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Regulation, Competition and Investment in the German Electricity Market: RegTP or REGTP [1]

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Abstract: The German energy industries will be subjected to regulation of network access enforced by a sector-specific regulator. Whereas the gas industry broke the regime of negotiated third party access, in electricity nTPA 'worked', although it clearly resulted in a margin squeeze. The government currently discusses whether to use rate-of-return or incentive regulation, to allow ex-ante approval of charges, and the length of the regulatory lag. Close examination suggests that generation capacity still is adequate, but in the longer term there is reason to be alert. The regulatory changes and emission trading system can both contribute to retain supply security by increasing investment.

Keywords: regulation, competition, emission trading, gas, electricity
JEL classification: L42, L43, L94

1. INTRODUCTION

The EU Electricity Directive of June 2003[4] imposes additional requirements that directly affect the German electricity supply industry (ESI). First, Germany must now establish a regulator for the industry. Second, negotiated Third Party Access (TPA) is no longer acceptable and must be replaced by regulated TPA from July 2004. Germany was successful in weakening the original force of this requirement, and the regulator is now only required to approve the *methodology* underlying the calculation of the network charges (clause 20(1)). Thereafter the level of the charges will be subject to *ex post* control. In anticipation of these developments the German Ministry of Economics prepared a "monitoring report" (BMWA, 2003), assessing the system of negotiated TPA in both the gas and electricity markets. This report, which should be interpreted as a political justification for further action, claims that the experiences in the electricity markets were modestly positive while in the gas market they were poor. In the electricity markets various parties agreed

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on a network access agreement, but network charges are high and the institutional framework clearly violated the level playing field as it encouraged low margins in the commercial businesses and thereby discouraged entry. In the gas market, the existing network access agreement was felt to be discriminatory and negotiations on an improvement failed.

The Ministry of Economics released the proposed modifications of the Energy Act in early 2004. It proposed that authority to regulate the ESI will be given to a new regulator which will be a part of the regulator for telecommunications and post services (RegTP). The new enlarged office will be called REGTP: Regulator for Electricity, Gas, Telecommunications and Post services. The Ministry also laid out details of the proposed regulation, which plans to adopt a cost-based methodology set out by the network access agreement; in November 2004 the Ministry explicitly opened up the option to introduce incentive regulation. In practice this means that the regulator would have the authority to approve the (level of the) charges ex ante (instead of merely the method) which then stay valid for some predetermined period. Finally the Ministry proposes the minimal requirements on vertical unbundling laid down in the EU Directive.

This paper examines the factors that persuaded the German government to end its opposition to creating an energy regulator, and argues that this was mainly driven by the unsatisfactory evolution of the gas market, as well as the margin squeeze in electricity. The shift to regulated TPA raises questions on how network charges will be set and with what implications for network investment. The paper also investigates investment incentives in generation in the light of concerns over security of supply post California and the impact of the EU Emission Trading Scheme that starts from January 2005. Forecast generation capacity looks adequate for supply security, although care should be taken. Support for renewables (especially wind) remain favourable, and a high carbon dioxide price and free CO_2-emission rights for new plant encourages new investment in gas-fired plants. Although the margin squeeze facilitated by vertical integration and the lack of network regulation discouraged new entry, the new regulatory framework should be expected to repair this flaw. Compared to the structural reforms elsewhere in the EU, the ability of the German ESI to exercise market power at the expense of the consumer continues to raise concerns, but the catalytic effect of a well-staffed regulator scrutinising access charges represents a considerable improvement on the recent past.

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[4] Directive 2003/54/EC concerning common rules for the internal market in electricity and repealing

2. THE LONG ROAD TO REGULATION

2.1 Key institutional steps

The liberalisation of the German ESI started in 1998 with the Energy Act that implemented the EU Electricity Directive of 1996. Three main features determined the resulting institutional framework. First, it mandated immediate and full customer liberalisation, so that all end-users could choose their retailer. However, it took until late 1999 before this became a reality. Second, it did not restrict vertical integration, which was prevalent and increasing in the German ESI. Only the minimal EU requirements on unbundling were implemented, but as they were rapidly shown to be ineffectively controlled, these requirements were meaningless in practice. Third, the Act opted for negotiated Third Party Access (nTPA) to the network, in contrast to the rest of Europe.[5]

While regulated TPA requires a regulator authorised to approve network charges *ex ante*, the German legislator relied on a negotiated arrangement of network access within the sector, while *ex post* control of possible abuse was left to the Cartel Office. The Competition Act, from which the Cartel Office derives authorisation, was strengthened with an essential facilities doctrine, which states that access to the networks should be given to third parties on non-discriminatory terms and against fair and reasonable charges. The latter part was the source of (ex-post) control of the network access charges. A general framework for the conditions of network access for third parties had to be negotiated by the sector associations.

The resulting association agreement (VV)[6] for network access is after VVI and VVII currently in its third version, VVII+. The first association agreement relied on a distance-related contract-path principle, which apart from ignoring the laws of physics, was deemed anti-competitive. In December 1999, VVI was replaced by VVII, which introduced postage stamps for network access. The structure and other conditions of network access in VVII were quite good, although some of the details could be criticised. The aim of the Energy Act was to leave the determination of the level of the network access charges to the network operators, and therein lay its main problem. Formally, the Cartel Office was authorised to control the level of the access charges, but the Cartel

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directive 96/92/EC, 26 June 2003. O.J. L176/37.

[5] Italy and Portugal opted for the single buyer model for the franchise market but all other countries adopted regulated TPA for internal trade.

Office lacked the necessary means, and the Competition Act was too weak to effectively enforce lower charges.

Meanwhile the sector became ever more concentrated, both vertically and horizontally. In general terms, the German ESI consisted of two different types of firms. On the one hand, a small number of so-called *Verbundunternehmen* owned and operated the High Voltage (HV) network and the generation plants in the associated control area. On the other hand, about 900 mainly municipality-owned distribution companies held franchises for both the distribution network and the local retail or supply businesses. The *Verbundunternehmen* have been quite active in taking over distributors, thereby integrating downstream, as well as merging among themselves.

Table 1 reveals that the concentration in generation increased slowly since the early 1990's but rather steeply around 2000/01. A first event was the direct consequence of the re-unification. The sale of the former East-German producer VEAG to the West German *Verbundunternehmen* was formally concluded in 1996. RWE, VEBA and VIAG each held 25% of the shares and the remaining 25% were divided over the other western *Verbundunternehmen*. As all data in table 1 reflect cross-participation rates, the sale of VEAG has been taken into account in the table 1 in the A columns; the B columns compare by taking out VEAG. In 1996, two relatively small firms, EVS and Badenwerk, merged to EnBW. The main merger wave occurred around 2000/01, when RWE merged with VEW to RWE and VEBA and VIAG merged to E.On. In this process, the firms were required to sell the shares they held in VEAG; it was agreed that the sole buyer, Vattenfall Europe, would merge former VEAG in the same process with Berlin-based BEWAG and Hamburg-based HEW. The number of *Verbundunternehmen* was thereby reduced to four, which corresponds to the current state. Table 1 reflects these critical steps around 2000/01 as pre-merger (again with A and B columns) and post-merger (without A and B distinction as the VEAG shares had to be sold). The process increased concentration steadily with a current Herfindahl index of about 2500.

It is often heard that this is the market structure desired by the government: four firms striking a balance between competitive pressure while retaining sufficiently strong bargaining parties to face large gas suppliers in Russia, Norway and the Netherlands. Furthermore, competitive pressure from abroad is restricted by the interconnector constraints (and the interconnectors are owned by the vertically integrated companies). The interconnectors to the

[6] In German: *Verbändevereinbarung*. It may be noted that the gas sector works with similar, but

Netherlands are used mainly for exports to the Netherlands and are typically export-constrained, whereas to Denmark they are heavily constrained in both directions. Two interconnectors are predominantly used for imports; first, from France, but EdF owns a big share in EnBW, and from the Czech Republic, which is heavily constrained. Lastly, the incumbents control large shares of the existing capacity. Further interconnector investment would be needed to allow imports to exert much competitive pressure.

This structure may represent the energy policy desires of the legislator, but is of course quite unlikely to be good for competition. Allowing market concentration to become this high must be considered a missed opportunity.

Table 1 Market shares in generation

Percentages of output

		1994 A	1994 B	2000 Pre A	2000 Pre B	2000 Post
VEBA	} E.ON	16.92	13.96	21.36	18.77	} 28.74
VIAG		11.23	8.27	12.55	9.97	
RWE	} RWE	31.38	28.42	31.53	28.94	} 37.27
VEW		7.24	6.65	8.84	8.33	
EVS	} EnBW	4.89	4.30	} 9.64	} 8.60	} 8.60
Badenwerk		4.91	4.32			
HEW	} V'FALL	3.55	2.96	3.09	2.57	} 15.03
BEWAG		2.87	2.28	2.65	2.13	
VEAG		-	11.84	-	10.33	
Other		17.00	17.00	10.35	10.35	10.35
Total		100	100	100	100	100
HHI		1807	1595	1903	1658	2622

Source: Drasdo et.al. (1998), Bergman et.al. (1999, p. 149) and Brunekreeft (2003, p.207)

Note: The shares have been corrected for participation rates. Pre means Pre-merger and Post means Post-merger. V'Fall is Vattenfall

A strongly criticized merger occurred in 2002, when E.On merged with Ruhrgas. E.On is predominantly electricity-based, while Ruhrgas is predominantly a gas importer and transporter and highly dominant on the German market. Because access to gas is increasingly critical to competition in electricity generation, the Cartel Office prohibited the merger, since it would substantially lessen competition in electricity. Again having other aims, the Minister of Economic Affairs overruled the Cartel Office as well as his own advisors in the Monopolies Commission and approved the merger.

Whereas the authorities have given the public impression that the various changes had worked well, official confirmation that the institutional

separate association agreements.

framework was unsatisfactory came with a review of network access by the Cartel Office in April 2001 (Bundeskartellamt, 2001). The review levelled two main criticisms. First and most important, access charges were (too) high. The VVII lays down a set of accounting principles for calculating the network charges, which are discussed below. In principle, this facilitates *ex post* control of the charges. After exploring the legal possibilities of the Competition Act, the Cartel Office claimed that its powers were severely constrained. In particular, it concluded that the Competition Act did not allow *ex ante* price-cap regulation, because the Competition Act can only be applied after justified suspicion of abuse, which is *ex post* by definition. Moreover, the Cartel Office expressed a preference for price benchmarking as an indicator of abuse of market power, but notes practical problems in its application. The price level may be too high overall, in which case comparison of different firms is inconclusive. Alternatively, firms can be compared with comparators abroad, but the Cartel Office notes that it does not have authority to collect information from firms abroad and would have to rely on (public) work of the regulators abroad. Benchmarking requires that firms are only compared with comparable firms, implying that structural differences beyond control of the firm should be taken into account, which requires rather detailed information.

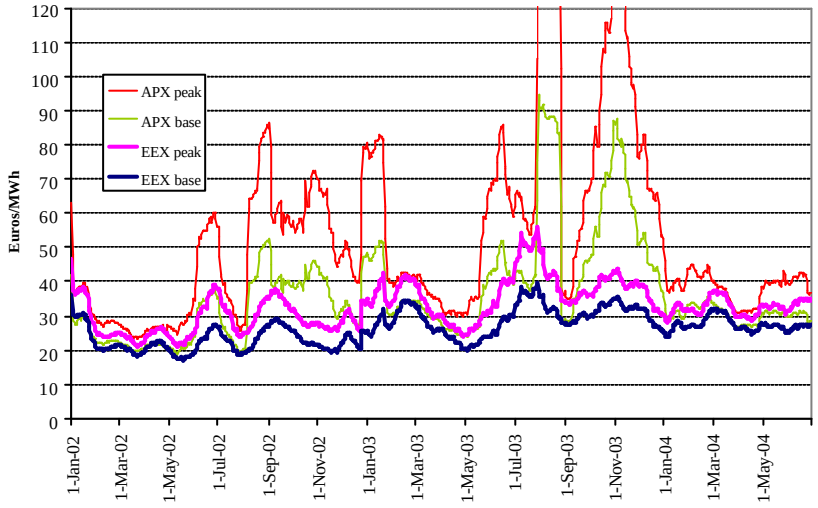
In the review the Cartel Office also discusses a number of practices of genuine discrimination of third parties (also known as raising rivals' costs or sabotage), but concludes that after settling the principle cases of doubt, it was to be expected that the network operators would not unduly discriminate against third parties (Bundeskartellamt, 2001, p. 70).

The highly critical review by the Cartel Office was followed by the VVII+ replacing the VVII. The structure of network access was modified only slightly; the main innovation of VVII+ was to introduce industrial self-regulation. VVII+ requires network operators to publish the network charges according to predefined consumer profiles as described below. The primary aim of this appears to be to assist the Cartel Office, but it can also be argued that the sector attempted to internalise free-riding behaviour of smaller network operators, who might have felt less restrained in abusing their local market power and who might have thereby undermined the case for self-regulation (Brunekreeft, 2003, 2004). Over the course of the last two years, the network access charges at LV levels fell modestly, while the HV charges increased slightly.

The result of this institutional framework is what can be described as a margin squeeze. In other words, the profit margins in generation and retail are

low. Müller & Wienken (2004) estimate that roughly 40% of the household market is effectively closed, because the margin is below cost. The cumulative switching rates are very low, with less than 5% for households and slightly more than 6% for commercial customers ever having switched. Several initially successful retailers went bankrupt and by 2004 only Yello, which is a subsidiary of EnBW, survived and it was struggling, despite having one million customers. The same picture emerges at the wholesale market. Figure 1 suggests that the wholesale power prices at the spot market EEX have been very low (at least in comparison with the (gas-based) thermal system in The Netherlands and with new entry prices), although they appear to be increasing recently. On the one hand, this could be the result of excess capacity, while on the other hand, high concentration ratios would suggest that the firms should have been able to keep prices reasonably high (as in Britain), unless they were keeping the competitive wholesale price low and enjoying profits in the transmission part of their vertically integrated structure.

Figure 1: German and Dutch wholesale power prices (28-day centred moving averages)



Source: EEX and APX web sites

The picture is consistent with theoretical explanation. As has been argued elsewhere (Brunekreeft, 2002),[7] the vertical integration of competitive and *unregulated* monopolistic businesses provides an incentive to secure profits

[7] In the context of telecommunications, compare also Beard et al. (2001) and Mandy (2000).

in the natural monopoly (wires) businesses and set low margins at the competitive stages. The result is a violation of the level playing field, as the low margins frustrate the development of active competition and new entry. Note that the poor situation for the entrants is not the result of discrimination of third parties. As Beard et. al. (2001, p. 328) nicely put it: "sabotage is solely a phenomenon associated with regulation." This implies that regulation of the network charges will shift attention of the vertically integrated firms to the competitive businesses and thereby increase the margins *and* intensify the incentives to discriminate against third parties. The price increase announced in September 2004 is telling. The announcements mainly concern end-user prices whereas changes in network charges are yet unclear, but can at least be expected to be under pressure as soon as the regulator picks up its task. Hence, an increase in the margins can already be observed.

What is perhaps surprising is that there appeared to be an outbreak of retail competition and a significant drop in end-user prices shortly after the VVII. The end-user prices increased slowly but steadily since then and a very substantial increase has been announced by the big firms in September 2004. After the introduction of VVII, new retailers and more prominently, new retail departments of the big four *Verbundunternehmen* entered the retail market on a large scale with low prices (cf. e.g. Brunekreeft, 2003, p. 220).[8] This rather surprising development requires an explanation. One explanation might be that the incumbents depressed the price levels to lower the acquisition value of possible take-over targets.[9] The argument is appealing but may not entirely apply here. As indicated above, take-over and merger activity has been modest until the big 2000/01 mergers. Many distributors/retailers were taken over from mid-1990's, while the price decrease started mid-1999. Moreover, the price decrease may have squeezed the retail margin, but the network charges were still high. Further, the sharp increase in generation concentration in 2000/01 predominantly concerned (horizontal, relatively symmetrical) mergers rather than take-overs. An alternative explanation comes from the perceived regulatory threat induced in particular by the notable absence of a regulator, in sharp contrast to all neighbouring countries; the industry was under severe pressure to show that self-regulation could work (cf. Brunekreeft, 2004). The announcement of the price increases in September 2004 is then unsurprising; because the

[8] In the subsequent period many of the low-priced entrants either went bankrupt or increased their prices. Since the average retail price level is the calculated average of a selection of best-practice prices, this process increased the average price level.

installation of a regulator is now a fact, there is no longer a need to try to hold it off.

The flaws of negotiated TPA have been documented by a report of the Monopolies Commission (Monopolkommission, 2003) and shortly after that by the so-called *Monitoring Report* of the Ministry of Economic Affairs (BMWA, 2003), which then paved the way to accepting the EU Directive's provision requiring regulated TPA. The new institutional framework will be laid down in a modified Energy Act 2004, which is expected to enter into force in the course of 2004.

2.2. WINGAS

The experiences with negotiated TPA in the ESI would convince most economists of the desirability of regulation, but it is questionable whether they have been sufficient to convince the politicians. The key political development undermining negotiated TPA and shifting support towards regulation was the failure of negotiated TPA in the gas market. The *Monitoring Report* (BMWA, 2003, p. 42) suggests three problems with the gas VVII. First, it argued that the contract-path approach for the network usage impeded competition. Second, there was a lack of transparency on network capacities and storage facilities that hindered effective negotiation. Third, high charges for balancing services impeded competitive entry. The first point may seem self-evident (and is certainly valid for electricity networks), but is in fact not obviously important. For an electricity network, a contract-path model is an inefficient pricing method because electricity flows over all paths between the source and sink, and cannot be attributed to a specific contract path. Gas in contrast can (and must) be controlled to flow over specific routes to remain within the pressure parameters of the pipelines and compressors. Second, because most gas is imported, it is not clear why distance dependent charges would discriminate against third parties. Nevertheless, an entry-exit model would improve the position of third parties without obvious disadvantages.

Because the Energy Act concerns both electricity and gas, developments in the gas sector triggered changes in the ESI as well. The question to be answered is why the experiences in the ESI were modestly successful, while the same institutional famework failed in the gas sector? Negotiated TPA means an obligation for the relevant associations to negotiate a collective framework for access. Co-producers and large industrial energy users

[9] The authors would like to thank David Newbery for pointing out the argument. In a more general

are represented by the association VIK (in both the electricity and the gas negotiations). VIK agreed and adopted the association agreement VV (electricity), but broke off the negotiations for VV (gas).

The German GSI relies strongly on gas imports. Over 80% of gas consumed is imported.[10] Trading, imports and the network are heavily dominated by Ruhrgas, which has a share in imports of approximately 75%. The long-distance network is in five hands. Three firms (BEB, VNG and Thyssengas) cover relatively small areas, while by far the largest area is covered by Ruhrgas. The network areas of these four are neatly demarcated and hardly overlap. The interesting case is the fifth firm: Wingas, which is a joint venture between the chemicals manufacturer BASF (65%) and the Russian gas provider Gazprom (35%). Wingas is active on the wholesale market but also builds and operates (long distance) pipelines in Germany. Since 1992, Wingas has built four pipelines and plans further expansion. These pipelines are partly parallel to Ruhrgas pipelines, with capacities ranging from 10 bcm to 24 bcm and a total length of over 2,000 km.

Wingas makes the key difference between the gas and electricity sectors. The primary aim of Wingas was a direct contract between Gazprom as a gas supplier and BASF as a large gas user, excluding any interference from Ruhrgas. This kind of competition also happens in electricity. However, in electricity the largely vertically integrated utilities which lose customers in the competitive businesses can fall back on their networks which cannot be by-passed.[11] In contrast, Wingas builds its own pipelines, partly parallel to the pipelines of Ruhrgas and thereby partly by-passing Ruhrgas' network. Thus, in contrast to electricity, where wholesale competition is not a threat to the monopoly networks, gas competition allows the development and network roll-out of competition in long-distance gas networks to at least some extent (cf. Knieps, 2002). It is unlikely that this will make the long-distance gas transport market competitive, but it may be a sufficiently strong threat to Ruhrgas to tip the balance in the negotiations over the association agreement.

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context, this type of argument has been examined in Burns (1986) and Saloner (1987).

[10] 31% from Russia, 19% from the Netherlands, 25% from Norway and 7% from the UK and Denmark. (Cf. website of BGW). The home production of gas is concentrated with a share of over 85% in three hands.

[11] Although there is restricted by-pass potential by co-generators, by-pass by building direct lines in competition to existing lines is extremely rare.

The argument is reminiscent of the general idea behind the essential-facilities doctrine.[12] The essential-facilities doctrine should not be applied, if it can be expected that an entrant could profitably invest in the facility itself without reducing overall welfare. In that case difficult access and relatively high access charges facilitate investment. The same line of argument applies for the incumbent firm; if Ruhrgas sets high network charges, it will invite further network roll-out by Wingas. Ruhrgas will thus have a reason to lower the network charges and consequently shift its attention to earning higher profit margins in trading activities. This in turn, however, would invite new entrants into the trading business and further development of the customer base of Wingas. Hence, Ruhrgas appears to have a straightforward reason to foreclose the trading activities by "sabotaging" network access.

The argument can stop here as it suggests an incentive to set relatively low network charges and in return foreclose the competitive market with third-party discrimination. This applies perfectly well to "fourth parties" (i.e. competitors in the competitive activities other than Wingas who do not own a network). With regard to Wingas the argument is slightly more refined, as Wingas would profit from the high trading margins as well. Given, however, the fringe position of Wingas' network it seems reasonable to assume that Wingas' customers will have to rely to at least some extent on the Ruhrgas network. Hence, third-party discrimination will likely harm Wingas customers and thereby lower the profit margin for Wingas. Assuming that it is unreasonable to assume that Wingas would duplicate the entire network of Ruhrgas, the incentives for Wingas to invest diminish.

The association agreements were negotiated by a number of industry associations, one of which was VIK, representing large energy users (and co-producers). In the electricity negotiations, VIK is a user of the network. In gas, VIK represents one of its more important members BASF, which is not only a network user, but also network competitor.[13]

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[12] And the discussion around local loop unbundling in telecommunications (cf. Gabelmann, 2002, and the references quoted therein).

[13] Meran & Hirschhausen (2004) offer an explanation of the failure of the gas negotiations relying on the argument that third-party competition threatens the dominant positions of the gas suppliers (BGW) and industrial users (VIK). Glachant et.al. (2004) explain the absence of a regulator from a political impasse but stress the pro-competitive dynamics of the presence of the Cartel Office (pushing the VVs towards stronger competition). It is not explained though why the pro-competitive dynamics of the Cartel Office did not apply to the GSI.

3. REGULATING THE NETWORK

3.1 Cost-based or price-based regulation?

As mentioned above, the regulation of the network access charges was minimal. Negotiated TPA meant that the industry associations negotiated a general access framework covering an outline of the structure of the charges and a method to calculate the charges. The precise determination of the level of the charges was left to the individual network operators. Control of the abuse of market power was handed over to the Cartel Office, which was strengthened for this task with an essential facilities doctrine (clause 19.4.4) in the competition law. The clause states that access to the network should be given on non-discriminatory terms and with fair and reasonable charges.

In the review of network access of April 2001, the Cartel Office (Bundeskartellamt, 2001) examined the problems and prospects of applying competition law to the (excessive) network charges. First, it noted that its control must necessarily be *ex post*. Applying the competition law and subsequently starting an investigation requires a justified suspicion of an abuse of market power. Second, it explores in some detail the methods to exercise control in the event that charges were found to be excessive, in particular cost-control and price benchmarking. The Cartel Office expresses a preference for the price benchmark, although this runs into an obvious information problem. The benchmark would compare a high-priced firm with a comparable low-priced firm. Since the low-priced comparator does not abuse its market power by assumption, the Cartel Office cannot require the company to provide information. Although, as described below, the VVII+ helps in this respect, it is nevertheless believed that the Cartel Office was powerless and the network charges were excessively high (cf. for instance Monopolkommission, 2003; BMWA 2003; and Canty, 2003).

Following this report of the Cartel Office, the ESI published VVII+, which entered into force in 2002. VVII+ strengthened the concept of industrial self-regulation in two respects, both in annex 3. First, VVII+ outlined the accounting principles to calculate the level of network charges. Second, the VVII+ assisted the Cartel Office by prescribing rules for transparent and harmonised publication of network charges, implicitly allowing the price benchmark as favoured by the Cartel Office. It required the distribution network operators to publish network charges calculated for given consumer profiles. In order to allow a proper benchmark in which firms are compared with comparable firms, the network operators have been classified into different

groups controlling for the following structural parameters: east/west, consumer density and the share of overhead lines. The idea was that network operators with charges in the top 30% of their class could be asked to justify the high level before an industrial arbitrator. In other words, if a high-priced network is not able to justify the high level it will find itself in the spotlights of the Cartel Office. Growitsch & Wein (2004) observe that this reduced the spread in network charges.

The new Energy Act 2004 intends to apply the principles laid down in annex 3 of the VVII+ as the base for its regulation. As mentioned above, the choice between cost-based versus incentive-based is still out. In either case we may expect that the accounting principles of VVII+ will be applied:

- depreciation is linear
- capital life duration has been specified in detail
- the underlying asset valuation method is written-down replacement value (for equity financed capital)
- the ratio of equity over total capital has been restricted to 40%
- the allowed real rate of return on equity has been set on 6.5%; this is post trade-tax, while pre corporate-income-tax. There is discussion to apply the principles of a CAPM approach.[14]

These principles applied before the new Energy Act, but were not effectively enforced. Canty (2003) describes the experiences of the Cartel Office and criticises the application of the principles on several counts with the implication that the rules were simply not effective.

Asset valuation relied on replacement values but depreciation did not. According to the rules, depreciation is determined at the start of the accounting year, while replacement value is determined at the end of the accounting year. Thus if the replacement value goes up and depreciation value is not (fully) adjusted both the cost including depreciation and the allowed return (at 6.5%) on equity are high. Either the Regulatory Asset Base (RAB) should be written down by the allowed depreciation (and incremented by investment) or depreciation should be calculated as the change in value of the original assets (excluding new investment).

Canty also criticises the allocation of an excessive fraction of common costs to the electricity network, creating higher network costs, which can be recouped through higher charges. This is a difficult issue. In as far as it concerns non-genuine common costs, the criticism is intuitive and to be taken seriously.

[14] The corporate income tax is 25%, while the trade tax varies by region.

However, the nature of common costs implies that there is no simple cost-related method of allocation these costs. It is not clear how the common costs should be allocated to various parts of the business. If network demand were thought to be more inelastic than demand for the services supplied over the network, such an allocation could be justified on efficiency grounds, but this Ramsey argument would be hard to defend as the services are jointly supplied with the network. The fact that in many countries the network is under separate ownership from the competitive activities suggests that the extent of common costs in the vertically related electricity businesses (between the networks and the competitive businesses) is low.

Furthermore, Canty notes the practice that over-recovery of costs is not passed on to consumers (or otherwise recharged). The allowed rate of return is translated into an allowed revenue based on output estimated at the beginning of the accounting year, which in turn results in allowed prices. If realised output is higher, there will be an over-recovery and the rate of return will exceed that allowed. Current practice is to ignore this.

Since the VVII+ will serve as the base for the new regulation, the question arises how this specific practice will be adjusted. If there is no change and ex-post difference (beyond a reasonable level of doubt) is not refunded to consumers, regulation will simply be non-binding. If, however, excess revenues must be refunded, two different options are available. On the one hand, the base for refunding may be the allowed rate of return. If the government sticks to ex-post control this procedure establishes a consequent rate-of-return regulation. On the other hand, the base may be allowed revenues, which appears to approximate current practice in as far as it exists at all. This seems to be the more practical option and has similarities with price-cap regulation. Standard price-cap regulation sets the initial price to cover costs including a reasonable rate of return on the regulatory asset base (RAB) and rolls this forward allowing for investment, depreciation and predicted productivity growth. The distinguishing features are that the (indexed) price formula is specified *ex ante* and remains valid for a reasonably long time: the control period. Presumably the control period for the German ESI would be one year, which is short. But if the Ministry of Economics is serious about changing the system to "incentive regulation", the required changes might actually be a mere shift in emphasis. In this case, all that would be needed to shift towards effective incentive-based regulation would be to extend the length of the control period during which the regulator commits to refrain from adjusting the price formula.

Roughly speaking one might say that incentive-based regulation is good for efficiency, while cost-based regulation is good for investment and thus network adequacy. Although data are scarce, the German ESI is said to be in a situation with relatively inefficient network operators but high supply security and high-capacity networks.[15] If the modification to incentive-based regulation is a mere shift in emphasis rather than a radical break, there is a case for changing to incentive regulation as soon as possible.

3.2. The design of balancing markets and the cost of balancing

As elsewhere, the balancing market is critical and with consequences for competition and new entry. Each of the four control areas has its own balancing market.[16] The current concerns are that the design allows strategic manipulation and that rather high balancing costs are passed through into the network charges. The present system was imposed by the Cartel Office in 2001 as part of the remedies in merger cases and replaces unsatisfactory previous arrangements. In all areas there are pay-as-bid auctions; the long term auction for capacity and short term auction for energy are separate. Availability of balancing capacity is compensated by a capacity price, while in addition, actual usage of the balancing capacity is compensated with an energy price. While the costs for the capacity payment is passed through to the network charges, the costs for (or revenue from) the energy prices is settled with a single balancing price.[17] Except in the E.On area, this is calculated *ex post* as the weighted average of the auction bids (MGAP); in the E.On area, the balancing price corresponds to the marginal bid.[18] Although this is the preferred model in well-functioning, liquid and competitive markets, it appears to be flawed in the German case. There appear to be two different problems currently.

The first problem is that the system is vulnerable to strategic manipulation. The reason is strategic behaviour of the market parties. If for instance the MGAP is expected to be high relative to the day-ahead price (e.g. EEX), generators want to be long. Although the system reinforces itself, because the MGAP will decrease if all generators are long, the incentive for market

[15] It should be noted though that the networks are relatively old and require replacement investment and updating in due time.

[16] Managed by the network operators of RWE, E.On, EnBW and Vattenfall Europe.

[17] Cf. Ritzau (2003). It should be noted that the change enforced by the Cartel Office was a response to the previous two-priced system (cf. NERA, 2000).

[18] *Mittlerer Gewichteter Arbeitspreis*. Below we will argue with MGAP but the reasoning applies to the marginal bid as in the E.On area as well.

parties to speculate on the balancing price may be undesirable as it destabilises the system.

The second problem is that market power is said to keep bids and prices relatively high. The issue is far from straightforward and needs more research as it depends critically on details. We know that the integrated incumbents are dominant in their control areas, especially on the balancing markets. They can exercise market power if they like. However, the incentives are not clear. First, arbitrage with the spot market matters and can correct perverse incentives. This applies for the energy prices and not for capacity prices. It is interesting to note that the capacity price (for non primary reserve) in the RWE area stopped decreasing at the moment the E.On market was implemented in July 2002. This event reduced liquidity on the RWE market. Second, it is not straightforward how the integrated firms gain form exploiting market power. The generation business of the firm could profit from high prices, but the TSO department would have to pay for this. The energy prices are passed through to the MGAP, which is partly paid by third parties. The capacity prices are passed through into the network charges. The high balancing costs can so be used as a justification for higher network charges.

Illiquidity in the balancing markets (combined with and partly created by market power) can lead to significant differences between the day-ahead and balancing prices. The balancing price follows the day-ahead price roughly, but not perfectly. One contributory problem is that the control areas are separated. Although generators from one control area are allowed to participate in the auctions of other control areas, this does not work well. The basically technical requirements to participate for generators outside the control area are said to be high, which works to the advantage of the incumbent with generators predominantly inside the control area. Presumably, further (regulatory) steps towards integration of the control areas are required. Already the RWE control centre is the main control centre in Germany, so it might form a natural hub for an independent system operator (ISO).

3.3. REGTP

Will the regulator be credible and will regulation become effective? There are reasons to be optimistic. Regulation as been placed in the hands of the Regulator for Telecommunications and Postal Services which has rather more than five year's experience and a reputation for toughness. It will have more authority to gather information, a key problem for the Cartel Office, and the regulator's decisions will be effective until overruled by a court. If legally challenged,

decisions taken by the Cartel Office did not come into operation until confirmed by a court: this, of course, could take several years.[19] Finally, the regulator for energy has an initial budget for 60 employees which, with over 800 network operators and ex-post cost-based control, may well be necessary. Presumably, the new office will have self-enforcing dynamics: 60 newly hired employees will want something to do. A newly created bureaucracy can be expected to be a new pressure group in the political process and will want to gain in importance, so even if the first round of regulation is soft, an irreversible process may have been started. Opinions on the political independence of the REGTP differ. The fact that REGTP belongs to, but is at arm's length from the Ministry of Economics is not the best guarantee for independence. On the other hand and in contract to telecommunications, the federal Ministry has no ownership interests in the energy sector.

What can be expected if regulation of network charges takes effect? First, of course, network charges will fall, partly squeezing out excessive profits but, in time, as a result of increased efficiency. Secondly, as network profits decline, integrated firms will shift their attention away from the network towards the competitive businesses (generation and retail). This will have follow-on effects as it will restore the level playing field between integrated firms and third parties. To make profits in these competitive businesses requires a sufficiently large profit margin, predominantly under the control of the integrated firms, so the currently very low margins in generation and retail (see above) will rise. These increased margins (retail and EEX prices) will open up profitable entry opportunities in both generation and retail. In other words, where new entry with gas-fired CCGT was a hazardous enterprise, it may now be merely a normally risky project. This has the desirable side effect of mitigating the problem of low investment and supply security. To the extent that regulation of network charges implicitly or explicitly rely on the rate-or-return type, investment incentives in the monopolistic part are also retained. Lastly, as the threat of competition from third parties increases, the integrated firms will have a stronger tendency to (non-price) discriminate against third parties through discriminatory use of the network. Hence, vertical integration will be an increased problem and proposals for further vertical separation (and its enforcement) and ring-fencing should be recommended and expected.[20]

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[19] This is not new in the Energy Act proposal as this shortcoming had been repaired in 2003 already.

[20] If, as suggested by the Energy Act, serious vertical unbundling of retail and the distribution network will wait until 2007, the prospects for Yello and other third-party retailers are bleak.

4. NEW ENTRY AND SUPPLY SECURITY

4.1. Capacity

Long-run capacity developments receive attention for two reasons, namely, security of supply and market power. The 2000/01 black-out in California and power shortages in Europe in the Summer of 2003 raised awareness of the high political costs of power black-outs. Moreover, capacity shortages increase the scope for exploiting market power. Competitive pressure depends, to a large extent, on the ratio of capacity to (peak) demand, and short-run Cournot-type competition relying on capacity withholding, loses credibility when faced with excess capacity. In other words, the firms can avoid severe short-run price competition by reducing available capacity. The importance of the capacity-to-demand ratio has already been recognised for electricity spot markets (CAISO, 2000, pp.50 ff.); if capacity becomes scarce, spot prices can rise quickly and to extreme levels. In the longer run, spot prices will serve as a signal to both incumbents and third parties to bring mothballed and new capacity into operation.

The combination of the traditional model of cost-based regulation, incentives to invest in new capital and an obligation to guarantee a reasonable supply security, created severe excess generation capacity in the German ESI (summarised in figure 2).[21]

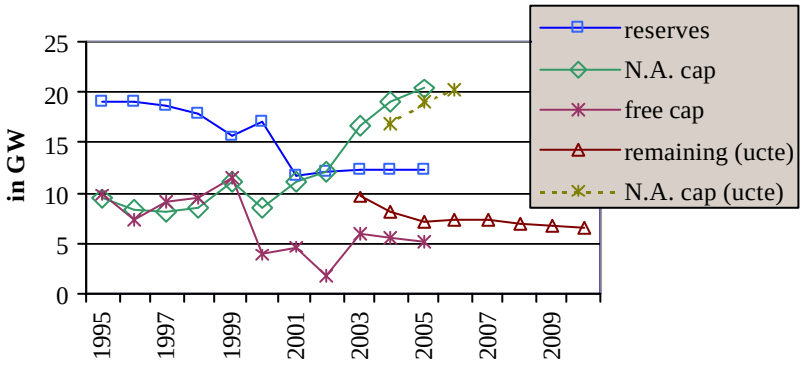


Figure 2: Excess generation capacity
*Sources: own calculations, Markewitz & Vögele (2001); VDN (*Leistungsbilanz*); UCTE 2003, 2004.*

In line with common industry practice (cf. VDN, UCTE), installed capacity has been spread over the following categories: maximum load, planned reserve

capacity, non-available capacity (N.A. capacity) and, as the calculated residual, remaining (or free) capacity. The share of planned reserve capacity, which is primarily determined by reliability rules (like n-1), fell recently to approximately 11%, still relatively high. The planned reserve ratio fell as a result of a policy change: the time between revisions was increased while the duration of revisions was shortened, which implies that less capacity is under revision and thus less reserve capacity is required. There seems to be sufficient reserve capacity to cope with some unplanned scarcity. The ratio of 11 % is still above UCTE average. The category N.A. (or, non-usable) capacity covers both "unreliable" renewable (wind)[22] and mothballed capacity. Data for the UK collected by Ofgem (JESS, 2003, p. 13) examined the time taken to bring 3.7 GW mothballed capacity into operation: 1.3GW required 0-3 months, 0.3GW required 3-6 months, 1.0GW required 6-12 months and 1.1GW required 12-24 months. These numbers suggest that while some mothballed capacity can be returned to service reasonably quickly, as time goes by mothballed capacity deteriorates and takes longer to restore.

Wind capacity increasingly becomes a problem. Wind power depends on the unreliable availability of wind, but as long as the proportion of wind power is small, it does not really matter whether it is considered to be available or non-available capacity. But with increasing shares of wind power, it does matter. Presumably, working from experience, load factors to calculate probabilities may help to determine the amount that is available with a certain loss of load probability. The figure clearly suggests that this may be the main capacity problem as suggested as well by the UCTE forecast report (UCTE, 2003, p. 13). The category N.A. capacity thus contains capacity which is either available with some defined probability, or can be made available within a reasonable time, and so amounts to excess capacity. The remaining category is free capacity, which as the name suggests, is genuine excess capacity.

The steep decrease in 2000 is interesting. On the one hand the data should be interpreted with caution. VDN demand data increase sharply while at the same time capacity falls sharply, with the calculated consequence that the remaining capacity falls. These developments are not confirmed by UCTE. On the other hand there have been capacity changes. Following low wholesale power prices, E.On and RW E announced closure of 4.5 and 5.0GW generation capacity respectively (cf. Markewitz & Vögele, 2001, pp. 21 ff.) and thereby reduced excess capacity. The RWE closure includes the closure of the nuclear

[21] See for more details, Brunekreeft & Twelemann (2004).

plant Mühlheim-Kärlich (1.2GW capacity). The capacity effect of its closure is very limited and may actually be positive. The plant had been switched off in 1988 because of a re-assessed risk of potential earthquakes, while being part of the nuclear phase out, negotiation with the government led to other nuclear plants producing more as compensation. RWE's plant closure also included old gas and coal plants. Because RWE had 3GW new capacity (mainly coal) under construction, the effective capacity reduction was 2GW. E.On reduced capacity by 4.58GW, of which 1.33GW was mothballed. With newly constructed plant of 0.8GW, the effective capacity reduction was 2.4GW. The sum of E.ON's and RWE's capacity reduction is 4.4GW. Mothballing plant which does not recover variable costs is a sensible strategy and also has the strategic side effect of demonstrating a credible commitment to refraining from the use of (excess) capacity on the spot market. Hence, mothballing capacity stabilises Cournot-like competition. Although this raises some concern about market abuse, mothballing does not necessarily inhibit security of supply, because the capacity should be available quite quickly.

A concern is the phasing out of 20 GW of nuclear assets over the next 20 years. Figure 2 suggests that current installed capacity corrected for planned reserves would still serve peak load whilst allowing a significant part of the phasing out of nuclear power. The extent and speed of replacing the nuclear assets critically depends on the assessment of the availability of the non-available capacity. UCTE forecast suggests that remaining capacity may be stable around 5 to 6 GW which is around 5% of installed capacity. Two factors complicate the assessment. First, many power plants are relatively old. Second, whether the nuclear phase out actually takes place or will be reversed by a next government is highly uncertain. Overall, although there is no urgent need for concern, it seems wise to monitor developments.

4.2. New entry

Post-liberalisation new entry into generation, other than renewables, has been disappointingly modest. The obvious candidate is gas-fuelled CCGT; four major projects are known, two of which (Fortum and Dynergy) failed (OECD, 2003, p. 20/21). Not only were wholesale electricity prices very low, but a change in tax law added to the problem. Gas plants were exempted from paying the mineral oil tax but only for those on-stream before January 1st 2004, and for plant with a

[22] Approximately 90% of wind capacity is included in N.A. capacity.

fuel efficiency of over 57.5%.[23] Further problems were caused by an increase in gas prices and problems in gas supply contracts. There is a gas spot market in Germany at Bunde (at the Dutch border), but liquidity is very low and dominated by Ruhrgas. Hence, for CCGT plants, supply contracts with Ruhrgas are difficult to by-pass. The merger between E.On and Ruhrgas mentioned above, presumably worsened the situation substantially. The only significant project currently under construction is Concord Power (at Lubmin). Concord Power is a 1200 MW plant, owned 50% by EnBW and 25% by E.On and can thus not be considered a third party. A fourth merchant project is an 800 MW gas turbine near Aachen developed by Trianel, which collects participants from especially the distributors/suppliers. The project is in fund-raising stage.

Further new entry should be expected from renewable energies. The renewable energy act (EEG) combines a technology-dependent feed-in tariff and a take-off obligation on the network operators to whose network the renewable is connected. The feed-in charges, for which the costs are socialised over the network customers, are considered to be high and new renewable capacity, especially wind, is expanding significantly. The promotion of renewables is expected to add 15 GW capacity in the next 5 years.[24] Currently, wind has a non-negligible output share of slightly below 5% which is expected to grow to 9% in 2008.

With the growth of renewables, controversy also grows. Industry observers suggest that the feed-in tariff for wind is still so high that new plant is built in highly unfavourable places. More importantly, as wind is unreliable, the demand for reserve capacity increases, raising the issue of who is responsible for this, and who will pay for it. Another controversy surrounds off-shore windfarms, albeit still in the planning stage, which would most likely be built in northern Germany in the Eastsee. Since the extreme north-eastern part of Germany is sparsely populated, the HV network running south is thin and would require substantial reinforcement. Again the question of payment arises. Currently, network upgrading is the responsibility of the network operators and costs are socialised over the associated network users. This may not be reasonable if the costs are high and specific to the wind power.

Further controversy arises with the start of the European emission trading scheme (ETS) in 2005 (see below). If the emission of greenhouse gases (especially CO_2) is a problem for the environment, then internalising emissions,

[23] In July 2004, this was reversed and exemption was extended to 2007 for fuel-efficient plant over 57.5%.

[24] Calculated by authors using numbers from Pfaffenberger & Hille (2003, p. 5.9).

which is what the ETS does, is the correct approach. Subsidising renewables is an indirect approach because it promotes alternatives, thereby displacing harmful sources. But this method contains a higher risk of distortion than directly pricing the emission, and having two simultaneous approaches seems difficult to defend. The remaining argument for subsidising wind relies on learning effects: until the technology is mature, the development shows learning-by-doing and requires R&D, while the (non-internalised) spill-over effects of new inventions and innovations inefficiently reduces the incentives to invest in learning and R&D. Whereas the argument is theoretically valid, the empirical relevance is controversial and depends quite strongly on the specific technology and life cycle. In any case, the start of ETS reduces the necessity to subsidise wind and other renewables. Notwithstanding these arguments, there are no political signs that the system of feed-in tariffs might be changed in the near future.

New entry will be promoted by regulating network charges. As argued in the section above, lack of regulation of network access charges and vertical integration created incentives for making profits from the network rather than from the competitive businesses. Despite high concentration in generation (see table 1) and retail, the margins were low, reducing incentives for new entry by third parties. This is about to change with the regulation of network access charges. Vertically integrated firms will shift the emphasis on securing profits towards the competitive businesses and away from the networks; concentration will start to matter and opportunities for new entry will increase. Thus, the new regulatory framework may lower network charges, but at the same time increase margins and, paradoxically, may increase end-user prices where the competitive stages are not sufficiently competitive.[25] It is just this, however, that will offer new opportunities for entrants and thereby increase long-term competitiveness and improve supply security.

4.3. ETS, NAP and new gas

The generation mix in Germany relies heavily on coal and lignite (cf. table 2); figure 3 indicates that the share of gas is still small. With the implementation of the European emission trading scheme (ETS) in January 2005, CCGT may be in a more favourable position because gas emits less CO_2 than coal. The ETS

[25] Although details differ, a similar phenomenon can be observed in New Zealand (cf. Brunekreeft, 2003, p. 196).

results from the EU Directive of October 2003,[26] and is currently in the process of being incorporated into national law in various member states who are required to publish National Allocation Plans (NAP).

Table 2: Generation mix 2002 (in MW)

	capacity in MW	shares	Generation TWh	shares
Nuclear	21,283	23%	156	32%
Lignite	18,811	20%	143	29%
Coal	24,882	27%	114	23%
Gas	16,315	17%	36	7%
Hydro & Wind	12,471	13%	45	9%
Total	93,762	100%	494	100%

Source: VDEW (2004)
Note: The figures are net of German Railways and co-generation.

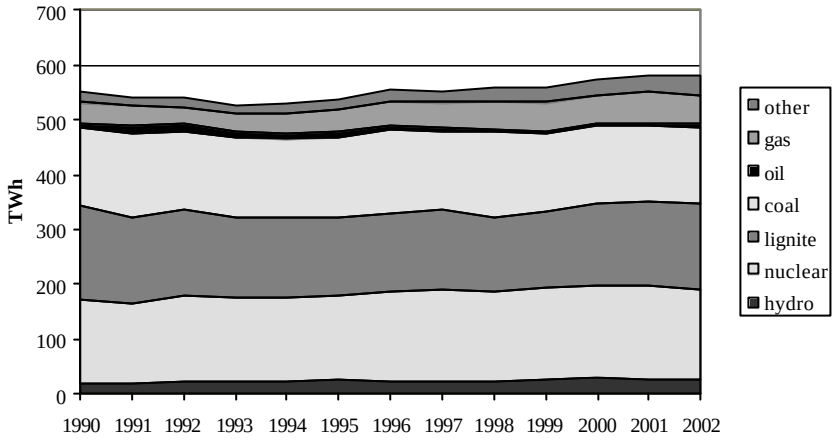
The ETS aims at introducing a system of tradable greenhouse gas emission rights, the most important of which is CO_2. The degree of detail in the Directive is low with many details left to the decision of member states. This will result in different and possibly conflicting rules. A key aspect arranged by the CEC is the prime method of allocation of CO_2 rights. Art. 10 of the Directive prescribes that for the period 2005 - 2007 at least 95% of all rights in each member state, and for the period 2008 - 2012 at least 90% must be allocated free of charge. It is left for the member states to decide how the remaining rights are allocated (i.e. free of charge or auctioned). Futures on CO_2 rights are traded already. For instance, EVO[27] was trading 2005 futures at a price of about €10/t CO_2 in July 2004. These prices are considered to be very low due to high uncertainty and generous national allocations.

Incorporation into German law and details of the allocation method are laid down in the National Allocation Plan for Germany (March 2004), for which the Ministry of Environment is responsible.[28] Caps for the sector "Energy and Industry" are 503 Mt CO_2/year for 2005-2007 and 495 Mt CO_2/year 2008-2012, considered by industry observers to be generous. CO_2 rights for existing plant will be allocated free of charge, basically relying on historical emission values. Although free allocation to existing plant sacrifices considerable public revenue, providing the allocation is not contingent on continuing operation or on the actual level of output, it need not be inefficient. It can be explained by a

[26] EU Directive 2003/87/EC, establishing a scheme for greenhouse gas emission allowance trading; O.J. L 275/32, 25.10.2003.
[27] www.evomarkets.com/evoid.

stranded-cost argument.[29] More problematic is free-of-charge allocation of rights to *new* plant. Possible inefficiencies associated with new investment can be severe, while the stranded-cost defence is not plausible. However, as will be argued below, as a by-effect, free allocation to new plant mimics a capacity element and thereby promotes new entry.[30]

Figure 3: Development of the generation mix in Germany (production)



Source: Pfaffenberger & Hille (2003, p. 3.1).

For this allocation, the ZuG distinguishes between genuinely new plant and replacement of decommissioned old plant. For genuinely new plant, the free allocation relies on best available technology (BAT). This looks better than it is. The precise wording is: "The electricity benchmark is 750g carbon dioxide equivalent/kWh. This value is derived from the weighted average (...) of modern lignite, coal and gas-fired power plants." However, "the allowances will not exceed actual requirement but will be at least 365g carbon dioxide equivalent/kWh." (i.e. based on CCGT) (ZuG, 2004, p. 36). Because the upper limit of 750g is actually the emission of an efficient coal plant, this clause protects new coal. At the same time, allocating the rights for new gas based upon the coal benchmark seems excessively generous to new gas. As a result,

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[28] With minor changes, the NAP passed parliament mid-July 2004 and is officially called *Zuteilungsgesetz* (ZuG).

[29] The system will work out differently for different plants and thereby firms. Allocation free of charge will create windfall profits overall and thereby soften these differences as probably all firms win.

[30] Note that we examine new entry for its competitive effect. For a detailed long-run study of replacement of old plant, especially in light of phasing out nuclear power, compare Peek et al. (2004).

the benchmark is reduced to own emission values with a minimum which corresponds to the emission value of new gas. For replacement of old plant, a transfer rule ensures that the rights allocated to the old plant can be carried over to the new plant. The transfer rule avoids delaying replacement of old plant by new clean plant, but it distorts the level playing field in favour of the incumbents. The fact that CO_2 rights are allocated free of charges to new plant also implies that rights have to be kept in reserve. These have been set at 9 Mt/year. If more than 9 Mt/year are needed, additional rights have to be provided by a government agency, which has to buy the rights on the market. In accordance with the EU Directive, banking from the first period (2005 - 2007) into the second period (2008 - 2012) is not allowed. The argument is that because the number of allowances in the first period is generous, carrying some over into the second period would make it more difficult to achieve the Kyoto benchmark.

What are the implications for new gas entry into the market? A CO_2 emission price increases variable costs and since gas emits less than coal and lignite, the increase is lower for gas than for coal. The key effect of the CO_2 emission price is that if the CO_2 price is high enough, gas has lower variable costs than either coal or lignite and this will reverse the merit order. In effect, the load factor of gas will increase substantially (and decrease for coal and lignite) which increases output of gas plants *cet. par.*, in turn decreasing average fixed costs of gas plant and thus decreasing the entry price of new gas plant, at least relative to coal and lignite.[31]

The (absolute) change in the entry price depends on a number of factors. The method of allocating the CO_2 emission rights is the second key factor. In comparing free versus purchased allocation of rights to new plant, we will assume that the rights for existing plants are free. Note that even if the rights to new plant are free, the ETS has an effect as the CO_2 price increases variable costs as an opportunity cost. However, as the rights are allocated freely they will be windfalls and, in effect, reduce fixed costs by the same amount. If the rights have to be bought, there is only the increase in variable costs (which will be partly or even fully offset by an increase in the electricity price induced by the increase in the opportunity cost of emissions).

We compare the gas entry price with two polar cases: the variable costs of incumbent plant and a Cournot benchmark. In the first case it is assumed that

[31] We concentrate on gas only. Using an electricity market model, Peek et.al. (2004) suggest that with even moderate CO_2 prices new investment to replace old plant will be gas plant. However, the calculations seem to presume that the firms pay for the rights, rather than receiving a free allocation.

existing plant, if pushed down the merit order by new gas, may lower prices to variable costs (including the CO_2 emission price), irrespective of (sunk) capital costs (Bertrand competition). For new entry, assuming such strong price competition from existing plant is the most negative scenario, and may not be realistic. Existing plant is likely to determine the market price for other plant as well, implying that incumbent firms will have an incentive to keep up marginal prices, even if there is excess capacity. The margin of price above variable costs depends on the extent of competition which can be anything between pure price competition, limit-pricing to deter new entry and (tacit) collusion. What will happen is mere speculation; however, as Newbery (1995) noted for England and Wales, the former National Power and PowerGen duopoly seemed at some point to have chosen to maintain prices at or even above the entry level and accept or even encourage new entry. For Germany, it can be argued that high concentration and the reduction of excess capacity could allow some restriction of (short-run) competition.

The other extreme is to examine the case of Cournot competition, and these two extremes should bound the range of plausible outcomes.[32]

Table 3: Assumed plant costs and technical data.

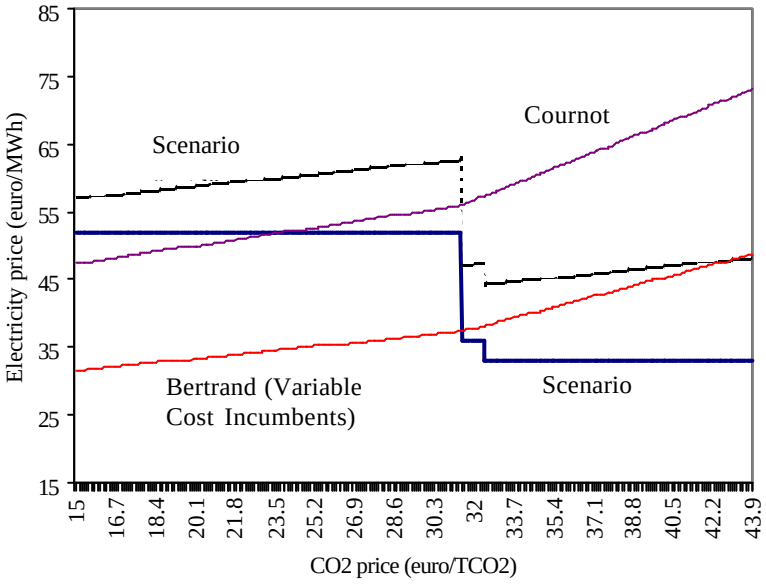
	Lignite	Coal	Gas (CCGT)
Capacity (MW)	1000	600	800
Load factor	varies; see table A1		
Cost of plant (10^6 €)	1000	540	320
Life time of plant (yrs)	40	40	35
WACC (%)	7.1	7.1	7.1
Staff (number of workers)	70	60	25
Cost per worker/yr (€)	70,000	70,000	70,000
Fixed operating costs (€/MWh) (=a(cost of plant/load)+ß)	a: 0.0135 ß: 0	a: 0.015 ß: 0	a: 0.0175 ß: 1.2 (€/MWh)
Fuel efficiency	0.43	0.45	0.57
Fuel cost (€/MWh) (not corrected for fuel efficiency)	3.6	6	15
CO_2 emission (T/MWh) (corrected for fuel efficiency)	0.92	0.75	0.35

Source: in particular Pfaffenberger & Hille (2003, Annex 1).

Table 3 summarises the characteristics for lignite, coal and gas underlying the calculations;[33] the calculations have been simplified by ignoring

nuclear and wind, assuming that these are base load and independent of the CO_2 emission price. The load factors are determined by the merit order which depends on variable costs, which in turn are determined by the CO_2 emission price. At critical values of the CO_2 price, there are four discontinuous changes in the merit order, summarised in table A1 given in the appendix. These values have been calculated using the approximated load curve of 2002, with peak load of 75.8GW and minimum load of 38.0GW. The existing plant capacities (in MW) are as given in table 2. It has been assumed that fully used base-load capacity requires 15% reserve giving a maximum load factor of 85%. The most significant change is at a CO_2 price of €31.50/tCO_2, when gas shifts up the merit order to replace lignite.[34] Coal displaces lignite at a CO_2 price of €29.25 but, whereas this makes a difference for revenues of incumbent plant, it does not affect the gas entry price. It may be noted further that only gas and lignite are ever marginal.

Figure 4: The entry price of new gas as a function of the price of CO_2



These preliminaries allow calculations of the gas entry price, both for the case of free-of-charge and paid allocation of CO_2 emission rights to new

[32] The Cournot benchmark assumes four symmetrical firms and a market price elasticity of demand of -0.75.

[33] Unless stated otherwise, the numbers are taken from Pfaffenberger & Hille, (2003, esp. annex 1), and UBS (2003, p. 31).

[34] Pfaffenberger & Hille (2003, figure 8-27) derive a comparable price with respect to variable costs.

plant, under the two scenarios of Bertrand and Cournot competition, as a function of the CO_2 price. These are depicted in figure 3, for which the key numbers are given in table A2 in the appendix.

Figure 4 suggests the following. Assuming first the benchmark with strong price competition (Bertrand). With a gas price of about €15/MWh (about 4.4 €/million BTU, uncorrected for fuel efficiency) and in the scenario in which new gas will be allocated free CO_2 emission rights, new entry becomes a threat only with a CO_2 price of slightly above €30/tCO_2. At that moment gas replaces lignite in the merit order which increases the load factor of gas sufficiently to reduce average fixed costs. Comparison with the variable costs of incumbents (i.e. Bertrand competition) is the most negative scenario for new gas. Not surprisingly, the Cournot scenario improves the opportunities for the entrants. With a residual market demand price elasticity of 0.75, new gas entry would become profitable at a CO_2 price of €23.7/tCO_2, which corresponds to a gross electricity price of €51.9/MWh; taking the gas (coal) CO_2 emission rate of 0.35 (0.75), the resulting net (Cournot) electricity price would thus be €43.6/MWh (€34.1/MWh), which would leave some room to increase the current EEX price, but not much.

The key point is the difference between free and paid allocation of CO_2 rights to new plant. Assuming Bertrand price competition, the calculations strongly suggest that new gas entry would be profitable at a CO_2 price of €30/tCO_2 with free allocation, but not if the rights are auctioned. In other words, if the CO_2 rights are free, catching up on lignite facilitates entry. If, on the other hand, they are auctioned to new plant, the price should be high enough to catch up on coal. In all, it may be expected that free allocation of the CO_2 emission rights mimics an 'as-if' capacity element and thus has the effect of stimulating new entry. Whether the effect is strong enough, depends on the CO_2 price. Thus, the NAP as it stands, stimulates (the threat of) new entry in generation and, thereby, competition, and at the same time counters the threat of low supply security.

5. CONCLUDING REMARKS

For both the gas and electricity markets, Germany opted for negotiated Third Party Access. Neither worked well and as a result the German government gave up protecting its electricity and gas industries, paving the way for the European Commission to remove negotiated TPA as an option in the recent EU Energy Directives. In the meantime, although delayed, a new Energy Act is in preparation in Germany, implementing the new Directive. The new Energy Act

installs a sector-specific regulator (REGTP) and authorises the regulator to give *ex ante* approval of the *methodology* to calculate the network charges. The control of the *level* of network charges is currently discussed in government; whereas ex-post control was long preferred, the government now shifts to ex-ante control. The new Energy Act further aims at strengthening the unbundling requirements, but only as minimally required by the Directive. The interaction of the two changes is crucial. If the regulation of the network charges is effective, we may expect that the vertically integrated companies will increasingly shift attention away from the network towards the competitive businesses. This will have two results. First, in order to make profits in the competitive businesses, the margins (in generation and retail) should be increased. It seems that by September 2004 this can already be observed. Second, to avoid the margins being competed away by third parties, there will be a stronger incentive to discriminate against third parties via the network. Increasing discrimination of third parties will encourage regulatory pressure for further unbundling.

Following the principle of negotiated TPA, association agreements have set a general framework for network access, whereas the level of network charges was left to the network operators. For electricity, the agreements did facilitate non-discriminatory access which worked reasonably well, but the fact that the network charges were unregulated resulted in a margin squeeze of the competitive stages. The result is bad for competition and new entry and thereby new investment, which of course has negative consequences for supply security. For gas, the association agreements were a disaster. An explanation offered here is that one of the parties in the negotiations (BASF being a large owner of WINGAS) was at the same time a (developing) competitor at the network level. In all, it seems that the problems in the GSI broke the system, whereas in the ESI it is unclear how things would have developed.

There is reason to be optimistic about the perspectives of the new regulation; in particular that it will have authority to gather information and has a budget to start off with a staff of 60. As mentioned, the type of regulation can be either ex ante or ex post. If ex post, it will be classical rate-of-return regulation; the combination of a reasonable rate of return as the basis for regulation and *ex post* control, which follows from *ex ante* approval of the method, causes the regulatory lag to be zero. A shift towards ex-ante (incentive-based) regulation should be welcomed. In practice, it may well be that nothing more is needed than to explicitly allow and enlarge the regulatory lag: the

control period for which the regulator commits to leave the allowed price (formula) unchanged.

The new institutional framework also affects investment in generation. Examination of capacity suggests that, for the moment, there is still sufficient generation capacity. However, the reserve margin decreases and, especially if the nuclear phase-out takes off, new investment seems to be required. There is reason to be optimistic. First, the concerns expressed above depend on the actual phasing out of nuclear power, which is highly uncertain. At the same time, the uncertainty around nuclear power hinders new investment severely. Second, the arrangements for renewables (especially wind) are still favourable and largely independent of market developments. Third, as explained above, provided that regulation of the network access charges is serious, it will strengthen the incentives of the integrated firms to increase the wholesale prices. While this strengthens the concerns about market power, the increased margin also increases the incentives for new entry. Thus, regulation of the network access charges induces new entry in generation. Fourth, new entry with CCGT may be enhanced by the EU CO_2 emission trading system (ETS) which will start January 2005.

In all, after a false start, the institutional arrangements for the German ESI are now a better deal for the consumer, but still not the best deal.

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APPENDIX: TABLES FOR SECTION 4
Table A1 gives the load factors in relation to the CO_2 prices.

Table A1: Load factors in dependence on the CO_2 price.

CO_2 price (€/T CO_2)	Merit order & load factor		
0 - 29.25	L: 0.85	C: 0.59	G: 0.19
29.25 - 31.50	C: 0.83	L: 0.53	G: 0.19
31.50 - 32.50	C: 0.83	G: 0.54	L: 0.22
32.50 -	G: 0.85	C: 0.63	L: 0.22

L - lignite; C - coal; G - gas

Table A2 gives the precise numbers underlying figure 4.

Table A2: Shoulder values of various prices in relation to the CO_2 price; all values in €

	CO_2 price (€ /tCO_2)	Gas entry FREE (€/MWh)	Gas entry PAID (€/MWh)	Var. Cost Inc. (€/MWh)	Cournot (€/MWh)
Range 0	0	51.80	51.80	26.32	39.48
	29.25	51.80	62.04	36.55	54.80
Range 1	29.25	51.80	62.04	36.55	54.80
	31.5	51.80	62.82	37.34	56.01
Range 2	31.5	36.06	47.09	37.34	56.01
	32.5	36.06	47.44	38.27	57.41
Range 3	32.5	32.94	44.32	38.27	57.41
	43.1	32.94	48.03	48.03	72.05