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ENERGY SERVICES

Background Note by the Secretariat[1]

1. This Note has been prepared at the request of the Council for Trade in Services, with a view to stimulating discussions in the Council on the sector of energy services. It provides background information and updates a previous Note on Trade in Energy Services (S/C/W/52, dated 9 September 1998). This Note focuses on developments and issues considered to be most relevant to the GATS. It is not intended to provide a comprehensive account of the sector.

I. OVERVIEW

2. Energy is one of the biggest markets in the world, with an estimated value of US$6 trillion a year (about a tenth of the world's economic output).[2] The energy sector is highly capital-intensive: significant costs are needed to find, produce and transport energy. The depletion of existing oil and gas wells and the need to search for and exploit resources in more remote regions and more difficult conditions (such as in deep seas) contributes to increasing prices. Large-scale development of renewable energy needed to diversify energy sources and mitigate climate change also entails significant research & development and infrastructure costs. Demand for energy is not expected to abate as economic development and population growth create pressing energy needs, in particular in developing countries.

3. An efficient energy sector is a prerequisite for social and economic development as energy underpins virtually any human activity. Ensuring the supply of reliable and affordable energy is seen as one of the basic responsibilities of governments which regulate the sector in order to pursue different policy purposes: (i) ensuring that the population has reliable and affordable access to energy goods and services (universal service for electricity, for instance); (ii) mitigating the environmental effects of energy production and consumption; (iii) diversifying energy sources in order to ensure security of supply; and (iv) ensuring conservation and sustainable use of natural resources.

4. Patterns of energy markets are multifaceted and do not necessarily evolve in a linear manner. Oil and coal markets have been global for a long time, but electricity and gas have been regional, due to transportation characteristics. However, the development of LNG terminals is contributing to the emergence of a global market for gas as well. Electricity markets remain regional (non-storable and grid-based nature of supplies) and depend on interconnection of the different national systems. Energy services markets are not limited directly by geographical limitations, but other types of obstacles may exist.

5. While there has been a long tradition of private sector involvement in oil markets, public monopolies have been predominant in gas and electricity markets. Until the end of the 1980s,

[1] This document has been prepared under the Secretariat's own responsibility and without prejudice to the positions of Members and to their rights and obligations under the WTO.

[2] *The Power and the Glory – A Special Report on Energy,* The Economist, 21 June 2008.

electricity and gas were supplied principally by state-owned, vertically integrated monopolies. Given the high-capital costs involved in building and maintaining infrastructure, and the monopoly situation characterizing the transportation segment in these sectors, direct state involvement was seen as the best option for ensuring public service obligations. Drivers for liberalization of gas and electricity markets included increased energy demand due to economic development and demographic growth, coinciding with strained public budgets. Technological developments (in particular the fact that smaller power generation units became competitive, and increased efficiency of power grids) and increasing public concerns about monopoly-related inefficiencies also contributed to the liberalization of the sector. On the other hand, a different trend has emerged in the oil sector, with the increasing role of state-owned national oil companies (NOCs), in particular in the upstream segment.

6. Over the last 15 years, business opportunities in the energy industry have expanded significantly for service suppliers. Liberalization programmes in the gas and electricity sectors have involved the unbundling of state-owned monopolies and have provided scope for private operators in the production and commercialization segments. Investment opportunities have also emerged in transmission and distribution networks. In the upstream oil and gas segments, oilfield services firms sell highly specialized services to national and international oil companies. Consumer demand and governmental policies in relation to climate change have created new market opportunities, including for small- and medium-sized service suppliers, in particular in the fields of renewable energy and energy efficiency. Their services involve feasibility studies, conceptual design, costs estimates, energy auditing, energy saving, environmental impact assessment, fiscal matters, etc. Many firms across the world are specializing in energy-related consultancy services.

7. Foreign investment provides an opportunity to attract improved technology and knowledge, and, hence, to strengthen domestic capabilities. For instance, some projects in the oil and gas sector (e.g. deep-water oil extraction, production of liquefied natural gas) require sophisticated technology not always locally available. Moreover, a number of countries require foreign investors to train staff and to transfer management skill functions and other responsibilities to local personnel.[3] In infrastructure industries, such as in the electricity industry, "technology transfer is among the most important potential contributions that TNC participation can make to host developing countries"; introduction of hard and soft technology[4] has contributed in a number of cases to improve productivity and efficiency, as well as reliability and quality of service provision.[5]

8. The energy sector is at a cross-roads. According to the International Energy Agency (IEA), "[i]t is not an exaggeration to claim that the future of human prosperity depends on how successfully we tackle the two central energy challenges facing us today: securing the supply of reliable and affordable energy; and effecting a rapid transformation to a low-carbon, efficient and environmentally-benign system of energy supply. What is needed is nothing short of an energy revolution."[6]

9. Investment requirements in the energy sector will be largely influenced by various factors: pace of economic growth, oil prices fluctuations and government responses to climate change threats will determine to a great extent the amount of investment required, as well as the type of energy source concerned. According to the IEA, cumulative investment of over US$26 trillion will be required for the period 2007-2030; this assessment is based on energy policies and measures adopted by mid-2008 and implies that global temperature may increase by up to 6° C. Assuming that policies are put in place and implemented with the objective of limiting the increase in global temperature of

[3] UNCTAD, 2003 and UNCTAD, 2007.

[4] Hard technology refers to specialist equipment and soft technology to organizational and managerial practices or business models.

[5] UNCTAD, 2008.

[6] IEA, 2008.

approximately 3° C, US$4.1 trillion more investment will be needed between 2010 and 2030. In the third scenario, which corresponds to a temperature rise of around 2° C, additional costs are even much higher, requiring an additional 5.1 trillion as compared to the preceding scenario.[7]

II. BASIC STRUCTURAL PATTERNS OF THE ENERGY SECTOR

A. OIL & GAS

10. From exploration of the resource to distribution of the product to the final consumer, the oil and gas industry entails a long chain of complex operations.[8] Upstream activities are concerned with finding and extracting the resource, onshore or offshore. Exploration and production of oil and of natural gas – which may be found in the same reservoir – are closely linked and involve similar activities. The chain starts with various services, such as exploration management services, geological studies and geophysical services, the purpose of which is to locate and assess the resource. Once a suitable reservoir has been found, a well must be drilled and completed, which includes a range of different services, in particular: casing and tubular services, cementing, core analysis and other laboratory tests, core taking, design and construction of drilling rigs, drilling bits services, fighting and downhole special operations, mud engineering and supply, off-shore rig positioning and preparation, rig preparation and installation (on- and offshore), solids control, supply and installation of completion devices, waste management, and well testing. Other activities related to extraction of the resource include oil spill control services, well repair, and well decommissioning (plugging wells and removing well-head apparatus). As a number of oil and gas fields are reaching maturity, decommissioning is seen as an important growth sector.

11. Downstream activities involve processing the hydrocarbons in appropriate facilities, transporting and commercialization. Processing includes refining of crude oil to produce petroleum by-products, such as gasoline, kerosene, gas oil, lubricating oils, etc. Raw natural gas must be purified into finished by-products, such as natural gas liquids (NGLs), for instance propane, butane. Natural gas may also be liquefied (LNG) which allows to transport it more easily to distant markets where it will be re-gasified[9]. The petroleum industry relies on various transportation means. Oil can be transported by pipelines, road, rail and tankers. On the other hand, the transportation of natural gas has taken place mainly through pipelines. Liquefied natural gas (LNG) is transported mainly on sea in LNG carriers, but transport by rail and road is developing. The last steps in the chain involve storage of the hydrocarbons, wholesaling and retailing, and distribution to the final consumer.

12. Different categories of companies are involved in the petroleum sector: (i) the five so-called "super-majors", private international oil companies (IOCs),[10] are active along the whole petroleum chain, from exploration/production to retailing; (ii) other smaller IOCs work in the exploration and production segments; (iii) NOCs owned (wholly or in majority) by the state, which are present in the upstream segment, but may also control the entire domestic supply chain[11]; and (iv) so-called "oilfield-services companies" which provide different services in the upstream market segment to

[7] IEA, 2008.

[8] For a detailed description, see Musselli & Zarilli, 2005 and USITC, 2003.

[9] There is no agreement among Members as to whether operations such as oil refining, liquefaction and re-gasification of natural gas should be considered as services or as production of a good.

[10] The five super-majors, ranked by total production, are: ExxonMobil (United States), British Petroleum (United Kingdom), Shell (United Kingdom/Netherlands), Chevron (United States), and Total (France) (UNCTAD 2007).

[11] The five biggest NOCs, ranked by total production, are: Saudi Aramco (Saudi Arabia), Gazprom (Russia), NIOC (Iran), Pemex (Mexico), and CNPC (China) (UNCTAD 2007).

IOCs and NOCs, but do not produce oil and gas themselves.[12] Note that these categories are not rigid: for instance, IOCs may also sell oil-field services to other companies, in particular NOCs.

13. The role of governments in the control and management of the resource has evolved over time. In the early age of oil exploitation, governments awarded concessions allowing foreign companies to explore and produce the resource against the payment of various taxes and royalties. Since the 1990s, the preference has switched towards greater direct governmental involvement in the exploitation of the resource, generally though NOCs; the purpose of this policy change is to maintain direct state control over the resource and to maximise revenues. This has contributed to strengthening the role of NOCs on the international stage as, in a number of countries, they are a necessary intermediary for private firms who want to work in the upstream segment. NOCs currently own more than 70 per cent of proven oil and gas reserves and account for 51 per cent of world production.[13] The share of NOCs is expected to grow and account for about 62 per cent of world oil production in 2030 (as compared with 57 per cent in 2007), accounting for about 80 per cent of incremental oil production.[14] While developed-country companies undertake most of their production overseas, companies from developing and transition economies, which control most of the global production of oil and gas, have a limited degree of internationalization; however, a number of them have become outward investors and are expanding quickly their overseas activities in the upstream segment.[15]

14. Recent years have seen the rise of oilfield-services companies, which provide a range of services related to oil and gas exploration and production. They allow NOCs to access advance technology and expertise while maintaining full control over the exploitation of the resource. IOCs may also buy these services as they may find it more economical to outsource certain activities to oilfield services companies rather than maintaining an in-house capacity to perform them. The revenue growth rate of the top three service companies (Schlumberger, Halliburton and Baker Hughes) averaged 25 per cent per year over the period 2005-2007. During the same period, these three companies have hired more than 15000 technical staff per year, and their research & development (R&D) expenditure have increased by 15 per cent to 20 per cent per year, which means that they now exceed those of the IOCs and NOCs.[16]

15. Global upstream oil and gas investment is expected to raise to over US$600 billion by 2012, most of it being devoted to field development. The bulk of investment (about 60 per cent) will continue to be made by international private companies. NOCs will account for about 40 per cent of total investment. Drilling alone represents more than half of the total upstream costs.[17]

[12] The five largest oilfield services companies are: Schlumberger (United States), Halliburton (United States), Aker (Norway), Weatherford International (United States) and Transocean (United States) (UNCTAD 2007).

[13] IEA, 2008.

[14] *Ibidem*.

[15] UNCTAD, 2007.

[16] IEA, 2008.

[17] *Ibidem.*

Gas Transport

The gas transmission and distribution sectors present characteristics different from oil and more similar to electricity. Like electricity, the gas sector has been traditionally dominated by state-owned vertically integrated utilities, which produced, purchased, stored, transported and delivered gas to the end users. Reforms aim at introducing competition by allowing the emergence of various independent producers and distributors; they entail the privatization of former state-owned monopolies and the vertical separation of the production, transmission/distribution and marketing segments (so-called "unbundling"), which leads to the creation of a transportation services market separate from the commodity market. The intent behind such restructuring "is to ensure that a firm cannot exploit its monopoly role in transmission and/or distribution to cross-subsidize or otherwise favour an affiliate engaged in a competitive segment like marketing or production".[18] The most extreme form of vertical restructuring requires complete ownership separation between each activity; other forms may include separate account or legal separation of the various entities. Vertical unbundling may have to be complemented by horizontal restructuring, i.e., preventing the domination of a market segment by a dominant firm.

Promoting competition is most feasible in the production and marketing segments. In transmission and distribution, which are subject to natural monopolies, regulation must prevent the incumbent from abusing its monopoly position. This means in particular that pipeline companies must ensure that gas shippers benefit from mandatory, non-discriminatory and open access (so-called "third party access") to the transportation network. Third party access (TPA) may take two forms: (i) under *negotiated* access, access terms the regulator lets suppliers and customers determine most access terms and conditions; (ii) these terms and conditions are set by the regulator under a *regulated* access system.

Other important elements of a competition policy programme include the establishment of an independent regulator, safeguards to prevent anti-competitive behaviour, regulatory transparency and dispute resolution mechanisms.

B. COAL

16. Coal is the world second most important fuel after oil and accounts for 26 per cent of global energy use.[19] Coal reserves are abundant and geographically dispersed as coal is mined commercially in more than 50 countries. The five main producers are China, the United States, India, Australia and South Africa.[20] More than 60 per cent of the coal produced worldwide goes to electricity generation; about 30 per cent is consumed by industry, in particular steel and cement, and some 4 per cent goes to residential and commercial sectors.[21] The IEA expects coal production to rise by almost 60 per cent between 2006 and 2030, and warns that large investments are needed in prospecting and in new mining projects. Most of this increase will be needed to meet energy needs in developing countries, in particular China and India.[22]

17. The coal sector consists of a chain of interrelated activities, which starts with exploration activities. This involves creating a geological map of the area, carrying out geochemical and geophysical survey, and exploration drilling. Mining will then start if the results of these exploration activities indicate that coal can be economically recovered. Services provided to the coal industry

[18] USITC, 2001.
[19] IEA, 2008.
[20] World Coal Institute, *Coal Facts 2008*, at www.worldcoal.org.
[21] Energy Information Administration (EIA), Official Energy Statistics from the US Government, International Energy Outlook 2009, at http://www.eia.doe.gov/oiaf/ieo/coal.html.
[22] IEA, 2008.

include removal of overburden, stripping the mine face, auguring or culm bank mining, drilling services, mine tunneling, and shaft sinking. Other activities include supply and installation of ventilation control devices, conveyor belt installation and maintenance, etc. Over short distances, coal is normally transported by conveyor or truck. Trains and barges are used for longer distances. Coal can also be mixed with water to form a coal slurry and is then transported through a pipeline.[23]

18. Coal burning emits significant quantities of greenhouse gas (GHG) emissions. For instance, coal used for electricity generation is responsible for some 20 per cent of global GHG emissions. On the other hand, coal is cheap as compared to other energy sources and reserves remain vast. In the context of the fight against climate change, it will be necessary to develop and implement on a large scale clean coal technologies to reduce GHG emissions. Experts view carbon capture and storage (CCS, see below) as being a promising technology to "decarbonize" the coal sector and ensure its sustainable use.[24]

C. RENEWABLE ENERGY

19. Renewables are commonly understood to include hydro, solar (photovoltaic and thermal), wind, geothermal, wave, tide, ocean and biomass (solid, liquid).[25] Some renewable energy technologies, such as hydropower, windpower, biomass combustion and geothermal power have been in use for centuries. Second generation technologies, including solar heating and cooling, biofuels, wind power, and solar photovoltaic, are now on the market, as a result of R&D investments initiated by developed countries in the 1980s, in the wake of the first oil shock. Third-generation technologies, which include concentrating solar power (CSP), ocean energy, enhanced geothermal systems, are still at the development stage.[26]

20. When taking into account traditional biomass, developing countries are the main renewable users. Developed countries are the main users of "new" renewables, such as solar and wind energy. Nevertheless, a number of developing countries, which face increasing energy needs, are turning towards wind and solar energy in order to diversify their supply sources. Over 60 countries have implemented some kind of support mechanisms for promoting renewable power generation, including a number of developing countries (Brazil, Chile, Egypt, Mexico, the Philippines, South Africa, Syria and Uganda).[27]

21. For the time being, renewable energy is often not competitive with conventional energy sources and their development is dependent on public support, in particular for research and development (R&D). However, should social and environmental costs caused by fossil fuels be internalised, some renewable sources, such as wind, would already be competitive.

22. Between 2004 and 2008, worldwide annual investment in renewable energy has increased fourfold to reach US$120 billion. It is estimated that some US$120 billion was invested in renewables in 2008, primarily in wind, solar PV and biofuels. Between 2004 and 2008, renewable power capacity increased by 75 per cent, excluding large hydropower renewable. Capacity in developing countries represents 43 per cent of the total increase, most of which being in China and India. In 2008, added power capacity from renewables in the United States and the European Community exceeded for the first time added capacity from conventional power (i.e. gas, coal, oil and nuclear).[28] Excluding traditional biomass use, renewables represented some 7 per cent of global

[23] Information in this paragraph comes from World Coal Institute, at www.worldcoal.org.
[24] IEA, 2008b.
[25] For a more detailed description of renewable energy sectors, see Annex 1.
[26] IEA, 2006.
[27] REN21, 2009.
[28] *Ibidem.*

primary energy needs in 2006 and are expected to increase to at least 10 per cent in 2030. Total investment in renewable energy supply for the period 2007-2030 will amount to some US$5.5 trillion, the greater part being devoted to electricity generation.[29]

23. The renewable energy sector involves a range of different service suppliers, including architecture, engineering, construction, technical testing and analysis, management consulting, services related to management consulting, and research and development services. For the time being, private sector R&D for renewables energy sources is overall limited and focuses on large hydropower, wind and solar.

24. The renewable energy sector is composed of big firms, which operate in the capital-intensive segments of the sectors, and of small- and medium sized entities targeting niche markets. Active government policies in favour of renewable energies tend to contribute to the emergence of renewable energy goods and services suppliers, which benefit from favourable conditions to gain experience on the home market and are then in a good position to compete on foreign markets. Firms from the United States, Germany, Spain, Denmark or Japan have the lead in the renewable energy sector; they benefited from pro-renewable policies put in place by their governments at the end of the 1980s.[30] More recently, several developing countries have also set targets for renewable energy use, which contributed to the emergence of national firms. Large renewable energy industries exist in several developing countries, for instance, Argentina, Botswana, Brazil, China, India, Malaysia, Nepal, South Africa and Thailand; some of them have significant export potential for renewables.[31]

D. NUCLEAR ENERGY

25. Nuclear energy provides about 16 per cent of electricity worldwide. New capacity is currently under construction in different parts of the world. Faced with concerns related to energy security, need to abate CO2 emissions and rising fossil fuel prices, a number of countries are reconsidering the role of nuclear in their energy mix. However, public acceptance and final waste management remain two important difficulties for the further development of this energy source.

26. Nuclear energy activities involve: (a) extraction of uranium from open pit or underground mining methods; (b) the conversion of uranium oxide into uranium hexafluoride, which possesses the required chemical purity for enrichment; (c) enrichment through gaseous diffusion or gas centrifuge; (d) fuel fabrication, where the enriched uranium is used to produce the final fuels elements to be placed into the reactors; (e) use of the fuel in the reactor to produce secondary energy from nuclear reaction; and (f) reprocessing and storage (final disposal) of high-level waste. From a WTO point of view, it may not be easy to draw the line between goods production and services supply as far as certain of these activities are concerned.

27. Moreover, and perhaps more importantly, nuclear energy raises specific safety and security concerns. The production, transformation and disposal of nuclear fuels are subject to strict safety and environmental regulations in all countries. Specific regulations also exist to ensure that no material in the civil fuel cycle is used for military purposes. In the Doha Development Agenda (DDA) services negotiations, several Members have expressed the view that nuclear energy should not be associated with energy trade in general. It is not clear, however, whether this implies that nuclear trade should be subject to specific provisions or whether Members consider that GATS Articles XIV and especially XIV*bis* provide sufficient scope for action. Article XIV*bis* of the GATS includes, among the security exceptions, actions that Members consider necessary to protect essential security interests "relating to fissionable and fusionable materials or the materials from which they are

[29] IEA, 2008.
[30] USITC, 2005.
[31] Martinot, 2002; Mukherjee & Goswami, 2009.

derived." One question here is whether "essential" security interests could be at stake in the international trade of nuclear energy services for pacific purposes, also considering the potential spillovers in the military field.

E. ELECTRICITY

28. Until the 1980s, the traditional structure of the electricity sector consisted of vertically-integrated state-owned enterprises, detaining a monopoly position over a determined region, and responsible for the whole chain of activities: power generation, transmission over high voltage lines, distribution to end-consumers through low voltage lines, as well as other activities related to selling electricity to end-consumers.

29. The provision of electricity has various unique characteristics explaining why, for a long time, markets were not seen as appropriate to guarantee reliable and affordable delivery. By its nature, electricity is difficult to store, but must nevertheless be available on demand, which itself fluctuates constantly. An entity responsible for matching supply and demand and ensuring the technical integrity of the network must therefore be established. Finally, power needs to be transported over networks which are costly to duplicate, thus leading to a situation of natural monopoly. The direct involvement of governmental entities in the sector was deemed necessary to ensure the proper functioning of electricity markets, protect consumers from possible abuses resulting from monopoly situations, ensure universal service as well as the integrity of the grid.

30. Since the end of the 1980s, several countries, including Argentina, Australia, Chile, Norway, Spain, Sweden and the United Kingdom started to promote competition in their electricity sector. Reforms have been facilitated by technological innovations: (i) the introduction of "combined cycle gas turbine generators" (CCG)[32], which has diminished fixed costs as compared to other generating technologies, and (ii) development of communications technologies that facilitate coordination among suppliers of electricity. Other factors include relative price changes, which made natural gas cheaper than other fuels, as well as a general political climate to replace state control with privatization and market regulation in various sectors of the economy starting at the beginning of the 1980s.[33]

31. Liberalization in the electricity sector shares many characteristics with the telecommunication sector, although it is more complex, due to the technical and economical characteristics of electricity. Stated purpose of promoting competition is to improve efficiency and lower prices for final consumers. Liberalization has started in the segments of generation and commercialization to end-users, but is more difficult in the transmission and distribution segments.[34] Policies adopted in reforms of the power sector include five main steps: (i) privatization of state-owned utilities and assets; (ii) vertical separation of generation, transmission, distribution and commercialization activities ("unbundling"); (iii) horizontal separation (in particular, limiting industry concentration among generators); (iv) ensuring equal access to transmission and distribution infrastructures (non-discriminatory third-party access); and (v) establishment of an independent regulator.[35]

32. The unbundling and privatization of the electricity sector allowed important services to emerge for private suppliers. While power generation would appear to entail the production of a

[32] In a CCGT, a gas turbine generator produces electricity; the heat released in the process is transformed in steam which will generate additional electricity thanks to a steam turbine.

[33] USITC, 2000.

[34] A survey of investment protection agencies (IPAs) in developed and developing countries shows that almost half of them were actively promoting foreign investment in electricity generation. However, the share of IPAs promoting investment in electricity distribution and transmission was 17 per cent and 19 per cent respectively (UNCTAD, 2008).

[35] USITC, 2000.

good,[36] a number of services are directly related to the construction, maintenance and operation of generation plants. Transmission and distribution networks must be constructed, expanded, maintained and operated. The existence of competing generators led to the creation of a wholesale electricity market, providing business opportunities for services providers. The possibility for end-customers to choose among various electricity retailers allowed the creation of a retail electricity market. Other services related to commercialization of electricity include installation, metering and billing.

33. Around 100 countries allowed for private participation in their electricity sector between 1990 and 2005. Private investment in generation plants has the biggest share, between US$11 billion and US$14 billion in 2003-2005. Investment in distribution fluctuated between US$1.5 billion and US$3 billion since 2001.[37] Countries are more reluctant to open this segment, which is also riskier for investors because it involves the politically sensitive discussion about the prices paid by the final consumer.

34. The world's largest electricity firms, which are also actively investing abroad, are primarily from developed countries.[38] They benefit from technological, financial and project management expertise. There is nevertheless considerable scope for developing country companies to invest abroad and several of them, in particular those from Brazil, India, Malaysia, Singapore and Thailand have started doing so, mainly in other developing countries.[39]

35. According to the IEA, global investment in the power sector over the period 2007-2030, including generation, transmission and distribution is US$13.6 trillion, which represents over half of all energy-sector investment. Some US$6.8 trillion is required for generation, and another 6.8 trillion is needed for transmission and distribution networks, of which two-thirds goes for distribution.[40]

F. OTHER ENERGY-RELATED SECTORS

36. In the global effort to mitigate climate change, increasingly stringent environmental regulations are being implemented, which directly concern the energy sector. In addition to the promotion of renewable energy, other measures are being considered with a view to reducing energy consumption or limit CO2 emissions. Carbon capture and storage (CCS) and energy efficiency are among the main ones.

1. Carbon Capture & Storage

37. Carbon capture and storage (CCS) refers to techniques aiming at capturing CO2 before it is released into the atmosphere and storing it on a long-term basis into geological sinks, such as depleted oil wells or deep saline aquifers, whether onshore or offshore. CCS technology is appropriate for big stationary CO2 sources and could contribute to curb emissions from heavy industrial sectors, for example steel, cement or oil refineries, but also power generation plants. CCS could also make the use of coal more environmentally friendly. CCS is considered to be an important tool, together with increasing use of renewable energy sources, to reach GHG abatement targets.[41]

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[36] If electricity is considered to be a good – a presumption which seems to be shared by most Members – generation of electricity is not covered by the GATS. If we consider that electricity is a service, generation would fall under the GATS.

[37] Tenenbaum & Izaguirre, 2007.

[38] The six largest electricity firms are: EDF (France), Electrabel (Belgium), Enel (Italy), E.ON (Germany), RWE (Germany) and Vattenfall (Sweden).

[39] UNCTAD, 2008.

[40] IEA 2008.

[41] See *Carbon Capture & Storage: Assessing the Economics*, McKinsey & Company, 2008.

38. In a first instance, the CO2 is captured, i.e., separated from the flue gases or fossil fuels, at the point of emission; it is then compressed and transported, by pipeline or tanker, and finally injected into a suitable geological formation where it will be stored permanently. The principle of capturing and re-injecting CO2 is not new as it has been used in the oil extracting industry to enhance recovery from declining oil fields, but more experience is needed to use these technologies in an integrated manner for the purpose of CCS. CCS is viewed as a medium term technology (2020-2030) as it has not reached commercial maturity yet.[42] There are only four large scale commercial CCS projects in operation today, in Norway (two projects), Algeria, and the United States. Moreover, several WTO Members are planning large-scale CCS demonstration projects (Australia, Brazil, Canada, China, EC, Norway, South Africa and United Arab Emirates).[43]

39. CCS entails various services relating to the capture, compressing and transport of the CO2. Identifying suitable storage sites also requires exploration, mapping, and assessment. The site must then be prepared, which entails drilling activities. Once the CO2 has been injected, the site must be closed and monitored on a relatively long-term basis to ensure that there is no leakage. The oil and gas business possesses an advantage for the development of CCS projects since it has already the technical expertise needed for assessing potential reservoirs and the behaviour of the CO2 injected therein. Several companies have invested in R&D to develop CCS technologies with a view to commercial applications and some of them already offer CCS-related services.[44]

2. Energy efficiency and related services

40. Concerns related to high oil prices, energy security and climate change have pointed to energy efficiency as an important tool in the promotion of new energy policies. To put it simply, energy efficiency refers to the endeavour to satisfy the same energy needs with less energy. Energy efficiency measures can be applied across sectors such as construction, transport and industry. Examples include insulating homes to diminish heating consumption while maintaining the same temperature inside, using fluorescent instead of incandescent lights, etc. Even though figures differ, it is estimated that energy efficiency could contribute to reducing global CO2 emissions by at least one fifth.[45]

41. Firms specialized in energy efficiency sell goods and related services. They also provide different services aiming at developing and implementing projects resulting in energy savings. Energy efficiency-related services include environmental engineering, energy audit, construction services, etc.

III. WHAT ARE ENERGY SERVICES?

A. DEFINITION OF ENERGY SERVICES UNDER THE GATS

42. Neither the MTN.GNS/W/120 nor the CPC[46] contain a separate section for energy services. [47] Nevertheless, energy-related activities are covered by these classification instruments. In the W/120,

[42] IEA, 2007.
[43] IEA, 2009.
[44] See, for instance, Schlumberger (http://www.slb.com/content/services/additional/carbon/index.asp?), Halliburton (http://www.halliburton.com/ps/default.aspx?navid=1333&pageid=2768).
[45] IEA, 2009b; ECT, 2007.
[46] For the purpose of this Note, "CPC" is understood to refer to the CPC prov.
[47] The CPC provides, in its Annex I, a compendium of energy related-products listed under different headings in the CPC, including energy-related services. They include: retail sale of motor fuels (61300); sales on a fee or contract basis of fuels, metals, ores, timber, building materials and industrial and technical chemicals (62113); wholesale trade services of solid, liquid and gaseous fuels and related products (62271); retail sales of fuels oil, bottled gas, coal and wood (63297); transport services via pipeline: transportation of petroleum and

three sub-sectors refer explicitly to energy. They are found in "Business Services" (two sub-sectors under "Other Business Services") and under "Pipeline Transport" in the "Transport Services" chapter, and are defined as follows:

1.F.h. Services incidental to mining 883 + 5115

CPC 883 covers "services rendered on a fee or contact basis at oil and gas fields, e.g., drilling services, derrick building, repair and dismantling services, oil and gas well casings cementing services".

Exclusion: Mineral prospecting services, oil and gas field exploration and geophysical (e.g., seismic) and geological surveying services are classified in class 8675 (Engineering related scientific and technical consulting services).

CPC 5115 (Site preparation work for mining) includes "tunnelling, overburden removal and other development and preparation work of mineral properties and sites, except for mining oil and gas".

Exclusion: Construction services incidental to oil and gas mining are classified in subclass 88300 (Services incidental to mining).

1.F.j. Services incidental to energy distribution 887

These are "transmission and distribution services on a fee or contract basis of electricity, gaseous fuels and steam and hot water to household, industrial, commercial and other users".

Exclusion: Transport services via pipeline on a fee or contract basis of petroleum and natural gas are classified in subclass 71310.

11.G.a. Transportation of fuels 7131

The CPC definition includes "transportation via pipeline of crude or refined petroleum and petroleum products and of natural gas". Transportation of coal slurry is explicitly covered under "Transportation of other goods" (CPC 7139).

43. "Services incidental to mining" focuses on oil and gas, which implies that similar activities in the field of coal mining would be covered under "site preparation work for mining". The explanatory note contained under CPC 883 provides limited information as to which activities are actually included. Like other Chapter 88 activities which are related to production processes, this sub-sector raises the difficult question of where to draw the line between actual mining and services "incidental to" mining (see below). In 2003, several delegations proposed a more detailed illustrative list of activities which could fall under this heading, including: on land site preparation, on land rig installation, drilling, drilling bits services, casing and tubular services, mud engineering and supply, solids control, fishing and downhole special operations, wellsite geology and drilling control, core taking, well testing, wireline services, supply and operation of completion fluids (brines), supply and installation of completion devices, cementing (pressure pumping), stimulation services (fracturing,

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natural gas (71310); services incidental to mining (88300); manufacture of coke, refined petroleum products and nuclear fuels, on a fee or contract basis (88450); services incidental to energy distribution (88700). Among the administrative services the CPC also include: administrative fuel and energy related services (91132) and administrative mining and mineral resources, manufacturing and construction related services (91133).

acidising, and pressure pumping), workover and well repair services, plugging and abandoning of wells.[48]

44. Definitional issues also arise in relation to "services incidental to energy" distribution. The definition in CPC 887 seems to suggest that transmission and distribution *per se* are covered. On the other hand, this definition does not provide examples of the activities considered to be services "incidental" to energy transmission and distribution. Activities which could be considered as "services incidental to energy distribution" include central network control services, and power management and monitoring services.

45. "Transportation of fuels" (CPC 7131) presumably covers those activities that are related to the actual operation of the pipeline, such as pumping of products, pressure measurement, implementation of a "roadmap", billing, etc. Activities relating to pipeline planning, construction and management fall under other service categories of the W/120 (engineering, construction, technical testing and analysis services, etc.).

46. In addition to these three sub-sectors, other activities, which are not necessarily specific to the energy sector, can be found under various sections of the W/120, in particular business services, construction, distribution and transport services. Some of these sub-sectors explicitly refer to various energy-related activities, such as: construction work for long distance pipelines and power lines; wholesale trade services of solid, liquid and gaseous fuels and related products; retail sale of fuel oil, bottled gas, coal and wood; bulk storage services of liquids or gases; engineering design services for oil and gas recovery procedures, the construction, installation and/or maintenance of drilling equipment, pumping stations, treating and storage facilities and other oil field facilities; etc. Others are more horizontal in nature and energy is one possible end-use: geological, geophysical and other scientific prospecting services; testing and analysis services of the chemical and biological properties of soil and minerals; management consulting services, services related to management consulting, or repair services incidental to metal products, machinery and equipment.

47. Some specific energy-related activities appear not to have an appropriate entry. For instance, no relevant category exists in either W/120 or the CPC for, respectively, wholesale trade services and retailing services of electricity, town gas, steam and hot water. Also, there is no explicit reference to metering and billing. Finally, W/120 does not refer to "Retail sales of motor fuel" (CPC 613).

48. Thus, it seems that nearly all relevant services along the energy chain find a place in the CPC and W/120.[49] Over the past few years, the understanding of the energy sector has benefited from several rounds of discussions in the Committee on Specific Commitments, as well as from proposals tabled by various Members. This work has allowed to identify relevant sectors and sub-sectors in the W/120 and CPC. For instance, the collective request on energy services contains an *ad hoc* list of twelve sub-sectors: they include activities in business services (such as engineering, management consulting services, technical testing, services incidental to mining, etc.), construction and distribution services, and apply to services supplied onshore or offshore. The request targets energy-specific activities for three sub-sectors ("retailing services of fuel oil, bottled gas, coal and woods", for instance). The other sub-sectors are not energy specific and may have other end-uses. [50]

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[48] Communication by Chile, The European Communities and Their Member States, Japan and the United States, *Proposed Guide for Scheduling Commitments on Energy Services in the WTO*, JOB(03)/89, 12 May 2003. See also the list of activities proposed by Indonesia in its *Proposal on Classification of Energy Services – Revision*, S/CSC/W/42/Rev.2, 28 April 2006.

[49] See the check-list of energy-related services in Annex II to this Note. This check-list aims at illustrating the main energy-related services found in the W/120, the CPC, or identified by Members.

[50] See *Review of Progress in Energy Services*, Communication by the European Communities, JOB(07)/208, 5 December 2007. See also Communication by Chile, The European Communities and Their

49. Except when the nature of an activity necessarily limits it to certain energy sources (e.g., services incidental to mining), classification of energy-related services is source neutral. This means that, whenever relevant, a definition covers all energy sources. Hence, a commitment on engineering services would cover services provided not only in connection with conventional energy, but also with renewables, for instance.

50. The rapid development of technologies in the energy sector, in particular those promoted by the climate change agenda, to control and mitigate pollution and to develop clean energy sources creates demands for new products. For instance, carbon capture and storage involves various services, such as identification of a suitable geological formation, CO2 capture at the point of emission, transport to the reservoir and storage on a long-term basis. From the point of view of the classification, the question might arise whether these activities represent "new" services or whether they are already covered in the W/120 and the CPC.

B. DISTINCTION BETWEEN TRADE IN GOODS AND TRADE IN SERVICES

51. In the WTO system, trade in goods and trade in services are subject to different agreements. On the other hand, the distinction between trade in goods and trade services is not always easy to make in practice in the energy business. Drawing the line remains difficult in particular with respect to activities surrounding the production of the resource: mining and related activities, as well as transformation of the resource (oil refining, gas liquefaction and re-gasification, for instance).

52. Division 88 of the CPC provides a list of "services incidental to" various industries, including mining and manufacturing. The explanatory note to Division 88 describes the totality of these services as "services rendered on a fee or contract basis by units mainly engaged in the production of transportable goods, and services typically related to the production of such goods". Hence, although these activities are generally referred to as services "incidental to", section 88 describes in fact two situations, i.e., production on a fee or contract basis on the one hand and services related to production processes on the other. These two situations are relevant for the energy sector.

(a) *Production on a fee or contract basis* Production on a fee or contract basis, as envisaged by the CPC, is not really a service "incidental to", but is production *per se*: the end-product is a good. In the CPC, production processes carried out on a fee or contract basis, i.e., on the account of a third party, are classified as services. However, identical processes, when carried out by a producer on its own behalf, are not considered to be services. Ownership of the raw material processed is thus a decisive criterion.[51] The question which arose in the Committee on Specific Commitments is whether production "on a fee or contract basis" should be regarded as a service under the GATS. This issue is important in the energy sector. For instance, section 884 of the CPC refers to "Manufacture of coke, refined petroleum products and nuclear fuel, on a fee or contract basis". If production on a fee or

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Member States, Japan and the United States, *Proposed Guide for Scheduling Commitments on Energy Services in the WTO*, JOB(03)/89, 12 May 2003; Indonesia, *Proposal on Classification of Energy Services – Revision*, S/CSC/W/42/Rev.2, 28 April 2006; Australia, Canada, the European Communities, Japan, Korea, Kuwait, Norway, Oman, Saudi Arabia, Separate Customs Territory of Taiwan, Penghu, Kinmen and Matsu and the United States, *Statement on Services of Common Interest in the Energy Sector*, JOB(06)/17, 3 February 2006.

[51] The explanatory note to services incidental to manufacturing (CPC 884-885) indicates that "[t]hese include manufacturing on a fee or contract basis, i.e., manufacturing services rendered to others where the raw materials processed, treated or finished are not owned by the manufacturer".

contract basis were considered to be a service, this would mean, *inter alia*, that oil refining is subject to the GATS when performed on a fee or contract basis.[52]

(b) *Services related to production processes* These services are close to the production process, but do not constitute the whole of that process. When dealing, for instance, with the sub-sector "services incidental to mining" (CPC 883), the word "incidental" conveys the idea that mining itself is not covered, but only activities related to mining. However, when seen from the point of view of the industry, it may seem artificial to try and determine at which point the resource is "mined" when, as is the case with oil and gas extraction, the production process consists of a long chain of complex and closely interconnected activities, which can be outsourced to several actors.

53. These issues boil down to the question of what a service is. The GATS, which does not contain a definition of "service", offers no clear guidance and definitions in the CPC are not conclusive for purposes of the GATS. Members addressed these issues in the Committee on Specific Commitments, but did not reach conclusions on them.[53]

IV. TRADE IN ENERGY SERVICES UNDER THE GATS

A. APPLICATION OF THE GATS TO ENERGY SERVICES

54. All four modes of supply are relevant in the energy sector, although their importance may vary depending on the activities concerned.

55. Owing to technological developments, cross-border trade (mode 1) is becoming increasingly relevant for the energy industry. A number of transactions can take place via the internet, as shown by the following examples. In the field of upstream oil and gas services, the analysis of geological data can be performed by a firm in country X for a consumer in country Y.[54] Some companies provide remote monitoring and diagnosis services for wind turbines.[55] It is also possible to remotely control and monitor pipelines.

56. The relevance of mode 2 may be limited in situations involving the actual movement of the consumer or its property. One example of consumption abroad may be the repair of energy equipment in a foreign country.

57. Establishment of a commercial presence (mode 3) is undoubtedly the most important mode of supply for many energy services. For instance, oilfield services providers supply most services through foreign affiliates because hydrocarbons production takes place over a long period of time and within a few regions; regional affiliates allow firms to compete for contracts on a long-term basis

[52] Discussions in the CSC indicated that there are diverging views among WTO Members as to whether activities such as oil refining, gas liquefaction and re-gasification are services or production activities. The CPC prov. does not contain a reference to these activities. They are mentioned in the subsequent versions of the CPC (1.0 and 1.1), where they are found in the category which corresponds to services incidental to mining of the CPC prov. The latest version of the CPC (version 2) places liquefaction and re-gasification in a sub-class CPC 67990, entitled "Other supporting transport services n.e.c.", in the Division 67 of "Supporting transport services" and defines them as "liquefaction and re-gasification of natural gas for transportation". It seems thus to consider that these activities are accessories to transport services. In any case, all three versions of the CPC view liquefaction and re-gasification as services activities.

[53] Committee on Specific Commitments, Reports of Meetings, S/CSC/M/16 to S/CSC/M/18/Rev.1. See also *Production on a Fee or Contract Basis*, Note by the Secretariat, Job 3973/Rev.1, 29 June 2000.

[54] USITC, 2003.

[55] See http://www.gepower.com/prod_serv/serv/remote/en/mondiag_serv.htm, 8 May 2009.

(USITC 2003). The unbundling of energy facilities in the electricity and gas sectors also provides investment opportunities. GATS commitments are also possible in monopoly situations, for instance in gas and electricity transmission and distribution services. Such commitments could, for instance, grant the right to invest in an existing monopoly, which implies elimination of foreign investment restrictions, or permit investment in, or operation of, a competing service supplier after a date specified in the schedule.[56]

58. Mode 4 commitments could contribute to facilitating the temporary transfer of intra-corporate specialists and managers working for energy companies. The ability to move quickly and temporarily key personnel, such as technicians or managerial professionals, to areas where projects are being developed is important for energy firms.

59. Trade in energy services are affected by restrictions similar to those found in other services sectors, and which may fall under GATS disciplines, in particular GATS Article XVI (market access) and XVII (national treatment). Measures most commonly pointed at include: nationality and residency requirements; restrictions on foreign investment, including restrictions on the legal forms of doing business, limitations on foreign capital participation; unspecified economic needs tests; the existence of exclusive rights and monopolies, inability to provide cross-border electronic information and transactions, discriminatory treatment of foreign providers (discriminatory tax treatment); restrictions on the repatriation of profits. These measures may exist at national or local level. In many countries, restrictions apply to the entry and temporary stay of foreign specialists and professionals employed by energy services companies.

60. Other measures affecting energy services include *de facto* technology transfer requirements; reciprocity requirements regarding exploration and exploitation of hydrocarbons; cabotage restrictions affecting the operations of foreign providers of offshore services; and anti-competitive practices by recently-merged utilities. Other problematic measures involve local content requirements for goods and services as well as high customs duties on imports – even for a brief period – of material and equipment needed by energy firms, for instance for oil and gas services. A recurrent concern expressed by energy firms relates to opaque regulatory frameworks, and administrative systems which provide scope for corruption and arbitrary business and licensing practices.[57]

61. The energy sector is heavily subsidized. Subsidies concern all energy sources, may target consumers and/or producers and take many different forms (grants, low-interest or preferential loans, tax rebates, tax credits, support for research and development, etc.). Lack of common definitions and methodologies makes it difficult to assess their magnitude and impact.[58] Worldwide, fossil fuels remain the most heavily subsidised energy source on a net basis, but government support to promote cleaner energy technologies is growing (tax exemptions or feed-in-tariff, support to research and development, etc.).[59] Information on the extent to which subsidy programmes may specifically affect energy services suppliers is scarce. Available information suggests that support programmes do not primarily aim at favouring certain suppliers (national) over others (foreign), but rather at promoting certain types of energy sources or ensuring universal service. For instance, in the electricity sector, governmental incentive programmes to promote wind energy tend to be available to both foreign and domestic suppliers.[60] Under the GATS, discriminatory subsidies affecting energy service suppliers

[56] *Information Tool – Energy Services*, Information Note by the Secretariat, JOB(05)/204, 21 September 2005.

[57] For further details on restrictions affecting energy service suppliers, see, for instance, Mukherjee and Goswami, 2009; United States Trade Representative, 2009 National Trade Estimate Report on Foreign Trade Barriers; IEA, 2008; UNCTAD, 2003; and USITC, 2003.

[58] The IEA estimated that world subsidies in the energy sector might amount to over US$250 billion per year (see *2006 World Energy Outlook*).

[59] UNEP, 2008.

[60] USITC, 2005.

would be subject to the national treatment obligation in sectors where specific commitments are undertaken.

62. Finally, the exclusion of government procurement from the scope of GATS Articles II, XVI and XVII is not without consequences in the energy sector.[61] Governments at local and central levels are often directly involved in the provision and purchase of energy services, through agencies or state-owned companies. Depending on the status and purpose of the entity purchasing energy services, a decision may be qualified as government procurement, and, thus, fall outside the scope of specific commitments and the MFN obligation.

B. SPECIFIC COMMITMENTS ON ENERGY SERVICES

1. Specific commitments on services incidental to mining, services incidental to energy distribution, and pipeline transportation of fuels[62]

63. Forty-five Members have undertaken commitments on services incidental to mining (CPC 883). Ten of them have limited the sectoral coverage to advisory and/or consulting services in relation to mining. Five other Members have listed different sorts of sectoral limitations. For instance, a commitment is limited to "services on a contract basis for repair and dismantling of equipment in oil and gas fields". Other schedules have excluded "prospecting, surveying, exploration and exploitation" or "exploitation of natural resources". There are also unspecified sectoral limitations expressed through CPC 883**. Market access and national treatment commitments are overall liberal. With respect to mode 1, there are eight unbound[63] (out of which six unbound for lack of technical feasibility) and two commitments with limitations. Mode 3 is even more open with one unbound and four commitments with limitations (including foreign equity limitations and joint-venture requirements).

64. Twenty-seven Members have undertaken commitments on site preparation work for mining (CPC 5115), by including a CPC reference under "services incidental to mining", as proposed by W/120. In addition, 47 Members have undertaken commitments on CPC 511 under "other" construction services, and, hence, also have commitments on "site preparation work for mining". Among them, two Members have explicitly excluded CPC 5115 from their commitment on "other" construction services. Eleven Members have undertaken commitments on CPC 5115 exclusively under "Services incidental to mining". Finally, 16 Members may be considered to have overlapping commitments since they have commitments on "site preparation work for mining" under both sectors. In seven of these schedules, the commitments are different in scope, for instance because: (i) the sectoral definition is more narrow in one sector (e.g., the sectoral definition under "services incidental to mining" is limited to advisory and consulting activities); (ii) mode 1 is fully bound under "services incidental to mining", but it remains unbound (for lack of technical feasibility) with respect to the commitment under construction services; or (iii) there is a limited mode 3 commitment under services incidental to mining, while mode 3 remains unbound for construction services. Overall, 58 Members can be considered to have commitments on site preparation work for mining.

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[61] GATS Article XIII:1 stipulates that "Articles II, XVI and XVII shall not apply to laws, regulations or requirements governing the procurement by governmental agencies of services purchased for governmental purposes and not with a view to commercial resale or with a view to use in the supply of services for commercial sale".

[62] Analysis subject to possible interpretative problems with respect to those schedules that do not make explicit references to the CPC.

[63] In most of these cases, both market access and national treatment are unbound. In one schedule, market access is fully bound and national treatment remains unbound for mode 1. In another schedule, for the same mode, market access is unbound and national treatment fully bound.

65. Eighteen Members have undertaken commitments on services incidental to energy distribution. Six Members have limited the sectoral coverage of their commitments: four of them allow only advisory and/or consultancy in relation to services incidental to energy distribution. One Member has entered an unspecified limitation (CPC 887**) and another Member limits the commitment to gas-related activities. Market access and national treatment commitments are overall liberal. One Member maintains mode 1 completely unbound and two Members have only partial commitments for this mode (one Member has listed a commercial presence requirement and another Member has left national treatment unbound). Mode 3 is fully bound, except for three Members which have listed limitations, including joint-venture requirement, unbound national treatment, or mode 3 unbound for distribution of electricity).

66. Twelve Members have undertaken specific commitments on pipeline transportation of fuels. No sectoral restriction has been listed and commitments are overall liberal. Mode 1 has been left completely unbound by one Member and two Members have partial commitments (one has listed a concession requirement and one has left market access unbound). Three Members have listed limitations under mode 3 (two concession requirements and one foreign equity limitation). Also, one Member has undertaken a commitment on "design, construction, operation and maintenance of oil and gas pipelines", found in the "Other business services" section of its schedule; the last two activities might be considered as relating to pipeline transportation activities.

67. Apart from some modifications of sectoral descriptions, Members have normally followed the W/120 and/or the CPC to schedule their commitments in these three sectors. Nevertheless, two Members have undertaken extensive commitments in the hydrocarbon sector, largely based on a *sui generis* classification and definition system.

68. There is one case of additional commitment, which has been undertaken with respect to pipeline transportation. This Member "... commits itself to provide full transparency in the formulation, adoption and application of measures affecting access to and trade in services of pipeline transportation." It further "... undertakes to ensure adherence to the principles of non-discriminatory treatment in access to and use of pipeline networks under its jurisdiction, within the technical capacities of these networks, with regard to the origin, destination or ownership of product transported, without imposing any unjustified delays, restrictions or charges, as well as without discriminatory pricing based on the differences in origin, destination or ownership."

69. Overall, the number of GATS commitments in these three sectors is modest. Moreover, they are due in a very large proportion to Members which have acceded to the WTO since 1995.

Table: Total number of commitments vs. accession commitments

	Total number of commitments	Accession commitments
Services incidental to mining	45	18
Services incidental to energy distribution	18	10
Pipeline transportation	12	9

Source: WTO Secretariat, August 2009.

70. These three sectors are not prone to MFN exemptions. Only one such exemption has been listed. It concerns pipeline transportation and allows to maintain a reciprocity requirement regarding

acquisition by foreigners of rights-of-way for oil and gas pipelines, as well as leases in certain mineral resources.

2. Commitments in the other energy-related sectors

71. The number of commitments in other energy-related services varies greatly depending on the sector concerned, ranging from 3 (retail sales of motor fuels) to 79 (engineering services).

> Engineering services (79), integrated engineering services (51), management consulting services (72), services related to management consulting (48), technical testing and analysis services (54), services incidental to manufacturing (34), related scientific and technical consulting services (47), maintenance and repair of equipment (50), site preparation work for mining (58[64]), general construction work for civil engineering (70), renting services related to equipment for construction or demolition of buildings or civil engineering works, with operator (53), commission agents' services (40), wholesale trade services (55), retailing services (54), retail sales of motor fuel (3), storage and warehousing (46).

72. In several schedules, specific references to activities related to the energy sector appear under various sectors. These references aim at excluding energy-related activities from a sector, or, on the contrary, at explicitly including them. In most cases, *sui generis* definitions are used for that purpose. In some schedules, limitations on market access or national treatment specifically targeting energy-related activities have been listed.

73. The following are examples of exclusions of energy-related activities from the sectoral scope of a commitment: (i) "operation of mines" from a commitment on related scientific and technical consulting services; (ii) off-shore activities from a commitment on related scientific and technical consulting services; (iii) construction of "electric power stations and plants for the piping of oil and oil products" from the scope of a commitment on construction services; (iv) services related to petroleum and petroleum products from commitments in the distribution sector (two cases); (v) "wholesale trade services of solid, liquid and gaseous fuels and related products" (CPC 62271) from a commitment on wholesale services; (vi) services related to petroleum and petroleum products from various commitments, in particular engineering and integrated engineering services, related scientific and technical consulting services, distribution services, and storage and warehousing services.

74. Other schedules specifically refer to energy-related end uses in defining the scope of the commitment, for instance: (i) a commitment on management consulting includes, *inter alia*, "advisory, guidance and operational assistance services concerning management of the transmission of non-conventional energy"; (ii) a commitment on technical testing and analysis services applies, *inter alia*, to "prospecting, mining or processing of minerals"; (iii) one schedule refers to energy-related activities under "related scientific and technical consulting services", i.e. "study and evaluation of hydrocarbon deposits", "production analysis control", and "improved recovery of hydrocarbons".

75. Some commitments contain limitations aimed specifically at the energy sector, for instance: (i) a commitment on related scientific and technical consulting services has a national limitation, under modes 1 and 2, for tax measures that "result in a difference of treatment for expenditures incurred in connection with services performed in [that Member] related to the exploration and development of a mineral resource, petroleum or natural gas"; (ii) under related scientific and technical consulting services, a Member has listed different market access restrictions for on-shore and off-shore oil-field services; and (iii) in the distribution sector, a Member maintains an economic needs test for wholesale and retailing services of gaseous fuels.

[64] Counting commitments under "services incidental to mining" and "other" construction services.

C. OTHER GATS ISSUES

1. The question of ownership of natural resources

76. It is generally recognized that states have full sovereignty over natural resources situated in their territory, including the territorial sea. With respect to energy resources, governments have the exclusive right to decide whether to exploit, produce or develop the resource, whether to allow private sector participation, and what types of contractual arrangements to use in the development of the resource (concessions, services agreements, production sharing agreements, etc.). In the WTO, Members have consistently expressed the view that natural resources were under the sovereignty of each Member and that the issue of ownership of energy resources remained outside the scope of the negotiations.[65]

77. In the oil and gas industry, one can distinguish broadly two types of situations. Some companies are granted exclusive rights to explore, develop and produce an energy resource and, depending on the contractual arrangement negotiated with the state, they may own the resource produced (or a given percentage of it), and may be entitled to market it. The second category are those companies which provide services to other firms in relation to the exploration, development and production of the resource, but do not acquire ownership of the resource.

78. The GATS does not explicitly address the issue of ownership of natural resources. The following elements might provide a basis for further consideration:

(a) Footnote 9 to GATS Article XVI:2(c) excludes from the scope of specific commitments "measures of a Member which limit inputs for the supply of services". It might be argued that natural resources constitute "inputs" for the supply of energy services, and are outside the scope of relevant market access commitments.

(b) As noted above, the production of goods on a company's own account, i.e., performed by an entity which owns the raw material, is deemed in the CPC not to be a service. Accordingly, the fact that a firm has a proprietary title on the resource could mean *ipso facto* that, with regard to the processing of this resource, it is not a service supplier within the meaning of the GATS.

(c) Article XIV of the GATS (General exceptions) includes an exception for measures "necessary to protect human, animal or plant life or health" (Art. XIV(b)). It does not contain an exception relating to the protection of exhaustible natural resources, which would be the equivalent of GATT Article XX(g).

2. Is there a need for additional rules on energy services?

79. The energy sector has been traditionally characterized by large vertically-integrated state-owned monopolies which own and manage key facilities, in particular transmission and distribution networks. After unbundling and privatization, these suppliers may retain a dominant position on the market, impede or discriminate among new entrants and skew competition. Moreover, when competition is introduced in the generation/production and commercialization segments, transmission and distribution networks – pipelines and electricity grids – tend to remain in the hands of a monopoly provider, whether public or private.

[65] Also, the collective request states that it "does not extend to the ownership of energy resources, which remains under the full sovereignty and sovereign rights of each Member, and outside the scope of GATS negotiations".

80. GATS disciplines on monopolies and exclusive suppliers offer only partial remedies. Pursuant to Article VIII, paragraph 1, Members shall ensure that a monopoly supplier "does not, in the supply of the monopoly service in the relevant market, act in a manner inconsistent with that Member's obligations" under Article II (MFN) and its specific commitments. Paragraph 2 stipulates that "[w]here a Member's monopoly supplier competes, either directly or through an affiliated company, in the supply of a service outside the scope of its monopoly rights and which is subject to that Member's specific commitment, the Member shall ensure that such a supplier does not abuse its monopoly position to act in its territory in a manner inconsistent with such commitments". GATS Article VIII applies to public and private monopolies.[66] This would mean that when, for instance, commitments have been made with respect to some, but not all energy-related activities, Article VIII could prevent a monopoly controlling transportation networks from abusing its position to gain a competitive advantage in a market outside the scope of its monopoly. In contrast, Article VIII would not allow to address the situation where a former monopoly supplier retains a dominant position in a market segment open to competition.

81. Article IX deals with business practices which may restrain competition and which do not fall under Article VIII. It provides essentially for Members to enter into consultations and to exchange information on the matter; it does not contain substantive obligations concerning anti-competitive business practices.

82. Against this background, it might be useful to consider additional rules for energy services, which would complement specific commitments and help to ensure a level-playing field among suppliers. A relevant precedent is the Reference Paper in basic telecommunication services: the disciplines it contains were developed by interested Members in order to be made available to all Members for adoption on a voluntary basis in the form of additional commitments. In a similar vein, three Members[67] proposed to develop rules for promoting fair competition in energy networks. It was suggested, *inter alia*, to consider a Reference Paper for energy services modeled on the Reference Paper for telecommunication services and including elements such as: (i) a regulatory framework ensuring transparency in the adoption and implementation of rules, regulations and technical standards; (ii) non-discriminatory third-party access (TPA) to, and interconnection with, networks, grids and other essential infrastructure; (iii) establishment of a regulator which is independent of, and not accountable to, any supplier; (iv) non-discriminatory and timely information on data relevant for transportation and transmission of energy, such as prices, transmission capacity, etc.; and (v) requirements preventing certain anti-competitive practices for energy services in general.

83. Members also remain free to undertake additional commitments regarding energy-related services, whether or not based on a Reference Paper. In fact, as mentioned above, one Member has undertaken additional commitments regarding pipeline transportation.

V. ENERGY SERVICES IN PREFERENTIAL TRADE AGREEMENTS

84. A survey of some forty PTAs[68] showed that, whether based on positive or negative lists, these agreements provide for a greater level of access than current GATS commitments in the three energy sectors listed in W/120[69], as well as in other energy-related sectors. The situation varies – sometimes quite considerably – from one PTA to another and important differences exist between negative- and

[66] GATS Article XXVIII(h) defines a monopoly supplier as "any person, public or private, which in the relevant market of the territory of a Member is authorized or established formally or in effect by that Member as the sole supplier of that service".

[67] See proposal by the United States (S/CSS/W/24), Japan (S/CSS/W/42/Suppl.3) and Norway (S/CSS/W/59).

[68] This section borrows from Cossy, 2008.

[69] I.e., services incidental to mining, services incidental to energy distribution and pipeline transportation of fuels.

positive-list PTAs.[70] In the absence of empirical research, it is impossible to say whether preferential commitments bind existing levels of access or whether they represent real liberalization.

85. Positive-list agreements are generally modelled on the GATS, in terms of their obligations and of the schedules' structure. Most of them provide an overall higher level of bindings than the GATS schedules as far as energy and energy-related services are concerned. Nevertheless, the level of obligations varies significantly across these agreements: while some signatories have made important improvement over their GATS commitments, others hardly go beyond them. Moreover, the same signatory may have a different level of commitments across its various positive-list PTAs.

86. The level of commitments achieved under negative-list PTAs tends to be higher than in positive-list agreements. For instance, nearly all the countries having signed negative-list agreements with the United States have bound some (in some cases a significant) level of preferential access with respect to services incidental to mining, services incidental to energy distribution and pipeline transportation of fuels, whereas they have undertaken very few corresponding commitments under the GATS. Most PTA signatories, whether developed or developing, have listed some kind of reservation, reflecting the lack of competition in the gas and electricity transmission and distribution segments. The level of obligations concerning other energy-related services appears to be even higher as all countries have consolidated some level of access.

87. The structure and the type of obligations undertaken in negative-list PTAs present several advantages. The fact that the same disciplines apply to all investments, whether in goods or services, may prove useful in the energy sector, where there are different views concerning the nature of certain activities (such as, for instance, whether refining, liquefaction and re-gasification constitute production of goods or services). Disciplines on government procurement contained in certain PTAs also represent a plus for the energy sector as the purchase of energy services by certain public entities may well qualify as government procurement pursuant to GATS Article XIII and would thus fall outside the scope of specific commitments and the MFN obligation. Finally, some PTAs, in particular those based on negative lists, go further than the GATS in terms of requiring regulatory transparency.

88. With the exception of NAFTA[71], none of the PTAs reviewed contains disciplines specifically directed at the energy sector. Some agreements include provisions which encourage greater collaboration in the energy sector, but which do not appear to entail specific legal obligations regarding the supply of energy services. For example:

- In their PTA, the European Communities and Chile undertake to "consolidate economic relations in key sectors such as hydroelectricity, oil and gas, renewable energy, energy-saving technology and rural electrification". This cooperation entails, *inter alia*, exchange of information, transfers of technology, studies and analyses, "involvement of public and private operators from both regions in technological development and common-infrastructure projects, including networks with other countries in the region", possible conclusion of specific agreements, assistance for Chilean institutions dealing with energy matters and the formulation of energy policy (article 22).

[70] When assessing the respective levels of obligations under the GATS and PTAs, the use of different systems for sectoral descriptions introduces an element of uncertainty as to the scope of the activities concerned. For instance, it is difficult to assess the extent to which a reservation for "mining", which is found in various PTAs, overlaps with "services incidental to mining" (CPC 883).

[71] Chapter 6 of NAFTA deals, *inter alia*, with " ... measures relating to investment and to cross-border trade in services" associated with energy and basic petrochemicals goods. This chapter essentially builds on certain GATT obligations.

- ASEAN Members have adopted successive "Plans of action for energy cooperation" (APAEC), which seeks to develop the regional power grid (improve interconnections), to work towards the realisation of the Trans-ASEAN gas pipeline, to promote sustainable utilisation of coal, energy efficiency and conservation, etc., and call, *inter alia*, for "Encouraging a conducive environment for greater private sector involvement and participation, including securing foreign direct investment".

- An Annex in the Japan – Indonesia PTA stipulates that both parties agree "to consult on risk sharing measures to support investments by investors of Japan in the energy and mineral resource sector in the Area of Indonesia".

- In a Joint Statement made on the occasion of the signing of the Agreement between Brunei Darussalam and Japan for an Economic Partnership, the two governments "are convinced that the JBEPA will serve as a main vehicle by facilitating the free flow of goods, services and investments, improving the overall business environment for the private sectors between the two countries and at the same time deepening and enhancing cooperation in the fields of energy, ...". The programme on energy, attached to the joint statement focuses on information exchange and experience sharing on various energy-related issues, such as electricity supply, renewables in electricity generation, carbon capture and storage, energy efficiency, clean coal technologies, etc.

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ANNEX I

Renewable Energy

A. WIND ENERGY

1. Turbines use the kinetic energy in the wind to generate mechanical power. This mechanical power can be used to perform directly certain activities (pumping water, for instance), or is converted into electricity via a generator. Most wind turbines are built on-shore. However, off-shore wind parks are also being installed; although they are more expensive to build, connect and maintain, they can produce up to 50 per cent more electricity than onshore turbines due to higher and steadier wind speeds. Wind turbines can be employed in small-scale projects (e.g., generating electricity for a household or a small community) or in large projects (wind parks generating electricity which is supplied to the grid).[72] Small-scale stand-alone wind systems have the potential to play an important role in the electrification of remote regions in developing countries.

2. By the end of 2008, wind turbines produced more than 1.5 per cent of global electricity consumption and more than 80 countries had commercial wind power installations.[73] The United States and Asia – with China and India as leading countries – are rapidly increasing their share in new capacity. Wind industry in China and India already plays a role on world markets. Pakistan and Mongolia have also started to install grid-connected wind-turbines. In Africa, wind farms exist in Morocco, Egypt, Tunisia and South Africa; Ethiopia, Kenya and Tanzania are planning ambitious windfarm projects. South America has major wind farms in Brazil and Uruguay; projects are reported to be in construction in Argentina, Brazil, Chile, Costa Rica and Mexico.[74]

3. World generating capacity is growing at 20-30 per cent per year and annual investment topped US$50 billion in 2007. The IEA predicts that in 2050 wind power could supply up to 12 per cent of global demand for electricity.[75] Wind power plants at sites with reliable wind resources and nearby grid access can be competitive with conventional electricity producers.

4. Service suppliers in the wind energy industry include large energy and engineering companies that supply goods and related services as a "package", and small firms that specialize in the provision of certain niche services, such as environmental monitoring and permitting services for wind power projects and wind modelling, mapping and resource assessment services.[76] Services related to the installation and operation of wind turbines include wind measurement, site selection, assessment of grid requirements and connection, project management, construction and monitoring, servicing and maintenance of the facility.[77]

B. HYDROPOWER

5. Hydropower sources generate about 20 per cent of electricity world wide. Large scale hydropower facilities were built in the second half of the twentieth century in developed countries. As their investments have been amortised, they produce low cost electricity. It is estimated that developed countries have used about 70 per cent of their capabilities in this sector. Suitable sites for

[72] USITC, 2005.
[73] REN21, 2009.
[74] World Wind Energy Association, Highlights of the World Wind Energy Report 2008, at http://www.wwindea.org.
[75] IEA, 2008c.
[76] USITC, 2005.
[77] See, for instance, http://www.gepower.com/prod_serv/serv_for/wind_turbines/en/index.htm, and http://www.vestas.com.

large projects remain in developing countries. China and India are the two countries which recently experienced the most significant increase in large hydropower production.[78]

6. In some countries, liberalization of the electricity sector has contributed to the development of small (or micro-hydro)[79] hydropower generating plants by independent decentralised power producers. They are used mainly in developing countries and allow to provide electricity to communities not connected to a grid. Small hydropower can produce power at competitive prices and have relatively low operation and maintenance costs.[80] China is the main user of small hydro, but developments have also occurred in several African and Asian countries.[81]

7. The hydropower industry entails a range of different services: outage management, assembly/disassembly, cavitation repair, site inspection/evaluation, field supervision, project execution, field machining, technical direction, engineering, specification writing, data acquisition and review, hydrological & hydraulic analyses, development of project layouts, plant selection, cost estimates, performance analysis, economic design analysis, economic evaluation, environmental studies, permitting studies, construction and reporting.[82]

C. SOLAR ENERGY

8. Solar energy includes three main technologies: (i) photovoltaic (PV) energy converts sunlight into electricity via solar cells usually made of silicon; it can be used in small applications (pumping water or electrifying a fence) or in larger electric PV systems connected to a grid; (ii) solar heating gathers the sun's thermal heat through solar collectors and transfers that heat to water or air; (iii) solar power plants (or concentrating solar power) concentrate solar energy with the help of reflective mirrors in order to produce steam that will be used to drive turbines and produce electricity.

9. According to the IEA, solar photovoltaic experienced the highest growth between 1990 and 2006, with a 36.1 per cent annual growth rate, mainly in the European Union.[83] Grid-connected solar PV is that fastest growing power generation technology and has increased sixfold in global capacity since 2004. In 2008, Spain, the United States, Korea, Japan and Italy were the main markets. Other segments of the solar markets (such as building-integrated PV, thin-film solar PV technologies and utility-scale solar PV) have continued to grow. New concentrating solar power plants (CSP) were recently built in Spain and the United States. Projects are under development in the United States, United Arab Emirates, Algeria, Egypt, Israel, Italy, Portugal, Spain and Morocco.[84]

10. The solar industry sells manufactured equipment and associated services (design, installation, maintenance, etc.). Research and development services also play an important role as companies are trying to develop new products allowing to cut costs and maximising solar energy.

D. GEOTHERMAL

11. Geothermal resources can be used directly (direct use) for heating buildings and greenhouses, melting snow on streets, running spas, etc. For the time being, direct use represents the largest share

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[78] REN21, 2009.

[79] There is no agreed definition of "small" or "micro" hydro. These terms are sometimes used interchangeably or a distinction may be made.

[80] IEA, 2004.

[81] REN21, 2009.

[82] See, for instance, Hydro Power Services at http://www.hydropowerservices.com/; and Black & Veatch at http://www.bv.com/Markets/Energy/Hydropower/Default.aspx.

[83] IEA, 2009c.

[84] REN21, 2009.

of the market. Heat extracted from steam or hot water found in the ground can also be used to produce electricity based on steam turbine and generator equipment (indirect use).

12. Geothermal electricity production grew at an average annual rate of 1.8 per cent between 1990 and 2006. The United States is the main electricity producer from geothermal sources, followed by Mexico and Italy.[85] Other countries with significant recent growth in this sector include Australia, El Salvador, Guatemala, Iceland, Indonesia, Kenya, Mexico, Nicaragua, Papua New Guinea and Turkey.[86] It is anticipated that geothermal energy could supply more than 5 per cent of the world's electricity needs by 2020.

13. Ranging from exploration, drilling, installation, maintenance, monitoring, resource management, technical and economic feasibility studies, geological surveying and mapping, thermal studies, well testing, environmental impact assessment, engineering and consulting, geothermal energy involves many services, offering opportunities for large and small firms.[87]

E. BIOMASS

14. Biomass is any biological matter, i.e., animal, plant, waste, etc., that is used to produce energy. "Traditional" biomass, which is the most ancient energy source used by human societies, is still widely used by rural populations in developing countries for cooking, heating and lighting. "Modern" biomass energy can be used as transportation fuel and to produce heat and electricity. Biomass (traditional + modern) is the most important source of renewable energy and is expected to remain so for several decades.[88] The rest of the section focuses on "modern" biomass.

15. Biomass energy is used in the road transport sector as a substitute for oil (also referred to it as "biofuels"). First-generation biofuels are produced from food crops, such as corn, sugar beet, sugar cane and oilseeds. Demand for biofuels has more than tripled between 2000 and 2007, in both developed and developing countries. Biofuels account now for some 1.5 per cent of transport fuels and their share could reach 5 per cent by 2030. Incentive programmes, including specific targets, to encourage the use of biofuels have been put in place in countries such as the United States, China, the EC, Australia, New Zealand, Colombia, South Africa, Thailand, Japan, Indonesia, Mexico and Canada. Several developing countries have their own biofuel industry and produce fuels for local use and exports (Brazil, Colombia, India, Thailand). Concerns regarding the sustainability of first generation biofuels (in particular their impacts on food production and prices) brought about interest for developing biofuels from non-food biomass, such as cereal straw, bagasse, or forest residue and non-food crop feedstocks. Second-generation biofuels have not reached commercial maturity yet.[89] The biofuel industry relies on various services, including engineering, consulting, construction, transport, storage, distribution, etc.

16. Biomass can also be used for electricity generation, for heat production, or for both (then termed "co-generation" or "combined heat and power" (CHP). Biomass energy technologies are used mainly in industrial facilities (such as pulp and paper manufacturing plants). The electricity and/or heat produced is/are often consumed on-site. The surplus electricity may be sent to the grid, and the extra heat (steam) can be used to heat buildings. The share of biomass in electricity production is expected to double by 2030, to reach some 2.6 per cent of global power generation; this increase will take place mainly in the United States, Europe and China.[90] Industry data indicate that services –

[85] IEA, 2009c.
[86] REN21, 2009.
[87] USITC, 2005.
[88] IEA, 2008.
[89] IEA, 2008; IEA, 2008d; World Bank/UNDP, 2005.
[90] IEA, 2008.

engineering and construction – provided in relation to biomass power plants amounted to about US$1.7 billion in 2004.[91]

F. OCEAN ENERGY

17. Ocean energy includes three different technologies, using the movement of tides, current or waves to produce power. This renewable energy source is still small compared to others and has limited commercial application. Only tidal energy has been used commercially to date, mainly in France, Canada and China. Current and wave energies are still at the development stage.

18. Ocean energy services include testing and analysis services associated with potential site evaluation, architecture, engineering, construction and installation services.

[91] USITC, 2005.

ANNEX II

Checklist of main energy-related services

W/120	Sector/ sub-sector	CPC prov.	Examples of relevant activities as defined in the CPC (non-exhaustive description)
1.A.e	Engineering services	8672 (86721-86729)	Advisory and consultative engineering services (f. ex., preparatory technical feasibility studies and projects impact studies for the construction of a pipeline, study of the environmental impact of a project); engineering design services for the construction of foundations and building structures; engineering design services for the construction of civil engineering works (f. ex. dams); engineering design services for industrial processes and production (f. ex. mine development layout and underground construction, the complete civil, mechanical and electrical mine surface plant installations, oil and gas recovery procedures, construction and/or maintenance of drilling equipment, pumping stations, treating and storage facilities and other oilfield facilities, etc.); other engineering services, such as geotechnical engineering services, contamination studies, corrosion engineering services, etc.).
1.A.f	Integrated engineering services	8673 (86731-86739)	Integrated engineering services for the construction of transportation infrastructure turnkey projects; integrated engineering services for the construction of manufacture turnkey projects.
1.F.c	Management consulting services	865 (86501-86509)	Advisory, guidance and operational assistance services concerning methods for improving productivity, reducing production costs and improving the quality of production.
1.F.d	Services related to management consulting	866 (86601)	Project management services for preparing, running and completing a project .
1.F.e	Technical testing and analysis services	8676 (86761-86769)	Testing and analysis of the chemical and biological properties of materials such as air, water, waste, fuels, metal, soil, minerals; testing and analysis services of physical properties; testing and analysis services of integrated mechanical and electrical systems.
1.F.h	Services incidental to mining	883 5115	Services rendered on a fee or contract basis at oil and gas fields, e.g. drilling services, derrick building, repair and dismantling services, oil and gas well casings cementing services. Site preparation work for mining (tunnelling, overburden removal and other development and preparation work of mineral properties and sites, except for mining oil and gas).
1.F.j	Services incidental to energy distribution	887	Transmission and distribution services on a fee or contract basis of electricity, gaseous fuels and steam and hot water to household, industrial, commercial and other users.
1.F.m	Related scientific and technical consulting services	8675 (86751-86754)	Geological, geophysical, geochemical and other scientific consulting services as they relate to the location of mineral deposits, oil and gas and groundwater by studying the properties of the earth and rock formations and structures (f. ex., services of analysing the results of subsurface surveys, the study of earth sample and core, and assistance and advice in developing and extracting mineral resources); subsurface surveying services (gathering services of information on subsurface earth formations by different methods); surface surveying services (gathering services of information on the shape, position and/or boundaries of a portion of the earth's surface); preparation and revision of maps of all kinds.

W/120	Sector/ sub-sector	CPC prov.	Examples of relevant activities as defined in the CPC (non-exhaustive description)
1.F.n	Maintenance and repair of equipment	8861-8866	Repair services of fabricated metal products, machinery and equipment, electrical machinery, etc.
3.B	Construction work for civil engineering	513	Construction work for dams, long distance pipelines, power lines, local pipelines and cables, constructions for mining and manufacturing.
3.E	Other	518	Leasing or rental services concerning construction or demolition equipment with operator and operational services provided by the operator.
4.A	Commission agents' services	621	Wholesaling services of fuels by commission agents, commodity brokers, etc.
4.B	Wholesale trade services	622	Wholesale trade services of solid, liquid and gaseous fuels (e.g., coal and lignite, petroleum oils, natural gas, coal gas, etc.)
- -	Wholesale trade services of electricity, town gas, steam and hot water	- -	- -
4.C	Retailing services	632	Retail sales of fuel oil, bottled gas, coal and wood.
- -	Retail sales of motor fuel	613	Retailing services of petroleum refineries products, such as gasoline and other motor fuels for internal combustion engines, kerosene, lubricating oil and grease, fuel oil, liquefied petroleum gas put up for retail sale and other products of petroleum refineries.
- -	Retailing services of electricity, town gas, steam and hot water	- -	- -
11.A.b	Maritime transport - freight transportation	7212	Transportation by seagoing vessels of bulk liquids or gases in special tankers.
11.B.b	Internal waterways transport – freight transportation	7222	Transportation by non-seagoing vessels of bulk liquids or gases in special tankers.
11.E.b	Rail transport services – freight transportation	7112	Transportation by railway of bulk liquids or gases in special tank cars.
11.F.b	Road transport services – freight transportation	7123	Transportation by road of bulk liquids or gases in special tank trucks.
11.G.a	Pipeline transport – Transportation of fuels	7131	Transportation via pipeline of crude or refined petroleum and petroleum products and of natural gas.
11.G.b	Transportation of other goods	7139	Transportation via pipeline of coal slurry.
11.H.b	Services auxiliary to all modes of transport – Storage and warehouse	7422	Bulk storage and warehousing services of liquids and gases.

ANNEX III

Specific commitments in energy services

Members	Services incidental to mining	Services incidental to energy distribution	Pipeline transportation of fuels
Albania	X		
Argentina	X		
Armenia	X		
Australia	X	X	X
Austria	X		
Bulgaria	X		
Cambodia	X	X	X
Canada	X		
Cape Verde	X		
Colombia	X		
Croatia		X	X
Dominican Rep.	X	X	
Ecuador	X		
EC	X		
Finland	X		
FYR Macedonia	X		X
Gambia		X	
Georgia	X	X	
Hungary	X	X	X
Indonesia	X		
Korea, Rep. of	X		
Kyrgyz Rep.	X	X	X
Latvia	X	X	
Lesotho	X		
Liechtenstein	X		
Lithuania		X	X
Malawi	X		
Moldova	X	X	X
Mongolia	X		
Nepal	X		X
New Zealand			X
Nicaragua	X	X	
Oman	X	X	
Pakistan	X		
Panama	X		
Poland	X		
Saudi Arabia	X	X	X
Sierra Leone	X	X	
Singapore	X		
Slovenia		X	
South Africa	X		
Sweden	X		
Switzerland	X		
Chinese Taipei	X		
Thailand	X		
Turkey	X		
Ukraine	X	X	X

Members	Services incidental to mining	Services incidental to energy distribution	Pipeline transportation of fuels
United States	X	X	
Venezuela	X		
Vietnam	X		
Zambia	X		
Total	*45*	*18*	*12*

Source: WTO Secretariat, September 2009. The count is based on an EC-12 schedule.