

PUBLIC RECORD

From: Maddison Godwin [mailto:Maddison.Godwin@moulislegal.com]
Sent: Tuesday, 2 February 2021 3:39 PM
To: King, Tim <tim.king@adcommission.gov.au>; Daniel Moulis <Daniel.Moulis@moulislegal.com>
Cc: Abdala, Juan <Juan.Abdala@adcommission.gov.au>; Kothari, Rajesh <Rajesh.Kothari@adcommission.gov.au>
Subject: RE: Information requests from today's meeting [SEC=OFFICIAL:Sensitive]

Dear Tim

Please see below for EuroChem's responses to your questions:

<REDACTED RESPONSES TO VERIFICATION QUESTIONS>

Moreover, we note that we indicated that we would provide a CV for the authors of the Brattle Report. As such, please see attached *Serena Hesmondhalgh - Gas CV* who is one of the authors of the report. Again, we recommend that CV to you. It establishes her expertise, as the principal author of the report, to come to the conclusions reached therein. No evidence or testimony presenting different facts or seeking to contest the report has been provided by the Australian industry applicants, noting also that it has been on the public record since 6 November 2020.

Kind regards



Maddison Godwin
Lawyer
moulislegal
commercial+international

Tel +61 2 6163 1000
Fax +61 2 6162 0606
Mobile +61 417 247 772

Canberra | Brisbane | Melbourne | Adelaide

SERENA HESMONDHALGH

Principal

London, United Kingdom

+44.20.7406.7900

Serena.Hesmondhalgh@brattle.com

Dr. Serena Hesmondhalgh has worked as a consultant in the energy sector for more than twenty-five years, predominantly in the electricity and gas sectors. She has provided advice on a wide range of topics: litigation and arbitration, commercial damages, competition cases, asset valuation, the design of trading arrangements and price controls.

In recent years she has provided expert testimony for around fifteen gas contract arbitrations, mostly focused on north-west Europe, as well as arbitrations on issues including billing system problems, electricity contracting restrictions, market manipulation, failure to respect regulatory guarantees and due process in relation to electricity and gas networks, expropriation of district heating assets, warranty violations and insurance claims for power stations.

Dr Hesmondhalgh has also worked extensively with EU energy regulators, particularly in Great Britain, on competition and regulation issues. On behalf of Naftogaz of Ukraine, Dr Hesmondhalgh analyzed the potential anti-competitive effects of the Nord Stream 2 pipeline unless various commitments regarding its use and pricing were to be imposed – the analysis was submitted to the European Commission. She has also conducted investigations into potential electricity market abuse undertaken by the GB regulator, as well as providing advice on the redesign of trading arrangements (GB, the Netherlands, Belgium), transmission network access (EU, GB, Greece), transportation tariffs (GB, Ukraine) market monitoring, quality of supply obligations (GB, Germany, Australia) and price controls and incentives (GB, Germany, Australia).

Dr Hesmondhalgh's modelling skills have been used to develop a range of tools for asset valuation including electricity dispatch modelling, power plant asset valuation, price control revenue assessments, interconnector trading arrangement impacts and pan-European gas flows.

EDUCATION

1981-1985	University of Oxford D.Phil. in Experimental Nuclear Structure Physics	Oxford, United Kingdom
1977-1981	Sussex University B.Sc. Physics with Mathematics (First Class Honours)	Brighton, United Kingdom

AREAS OF EXPERTISE

- Antitrust/Competiton
- Electric Power

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- International Arbitration
- Natural Gas
- Utility Regulatory Policy and Ratemaking

EXPERIENCE

Litigation and Arbitrations

- North-West European gas arbitration against Gazprom – Dr Hesmondhalgh acted as an expert witness for a gas buyer, primarily focusing on the analysis of import prices and the value of flexibility. This arbitration involved multiple contracts, with different delivery points, different prices and different flexibility terms.
- Ukrainian gas supply and transit arbitrations against Gazprom – Dr. Hesmondhalgh acted as an expert witness for a gas buyer, providing analysis of the value of gas in north-west Europe, cost-related gas transit tariffs that followed the principles laid out in the TAR and CAM network codes, and competition issues related to both supply and transit. The supply arbitration resulted in the replacement of a 100% oil-linked contract price with one 100% linked to German hub prices.
- South-east European gas arbitration – Dr. Hesmondhalgh acted as an expert witness for a gas buyer, providing analysis of the value of gas in western Europe and on changes in the western European gas market since the late 1990's.
- North-west Europe gas arbitrations – Dr. Hesmondhalgh has acted as an expert witness for a gas producer, providing analysis of the value of flexibility and the relevance and applicability of German import prices for a variety of different claim dates.
- Independent expert – Dr Hesmondhalgh acted as an independent expert for a Tribunal in a gas contract arbitration involving a central European country. She provided assistance in relation to translating its decision into a revised price formula and on different ways of reaching a fair and equitable solution.
- Gas contract arbitrations – Dr. Hesmondhalgh has acted as an expert for a major oil & gas utility who is both a buyer and a seller of gas. She acted as an expert for the company in its role as a gas buyer and she previously acted as an advisor to its production arm in three gas arbitrations brought by a large European utility, who has requested a complete change in pricing methodology.
- Norwegian gas contract disputes - Dr. Hesmondhalgh has appeared as an expert witness for two gas price arbitrations and five price reviews involving deliveries of Norwegian gas to Germany and central Europe.

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- German gas contract disputes - Dr. Hesmondhalgh has acted as an expert witness for three gas contract arbitrations for the same buyer involving deliveries of gas within Germany. She has also prepared expert witness testimony for a further two arbitrations which were settled before the oral hearing.
- Czech gas contract disputes – Dr. Hesmondhalgh acted as an expert witness for price reviews involving deliveries of gas within the Czech Republic.
- Gas price arbitration in Spain - Dr. Hesmondhalgh formed part of the Brattle team hired to provide expert witness testimony in a gas supply agreement arbitration involving gas deliveries to Spain.
- Other gas contract disputes - Dr. Hesmondhalgh has formed part of Brattle teams that have provided advice on gas contract disputes in Italy, Belgium and France.
- Gas distribution and supply company in Hungary: – Dr Hesmondhalgh acted as an expert witness for the claimant on regulatory matters before the ICSID in an arbitration regarding whether the regulatory treatment of the company was fair and equitable given the economic situation in Hungary and the high levels of energy poverty in the country. This involved comparing the Hungarian regime to the cost-reflective principles embodied in the Third Gas Directive.
- Discriminatory impact of zonal losses on an offshore wind farm in Scotland – Dr Hesmondhalgh is co-author of an expert report on the discriminatory impact of the unexpected introduction in GB of zonal losses on the profitability of an offshore wind. As well as quantifying the damages associated with the introduction of zonal losses, Dr Hesmondhalgh also explained why the way that zonal losses had been introduced was incompatible with both the government’s support for renewable energy and the stated aims underlying the introduction of zonal losses.
- Impact of a cooling tower fire on a UK power plant’s profitability – Dr Hesmondhalgh has developed a model to estimate the impact that the extended outage at and subsequent constrained operating regime of a UK power plant had on its profitability as a part of a disputed insurance claim that is being disputed in the High Court.
- Supply Contract Agreement – Dr Hesmondhalgh is acting as an expert witness in a dispute between a CHP generator and the company to whom it sells its heat and power regarding the apportionment of the costs of the impact of the removal of Climate Change Levy Exemption Agreements and the treatment of fixed distribution and transmission costs.
- Gas production agreement – Dr Hesmondhalgh is acting as an expert witness in a Stockholm Chamber of Commerce arbitration regarding the damages suffered by a gas producing company in eastern Europe as a result of the failure of the other parties to a joint activities agreement to meet their contractual obligations to modernize its production facilities.

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- Contract termination arbitration – Dr Hesmondhalgh acted as an expert witness in an UNCITRAL arbitration regarding the damages suffered by a trading company as a result of the early termination of a power purchase agreement that it held with a major Romanian generators.
- Electricity network and supply arbitration - Dr. Hesmondhalgh acted as an expert witness in an ISCID arbitration regarding the damages suffered by the foreign purchaser of two eastern European electricity networks and supply companies due to the failure to respect regulatory guarantees and due process.
- District heating arbitration – Dr. Hesmondhalgh acted as an expert witness in an arbitration before the ICSID regarding the expropriation of district heating facilities in Latvia. She has calculated the damages owing to the majority owner of the facilities.
- Electricity supply contract dispute – Dr. Hesmondhalgh acted as an independent expert on behalf of a client in a claim for misrepresentation and breach of contract concerning an allegation that the client's refusal to allow a third-party to sell back electricity or terminate its contract caused damages.
- Billing systems dispute – on behalf of a client who supplied a billing system to a major utility, Dr. Hesmondhalgh rebutted the damages claimed by the purchaser, who alleged that the billing system had failed to work properly.
- Power station damages – Dr. Hesmondhalgh managed a team calculating the damages associated with the failure of a large power station to operate in the manner guaranteed by the warranties provided by the seller at the time that the power station was sold to Dr. Hesmondhalgh's client.
- Gas storage facility testimony, GB - Dr. Hesmondhalgh provided testimony regarding the economic case for a new gas storage facility in the GB at a public planning enquiry on behalf of the local council in whose area the facility would be built.
- Advice on the GB renewable obligations certificate (ROC) market – as part of a US case concerned with the alleged failure of a renewable power investment fund to meet its obligations to its investors, Dr. Hesmondhalgh provided evidence regarding the operation of the GB ROC market and the likely revenues that could have been anticipated for energy from waste plants.

Gas Market Regulation and Competition

- Competition complaint relating to the Nord Stream 2 - Dr Hesmondhalgh contributed to the economic analysis for a complaint lodged by Naftogaz (and subsequently withdrawn as

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part of a Settlement Agreement between Naftogaz and Gazprom) with the European Competition regarding the potential anti-competitive effects of the Nord Stream 2 pipeline unless various commitments regarding its use and pricing were imposed on Gazprom.

- Competition complaint relating to the relaxation of the exemption conditions for the OPAL pipeline – on behalf of Naftogaz, Dr Hesmondhalgh helped draft an expert report on the consequences for the European gas market of the relaxation of the exemption conditions for the OPAL pipeline in 2016/17.
- TAR Network Code – Dr Hesmondhalgh provided advice to the Ukrainian regulator on the requirement of the TAR Network Code in respect of introducing transportation tariffs in Ukraine that were consistent with the Third Gas Directive.
- Draft gas balancing network code for the EU – Dr. Hesmondhalgh advised Ofgem on whether the draft balancing network code for the EU, which was to be published by the European Network of Transmission System Operators for Gas (ENTSOG), met the requirements laid out in the Framework Guidelines issued by the Agency for the Cooperation of Energy Regulators (ACER). The work was commissioned by Ofgem on behalf of ACER – Ofgem.
- Impact assessment for changes to transportation capacity in GB – for the GB regulator, Dr. Hesmondhalgh drafted an impact assessment for changing the arrangements for obtaining exit capacity in the gas transportation system. The work involved analysis of the costs that market participants estimated they would incur, of potentially avoided investment costs, and of the effects on competition, discrimination and consumers.
- Competition complaint relating to the relaxation of the exemption conditions for the OPAL pipeline – on behalf of Naftogaz, Dr Hesmondhalgh helped draft an expert report on the consequences for the European gas market of the relaxation of the exemption conditions for the OPAL pipeline in 2016/17.
- Competition complaint relating to the Nord Stream 2 - Dr Hesmondhalgh contributed to the economic analysis for a complaint lodged by Naftogaz (and subsequently withdrawn as part of a Settlement Agreement between Naftogaz and Gazprom) with the European Competition regarding the potential anti-competitive effects of the Nord Stream 2 pipeline unless various commitments regarding its use and pricing were imposed on Gazprom.
- Gas cost calculations – Dr. Hesmondhalgh has examined how the gas tariffs paid by Russian fertilizer producers compare to Gazprom’s underlying production & delivery costs, and whether they pay an unfairly low price.

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- Assistance to Ofgem in developing system operator (SO) incentives for 2013 – Dr. Hesmondhalgh was part of the Ofgem team working on the long-term SO incentives for electricity transmission to align the current schemes with to the TO price control (RIIO T1).
- Analysis of gas contract flexibility - On behalf of an international oil and gas company, Dr. Hesmondhalgh valued the flexibility included in a gas supply contract in comparison with the flexibility in typical German import contracts. Also, for a Dutch utility, Dr. Hesmondhalgh built a model to assess the relative value of different types of gas flexibility: swing in gas contracts, gas storage, linepack and conversion between L-cal and H-cal gas.
- German gas market study – On behalf of a major international energy company, Dr. Hesmondhalgh produced a study of the gas market in Germany for use in potential price review arbitrations.
- Supply contract margins – For an European energy company, Dr. Hesmondhalgh calculated the margin the company could have expected to earn on its supply contracts. As well as providing analysis on contract margins, Dr. Hesmondhalgh also provided advice on the relevance of German import prices to the obtainable value.
- Damages associated with alleged abuse of dominant position – Dr. Hesmondhalgh was part of a Brattle team that estimated the damages associated with the alleged abuse of a dominant position in the non-provision of the SIPs database to competing retail companies.
- Transit tariff benchmarking study – Dr. Hesmondhalgh led a study that compared the Ukrainian transit tariff to tariffs charged by other European pipeline companies.
- Retail competition – on behalf of an energy trading company, Dr. Hesmondhalgh reviewed and provided comments on a proposed submission to Ofgem on retail competition.
- Gas price controls, Belgium - Dr. Hesmondhalgh managed a study for Fluxys that explained the rationale for multi-year tariffs, reviewed the application of multi-year tariffs in other jurisdictions, and recommended measures for Belgium.
- Analysis of the opportunity costs associated with providing gas to Ireland rather than GB - as part of a mediation process, Dr. Hesmondhalgh directed a project that modelled the development of electricity prices in GB and Ireland in order to determine what value would be lost from providing gas in Ireland rather than GB. She subsequently gave extensive advice on how the contract terms should be adjusted to reflect the changing way in which power prices are determined in Ireland.
- Determination of the fair price for gas supplies to industrial consumers in Russia - Dr. Hesmondhalgh directed a project that assessed what it would have been reasonable for an

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industrial consumer in Russia to pay for gas. The work was undertaken to provide a defence against a US Department of Commerce allegation of dumping in relation to the goods produced using the gas.

- Impact of potential gas price discrimination on the Spanish electricity market - as part of an analysis of the likely effects of the proposed mergers between Gas Natural and Iberdrola and Gas Natural and Union Fenosa, Dr. Hesmondhalgh was responsible for modelling the impact on prices and generator profits of possible gas price discrimination strategies pre- and post-merger.
- Analysis of the value of gas storage facilities, Europe - for a gas storage owner, Dr. Hesmondhalgh carried out an option based analysis of the value of its storage facilities and also benchmarked this value against other storage facilities, taking into account their different operating characteristics.
- Drivers of gas storage value, the Netherlands - for a Dutch utility considering investment in a gas storage project, Dr. Hesmondhalgh directed a study that assessed the supply of and demand for peak capacity in the Netherlands, and identified the key risks to the future value of gas storage facilities in the Netherlands.
- Gas price control regime for Germany - in conjunction with E-Bridge Consulting, Dr. Hesmondhalgh developed proposals for a gas price control regime for Germany for a major Germany utility. The proposals were subsequently presented to the German regulator.
- Harmonisation of gas tariffs, Ireland - Dr. Hesmondhalgh managed a project exploring potential options for harmonising gas tariffs in the Republic of Ireland and Northern Ireland.
- Gas contract advice, GB, Ireland and Spain - for major gas suppliers in GB, Ireland and Spain, Dr. Hesmondhalgh led projects reviewing the economic and commercial consequences of draft gas contracts with potential new power stations. The contract terms varied from straightforward oil product price indexation through power price indexation to tolling contracts, with a variety of re-opener clauses and other terms.
- Gas market design and liquidity - for the Dutch regulator, Dr. Hesmondhalgh directed a project investigating which market features were necessary to ensure the development of a liquid and well-functioning market. This work involved analysing a number of gas markets around the world, including the UK and US gas markets.
- Investment incentives, GB – Dr. Hesmondhalgh was extensively involved in drafting the GB regulator’s proposals for the new deep incentive regime for Transco as operator of the high pressure gas transmission system.

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- Gas/electricity arbitrage opportunities, GB – Dr. Hesmondhalgh conducted a review of the opportunities for and implications of arbitrage between electricity and gas markets for the GB gas regulator.
- Introduction of the Network Code, GB – on behalf of the GB gas regulator, Dr. Hesmondhalgh was the manager of a team responsible for reviewing the state of readiness of the gas industry for the introduction of daily balancing and the Network Code.
- Gas pipeline transit capacities, Belgium - Dr. Hesmondhalgh directed a project for the Belgian regulator (CREG) on future prospects for European transit activities and the need for investment in network capacity in Belgium. This involved assessing all of the key drivers of gas flows across Europe including liberalisation, hub trading, security of supply requirements, and supply and demand patterns.
- Security of supply review, GB - Dr. Hesmondhalgh reviewed security of supply issues for the GB regulator, which involved in-depth analysis of the supply/demand position in GB, uses and costs of storage, and the economics of interruption.
- Gas storage valuation, UK – Dr. Hesmondhalgh has produced a gas storage valuation in relation to negotiations to buy back rights to storage capacity that had been sold under a 5-year contract.

Electricity Regulation

- Assistance to Ofgem in developing long-term system operator (SO) incentives from 2013 – Dr. Hesmondhalgh was part of the Ofgem team working on the long-term SO incentives for electricity transmission to align the current schemes with to the TO price control (RIIO T1), including reviewing NGET's proposals.
- Proposals for the reform of the Spanish electricity and gas wholesale markets – for a major Spanish utility, Dr. Hesmondhalgh managed a team that provided proposals for ways in which the Spanish energy markets could be improved.
- Investigation of potential sources of demand response in GB – for Sustainability First's Demand Forum, Dr. Hesmondhalgh developed a bottom-up model of demand use by sector, end-use and half-hour in GB. She used this model to estimate the potential for demand response and reduction at different times of the day and year and the impact that such demand changes might have on electricity prices and carbon emissions.
- Incentive design for electricity system operations, Spain – Dr. Hesmondhalgh advised Endesa on the design of incentives for electricity system operations which was used to assist Endesa in negotiations over EU and Spanish regulations.

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- Incentive arrangements for offshore wind transmission owners, GB - for the GB regulator, Dr. Hesmondhalgh was responsible for developing a set of availability incentive arrangements that took into account the very wide range of outages that can be associated with offshore wind cables.
- Analysis of the advantages and disadvantages of a centralized renewables market - for the GB regulator, Dr. Hesmondhalgh was responsible for analysing whether a centralised renewables market would facilitate the construction of renewable power plants. The resulting report was published by the regulator and can be found at <http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=169&refer=Markets/WhlMkts/Discovery>.
- GB industry code governance arrangements - in conjunction with Simmons and Simmons, Dr. Hesmondhalgh led a project looking at the governance arrangements for the codes that specified how the GB electricity and gas markets work and made recommendations as to how the governance arrangements could be improved. This review was published by the GB regulator and can be found at <http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=66&refer=Licensing/IndCodes/CGR>.
- Treatment of zonal losses in GB electricity market and impact of carbon support mechanism - for the GB regulator Dr. Hesmondhalgh analysed the impact of introducing a zonal system for losses and the impact of the carbon support mechanism. She also critiqued a report on the impact of zonal losses prepared by a third-party consultancy as well as providing her own qualitative assessment of the likely impact.
- Cross border system operator incentives - on behalf of a Spanish client, Dr. Hesmondhalgh led a team that produced a report on the interactions between domestic and cross border congestion constraints. This report was submitted to the Council of Europe Energy Regulators in response to a consultation that they published on the same subject.
- Mechanisms for improving electricity market liquidity in GB - for the GB regulator, Dr. Hesmondhalgh was responsible for developing ideas on potential regulatory mechanisms to increase electricity market liquidity and was heavily involved in drafting the subsequent consultation document.
- Analysis of the impact of early connection rights for renewable generators in GB - for the GB regulator, Dr. Hesmondhalgh directed a project to analyse the impact of allowing renewables generators to connect to the grid before the consequential wider reinforcement

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works were completed. The analysis looked at the impact on congestion costs, CO2 emissions and power prices.

- Advice on renewable integration in the Spanish electricity market - Dr. Hesmondhalgh worked for a large Spanish electricity firm developing market rules that would better accommodate the growing capacity of wind power in the Spanish electricity market. Issues included (i) the need for adequate remuneration for an efficient mix and amount of conventional plant; (ii) sharper demand-side management signals; (iii) incentives to build flexibility into the system in order to absorb the renewable energy and to store it; (iv) appropriate incentives for renewable generators; and (v) measures to ensure that the generators of renewable energy bear an adequate share of the back-up costs they impose on the system.
- Assessment of alternative congestion management arrangements in the Netherlands - Dr. Hesmondhalgh oversaw a project that developed and quantitatively assessed alternative methods for congestion management in the Netherlands. The work involved an assessment of the costs and benefits to different groups, as well as an assessment of how various mechanisms would be able to cope with market power. The report was published and submitted to the Dutch parliament as part of the decision making process for a new law on congestion management.
- Reform to transmission access regime & review of TenneT's connection policy - Dr. Hesmondhalgh was involved in assessing possible reforms to the transmission access regime in the Netherlands. The work examined several proposals including auctioning available transmission capacity, forced site auctions, the use of tradable transmission rights, greater publication of relevant congestion information, a "connect and manage" approach and the use of locational transmission charges. Dr. Hesmondhalgh took part in a number of workshops in which generators and other industry representatives gave feedback on the proposals and detailed their concerns and ideas for connection policy. The work was subsequently published by TenneT.
- Analysis of the impact of Enel's asset sales on liquidity - for an Italian utility, Dr. Hesmondhalgh investigated the impact that Enel's asset sales could have on market liquidity and on market power concerns. Dr. Hesmondhalgh showed that the way in which the assets were sold would be likely to limit the effectiveness of the process although there should be some impact.
- Critique of proposals designed to increase liquidity in the Belgian power market - for Electrabel, Dr. Hesmondhalgh analysed proposed forced asset sales to investigate whether they could contribute significantly to market liquidity. She concluded that the proposals

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were unlikely to have a significant effect on liquidity since there were other aspects of the market, such as interconnector trading arrangements, that were more significant constraints on liquidity.

- Critique of Greek Electricity Distribution Code - Dr. Hesmondhalgh led a project to provide advice to the Greek regulator (RAE) on the proposed distribution code. The code included a number of performance incentives and part of the project involved comparing those incentives to others implemented across Europe. In addition, Dr. Hesmondhalgh provided detailed comments on the algebra and drafting of the proposed code.
- NGC's System Operator Incentives, GB - Dr. Hesmondhalgh was involved in the development of NGC's incentives. This involved analysing how NGC contracts for ancillary services and the costs it incurs in so doing, NGC's use of the balancing mechanism under NETA, and the form and parameters for NGC's financial incentive scheme. She also assisted with drafting licence conditions, including those relating to the publication of information on procurement mechanisms and balancing principles.
- Overview of international approaches to the regulation of electricity networks, E.ON - Dr. Hesmondhalgh provided a report comparing and contrasting approaches to the regulation of electricity networks in liberalised markets around the world.
- Long term reserve contracts as an aid to security of supply, NMa - Dr. Hesmondhalgh analysed the extent to which long term reserve contracts might improve security of supply in the Netherlands by encouraging marginal generators to remain on the system. The project also involved a cost-benefit analysis of the proposed scheme and looked at the problem of market power in the reserve market and the implications that this had for the wider wholesale market.
- Regulation of transmission and distribution companies in the Netherlands - for SEP, the umbrella body who owned the Dutch transmission network operator/owner TenneT, Dr. Hesmondhalgh drafted a response to the consultation paper on the regulation of transmission and distribution companies in the Netherlands produced by the DTe. The document covered international regulatory approaches, the calculation of appropriate rates of return on capital, an explanation of relevant considerations in the determination of a regulatory asset base and the limitations of benchmarking exercises for transmission companies.
- The need for and role of a GB system operator under BETTA in GB - as part of the work on the integration of the GB electricity market, Dr. Hesmondhalgh provided advice to Ofgem on how a single set of wholesale trading arrangements would be most efficiently managed by a single system operator (SO). She considered options for the extent to which a GB SO

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should be responsible for transmission planning and how such planning should be co-ordinated across the three transmission network owners.

- Transmission system access and pricing arrangements in GB - Dr. Hesmondhalgh provided economic advice and policy support to Ofgem on issues associated with future transmission network access and pricing arrangements.
- Review of connection policies for transmission and distribution in GB – for Ofgem, Dr. Hesmondhalgh compared and contrasted the approaches to connection costs (e.g. deep versus shallow) for transmission and distribution networks in electricity and gas. She reviewed NGC’s proposals to move to a “super shallow” connection policy with more sharply differentiated use of system charges.
- Assistance in preparing responses to proposed distribution price control for distribution companies - for two UK distribution companies, Dr. Hesmondhalgh helped draft responses to the regulator’s consultation documents and prepare evidence to support the arguments that were being made.
- New Electricity Trading Arrangements in GB - Dr. Hesmondhalgh advised the Director General of Electricity Supply throughout the process of reviewing and restructuring the electricity trading arrangements. She was responsible for drafting most of the key documents relating to the economic aspects of the proposed changes, including reviewing arrangements in other liberalised markets. She also assisted in the preparation of various reviews of NETA prepared by Ofgem and provided advice on modifications to the trading arrangements.
- Competition Commission referral, GB - Dr. Hesmondhalgh provided economic advice to Ofgem in relation to the referral of two generators to the Competition Commission following their refusal to accept a licence condition prohibiting market abuse. This involved, amongst other things, analysing past examples of Pool price manipulation and considering what the potential for market abuse may be under NETA.
- Alternative market mechanisms for Italy – on behalf of Edison, Dr. Hesmondhalgh led a four day workshop exploring various aspects of potential market mechanisms for Italy. This included developing a simulation model, which allowed the workshop participants to experiment with different strategies under different sets of Pool rules. Subsequently she presented the key conclusions emerging from the workshop to the Ministry of Energy and Industry, at the request of the client.
- Preparation for market liberalisation, Union Fenosa, Spain - Dr. Hesmondhalgh directed the on-site team advising Union Fenosa on its preparations for electricity market

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liberalisation, specifically in the areas of company restructuring, economic assessment of proposed market rules, and modelling of electricity prices and revenues of generating plant in a competitive environment.

- CHP and renewables policy under NETA, Ofgem - Dr. Hesmondhalgh was involved in drafting Ofgem's "Report to the DTI on the Review of the Initial Impact of NETA on Smaller Generators". Previously, she had advised Ofgem on policy for CHP plant and generation from other renewable sources of energy under NETA.
- Emission constraint modelling, Ofgem - Dr. Hesmondhalgh managed a project that modelled the effects of Environmental Agency proposals for changes to sulphur dioxide emission limits for generating plant. The project investigated the incentives placed on coal-fired generators to invest in and use flue gas desulphurisation equipment as a result of changes in company-wide and plant-specific sulphur emission limits. She also investigated the effects that these changes would have on overall generation patterns.
- Analysis of generators' ancillary services revenues, NGC - Dr. Hesmondhalgh undertook a top-down analysis of the revenues that generators were earning from ancillary services and the Pool to see if there was any correlation between their behaviour in the Pool and the ancillary services market.
- Pool price enquiries, OFFER (one of the precursors of Ofgem) - Dr. Hesmondhalgh provided economic and analytical support for OFFER's various inquiries into the operation of the initial wholesale trading arrangements in England and Wales (the Pool).

Markets & Investments

- Due diligence on two UK offshore wind farms – on behalf of a potential buyer, Dr. Hesmondhalgh led a team in 2019 assessing the value of two offshore wind farms receiving compensation under the Renewables Obligation scheme.
- Analysis of proposed offshore wind farm and electricity interconnector project – on behalf of TenneT and Energienet, Dr. Hesmondhalgh analysed the value for the proposed COBRACable between the Netherlands and Denmark under various different assumptions regarding how an offshore wind farm might be connected to the cable.
- Advice on potential acquisitions in the Netherlands and Belgium - for a major utility, Dr. Hesmondhalgh carried out extensive analysis of the potential value of different acquisition targets in these markets.
- Valuation of a potential IGCC plant in Belgium - for an independent power producer, Dr. Hesmondhalgh was involved in producing power price projections and a financial model

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for a potential new IGCC power plant. She tested the sensitivity of the valuation to different scenarios regarding the development of the Belgian electricity market and also the interactions between carbon prices, coal prices and gas prices.

- Interconnector valuations - Dr. Hesmondhalgh has carried out studies to value (congestion rent, reserve) of proposed interconnectors between GB and the Netherlands, Belgium and Ireland. This work has involved stochastic analysis of power prices since the value of interconnectors mainly derives from fluctuating price differences in the two connected markets. She has also provided revenue forecasts for a new interconnector between Belgium and Germany for a number of alternative scenarios. The projects also involved estimating the impact of the interconnectors on renewables, CO₂ and consumer and producer welfare.
- Power contracting strategies – for Tennet, Dr. Hesmondhalgh has provided advice on a power contracting strategy during the commissioning of the BritNed cross-border cable between GB and the Netherlands.
- Trading arrangements, Norned cable – at the request of Tennet, Dr. Hesmondhalgh analysed alternative trading arrangements for the NorNed cable. She also presented proposals regarding trading arrangements to Dutch electricity traders at a seminar arranged by TenneT.
- Electricity price projections – for an investment bank, Dr. Hesmondhalgh produced electricity price projections for Switzerland, Hungary, Czech Republic and Italy. She also produced green certificate projections for Italy.
- Valuation of electricity assets in Singapore - Dr. Hesmondhalgh carried out detailed modelling of the Singapore electricity market, taking account of the possible effects of high levels of vesting contracts, the reserve market and opportunities to exercise market power.
- Analysis of EU energy and climate change policy and the implications for carbon capture and storage - for Alstom, Dr. Hesmondhalgh produced a published report analysing likely power market developments that will have an impact on the demand for carbon allowances.
- Acquisition advice relating to Viesgo, Spain - Dr. Hesmondhalgh provided valuation advice relating to the generation, supply and distribution businesses for this spin-off from Endesa.
- Analysis of the impact of different trading arrangements on the value of various proposed interconnectors - Dr. Hesmondhalgh undertook probabilistic studies of the value that could be derived from various proposed interconnectors in NW Europe and the impact that different trading arrangements (market coupling or explicit auctions) might have.

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- Economics of renewable plants in GB, Ireland, Spain, Denmark and the Netherlands - Dr. Hesmondhalgh has directed projects analysing the economics of renewables plants of various types – wind, min-hydro, solar – receiving various types of subsidies.
- Economics of independent power plants in GB, Spain, Germany, Netherlands, Italy and Ireland (north & south) - Dr. Hesmondhalgh has directed numerous projects analysing the economics of various independent power plant projects across Europe. To do this, she helped develop an integrated financial asset modelling methodology, which uses both market-based data and cost-based equilibrium market modelling.
- Tolling contract advice, Ireland and Spain - Dr. Hesmondhalgh has led projects reviewing the economic and commercial consequences of draft tolling contracts with potential new power stations for major gas suppliers in Ireland and Spain.
- Value of stranded contracts, the Netherlands - the umbrella group for Dutch generators entered into a number of long term contracts with power producers in other countries, which subsequently proved to be out of the money. For a number of different parties at different times, Dr. Hesmondhalgh analysed the stranded costs locked into these contracts and assisted in negotiations regarding the discount that should be paid for the generating companies saddled with these contracts.
- Market risk advice, AES - Dr. Hesmondhalgh advised AES on the market risks to which its Barry plant would be exposed. She has also led a team providing market advice to both AES and the syndicating banks relating to the £1.9 billion acquisition of the 4,000 MW Drax coal fired station. For AES, she has also directed projects looking at a number of other markets including NordPool, Poland and Spain.
- Analysis of pumped storage assets - Dr. Hesmondhalgh assisted Kleinwort Benson in the preliminary bidding process for First Hydro, the pumped storage plant then owned by National Grid Company. She was subsequently advisor to Dominion Energy on its proposed acquisition of the £653 million business.
- Advice on the acquisition of an English electricity supply and distribution company, Singapore Power - Dr. Hesmondhalgh directed a project providing market and regulatory advice for Singapore Power when they were bidding for a supply and distribution company. This included modelling the future supply and regulated distribution revenues, providing advice on the concerns of the regulator and negotiating with a potential joint bidder.

Electricity & Gas Market Modelling

SERENA HESMONDHALGH

Dr. Hesmondhalgh has developed a number of models to simulate the operation of competitive electricity markets. These have been extensively used to value over 40 power plant projects across Europe and beyond. One of her models, the Brattle Annual Model, enables prices across Europe to be estimated by representing the region as individual electricity markets interconnected by transmission lines. Whilst primarily a cost-based model, it has been designed to facilitate including shaped price add-ons to match historic price shapes and forward curve data.

She has also developed a number of bespoke models to value long term contracts in electricity and gas markets and a model of the European gas network, designed to assess flows between markets and prices in those markets on the basis of existing and proposed supply sources, storage costs and price-sensitive demand.

Dr. Hesmondhalgh has also directed a number of other projects which required an in-depth understanding of modelling issues. These include:

- A study of the impact of different connection policies on congestion costs in GB.
- A study of the impact of the introduction of an LMP market on wind generators in Ireland.
- The impact of environmental measures (the Large Combustion Plant Director, the EU Emissions Trading Scheme) on the pattern of electricity flows around Europe.
- An analysis of the likely costs of operating the UK electricity transmission system, based on a probabilistic assessment of the costs of different ancillary services.
- An investigation into potential market abuse in the England & Wales power pool.

Other

- Investigation into wind farm delay in Ireland – Dr. Hesmondhalgh was contracted by Art Generation, a developer of wind farms in Ireland, to investigate why the allowed connection date for its two wind farms had been pushed back from 2015 to 2019.
- Carbon auctions, CEFIC – Dr. Hesmondhalgh provided advice to the European Chemical Industrial Council (CEFIC) on carbon auctions and their impact on chemical companies.
- Carbon issues, GB – Dr. Hesmondhalgh helped the GB regulator draft a paper on the approach that the regulator should take when interacting with the government on low carbon issues.

PUBLICATIONS

SERENA HESMONDHALGH

"GB Electricity Demand – 2012 and 2025. Impacts of demand reduction and demand shifting on wholesale prices and carbon emissions. Results of modelling", for the Sustainability First Smart Demand Forum, Serena Hesmondhalgh, Gill Owen, Maria Pooley and Judith Ward, December 2013.

"A Trip to RIIO in Your Future?", Peter Fox-Penner, Dan Harris and Serena Hesmondhalgh, Public Utilities Fortnightly, October 2013.

"GB Electricity Demand – 2012 and 2025. Initial Brattle Demand-Side Model – Scope for Demand Reduction and Flexible Response", for the Sustainability First Smart Demand Forum, Serena Hesmondhalgh and Sustainability First, December 2012.

"Easing the Transition from Oil-Indexation", Serena Hesmondhalgh and Dan Harris, Petroleum Economist, August 3, 2011.

"BSC Modification 229: Potential interactions with options for changes to transmission charging", Serena Hesmondhalgh and Dan Harris, The Brattle Group, Ltd., May 23, 2011.

"A Review of LE/Ventyx's Cost-Benefit Analysis of Modification, P229, Lot 3 Additional Analysis", Serena Hesmondhalgh and Dan Harris, The Brattle Group, Ltd., September 2, 2010.

"A Review of LE/Ventyx's Cost-Benefit Analysis of Modification, P229, Lot 1 Report", Serena Hesmondhalgh and Dan Harris, The Brattle Group, Ltd., September 2010.

"Alternative Trading Arrangements for Intermittent Renewable Power: A Centralised Renewables Market and Other Concepts", Serena Hesmondhalgh, Dan Harris and Penelope Wilson, The Brattle Group, Ltd., April 2010. Published by Ofgem at (www.ofgem.gov.uk).

"EU Climate and Energy Policy to 2030 and the Implications for Carbon Capture and Storage: A Report for ALSTOM Power Systems", Serena Hesmondhalgh, Toby Brown and David Robinson, The Brattle Group, Inc., March 2009.

"Is fuel diversity the answer to security of supply?", Serena Hesmondhalgh and Dan Harris for the 9th IAEE European Energy Conference "Energy Markets and Sustainability in a Larger Europe," Florence, Italy, June 2007.

"Critique of the Industry Codes Governance Arrangements", Serena Hesmondhalgh, Boaz Moselle and Toby Brown, The Brattle Group, Inc., June 2008.

"A Review of TenneT's Connections Policy", Serena Hesmondhalgh, Carlos Lapuerta and Dan Harris, The Brattle Group Ltd., July 2007.

"Can Wind Work In An LMP Market?", Serena Hesmondhalgh, Philip Q Hanser and Dan Harris, Natural Gas & Electricity, November 2005.

"Long-Term Reserve Contracts in the Netherlands", Serena Hesmondhalgh, Carlos Lapuerta and Dan Harris, The Brattle Group Ltd., June 2004.

SERENA HESMONDHALGH

"A Study on Renewable Energy in the New Irish Electricity Market", Serena Hesmondhalgh and Dan Harris, The Brattle Group Ltd., June 2004.

PRESENTATIONS

"Global Gas Supply & Demand – Impact on Hub Prices Query" presented at C5 Conference in Frankfurt, Germany, December 2011.

"An Economic Analysis of the Remit Proposals", presented at the 16th European Gas Conference in Oslo, Norway, June 2011.

"Resource Adequacy and Renewable Energy in Competitive Wholesale Electricity Markets", Serena Hesmondhalgh, Johannes P. Pfeifenberger and David Robinson, The Brattle Group, Inc., presented at the 8th Annual British Institute of Economics Academic Conference, September 23, 2010.

"Oil Indexation & Gas Prices: Is Current Pricing for Gas Sustainable?", presented at the Flame 2010 Conference, Amsterdam, The Netherlands, March 2010.

"How Do You Value Storage in Emerging Gas Markets?", presented at the Sparks and Flames Conference, Rotterdam, The Netherlands, December 2009.

"Liquidity in wholesale electricity markets", presented at an Ofgem Seminar, London, United Kingdom, August 2009.

"How Open are Europe's Energy Markets?", presented at 13. IIR-Jahrestkongress für die Energiewirtschaft, Austria, April 2008.