and mobile voice telephony operators and by Telecom Italia. Following these hearings and assessing further technical, economic and regulatory aspects a Resolution – called 152/02/CONS – was finally adopted by the AGCom in 2002. This Resolution seeks the equal treatment of operators using Telecom Italia's wholesale services and imposes the following obligations on Telecom Italia:

- Separation between the business units dedicated to retail services from those dedicated to network management (both for access and transport, as requested by the Italian competitive operators in 2002);
- Separation between the business units dedicated to retail services from those dedicated to selling network and wholesale services and to managing the relevant contracts;
- Separation between the information systems of the network and commercial departments. This separation is certified on annual basis by an independent auditor who issues a report to the AGCom;
- The adoption of internal procedures, certified by an independent auditor, which prevent that confidential data used by the network department on competitive operators' customers may be exploited by the commercial departments.

Competitive operators which have already activated 5,1% of Telecom Italia's copper lines, as of end of September 2005.

Korea

Structural separation of the formerly state owned telecom provider, Korea Telecommunications (KT), has not occurred, in light of the social benefits arising from vertical integration and the costs of vertical separation. Accounting separation has been implemented along with local loop unbundling. At the end of 2000, KT accounted for 99.3% of local calls, 83.4% of long-distance domestic calls, and 49.5% of international calls. By 2003, the figures changes to 95.4%, 77% and 39.7% respectively.

Mexico

Telmex implemented changes in its network to allow long distance interconnections with competitors in 1997. There are currently 9 competing long-distance carriers in 200 out of 406 local areas. Market openness has been delayed due to technical unavailability of switching facilities.

Behavioral controls of Telmex have been limited because of amparo rulings, even though Telmex has been deemed to have substantial market power by the Mexican competition authority.

In 2004, the WTO ruled that Mexico: (a) failed to ensure that Telmex provided interconnection at cost-oriented rates; (b) did not maintain appropriate measures to prevent anti-competitive practices; (c) failed to ensure appropriate access to the public switched telephone network; and (d) failed to ensure the U.S. commercial companies had adequate access to private line circuits.

Netherlands

Separation in the telecom sector is very light, with the telecom regulator having the option to impose access pricing and separate accounting obligations. When OPTA has completed its market analyses at the end of 2004, proposed solutions will become clearer.

Access obligations have been imposed on cable operators to provide third party access for broadband.

New Zealand

In 2001, New Zealand introduced a revised regulatory regime, with the Telecommunications Commissioner within the Commerce Commission with the power to resolve disputes over access to defined network services. Structural separation was not considered to offer net benefits. New Zealand no longer requires access separation because the access regime focuses on efficient pricing of access services instead of historical or management accounting costs.

Portugal

Strong forms of structural separation have not been implemented in Portugal, with the telecom incumbent even controlling the main cable company.

Spain

Indirect and direct access are the two primary modalities for the fixed telephone market. For the mobile phone market, dominant operator in the interconnection market must reveal their costs for providing service.

- Sweden* Prices for telecom services and equipment have fallen by fully 17 percent relative to CPI between 1990 and 2004. The major cable TV operator, previously owned by the incumbent Telia, has launched telephony services. As a result of the Telia/Sonera merger, Telia has been required to divest all cable TV services in Sweden, and fixed and mobile network business are held in separate legal entities that are distinct from related retail activities.
- Switzerland* The largest cable TV operator was sold by the telecommunications incumbent and hence the incumbent's dominant position was reduced. The cable operator in 2003 launched an offer for voice and high-speed services at competitive prices. Unbundling the local loop is being discussed in parliament.
- Turkey* During the privatisation process of Turk Telecom, the incumbent telecoms operator in Turkey, the Competition Board, in order to encourage facility-based competition, opined that Cable TV infrastructure should be divested and sold as a separate legal entity, together with all the rights related to the ownership and operation of this infrastructure. Moreover, the Competition Board advised that the Internet branch of Turk Telecom should be separated from its other facilities in its accounts, activities, and decision-making and be organized as a separate legal entity (with no constraints on its ownership), and the dominant GSM network operator and its shareholders are not allowed to participate in the tender on its own or to obtain direct or indirect controlling rights over Turk Telecom. The Opinion of the Competition Board was adopted by the Privatisation Administration and Turk Telecom was privatised after Cable-TV infrastructure was separated. Moreover, in line with the Opinion of the Competition Board, tender specifications included the conditions that shareholders of the dominant GSM network could not participate in the tender and that separation of the internet service provider of the incumbent would be realised within 6 months following the acquisition.
- U.K.* In November 2003, Ofcom commenced a review of the case for the structural separation or operational separation of BT or for the delivery of full functional equivalence. In November 2004, Ofcom set out its view that the BT access network remained an enduring bottleneck and that as a consequence competition in the fixed line telecoms was stifled. Ofcom consulted on the options of full structural separation or requiring BT to allow real equality of access to its networks. In September 2005, Ofcom accepted legally-binding undertakings from BT to create a new regulatory approach to the access infrastructure of BT. This involved operational separation of BT's Access Services Division (named Open Reach) and the requirement for BT to provide Equivalence of Input (same product, price, process) to other telecoms providers.
- U.S.* The U.S. has moved away from stringent structural separation between vertically related carriers. The Regional Bell Operation Companies (RBOCs) now provide long distance service in all states, subject to certain structural, accounting, and transactional requirements separating activities in the local and

long-distance markets. These RBOC requirements have lapsed in many states by operation of law.

Consistent with 1996 statutory amendments designed to promote competition in the provision of telecommunications services, local competitors now play an active role in the provision of local service – and particularly the provision of service to medium and large enterprises – in many U.S. jurisdictions.

If continued growth takes place in the availability of services provided over alternative platforms (including mobile and cable-based telephony) and those services prove to be adequate substitutes for RBOC wireline services, this could further alleviate concerns regarding the vertical integration of local and long distance providers.

Railways

Australia

The Australian Rail Track Corporation (ARTC) has been established as an independent provider of access to the interstate rail network. This has provided a one-stop shop for access seekers but has simultaneously created vertical separation of the ownership, accounting, and operational activities of interstate rail. Under ARTC, estimates indicate that tariff rates have decreased by 25% on the Melbourne to Perth corridor and train lengths East-West have increased by 5-6 %.

In states characterised by vertical integration and non-prescriptive access regimes (principally Victoria) competitive above-track entry has not occurred.

Austria

According to the new Austrian legislation of the rail industry (2004) the Austrian Federal Railways were split up into nine different companies under the head of the holding company (ÖBB Holding AG). New entry first occurred in 2001. While there are three passenger operators (including the “national” operator) and 12 freight operators (including the “national” operator) the national operator ÖBB maintains a very high market share.

Canada

Canadian railways are vertically integrated. Access regulation – interswitching, competitive line rates and running rights – has been the policy tool chosen to promote competition in the sector. There have been very few instances of the regulatory agency granting competitive line rates or running rights; however, there are several instances of private negotiations of interswitching and running rights. To encourage the use of access, Bill C44 which was tabled into the House of Commons on March 24, 2005 contains amendments to the interswitching provisions and the competitive line rates provisions now known as the competitive connection rates provisions.

Denmark

From 1997, the track infrastructure (except local rail) was separated from the incumbent rail operator by forming a separate state-owned enterprise that operates under the auspices of the Ministry of transport. The freight company was separated from the passenger operator and, since 2001, has been run by a

private company. Rail freight plays a minor role in Danish rail, but there are six operators (including the “national” operator, now owned by Railion). There are 11 passenger operators (including the “national” operator).

European Commission

The European Commission adopted a directive that took previously required accounting separation a further step by requiring, *inter alia*, that certain essential functions for non-discriminatory network access are carried out independently of the provision of rail transport services.

In a Commission proposal of March 2004, open access to the rail passenger market would be subject to the right of each Member State to safeguard services of a general economic interest.

Finland

The EU rules are implemented, with corporatisation and functional separation of activities, but so far no new entry has occurred. Unbundling of infrastructure occurred in 1995. Rail transport has been partially opened to competition by the Rail Transport Act which entered into force in March 2003. National freight transport will be opened to competition in 2008; rail passenger transport will probably continue to be regulated even after 2008. The aim of structural reform in the Finnish railway sector is to create equal conditions for competition in rail transport. A technical barrier hampering international competition is the different rail track gauge compared to the other European countries.

France

In 1997, RFF was created as a state-owned company to own the French rail network and serve as an independent infrastructure manager. SNCF serves as a railway undertaking that operates passenger main lines, passenger regional services and freight. Since 2003, RFF has permitted access to freight international traffic for railway undertakings with an operating license and safety certificate. At least two freight operators now exist in addition to the incumbent.

Germany

The German railways law is not seeking complete ownership separation between network and operations, but the infrastructure manager will be independent from intra-group instructions regarding the setting of train-path pricing and allocation of train paths. There will be an accounting separation between track network and operation and an independent rail track agency. DBAG is a federally owned company with separate subsidiaries for infrastructure, passenger and freight operations. It remains by far the largest operator, but there are a number of other freight and passenger operations and many regional services are put out to tender.

Hungary

On 1 May, 2004, the rail freight market was liberalised. Four operators have been granted licenses and the two vertically integrated incumbents have strongly resisted. The national operator MAV still has 98% of the rail market.

- Italy* The incumbent railway company was restructured in 2001 so that infrastructure management and transport operation have been divided into two separate legal entities owned by a holding company. Passengers, freight and regional services are organised internally with three different divisions. Network access, capacity allocation and infrastructure charging have been regulated since 2000. Besides the “national” operator there are four passenger operators (mainly at a regional level) and almost 10 freight operators (operating in local niche markets and Alps crossings).
- Japan* The passenger railways own and operate the rail infrastructure on which they provide service. The freight operator has been separated from the passenger rail companies. Increasingly, vertical separation is being used as a device to finance rail development with public funds while passenger operations would rest in the hands of a separate operator.
- Korea* In 2005, access to the track by third parties will be allowed. The Korea Rail Network Authority, a state-owned non-profit entity, is in charge of construction work and infrastructure management. Maintenance and repair are covered by the Korea Railway Corporation, a public corporation 100% financed by the government that provides passenger and freight operational services.
- Mexico* After 1996, the railways were privatised and split into three regional lines, sharing the Mexico City Terminal, the major node. The node is equally and jointly owned by the three companies and the government, thus guaranteeing equal access. Apart from this shared point, railways remained vertically integrated.
- Between 1996 and 2003, railways increased their share in freight transport from 13.3 to 17%, transported tons increased by 53% tons/kilometer increased 37%, personnel productivity increases of 357%, consumer complaints fell by 66%, and accidents decreased by over 80%.
- Netherlands* Economic separation of infrastructure provision and delivery of transport services was introduced in 2002. This occurred as a result of experiences with legal separation that were not positive. Direct on-track competition did not appear to work well largely because of the difficult of successfully organizing competition in densely operated track. The Ministry of Transport sets the framework for charging, issuing concessions for passenger transport and infrastructure management. The NMa is the national competition authority and rail regulatory body which considers appeals related to infrastructure charges. Prorail, the infrastructure manager, is a fully state-owned company under private law and has access contracts with railway undertakings. Based on exclusive concessions, the main passenger operator is NS. There are eight railway undertakings active in freight.

- Poland* A reform in 2000 incorporated a number of business entities including a manager of railway infrastructure, a carrier of goods, a carrier of regional passengers and a carrier of passengers. The joint stock company that owns these entities is not a manager of infrastructure and is not involved in transport operations. The infrastructure manager is responsible for providing access to the railway infrastructure and sets basic fees according to a relatively simple, public formula. As of January 25, 2005, a total of 90 licenses have been granted for rail carriage of passengers and goods, as well as 51 licenses to railway carriers.
- Portugal* Railway infrastructure has been separated from transport operation for seven years, but little entry has occurred for transport operation. The liberalization of rail services, future of public subsidies and scope for cross-modal competition will be key issues for potential entry in the future.
- Slovak Republic* The process of structural separation in the railway sector in the Slovak Republic began in the year 2000. Rail and operation services were separated in the year 2002, freight and passenger services have been separated in the year 2005. In March 2005, the Government approved that the freight company CARG Slovakia will be privatised.
- Spain* The Act of the Railways sector entered into force on December 31, 2004 and required accounting separation and corporate separation between transport service provision and infrastructure provision. Several companies have applied for the authorisation to act as railway transport operators.
- Sweden* Liberalisation of the railway sector in Sweden began in the 1980s and track maintenance and railway operations were divided in 1988. The national railway was split into a public service enterprise responsible for railway transports, Statens Järnvägar (SJ) and a government agency responsible for infrastructure, the Swedish National Rail Administration. Freight rail traffic was opened to competition in 1996. Freight transport on rail has developed in a positive way, with a high market share by international comparison. A separate state authority, the National Public Transport Agency was in the late 1990s assigned the task to procure unprofitable inter-regional passenger rail services. In 2001, the incumbent public rail operator was split into several liability corporations - one of them. SJ AB, operating passenger traffic and another, Green Cargo AB, operating freight traffic. SJ AB still enjoys exclusive rights to inter-regional passenger services on routes that the company considers profitable. The liberalisation of the railway sector in Sweden has resulted in a number of new actors entering the markets both for passenger and freight rail services, but SJ AB and Green Cargo still have very high market shares.
- Switzerland* Organisational structural separation has been required. Financing of regional and long-distance transportation were strictly separated in 1996. Non-discriminatory mandated access is required in freight transport. While passenger services have remain relatively closed, competitors to the largest incumbent gained market share up to 12% in 2003 by ton kilometres. There are six freight operators and 27 passenger operators.

U.K.

The UK mainline rail industry was privatised into three main separate elements, a national rail infrastructure company, Railtrack plc; rail passenger train and freight operating companies and three rolling stock leasing companies. Competition amongst rail passenger train companies is achieved by competition for the market, through franchises, rather than through 'on-track' competition in the market. However, non-franchised ('open access') passenger train companies are able to apply to run passenger services. Rail freight operators do not operate by way of a franchise and are free to compete in the rail freight market. In October 2001, the Transport Secretary was successful in petitioning the High Court to put Railtrack plc into Railway Administration. Network Rail Infrastructure Limited, the 'not for dividend' body, formally took responsibility for GB's mainline track, signals and stations in October 2002. Regulation of rail services has been restructured following a new Railways Act (2005), which saw responsibility for rail safety coming under the jurisdiction of the Office of Rail Regulation and the abolition of the Strategic Rail Authority, the rail passenger franchising authority, whose responsibilities in respect of franchising have been transferred to the Secretary of State for Transport.

U.S.

The freight railroads are vertically integrated and in most parts of the country, and the passenger carrier Amtrak operates over the freight railroads' infrastructure. Route and source competition has been the chosen approach in freight. A number of proposals have been made to increase the ability of shippers to insist upon service from competing train companies over monopoly track, but these proposals have not been successful.

Post

Belgium

The separation in Belgian postal companies between services that are open vs. not-open to competition is as follows:

- A statutory distinction is made between reserved (not open to competition) and non-reserved (open to competition) services in Article 144 octies of the Act of 21 March 1991 ('the Act') on the reform of certain economic public companies. The reserve area is reduced to 50 grammes from 1 January 2006.
- The financing between both types of services needs to remain separated. In its article 144 ter, 6°, the Act outlaws the funding of services open to competition by revenues from services not open to competition.
- With regard to accounting, the Act lays down that La Poste should keep separate accounts for at least each of the services that come under the reserved services and the services that come under the non-reserved services.
- The separation between reserved and non-reserved services has implications in terms of pricing that were elaborated in the management contract between La Poste and the Belgian state.

- There is no far-reaching organisation or functional separation at La Poste, except that one has to find that in effect, more and more of La Poste's services are entrusted to the care of subsidiaries of La Poste, such as Exbo, Speos, Taxipost and Deltamedia.

<i>European Commission</i>	<p>In the Deutsche Post I decision, Deutsche Post undertook to create a separate legal entity within the Deutsche Post group to avoid cross-subsidization of commercial parcel delivery services.</p> <p>The Postal Directive imposes accounting separation, but this appears not to impede continued cross-subsidisation.</p>
<i>Finland</i>	<p>In 1994, commercial functions were separated from regulatory functions and complete <i>de jure</i> liberalisation of the postal market took place. Entry to postal deliveries less than 2 kg is nonetheless subject to a license and there are specific requirements such as daily delivery, the fact that Finland Post owns its own register and problems with access to its network. A Universal Service Obligation fee is collected from companies with restricted licenses, which may be as high as 20%, although currently Post Finland receives no compensation for its Universal Services Obligation.</p>
<i>Mexico</i>	<p>The postal sector remains an activity reserved to the state, while express and parcel service have been opened to competition.</p>
<i>Netherlands</i>	<p>A debate on the future regulation of the postal market has taken place this year. The outcome is that access regulation is planned for the main delivery network and that no form of structural separation will be implemented.</p>
<i>Netherlands</i>	<p>Schiphol airport is allowed to own interests in aviation companies but has never made use of this right.</p>
<i>Netherlands</i>	<p>The government will be splitting up the network of transmitters and the service (programming) business. The government will retain ownership of transmitters with a view to ensuring non-discriminatory, transparent, and open access.</p>
<i>New Zealand</i>	<p>New Zealand removed statutory barriers to competition in postal services in 1998. No structural separation was introduced. The incumbent is obliged to provide "fair and reasonable" access to its network to competing operators. Some competition has developed, although the scale is modest.</p>
<i>Sweden</i>	<p>No structural separation took place after liberalization in 1993. Actual and potential competition has boosted efficiency in the postal services. Conditions governing access to the postal network have become a topical issue. The Swedish Competition Authority has had more than 100 competition cases concerning Posten.</p>
<i>Switzerland</i>	<p>Postal services are considered different than other network industries because sunk costs are lower. Parcel delivery has been opened in 2004.</p>

Further liberalization is envisioned in 2006, depending on experience with the liberalization process.

U.K. Postcomm has recently published proposals for full liberalisation of postal service by January 1, 2006. There are strong economies of scale in postal services, particularly in the final mile deliveries.

U.S. The longstanding workshare program of the U.S. Postal Service (USPS) allows large customers to obtain discounts equivalent to the avoided costs of the USPS for sorting and transportation functions that the USPS would otherwise perform.

Other sectors

<i>Netherlands</i>	Airports	Schiphol airport is allowed to own interests in aviation companies but has never made use of this right.
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<i>Netherlands</i>	Radio	The government will be splitting up the network of transmitters and the service (programming) business. The government will retain ownership of transmitters with a view to ensuring non-discriminatory, transparent, and open access.
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<i>Portugal</i>	Water	Vertical integration between multi-municipality concessions and retail level distribution services is not very frequent.
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Sources for all tables: Written contributions and, for the railways table, ECMT (2005).

APPENDIX

RECOMMENDATION OF THE COUNCIL CONCERNING STRUCTURAL SEPARATION IN REGULATED INDUSTRIES

C(2001)78/FINAL

(adopted by the Council at its 1003rd session on 26 April 2001 [C/M(2001)9, Item 134])

THE COUNCIL,

Having regard to Article 5 b) of the Convention on the Organisation for Economic Co-operation and Development of 14th December 1960;

Having regard to the agreement reached at the 1997 Meeting of the Council at Ministerial level to reform economic regulations in all sectors to stimulate competition [C/MIN(97)10], and in particular to:

"(i) separate potentially competitive activities from regulated utility networks, and otherwise restructure as needed to reduce the market power of incumbents;

(ii) guarantee access to essential network facilities to all market entrants on a transparent and non-discriminatory basis"

Having regard to the report "Structural Separation in Regulated Industries" [DAFFE/CLP(2001)11].

Recognising that there are differences in the characteristics of industries and countries, differences in the processes of regulatory reform and differences in the recognition of the effectiveness of structural measures, behavioural measures and so on, and that such differences should be taken into account when considering structural issues;

Recognising that regulated firms, especially in network industries, often operate in both non-competitive and in competitive complementary activities;

Recognising that the degree of competition which can be sustained in the competitive complementary activities varies, but that when these activities can sustain effective competition it is desirable to facilitate such competition as a tool for controlling costs, promoting innovation, and enhancing the quality of the regulation overall, ultimately to the benefit of final users and consumers;

Recognising that, in this context, the regulated firm has the ability, in the absence of antitrust or regulatory controls, to restrict competition by restricting the quality or other terms at which rival upstream or downstream firms are granted access to the services of the non-competitive activity, restricting the capacity of the non-competitive activity so as to limit the scope for new entry in the complementary activity, or using regulatory and legal processes to delay the provision of access;

Recognising that, depending upon the structure of the industry, a regulated firm which operates in both a non-competitive activity and a competitive complementary activity may also have an incentive to restrict competition in the complementary activity;

Recognising that such restrictions of competition generally harm efficiency and consumers;

Recognising that there are a variety of policies that can be pursued which seek to enhance competition and the quality of regulation by addressing the incentives and/or the ability of the regulated firm to control access. These policies can be broadly divided into those which primarily address the incentives of the regulated firm (such as vertical ownership separation or club or joint ownership), which may be called structural policies, and those which primarily address the ability of the regulated firm to deny access (such as access regulation), which may be called behavioural policies;

Considering that behavioural policies, unlike structural policies, do not eliminate the incentive of the regulated firm to restrict competition;

Considering that despite the best efforts of regulators, regulatory controls of a behavioural nature which are intended to control the ability of an integrated regulated firm to restrict competition may result in less competition than would be the case if the regulated firm did not have the incentive to restrict competition;

Considering that, as a result, the efficiency and effectiveness of regulation of the non-competitive activity, the available capacity for providing access, the number of access agreements and the ease with which they are reached and the overall level of competition in the competitive activity may be higher under structural policies;

Considering that, under such circumstances, it is all the more necessary that, to prevent and tackle restrictions of competition, competition authorities have appropriate tools, in particular the capacity to take adequate interim measures;

Considering that certain forms of partial separation of a regulated firm (such as accounting separation or functional separation) may not eliminate the incentive of the regulated firm to restrict competition and therefore may be less effective in general at facilitating competition than structural policies, although they may play a useful and important role in supporting certain policies such as access regulation;

Recognising that, in some circumstances, allowing a regulated firm operating in a non-competitive activity to compete in a complementary competitive activity allows the regulated firm to attain significant economic efficiencies or to provide a given level of universal services or service reliability;

Recognising that structural decisions in regulated industries often require sensitive, complex, and high-profile trade-offs, requiring independence from the regulated industry and requiring expertise, experience, and transparency in assessing competitive effects and comparing these with any economic efficiencies of integration; and

Recognising that the boundaries between activities which are potentially competitive and activities which may be non-competitive are subject to change and that it would be costly and inefficient to continuously adjust the degree of vertical separation;

I. RECOMMENDS as follows to Governments of Member countries:

1. When faced with a situation in which a regulated firm is or may in the future be operating simultaneously in a non-competitive activity and a potentially competitive complementary activity, Member countries should carefully balance the benefits and costs of structural measures against the benefits and costs of behavioural measures.

The benefits and costs to be balanced include the effects on competition, effects on the quality and cost of regulation, the transition costs of structural modifications and the economic and public benefits of vertical integration, based on the economic characteristics of the industry in the country under review.

The benefits and costs to be balanced should be those recognised by the relevant agency(ies) including the competition authority, based on principles defined by the Member country. This balancing should occur especially in the context of privatisation, liberalisation or regulatory reform.

2. For the purposes of this Recommendation:

(a) a "firm" includes a legal entity or a group of legal entities where the degree of inter-linkages (such as shareholding) among the entities in the group is sufficient for these entities to be considered as a single entity for the purposes of national laws controlling economic concentrations;

(b) a "regulated firm" is a firm, whether privately or publicly owned, which is subject to economic regulation intended to constrain the exercise of market power by that firm;

(c) a "non-competitive activity" is an economic market, defined according to generally accepted competition principles, in which, as a result of regulation or underlying properties of demand and supply in the market, one firm in the market has substantial and enduring market power;

(d) a "competitive activity" is an economic market, defined according to generally accepted competition principles, in which the interaction among actual and potential suppliers would act to effectively limit the market power of any one supplier;

(e) "complementary" is used in the broad sense to include products (and services) that enhance each other. Products that are complementary to the regulated firm's non-competitive activity therefore include (1) products bought by the firm from (upstream) suppliers, (2) products sold by the firm to (downstream) customers, and (3) other products used in conjunction with the firm's non-competitive product, and where competitors' success in providing such products depends on their or their customers' ability to obtain access to the non-competitive product;

II. INSTRUCTS the Competition Law and Policy Committee:

1. to serve, at the request of the Member countries involved, as a forum for consultations on the application of the Recommendation; and

2. to review Member countries' experience in implementing this Recommendation and to report to the Council within three years as to the application of this Recommendation and any further need to improve or revise the Recommendation.

III. INVITES non-Member countries to associate themselves with this Recommendation and to implement it.

BIBLIOGRAPHY

- Borenstein, Severin (2002) "The trouble with electricity markets: understanding California's restructuring disaster." *The Journal of Economic Perspectives*, 16(1):191-211.
- Borenstein, Severin, James Bushnell and Christopher Knittel (1999) "Market Power in Electricity Markets: Beyond Concentration Measures." *The Energy Journal*, Vol. 20, No. 4., 1999; also available as POWER Working Paper PWP-059, University of California Energy Institute, available at <http://www.ucei.berkeley.edu/ucei/PDFDown.html>
- Borenstein, Severin, Bushnell James and Wolak, Frank (2002) "Measuring market inefficiencies in California's restructured wholesale electricity market." *The American Economic Review* 92(5) 1376-1405.
- BTRE (Bureau of Transport and Regional Economics) (2003), *Rail Infrastructure pricing: Principles and Practice*, Report 109, BTRE, Canberra, ACT, <http://www.btre.gov.au/docs/reports/r109/r109.aspx>
- Brennan, Timothy, Palmer, Karen and Martinez, Salvador (2002) *Alternative currents: electricity markets and public policy*. Resources for the Future: Washington, DC.
- Congressional Budget Office (2001) "Causes and lessons of the California electricity crisis." Paper, September.
- ECMT (European Conference of Ministers of Transport) (1996), *Roundtable 103: The Separation of Operations from Infrastructure in the Provision of Railway Services*, Paris, June.
- ECMT (European Conference of Ministers of Transport) (2005) *Railway reforms and charges for the use of infrastructure*, Paris.
- European Commission (2003) "Second benchmarking report on the implementation of the internal electricity and gas market" Brussels, 7.4.2003, SEC(2003) 448.
- Ivaldi, Mark and McCollough, Gerald (2004) "Subadditivity tests for network separation with an application to U.S. railroads," mimeo.
- Joskow, Paul (2003) "The blackout," mimeo from August 17.
- Joskow, Paul and Kahn, Edward (2002) "A quantitative analysis of pricing behaviour in California's wholesale electricity market during summer 2000." *The Energy Journal*, 23(4): 1-35.
- Kessides, Ioannis and Robert Willig, (1998), "Restructuring Regulation of the Rail Industry for the Public Interest", in OECD (1998).

- Nash, Chris, Jeremy Shires and Bryan Matthews, (2004), "The EU Transport Policy White Paper: An assessment of progress", July 2004, http://www.cer.be/files/ITS%20Study_EN-120818A.pdf
- OECD, (1998), *Railways: Structure, Regulation and Competition Policy*, Number 15 in Series "Best Practice" roundtables on competition policy, February 1998, <http://www.oecd.org/dataoecd/35/5/1920239.pdf>
- OECD (2001) "Restructuring public utilities for competition." Paris: OECD.
- OECD(2003a) "Competition issues in the electricity sector." Paris: OECD.
- OECD(2003b) "The benefits and costs of structural separation of the local loop." DSTI/ICCP/TISP (2002) 13FINAL Paris: OECD.
- OECD (2004) "Access pricing in telecommunications," Paris: OECD.
- OECD (2004) "Structural reform in the rail industry: should train operations be separated from the provision of the track infrastructure?" DAF/COMP/WP2(2004)6.
- Ofcom (2004) "Strategic Review, Phase 2 Consultation Document" 18 November, 2004.
- Ofcom (2005) "Notice under Section 155(1) of the Enterprise Act 2002." 30 June, 2005.
- ORR (Office of the Rail Regulator), 1999, *Final Report: Railway Infrastructure Cost Causation*, http://www.rail-reg.gov.uk/filestore/consultants/bah-cost_caus_cont.htm
- Owens, Helen, (2003), "Rail Reform Strategies: The Australian Experience", Working Paper 9592, NBER Working Paper Series, March 2003, <http://www.nber.org/papers/W9592>
- Pfund, Carlo, (2002), "Réforme des chemins de fer 2: La separation du transport et de l'infrastructure des chemins de fer ou la théorie de la separation de l'Union européenne", LITRA, 1 November 2002
- Pfund, Carlo, (2003), "The separation of railway infrastructure and operations constitutes a fundamental mistake", *Public Transport International*, 3/2003, 32.
- Pittman, Russell (2004) "Structural separation and access pricing in the railways sector." Mimeo.
- Postcomm (2004) "Competitive Market Review: Proposals for consultation" September 2004.
- Profillidis, Vassilios A., (2001), "Separation of Railway Infrastructure and Operations", *Japan Railway & Transport Review*, 29, December 2001.
- Scarpa, Carlo (2004) "Vertical separation in energy markets: some thoughts about the EU experience." Presentation, Working Party 2, June 7.
- Stagecoach Group (2001), "A Platform for Change: The Potential for Vertical Integration on Britain's Railways: A Discussion paper prepared by Stagecoach group plc", November 2001. <http://www.stagecoachgroup.com/sgc/investorinfo/reports/platform/platform.pdf>
- Steer Davies Gleave (2004), "EU Passenger Rail Liberalisation: Extended Impact Assessment", Report prepared for the European Commission, March 2004, full study available at http://europa.eu.int/comm/transport/rail/research/studies_en.htm

UCTE(2004) Final report of the investigation committee on the 28 September 2003 blackout in Italy.
UCTE: April 2004.

UK Dept of Transport, (2004), *The Future of Rail: White Paper CM 6233*, July 2004,
http://www.dft.gov.uk/stellent/groups/dft_railways/documents/divisionhomepage/031104.hcsp

US-Canada Power System Outage Task Force (2004) Final report on the August 14, 2003 blackout in the United States and Canada: Causes and recommendations.