COMMISSION DECISION (EU) 2017/2112

of 6 March 2017

on the measure/aid scheme/State aid SA.38454 — 2015/C (ex 2015/N) which Hungary is planning to implement for supporting the development of two new nuclear reactors at Paks II nuclear power station

(notified under document C(2017) 1486)

(Only the English version is authentic)

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union, and in particular the first subparagraph of Article 108(2) thereof,

Having regard to the Agreement on the European Economic Area, and in particular Article 62(1)(a) thereof,

Having called on interested parties to submit their comments ([1]) and having regard to their comments,

Whereas:

1. PROCEDURE

(1) On the basis of press articles and informal contacts with the Hungarian authorities, on 13 March 2014, the Commission started a preliminary investigation into possible State aid involved in the construction of Paks II nuclear power plant ('Paks II') under the case number SA.38454 (2014/CP).

(2) After several exchanges of information and formal meetings, the Hungarian authorities notified the measure for legal certainty on 22 May 2015 stating that the project involved no State aid within the meaning of Article 107 of the Treaty on the Functioning of the European Union ('TFEU').

(3) By letter dated 22 May 2015, Hungary notified the Commission a measure to provide financial contribution for the development of two new nuclear reactors in the Paks site.

(4) By letter dated 23 November 2015, the Commission informed Hungary that it had decided to initiate the procedure laid down in Article 108(2) TFEU in respect of the measure (the Opening Decision). This Commission Decision was published in the *Official Journal of the European Union* ([2]). The Commission invited interested parties to submit their comments.

(5) Hungary sent its comments on the Opening Decision on 29 January 2016.

(6) The Commission received comments from interested parties. It forwarded them to Hungary, which was given the opportunity to react. Its comments were received by letter dated 7 April 2016.

(7) Further information was submitted by Hungary on 21 April, 27 May, 9 June, 16 June, 28 July 2016, 16 January 2017 and 20 February 2017.

(8) On 12 September 2016 the Hungarian authorities provided a language waiver and agreed that the decision will be adopted in English as the authentic language.

2. DETAILED DESCRIPTION OF THE MEASURE

2.1. *DESCRIPTION OF THE PROJECT*

(9) The measure consists of the development of two new nuclear reactors (units 5 and 6) in Hungary, whose construction is fully financed by the Hungarian State for the benefit of the entity Paks II (*MVM Paks II Nuclear Power Plant Development Private Company Limited by Shares*) that will own and operate the new reactors.

([1]) OJ C 8, 12.1.2016, p. 2.
([2]) See footnote 1.

(10) The Russian Federation and Hungary concluded an intergovernmental agreement (IGA) on a nuclear programme on 14 January 2014 ([3]). Based on the IGA, both countries shall cooperate in the maintenance and further development of the current Paks nuclear power plant (Paks NPP). This includes the design, construction, commissioning and decommissioning of two new power units 5 and 6 with VVER (water-cooled water moderated) type reactors with installed capacity of each power unit of at least 1 000 MW ([4]) in addition to the existing power units 1-4. The operation of units 5 and 6 is intended to compensate for the loss in capacity when units 1-4 (2 000 MW altogether) retire. Hungary submitted that units 1-4 will be in operation until the end of 2032, 2034, 2036 and 2037 respectively, without envisaged prospect of further lifetime extension.

(11) Pursuant to the IGA ([5]) both Russia and Hungary would designate one experienced State-owned and State-controlled organisation which would be financially and technically responsible for fulfilling its obligations as contractor/owner in relation to the Project.

(12) Russia has appointed Joint-Stock Company *Nizhny Novgorod Engineering Company Atomenergoproekt* (JSC NIAEP) to construct the new reactors (units 5 and 6) and Hungary has appointed *MVM Paks II Nuclear Power Plant Development Private Company Limited by Shares* ([6]) ('Paks II') to own and operate the two reactors.

(13) Whilst the IGA sets out the general rights and obligations of nuclear cooperation between the two countries, the detailed implementation of the IGA is to be specified in separate agreements called the 'Implementation Agreements' ([7]) as follows:

(a) the engineering, procurement and construction contract for the construction of the two new VVER 1200 (V491) units 5 and 6 at the Paks site is to be called the 'EPC Contract';

(b) the contract stipulating the terms and conditions for the cooperation on operation and maintenance of the new reactors is to be called the 'O&M contract';

(c) the agreement on the terms for fuel supply and management of spent fuel.

(14) JSC NIAEP and Paks II concluded the EPC Contract on 9 December 2014, which stipulates that the two new units 5 and 6 are meant to start operation in 2025 and 2026 respectively.

(15) Separately, Russia undertook to provide Hungary with a state loan to finance the development of Paks II. This loan is governed by a Financing Intergovernmental Agreement (the Financing IGA) ([8]) and provides a revolving credit facility of EUR 10 billion which is limited to the sole use of the design, construction and commissioning of power units 5 and 6 at Paks II. Hungary will use this revolving credit facility to directly finance the investments in Paks II necessary for the designing, construction and commissioning of the new power units 5 and 6, as set out by the Financing IGA. Further to the Financing IGA, Hungary will provide an additional amount of up to EUR 2,5 billion from its own budget to finance the investment at Paks II.

(16) Other than the investment support outlined in recital 15, Hungary does not intend to grant any other financial support to Paks II once power units 5 and 6 have been constructed. The new units will operate under market conditions without any fixed amount of revenues or guaranteed price. Hungary considers that at this stage raising any debt directly by Paks II will not be necessary.

([3]) Agreement between the Government of the Russian Federation and the Government of Hungary on cooperation on peaceful use of nuclear energy, concluded on 14 January 2014 and ratified in Hungary by Act II of 2014 of the Hungarian Parliament (2014. évi II. törvény a Magyarország Kormánya és az Oroszországi Föderáció Kormánya közötti nukleáris energia békés célú felhasználása terén folytatandó együttműködésről szóló Egyezmény kihirdetéséről).

([4]) The reactors are assumed by the Hungarian authorities to have 1 180 MW net capacity per unit.

([5]) Article 3 of the IGA.

([6]) Government Resolution 1429/2014. (VII. 31.) (A Kormány 1429/2014. (VII. 31.) Korm. Határozata a Magyarország Kormánya és az Oroszországi Föderáció Kormánya közötti nukleáris energia békés célú felhasználása terén folytatandó együttműködésről szóló Egyezmény kihirdetéséről szóló 2014. évi II. törvény szerinti Magyar Kijelölt Szervezet kijelölése érdekében szükséges intézkedésről).

([7]) Article 8 of the IGA.

([8]) Agreement between the Government of the Russian Federation and the Government of Hungary on the extension of a state credit to the Government of Hungary for financing the construction of a nuclear power plant in Hungary, concluded on 28 March 2014.

2.2. *OBJECTIVE OF THE MEASURE*

(17) As explained in the Opening Decision, Paks NPP is the only nuclear power plant operating in Hungary. It belongs to the 100 % State-owned electricity trader and power producer Magyar Villamos Művek Zártkörűen Működő Részvénytársaság ('the MVM Group') ([9]). Its four units have a total installed capacity of 2 000 MW, each one of which is currently equipped with Russian technology (VVER-440/V213). The units will be gradually phased out by 2037 (see recital 10).

(18) Electricity generation from nuclear sources plays a strategic role in Hungary's energy mix, as approximately 50 % of the overall domestically generated electricity comes from the existing four reactors at Paks NPP ([10]).

(19) Based on the following objectives:

— maintaining a sensible share of national resources, and

— reducing Hungarian dependence on imports whilst remaining consistent with national climate policy,

the Government requested MVM Group to investigate the alternatives to the expansion of electricity production in nuclear power plants. A Feasibility Study was prepared by MVM Group that explored the implementation and financing of a new nuclear power plant that could be integrated into the electricity system and that could be operated in an economical, safe and environmentally friendly way. Based on this Feasibility Study presented in 2008 by the MVM Group, the Government proposed the project to the Hungarian Parliament, which consented to the start of preparatory work for the implementation of new nuclear power plant units at the Paks site ([11]). This was supported by calculations which showed that the retirement of 6 000 MW from the 8-9 000 MW gross installed capacity was forecast by 2025 as a result of the shutdown of the obsolete power plants. These plants were due to be partly replaced by the expansion of the Paks NPP.

(20) In 2011 the National Energy Strategy for the period up to 2030 was implemented ([12]). That strategy focusses on a Nuclear-Coal-Green scenario for Hungary. The Hungarian Transmission System Operator (the 'TSO'), MAVIR, projects that there will be a need for at least 5,3 GW of new generation capacity in Hungary by 2026, and somewhat more than 7 GW by 2031 as a result of future demand and the retirement of existing generation capacity in Hungary ([13]). MAVIR also forecasts that almost all of the current coal generation fleet will have retired between 2025 and 2030, and that the installed capacity of Hungary's gas-fleet will have declined by approximately 1 GW, as shown in Table 1 submitted by Hungary on 16 January 2017. Hungary explained that MAVIR's study does not take into account any imports, or new installed capacities in the projection of the required 7 GW of new capacity.

Table 1

Expected phase-outs of domestic installed capacities by 2031

MW

	Existing	Phase-out
Nuclear	2 000	
Coal	1 292	1 222
Natural gas	3 084	960

([9]) See recital 18 of the Opening Decision for more information on the MVM Group.
([10]) Data of the Hungarian Electricity System (Mavir, 2014) — https://www.mavir.hu/documents/10262/160379/VER_2014.pdf/a0d9fe66-e8a0-4d17-abc2-3506612f83df, accessed on 26 October 2015.
([11]) 25/2009. (IV.4.) OGY Határozat a paksi bővítés előkészítéséről.
([12]) National Energy Strategy (Ministry of National Development, Hungary, 2011): http://2010-2014.kormany.hu/download/7/d7/70000/Hungarian%20Energy%20Strategy%202030.pdf
([13]) A magyar villamosenergia-rendszer közép- és hosszú távú forrásoldali kapacitásfejlesztése (Medium- and long-term development of generation assets of the Hungarian electricity system): https://www.mavir.hu/documents/10258/15461/Forr%C3%A1selemz%C3%A9s_2016.pdf/462e9f51-cd6b-45be-b673-6f6afea6-f84a (Mavir, 2016).

MW

	Existing	Phase-out
Oil	410	
Intermittent renewables/weather-dependent	455	100
Other renewables	259	123
Other non-renewables	844	836
Sum	8 344	3 241

Source: Hungarian authorities (Mavir)

(21) Hungary and Russia signed the IGA with the objective of developing new capacities at the Paks site. Hungary explained that by keeping nuclear generation in the fuel mix, it could address the need to replace phased-out capacity, to develop new capacities and to meet Hungary's target as regards Union climate objectives (especially those related to the anticipated decrease of CO_2 emissions).

2.3. *DESCRIPTION OF THE NEW UNITS — THE TECHNOLOGY TO BE DEPLOYED*

(22) The new units 5 and 6 at Paks II NPP will be equipped with VVER 1 200 (V491) technology and will be more advanced Generation III+ reactors. Hungary explains that the technical specifications of the units to be deployed at Paks II will give rise to notable advantages over the current Paks NPP units such as increased efficiency, and more economic operation in addition to enhanced safety features.

(23) Apart from the significantly higher installed capacity of VVER 1 200 (V491), there is also a material difference in the envisaged operating lifetime (60 years for VVER 1 200 units as opposed to 30 years for the existing units of Paks NPP) and wider manoeuvrability, which allows for the capacity of each unit to be adjusted according to demand on the grid within a certain range.

(24) The reduction in the amount of fuel required by the new units also reflects technological improvements in recent years. Instead of the existing 12-month fuel cycle, the new units can operate on an 18-month cycle. This means that the new units will require fewer shut-downs per year for fuel reloading and the plant will be able to operate for longer on average each year and not lose production time.

(25) The technical specifications also indicate that the power density, which will be provided by the new fuel assemblies, will be significantly higher than the existing fuel assemblies. This in turn means that a higher output can be achieved per unit mass of fuel material, which may improve the economics of the plant.

2.4. *THE BENEFICIARY*

(26) As explained in Section 2.3 of the Opening Decision, the beneficiary of the measure is the company Paks II, currently owned by the Hungarian State. The shareholder rights are exercised by the Prime Minister's Office. Paks II will own and operate the reactors units 5 and 6 that are paid for by the Hungarian State.

(27) Recital 19 of the Opening Decision explains how the shares of Paks II held originally by the MVM Group were transferred to the Hungarian State ([14]). According to the information submitted by Hungary on 30 January 2016, the purchase price of the transfer was HUF 10,156 billion, which equals approximately EUR 33 million.

([14]) Decree of the Minister of National Development No 45/2014. (XI.14.) (45/2014. (XI.14.) NFM rendelet az MVM Paks II. Atomerőmű Fejlesztő Zártkörűen Működő Részvénytársaság felett az államot megillető tulajdonosi jogok és kötelezettségek összességét gyakorló szervezet kijelöléséről).

2.5. *FINANCING STRUCTURE OF THE PROJECT AND RIGHTS AND OBLIGATIONS UNDER THE EPC CONTRACT*

2.5.1. FINANCING INTERGOVERNMENTAL AGREEMENT (THE 'FINANCING IGA')

(28) Within the framework of the IGA ([15]), Russia provided Hungary with a state loan in the form of a revolving credit facility of EUR 10 billion to finance the development of nuclear power units 5 and 6 in Paks. The interest rate of the loan ranges between 3,95 % and 4,95 % ([16]). The loan is earmarked for the design, construction and commissioning of those new power units.

(29) Pursuant to the Financing IGA, the loan must be used by Hungary to finance 80 % of the value of the EPC contract for the execution of works and services and delivery of equipment, while the balance of 20 % of the EPC contract shall be paid by Hungary (see recital 15). The loan must be used by Hungary by 2025.

(30) The loan must be repaid by Hungary within 21 years as of 15 March or 15 September following the date of commissioning of both of the new nuclear power units 5 and 6, but not later than 15 March 2026 ([17]).

(31) Payments under the Financing IGA may be made only once a request by the Ministry for National Economy of Hungary and a notice of approval by the Ministry of Finance of Russia have been issued.

2.5.2. THE EPC CONTRACT

(32) According to the EPC contract, JSC NIAEP must deliver the two reactors as set out in the detailed technical specifications by the agreed dates and for the agreed lump sum price (EUR […] (*) billion). Every cost previously undefined is deemed to be included in this price […] ([18]).

(33) The contract provides for liquidated damages ([19]) to be paid in specific circumstances, […].

(34) […]

(35) […]

2.5.3. RELATIONSHIP BETWEEN THE STATE AND THE BENEFICIARY

(36) Initially, Hungary had envisaged that Paks II would remain a 100 % subsidiary of MVM Hungarian Electricity Ltd, which itself is owned by the Hungarian State and municipalities. Since November 2014, Paks II is no longer a subsidiary of MVM Hungarian Electricity Ltd or part of the MVM Group but is a 100 % directly State-owned company that currently has no legal relationship with the MVM Group.

(37) As regards the activity of Paks II, in particular the sale of electricity, Hungary stated that no separate power purchase agreement with a separate supplier is in place or is envisaged at this stage. The Hungarian authorities envisage that the electricity generated by Paks II would be sold on the market and to electricity consumers in accordance with typical market practice base-load power sales agreements. According to the Hungarian authorities, Paks II, as a base-load generator for an anticipated long period of operation, would be a price taker similar to existing nuclear power generators in Europe.

(38) Paks II will be the owner of the Paks II nuclear power plant and, during the construction phase of the two reactors, it will be fully equity financed by the Hungarian State. The Hungarian authorities consider that raising any debt directly by Paks II will not be necessary at this stage.

(39) Hungary will not transfer the funds required to transfer the purchase price for the Paks II nuclear power plant onto the accounts of Paks II. The largest part of those funds will be held by the Bank for Development and Foreign Economic Affairs of Russia (Vnesheconombank). For each milestone event that is considered fulfilled, Paks II will file a request to Vnesheconombank to pay 80 % of the amount due directly to JSC NIAEP. It will also file a request to the Government Debt Management Agency of Hungary to pay the remaining 20 %.

([15]) Article 9 of the IGA.
([16]) 3,95 % until the first day of repayment, and from 4,50 % to 4,95 % in the next 21 years.
([17]) In each 7-year term: 25 %, 35 % and 40 % of the actually utilised amount of the credit respectively.
(*) *Classified information/business secret.*
([18]) […].
([19]) Liquidated damages are a set amount of damages agreed by parties of a contract to become due as compensation in case of the breach of specific obligations under the contract.

(40) The rest of the financial requirements of Paks II during the construction phase will be ensured through equity from the Hungarian State budget. The initial amount earmarked during the construction phase will be up to EUR […] billion (difference between the amount of EUR 12,5 billion set for the nuclear project in the IGA and the actual purchase price of the Paks II NPP amounting to EUR […] billion). This is considered by Hungary to represent a cap on the State resources that can be drawn for the construction of the Paks II nuclear power plant, at least without further assessment. In the event that the equity requirements exceed such an amount, however, Hungary claims it will invest more if its assessment at the time concludes that it is economically reasonable for it to do so.

(41) Hungary claims that a sensitivity analysis on possible extra costs incurred by Paks II during the construction phase concluded that its costs would have to be multiplied by 10 for the expected IRR to decrease by 1 %. Therefore, Hungary expects the impact of costs increases to be minor.

2.6. *THE HUNGARIAN ELECTRICITY MARKET*

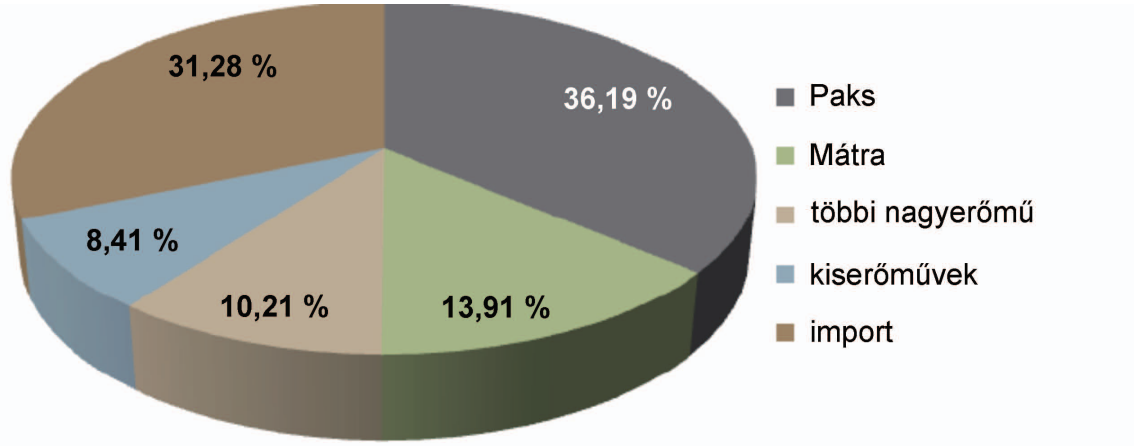
2.6.1. DESCRIPTION OF THE HUNGARIAN ELECTRICITY MARKET

(42) The current structure of the Hungarian electricity market was formed around 1995, when the majority of large power plants and public utility suppliers as well as distribution companies were privatised. The State retains a dominant position in the sector through the State-owned vertically integrated energy company MVM Group.

(43) The Study of MAVIR referred to in recital 20 explains that the total domestic consumption increased by 2,7 % since 2014 reaching a total domestic consumption of 43,75 TWh in 2015. Out of this consumption, domestic production amounted to 30,06 TWh, equalling 68,72 % of the total electricity consumption (see Figure 1). Imports amounted to 13,69 TWh corresponding to 31,28 % of the total consumption. As generator, the State-owned MVM Group has a significant market presence, due to its main generation asset, Paks NPP which provided 52,67 % of domestically generated electricity in 2015, as Figure 1 shows. Mátra Power Plant is a lignite fired power plant which is owned primarily by RWE Power AG (50,92 %) whereas the MVM Group also owns 26,15 % of its shares. The additional bigger (*többi nagyerőmű*) and smaller (*kiserőművek*) power plants play a modest role in the overall generation structure of the Hungarian market. In addition, MVM Group's vertically integrated wholesaling arm, MVM Partner, holds a dominant position in the wholesale electricity market ([20]).

Figure 1

Composition of total electricity consumption in Hungary in 2015

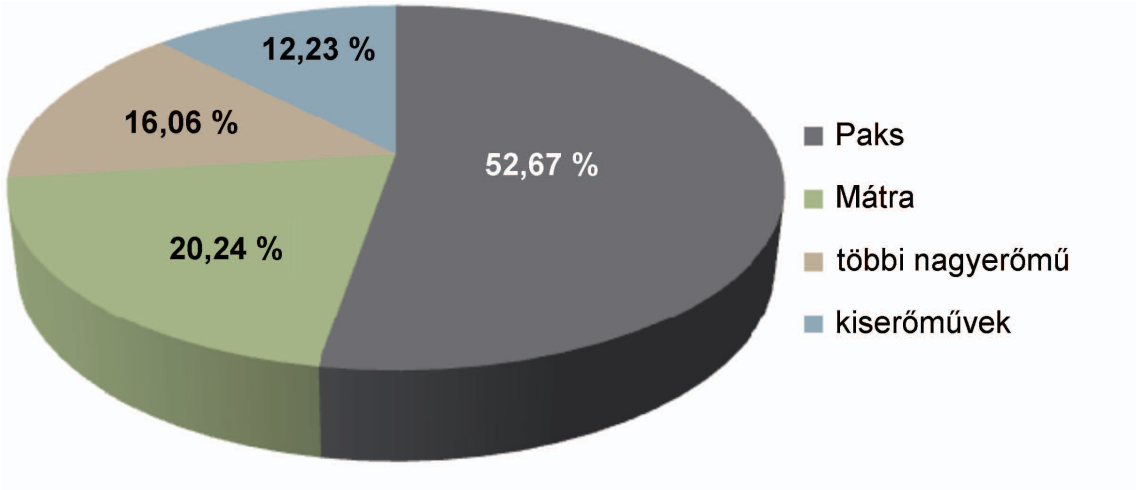


Source: Medium and long-term development of generation assets of the Hungarian electricity system (Mavir, 2016) ([21]).

([20]) See Decision No 747/2011 of the Hungarian Energy Office of 14 October 2011.
([21]) 'Többi nagyerőmű' means 'Other large power plants' whereas 'kiserőművek' means 'Small power plants'.

Figure 2

Gross domestic electricity production in Hungary in 2015



Source: Medium- and long-term development of generation assets of the Hungarian electricity system (Mavir, 2016).

(44) In Hungary, the most common transactions of wholesale are concluded via bilateral power purchase agreements (PPAs) where generators agree to sell a minimum pre-defined volume to wholesale traders and where traders are obliged to purchase a minimum volume. The PPAs are mostly concluded under the standards set out by the European Federation of Energy Traders.

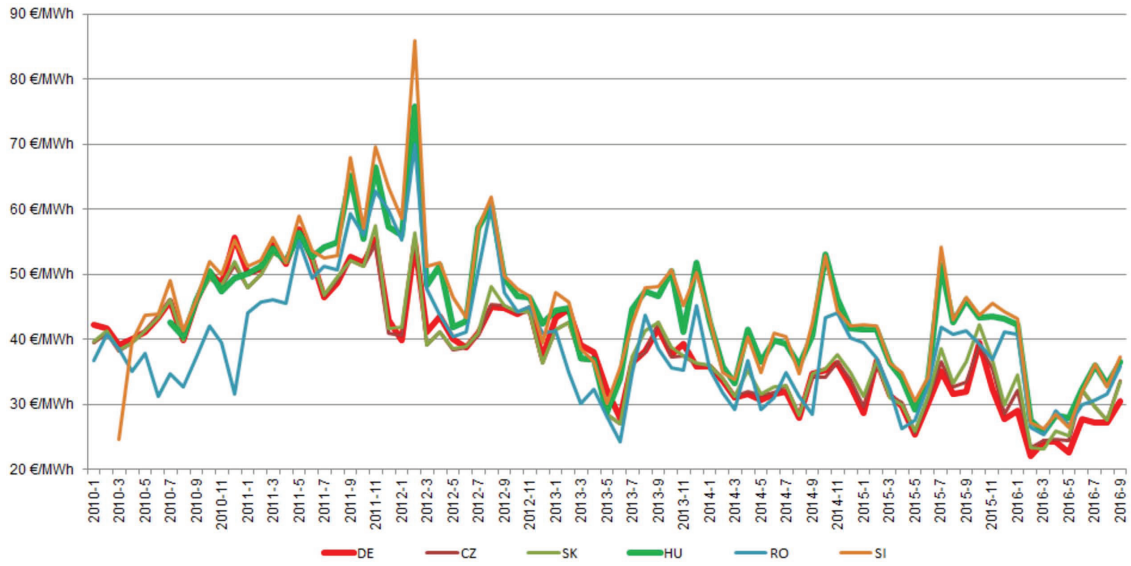
(45) The Hungarian Power Exchange Company Ltd (HUPX) started operating in July 2010 as a subsidiary company of the TSO, MAVIR. It offers day-ahead trades as well as physical future trades. Day-ahead trade starts at 11 am every day on the basis of offers and bids to be placed for each hour for the following day. Trading closes at 11:40 am at the latest. Physical future trades can be made for 4 front weeks, 3 front months, 4 front quarters and 3 front years. There are designated trading days for such transactions where offers and bids are made within a certain time interval. Since March 2016 on the HUPX Intra-day Market, both 15 minute products and 1 hour blocks are tradable. In addition to the organised day-ahead and intra-day markets, HUPX has cooperation agreements with two broker companies providing a service of submitting over-the-counter (OTC) deals for exchange clearing for common clients.

(46) In addition to the day-ahead auctions not organised by HUPX, electricity is also traded on exchanges based in the EU or OTC platforms as well as via direct bilateral deals (see recital 44).

(47) As seen from Figure 1 in recital 43, Hungary is a net electricity importer with imports accounting for circa 30 % of Hungarian electricity consumption. As Figure 3 shows, wholesale electricity price has been the highest in Hungary in the interconnected region neighbouring the country (i.e. excluding Poland or Slovenia).

Figure 3

Monthly average day-ahead baseload prices in the CEE region (including Hungary) and Germany (2010-2016)

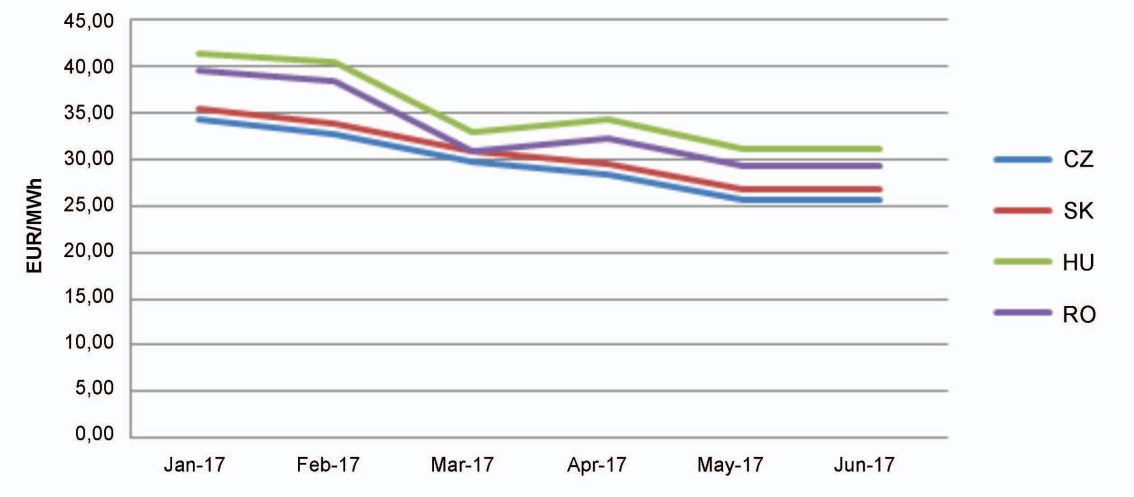


Source: European Commission.

(48) The short term projection of base-load prices in the region suggests the same trend, i.e. that Hungarian base-load prices will be the highest in the region (see Figure 4).

Figure 4

Regional base-load futures prices for January-June 2017

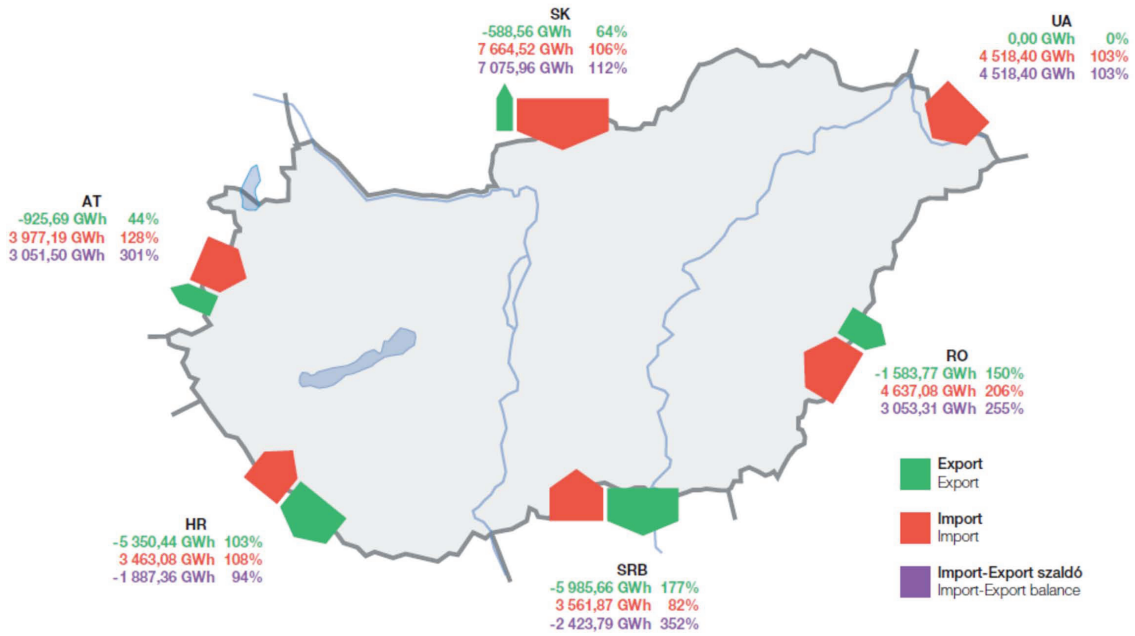


Source: European Commission (based on the data published by the Central European Power Exchange) (https://www.pxe.cz/Kurzovni-Listek/Oficialni-KL/).

(49) The country is well interconnected with neighbouring countries — interconnection capacity for electricity was 30 % in 2014, above the 2020 target ([22]). In 2014 the Czech-Slovak-Hungarian-Romanian market coupling became operational, resulting in an increase in the liquidity of HUPX and a decrease in price volatility. Figure 5 summarises the data of electricity exchange with neighbouring countries in 2014.

Figure 5

Electricity exchange between Hungary and neighbouring countries



Source: Data of the Hungarian Electricity System (Mavir, 2014).

2.6.2. DESCRIPTION OF THE ENVISAGED EVOLUTION OF THE HUNGARIAN ELECTRICITY MARKET

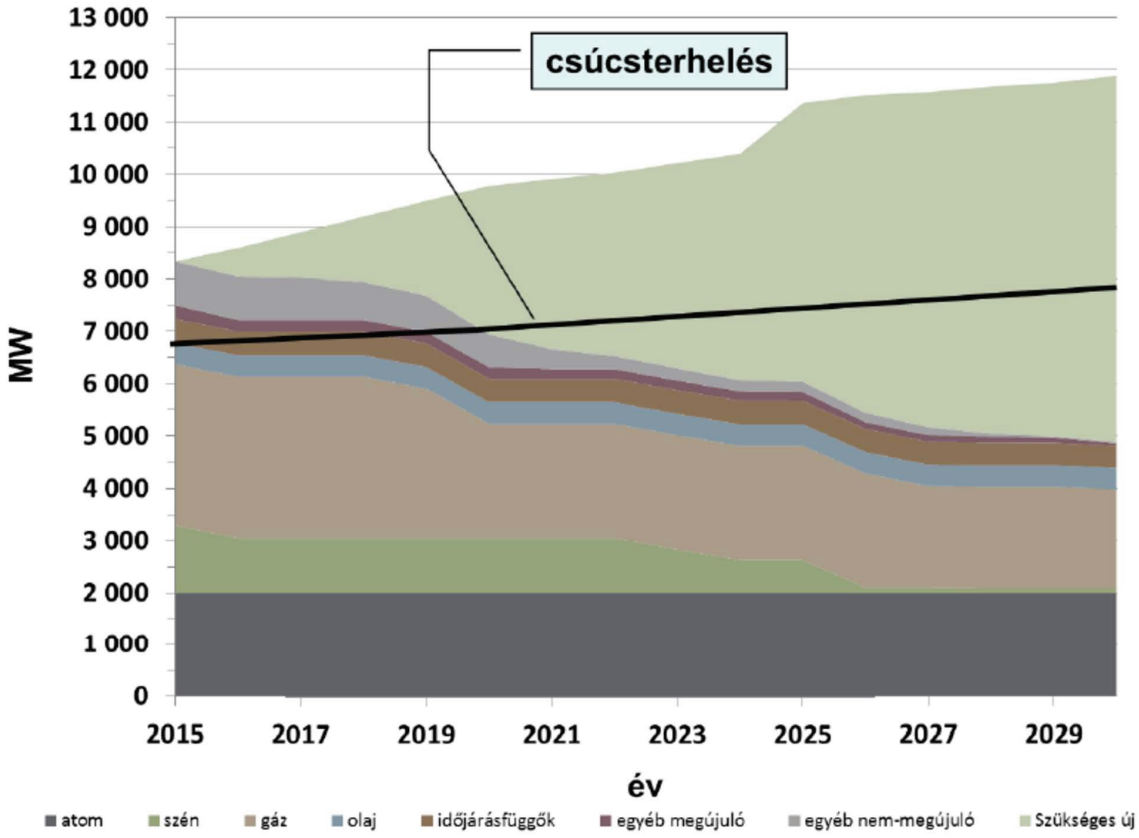
(50) On the basis of the study referred to in recital 20 issued by MAVIR ([23]), almost all of the coal generation fleet will have retired between 2025 and 2030 and the installed capacity of Hungary's gas-fleet will have declined by 1 GW. When compared to its estimates of peak demand growth, available generation capacity from domestic power producers is expected to fall below peak load by 2021. As a result, the TSO estimates that the Hungarian market will require at least 5,3 GW of additional new electricity generation capacity by 2026 and somewhat more than 7 GW by the end of the forecast period in 2031. This is depicted in Figure 6 below which shows that a significant amount of installed capacity beyond the growing Peak Load will be required. Hungary explained in its submission dated 16 January 2017 that it is required to ensure a certain level of remaining capacity reflecting the industry standard practices of ENTSO-E TSOs. The remaining capacity is the difference between the domestic reliable available capacity plus the national generating capacity plus peak load and the system services reserve. Remaining capacity is the part of the national generating capacity left in the system to cover any programmed exports, unexpected load variation, system services reserve and unplanned outages at a reference point.

([22]) Hungarian Energy Country Report (European Commission — 2014): https://ec.europa.eu/energy/sites/ener/files/documents/2014_countryreports_hungary.pdf, accessed on 26 October 2015.

([23]) A magyar villamosenergia-rendszer közép- és hosszú távú forrásoldali kapacitásfejlesztése (Medium- and long-term development of generation assets of the Hungarian electricity system): https://www.mavir.hu/documents/10258/15461/Forr%C3%A1selemz%C3%A9s_2016.pdf/462e9f51-cd6b-45be-b673-6f6afea6f84a (Mavir, 2016).

Figure 6

Additional capacity requirement in the Hungarian electricity sector



Source: Medium- and long-term development of generation assets of the Hungarian electricity system (Mavir, 2016).

(51) Hungary sets out that despite claims about the relatively large requirement for new generation capacity, the data from Platts Powervision suggests that relatively little new capacity is actually being built, as shown in Table 2. Hungary also contends that according to Platt's data, a 44 MW waste-to-energy plant is the only power station which is currently under construction in Hungary. Hungary further explains, that while there are investor plans to build larger (gas-fired) plants, none of those projects can be considered confirmed, as investors have not yet incurred substantial irrecoverable expenses such as construction costs, which would demonstrate commitment to actually undertake the project.

Table 2

New capacities to be built in the Hungarian electricity sector

Plant	Plant Type	Primary Fuel	Nameplate MW	Online Year	Status
Dunaujvaros Chp	Waste	Biomass	44	2016	Under Constr
Szeged Ccgt	CC/Cogen	Natural Gas	460	2017	Advan Develop
Szeged Ccgt	CC/Cogen	Natural Gas	460	2017	Advan Develop

Plant	Plant Type	Primary Fuel	Nameplate MW	Online Year	Status
Csepel III	CC/Cogen	Natural Gas	430	2018	Advan Develop
Tolna	Wind	Wind	260	2018	Early Develop
Gyor Region	Wind	Wind	300	2019	Early Develop
Szazhalombatta—Dunai Refinery	CC	Natural Gas	860	2020	Advan Develop
Almasfuzito	Coal	Coal Generic	435	2020	Proposed

Source: Platts Powervision, data accurate as of September 2015.

2.7. *GROUNDS FOR INITIATING THE PROCEDURE*

(52) In May 2015, Hungary notified the Commission its plans to invest in the construction of the two new nuclear reactors at the Paks site for legal certainty and claimed that the measure involved no State aid, as the State is acting as a market investor seeking a reasonable profit. In the Opening Decision, the Commission expressed concerns that the measure would entail State aid within the meaning of Article 107 TFEU, based on the information available at that stage. In particular, the Commission expressed serious doubts as to whether the measure entailed a selective advantage to Paks II, as Hungary did not object to the existence of the other elements of State aid during the notification phase.

(53) The grounds for doubts derived from the result of the Market Economy Investor Principle ('MEIP') test, which assesses whether a market investor would have invested in the project under the same terms and conditions as the public investor at the time the decision to make the public investment was taken ([24]). The MEIP test is also recognised by case law ([25]).

(54) In formal terms, the MEIP test sought to justify whether the expected internal rate of return ('IRR') of the investment would be higher than a purely market-based benchmark of the weighted average cost of capital ('WACC') for the project subject to the investment ([26]). While Hungary estimated the IRR of the project to be larger than a purely market-based benchmark WACC, the Commission raised doubts as to whether the WACC was to be considered higher.

(55) In light of doubts as regards the existence of State aid, the Commission further examined whether any possible State aid measures could be considered to be compatible with the internal market. However, given that the Hungarian authorities considered the measure to be free of State aid, the Hungarian authorities had not submitted, in the preliminary phase, any reasons as to why the measure would be compatible with the internal market. The Commission also expressed doubts that the measure did not fall within the scope of the Communication from the Commission — Guidelines on State aid for environmental protection and energy 2014-2020 ([27]), since those Guidelines do not cover measures in the field of nuclear energy and radioactive waste. Although the Commission concluded that no other Guidelines were applicable for the assessment of the notified measure, the Commission also concluded that it may declare a measure directly compatible under Article 107(3)(c) TFEU, if the measure aims to achieve an objective of common interest, if it is necessary and proportionate and where the positive effects of achieving the common objective outweigh the negative effects on competition and trade.

([24]) The MEIP test is a standard test to evaluate the existence of aid and was also used by Hungary in its economic analyses submitted both before and after the notification of the case. The Commission carefully evaluated and then complemented the MEIP analysis submitted by Hungary to derive its own assessment of the existence of aid.

([25]) T-319/12 and T-321/12 — Spain and Ciudad de la Luz v Commission, ECLI:EU:T:2014:604, paragraph 40, T-233/99 and T-228/99 — Landes Nordrhein-Westfalen v Commission, ECLI:EU:T:2003:57, paragraph 245.

([26]) Typically, there are two broad sources of capital: equity capital and (financial) debt capital. The total cost of capital is the weighted average cost of capital (WACC), taking into account the proportion of equity capital and the proportion of debt capital.

([27]) OJ C 200, 28.6.2014, p. 1.

(56) The Commission expressed doubts as to whether the measure could be considered to be proportionate, that is to say, whether the measure was limited to the minimum level of investment support necessary to enable the successful construction of the additional electricity generating units for the attainment of the common objective pursued. The beneficiary would receive generation assets without facing any particular risk linked to refinancing costs which other market operators would face. The Commission was not provided with any evidence as to how Hungary would prevent such overcompensation.

(57) The Commission emphasised that the Hungarian electricity generation market is characterised by a relatively high market concentration, with the existing Paks NPP providing some 50 % of domestic generation. In the absence of new capacities, electricity generation by Paks NPP and Paks II would be likely to provide an even greater portion of the supply market, which may have a distortive effect on the Hungarian electricity market. Hungary did not provide detailed evidence to the Commission as to how it would ensure the continuous independent operation of the existing and new generating assets.

(58) Finally, the Commission noted that due to the particularities of the Hungarian electricity market, the operation of Paks II may also cause a wholesale market liquidity risk by limiting the number of supply offers available in the market. Depending on the way the electricity produced by the new reactors is sold on the market, liquidity could be significantly affected, barriers to entry could be raised and competition could be reduced at various levels of the market. Hungary did not provide a detailed explanation as to how electricity would be traded by Paks II and how market liquidity would be ensured.

(59) Therefore, the Commission expressed doubts that the measure could comprise State aid within the meaning of Article 107(1) TFEU.

(60) In the absence of sufficient evidence, the Commission was also unable to reach any conclusions on the compatibility of any such measure, with the internal market under Article 107(3)(c). In addition, based on the doubts raised in the Opening Decision and given the lack of compatibility arguments from Hungary at that time, the Commission explored a series of competition distortion concerns and possibilities that Paks II might be overcompensated.

(61) As regards the doubts on proportionality expressed in recital 56 above, the Commission examined whether Paks II could, as a result of the aid, reinvest any profits that are not paid to the State in the form of dividends in order to develop or purchase additional generation assets and thus, strengthen its position on the market.

(62) As regards the doubts on proportionality expressed in recital 56, the Commission also investigated Hungary's intended dividends policy, in particular whether it would request dividends (at its discretion depending on the profit achieved by Paks II) or rather leave profits with Paks II. The Commission was concerned that Paks II could use its profits to reinvest by developing or purchasing additional generation assets and further distort competition.

(63) As set out in recital 57, due to the relatively high concentration level of the Hungarian electricity generation market and with the current nuclear power station Paks NPP (MVM Group) providing some 50 % of domestic generation, the Commission had concerns whether Paks NPP and Paks II would be held separately and could be considered independent and unconnected. The fact that Paks II is currently legally independent from the MVM Group was insufficient for the Commission as it did not receive any information during the notification phase as to whether the Paks NPP and Paks II would continue to operate fully separated legally and structurally. Such clarifications appeared necessary in order to minimise the risk of a further increase of market concentration.

(64) Furthermore, as explained in Section 2.6, the most common transactions in the Hungarian wholesale power sector are concluded by way of bilateral PPA's and that the Hungarian Power Exchange ('HUPX') has not yet triggered an adequate level of liquidity. As the Hungarian notification did not refer to the expected methods of electricity sales of electricity from Paks II, the Commission investigated the effect of Paks II on Hungary's current liquidity levels within the wholesale power sector.

(65) Considering the market liquidity doubts presented in recital 58, the Commission wanted to ensure that a wide range of supply offers are available on the market, particularly in light of MVM Partner's dominant position on the electricity wholesale market ([28]). The Commission was concerned that liquidity levels could be significantly affected and that the costs of downstream rivals may be raised by restricting their competitive access to an important input (input foreclosure). This could happen if the electricity produced by Paks II was sold primarily by way of long term contracts to only certain suppliers, thus converting Paks II's market power in the generation market to the retail market.

(66) The Commission, therefore, sought additional information in relation to Paks II's power output trading strategy, with special attention as to whether it would be at arms-length terms by offering its electricity on the exchange or any other transparent trading platform.

3. THE POSITION OF THE HUNGARIAN GOVERNMENT

3.1. *HUNGARY'S POSITION ON THE EXISTENCE OF AID*

3.1.1. ECONOMIC ADVANTAGE

(67) Hungary claims in the notification that the investment does not constitute State aid within the meaning of Article 107 TFEU as it does not confer an economic advantage to Paks II. Hungary supports this claim by indicating that the Paks II investment complies with the MEIP test (see recitals 53 and 54).

(68) In particular, Hungary claims that the MEIP test is satisfied in two ways ([29]). Firstly, the WACC of the project is found to be lower than its IRR. Secondly, it is argued that the levelised cost of electricity ('LCOE') is sufficiently low to make nuclear competitive with respect to other generation technologies and to offer reasonable returns under prevailing electricity prices ([30]).

(69) The following studies and supporting documentation were submitted by Hungary to support its view:

(a) The Market Economic Investor Principle substantiating analysis ('MEIP Study', 18 February 2015),

(b) Economic analysis for the Paks II nuclear power project ('Economic Study', 8 October 2015) ([31]),

(c) Letters to the Deputy Director-General for State aid reflecting on the preliminary analysis of the Commission (Clarifying Letters)

— First letter ('First clarifying letter', 16 October 2015),

— Second letter ('Second clarifying letter', 29 October 2015),

(d) Submissions reflecting on the Opening Decision (Response to the Opening Decision)

— Letter to the Deputy Director-General for State aid following the publication of the Opening Decision by the Commission on 3 December 2015 ('Letter acknowledging the Opening Decision'),

— Submission by Hungary to the Commission on 29 January 2016 ('Submission reflecting to the Opening Decision'),

([28]) See footnote 9.

([29]) The first way is a standard way of checking the MEIP across industries, whereas the second way is particularly designed for the electricity industry.

([30]) The LCOE is the total cost of installing and operating a power generation project expressed in a uniform electricity price over the lifetime of the project Formally,
LCOE = [Sumt (Coststt × (1 + r)-t)]/[Sumt (MWh × (1 + r)-t)],
where r is the discount rate and t denotes year t. As a result, it is sensitive to the discount rate applied. It is common practice to apply the WACC of the project as discount rate.

([31]) This document is publicly available at http://www.kormany.hu/download/6/74/90000/2015_Economic%20analysis%20of%20Paks%20II%20-%20for%20publication.pdf.

(e) The Government of Hungary's response to third party comments on the State aid Opening Decision on 7 April 2016 ('Response to Third Party Comments'),

(f) Response to the request for information dated 18 March 2016 on 21 April 2016 ('Further Clarifications').

(70) Furthermore, the Hungarian Government also submitted a financial model that was used to compute the IRR figures for the project. Two versions of the model were submitted to the Commission:

(a) Original version on 16 March 2015 ('Preliminary Financial Model')

(b) Final version on 16 October 2015 ('Financial Model').

(71) Except for the 'Further Clarifications', the documents listed in recital 69 address the topic of WACC and IRR computation, albeit with various levels of detail. The IRR of the project is computed by using the Financial Model ([32]). The LCOE approach is discussed in the Economic Study and in the 'Further Clarifications' (see recital 69).

(72) In terms of analysis by Hungary, the documents listed in recital 69(c)-(f) include various updates of the figures submitted in the MEIP study, and subsequently in the Economic Study. In particular, some updates are dated after the signing date of the EPC contract on 9 December 2014, i.e. the initial investment decision.

(73) The Opening Decision provides a detailed evaluation of Hungary's position on each key issue as reflected in its submissions up to the date of the Opening Decision ([33]). The remainder of this section provides an overview of Hungary's position on the key issues raised following the publication of the Opening Decision. In particular, the application of the WACC and IRR, as well as the LCOE will be presented separately.

3.1.1.1. ***Hungary's position on the WACC***

(74) In its Response to the Opening Decision, Hungary reiterated its estimated range of between 6,2-7,7 % for the WACC as in its previous submissions. It also reiterated on its earlier arguments set forward in the Clarifying Letters and noted that the Commission did not assess these arguments in the Opening Decision.

3.1.1.2. ***Hungary's position on the IRR***

(75) This section reviews Hungary's position in relation to the calculation of the IRR which used the Financial Model to compute future free cash flows for the project and determine the its IRR. The main elements of the Financial Model are:

(1) various long-term electricity price forecasts, and

(2) various operational assumptions for the nuclear power plant.

(A) Electricity price forecasts

(76) The price forecasts used by the Hungarian Government were reviewed in the Opening Decision. In its Response to the Opening Decision, Hungary criticised the Commission for using just one price forecast curve (based on the International Energy Agency's World Energy Outlook 2014 (IEA WEO 2014) publication to calculate the IRR of the project ([34]). In particular, it pointed out that all of the price forecasts submitted in the Economic Study should be used to assess the IRR.

([32]) The Financial Model is an updated version of the preliminary Financial Model. Updates include the contractual arrangements between Paks II and JSC NIAEP, the supplier of the nuclear power plant.
([33]) See recitals 52-81 of the Opening Decision.
([34]) See http://www.worldenergyoutlook.org/weo2014/

(B) Operational assumptions

(77) The operational assumptions for the Financial Model and the IRR calculations were provided by Paks II's technical team. Although originally no details were provided to justify those operational assumptions, Hungary subsequently submitted background information on those assumptions in its responses to information requests by the Commission. A key submission in this regard is the Further Clarifications submitted in response to a Request for Information following the Opening Decision and the third party comments.

(C) The IRR of the project

(78) In the Response to the Opening Decision, Hungary reiterated the results of its earlier computations of between 8,6-12,0 % for the IRR of the project.

(79) Hungary's Response to the Opening Decision criticised the Commission's assessment of the impact of a delay on the project's IRR (a decrease of 0,9 % for a delay of 5 years). The figure was calculated by assuming delays during the operational period. However, Hungary argued that a delay in the construction period could increase the IRR of the project where there would be a delay in incurring costs also.

3.1.1.3. ***Hungary's position on the LCOE***

(80) This section reviews Hungary's position on the LCOE for Paks II ([35]).

(A) The Economic Study

(81) Hungary argued in the Economic Study that the LCOE of Paks II is sufficiently low to make it competitive with other generation technologies. In particular, the study presented three estimates of the LCOE in respect of a nuclear project in Hungary. The first estimate of EUR 70/MWh, was based on a discount rate of 7 % (the upper limit of the estimated WACC presented in the same Economic Study) and was taken from a joint OECD/IEA/NEA 2015 publication 'Projected Costs of Generating Electricity' ('OECD/IEA/NEA 2015 study') ([36]). The second LCOE estimate of EUR 50-63/MWh was based on a study by Aszodi et al. (2014) which uses a discounted rate based on the interest rate of the Russian loan, falling within the 4-5 % range ([37]). The third LCOE estimate of EUR 58-120/MWh (2013 real prices) was calculated by way of a benchmark analysis based on figures published by various international agencies which offers a potential range for the LCOE ([38]). The study concluded that the LCOE for a Hungarian nuclear power plant falls within the range of between EUR 50,5-57,4/MWh (2013 real prices) l where the two end values were calculated by taking an interest rate equal to the two end-points of the WACC range (6,2 % and 7,0 %) reported in the same Economic study ([39]). When compared to the future electricity prices from the same Economic Study, the Hungarian nuclear power plant project can be argued to be profitable, and as such, Hungary argues that a private investor would feel it reasonable to undertake the project.

(B) Further clarifications

(82) In Response to the question by the Commission on how the LCOE range of between EUR 50,5-57,4/MWh in the final conclusion of the Economic Study can be reconciled with the range of between USD 89-94/MWh set out in the OECD/IEA/NEA study, Hungary explained in the 'Further Clarifications' that the difference was due to very different assumptions being used in the Economic Study and the OECD/IEA/NEA study, e.g. the difference in the assumed capacity factor (85 % vs 92 %) for nuclear power plants and in the commissioning dates (2020 vs 2025).

([35]) Due to insufficient information and lack of clarity, the Opening Decision did not evaluate estimates based on this methodology. Therefore, the following overview also includes documents from before the Opening Decision.

([36]) The LCOE in the OECD/IEA/NEA study is 89,94 USD/MWh (see Table 4.7) and it is not clear how the value of EUR 70/MWh in Figure 3 of the Economic Study and EUR 50,5-57,4/MWh were derived from that former value. The OECD/IEA/NEA 2015 study is available at https://www.oecd-nea.org/ndd/egc/2015/

([37]) See Aszódi, A., Boros I. and Kovacs, A., (2014) 'A paksi atomerőmű bővítésének energiapolitikai, műszaki és gazdasági kérdései', in Magyar Energetika, May 2014. An English translation entitled. 'Extension of the Paks II NPP — energy political, technical and economical evaluations' was submitted to the Commission in February 2016. This study presents calculations in HUF, concluding an average LCOE of 16,01-16,38 HUF/kWh over the lifetime of the project. No details are provided how these HUF based figures were converted into the LCOE range in EUR/MWh cited in recital 81.

([38]) See Figure 15 in the Economic Study.

([39]) See p. 77 of the Economic Study.

3.2. *HUNGARY'S POSITION ON THE POSSIBLE COMPATIBILITY OF THE MEASURE WITH THE INTERNAL MARKET*

(83) Although in its response to the Opening Decision Hungary emphasised that the measure did not involve State aid, it submitted comments to address concerns raised by the Commission with regard to the possible compatibility of the measure with the internal market, expressed in the Opening Decision in the event that the Commission came to the conclusion that State aid did exist.

3.2.1. POSITION ON THE OBJECTIVE OF COMMON INTEREST

(84) In its response to the Opening Decision, Hungary set out several policy considerations which it deemed relevant to define the objective of common interest based on the following:

(a) Hungary's energy policy;

(b) Euratom Treaty ([40]) objectives;

(c) Gap in future installed capacity;

(d) Diversification of energy sources;

(e) Decarbonisation;

(f) Job creation;

(g) Affordability.

(85) Hungary emphasised that, on the basis of Article 194(2) TFEU, each Member State has the sovereign right to choose its energy mix and it refers to its National Energy Strategy 2030 (see recital 20) which identifies a nuclear-coal-renewable path as mid-term energy strategy of the country.

(86) Hungary also refers to Article 2(c) of the Euratom Treaty which states that the Euratom Community shall facilitate investment and ensure the establishment of the basic installations necessary for the development of nuclear energy in the Euratom Community. Hungary emphasises that the provisions of the Euratom Treaty, which bind each signing Member State, are to be understood as a common objective of the Union.

(87) In addition, Hungary explains that there is a projected growth of approximately 4 % in electricity demand expected by the TSO by the year 2030 principally due to the proposed electrification of Hungary's transport, industry and heating systems. The same study of the TSO concludes that many of Hungary's existing older coal and gas plants are becoming obsolete and are expected to shut down by 2030. The study also found that very few newly installed capacities are expected to come on stream within the same timeframe. This will lead to a forecasted 32 % decrease in the existing capacity and Hungary argues that the construction of Paks II will be a well targeted response to this envisaged gap in future generation capacity.

(88) Furthermore, Hungary emphasises that its dependency on imported gas is higher than the EU 28 average. More than 95 % of the gas utilised in Hungary is imported and principally from Russia. It argues that without nuclear in the energy mix, Hungary's dependence on oil or gas would significantly increase. This would be particularly the case following the phasing out of the existing operating units of the Paks NPP where other additional electricity generating units would have to use such fuels to bridge the future gap in overall national installed capacity described in recital 50. Consequently, Hungary considers that the measure would contribute to the diversity of fuel sources in the energy mix and the security of the country's energy supply.

(89) Hungary argues that the project will contribute to the Union's 2020 objectives of a reduction of greenhouse gases as nuclear fission is considered as a low carbon source of energy. The Hungarian authorities argue that the country's topographic and geographic location does not allow for the deploying of offshore wind or hydropower plants. The remaining renewable electricity generation options are from onshore wind, solar and biomass, however the deployment of such technologies would not be sufficient to cover the envisaged gap in future capacity mentioned in recital 50 before where no additional generation from nuclear is foreseen. Consequently Hungary argues that the project is pursuing the objective of decarbonisation.

([40]) Treaty establishing the European Atomic Energy Community (Euratom).

(90) The Hungarian authorities allege that the project (both during and after the construction) will lead to significant job creation. This would be particularly important given the geographical location of the Paks II nuclear power plant, which lies in a NUTS II-region, with a GDP of less than 45 % of that of the EU average per capita. As such, Hungary considers that the implementation of the project would pursue an objective of growth and significant job creation in multiple sectors.

(91) Finally, Hungary argues that the investment in new nuclear generation capacity will directly translate into lower industrial and consumer electricity prices, which is in accordance with an EU-wide objective of affordability of services. Hungary also states that the fact that no support shall be granted to Paks II during its operation supports the argument of affordability.

3.2.2. POSITION ON THE NECESSITY OF THE MEASURE

(92) Hungary explains in light of the growing generation gap which Hungary faces, that a significant amount of investment in generation capacity is required, with the quantum of such investment required being greater than the projects which are currently under construction or in development.

(93) For these reasons Hungary had engaged Nera Economic Consulting to analyse the development of the Hungarian and neighbouring countries' electricity markets and the appropriate market definition for the Paks II project when it becomes operational (the 'NERA Study'). This study suggests that building the new units 5 and 6 at Paks II could be commercially preferable to other types of energy generation investments based on Hungary's market conditions, such as a similar capacity provided by open cycle gas turbines ('OCGT's') and CCGT's. Hungary concludes that there is thus no possible counterfactual that meets the policy objectives.

3.2.3. POSITION ON THE PROPORTIONALITY OF THE MEASURE

(94) Hungary reiterates that it expects to receive full compensation from the investment in the Paks II nuclear power plant from both capital appreciation and dividends.

(95) In addition, in its submission of 28 July 2016, while maintaining that the project would not involve State aid and that it was in line with the MEIP, Hungary provided additional information in response to the concerns raised in Section 3.3.6 of the Opening Decision regarding proportionality should the Commission find that State aid would arise in the notified project.

(96) According to its submission Hungary states that Paks II shall use all of the profits deriving from the activity of units 5 and 6 of Paks II only for the following purposes:

(a) The Paks II project, which is defined as the development, financing, construction, commissioning, operation and maintenance, refurbishment, waste management and decommissioning of two new nuclear power units with VVER reactors 5 and 6 in Paks, Hungary). Profits shall not be used to fund investments in activities that are not within the scope of the above defined project.

(b) The payment of the profits to the Hungarian State (for example by way of dividends).

(97) Hungary also confirmed that Paks II shall refrain from (re)investing in the extension of Paks II's own capacity or lifetime and the installation of additional generation capacities, other than those of reactors 5 and 6 of Paks II. Should such new investment be made, Hungary shall notify it to the Commission for a separate State aid approval

3.2.4. POSITION ON THE EFFECT OF THE MEASURE ON THE INTERNAL MARKET

(98) The Hungarian authorities put forward that where any distortive effects occurred, these would be limited in duration to the period of overlap between the phasing out of the existing reactors at Paks NPP and the coming into operation of the two new reactors of Paks II. Hungary considers it unreasonable to assume that Paks NPP's lifetime could exceed 50 years, therefore the overlapping period would be very short.

(99) Furthermore, in Hungary's view the overlap period is needed and reasonable bearing in mind the need that Paks II is operational at the time Paks NPP will approach the end of its extended lifetime, and that Paks II's development and commissioning may be subject to delays due to the technical complexity that the commissioning of a new nuclear power plant involves and to external factors outside the control of parties (e.g. change in legislation, safety requirements, regulatory environment). Hungary also submitted that some units equipped with VVER Generation III and III+ technology faced or are envisaged to face delays compared to the planned construction time of Paks II, as expressed in Table 3 below.

Table 3

Accumulated construction delays of VVER Generation III and III+ units

Site (country)	Delays (years)	Status
Kudankulam — 1 (India)	+ 5,8	completed
Kudankulam — 2 (India)	+ 7,0	ongoing
Novovoronezh II.-1 (Russia)	+ 1,5	completed
Novovoronezh II.-2 (Russia)	+ 2,5	ongoing
Leningrad II.-1 (Russia)	+ 2,0	ongoing
Leningrad II.-2 (Russia)	+ 2,5	ongoing

Source: Hungarian authorities.

(100) In addition, Hungary highlights that Paks NPP and the two new reactors of Paks II are owned and operated by separate entities and that the MVM Group is not related in any way to the Paks II project or to Paks II. It also maintains that, if a concentration between Paks II and the MVM Group were to be considered, such a concentration would be subject to the merger control rules.

(101) Hungary argues that the fact that the two companies are both State owned does not prima facie call into question their commercial autonomy. On the contrary, the companies can be proven to be independent of one another where each company has independent decision-making powers.

(102) Hungary contends that the MVM Group and Paks II are independent and unconnected on the following grounds:

(a) They are managed by different government departments (the MVM Group by the Ministry of National Development through the Hungarian National Asset Management Inc. and Paks II by the Prime Minister's Office);

(b) There are no shared or common directorships on the governing board of each company;

(c) There are existing safeguards to ensure that commercially sensitive and confidential information are not exchanged between the companies;

(d) The decision making powers of each company are separate and distinct from one another.

(103) Hungary criticises the Commission's findings in the Opening Decision regarding the calculation of MVM Group's market share in the Hungarian electricity supply market. Hungary argues that the market share was not examined in comparison with other producers present in the Hungarian market and that the market share of the MVM Group was calculated in view of domestically generated electricity only, excluding imports.

(104) On the basis of the NERA Study Hungary alleges that any possible distortions of competition must be interpreted in a market context that is larger than the State of Hungary. The NERA Study takes into account the following inputs in its market assessment:

(a) Existing generation capacities and technical capabilities (e.g. efficiencies, start-up costs);

(b) Committed expansions in generation capacity (e.g. plant under construction and new renewables);

(c) Committed retirements of existing units (e.g. due to the LCPD);

(d) Interconnector capacities;

(e) Generator fuel, CO_2 and variable operating and maintenance costs;

(f) Fixed operating and maintenance costs that would be avoided if a unit shuts;

(g) The costs of new entry.

(105) The basis of the argument why the market to be assessed is larger than Hungary is that imports of electricity from neighbouring countries accounted for 31,4 % of Hungarian electricity consumption in 2014. Hungary also argues that this high level of interconnection with neighbouring countries will increase further as a result of new interconnectors which will become operational between 2016 and 2021 between Slovakia (2 × 400 kV and 1 × 400 kV) and Slovenia (1 × 400 kV). In the submission of Hungary dated 16 January 2017, Hungary provided more details on the upcoming projects of cross-border transmission lines, according to which another interconnector of 2 × 400 kV will be built with Slovakia by 2029 and a 1 × 400 kV one with Romania by 2030. The expected total interconnection capacities for imports and exports are shown in Tables 4 and 5.

Table 4

ENTSO-E Projections of Installed Interconnection Capacities for Import in Hungary

	Austria	Slovakia	Romania	Croatia	Serbia	Ukraine (*)	Slovenia (**)	Total
2015	600	800	1 000	1 200	1 000	450	0	5 050
2016	720	1 040	1 080	1 360	920	450	400	5 970
2017	840	1 280	1 160	1 520	840	450	800	6 890
2018	960	1 520	1 240	1 680	760	450	1 200	7 810
2019	1 080	1 760	1 320	1 840	680	450	1 600	8 730
2020	1 200	2 000	1 400	2 000	600	450	2 000	9 650
2021	1 200	2 000	1 400	2 000	600	450	2 000	9 650
…								
2030	1 200	2 000	1 400	2 000	600	450	2 000	9 650

(*) No data provided in forecast
(**) Assumption: Slovenia starting from zero.

Source: NERA Study.

Table 5

ENTSO-E Projections of Installed Interconnection Capacities for Export in Hungary

	Austria	Slovakia	Romania	Croatia	Serbia	Ukraine (*)	Slovenia (**)	Total
2015	600	800	1 000	1 200	1 000	450	0	5 050
2016	640	1 040	1 060	1 360	920	450	340	5 810
2017	680	1 280	1 120	1 520	840	450	680	6 570
2018	720	1 520	1 180	1 680	760	450	1 020	7 330
2019	760	1 760	1 240	1 840	680	450	1 360	8 090
2020	800	2 000	1 300	2 000	600	450	1 700	8 850
2021	800	2 000	1 300	2 000	600	450	1 700	8 850
…								
2030	800	2 000	1 300	2 000	600	450	1 700	8 850

(*) No data provided in forecast
(**) Assumption: Slovenia starting from zero.

Source: NERA Study.

(106) The study also identifies a successful energy supply market coupling with Slovakia, the Czech Republic and Romania and refers to ENTSO-E's proposals published in October 2015 which defined Hungary as a part of a single Central and Eastern Europe coordinated capacity region with several countries with which it does not yet have coupling arrangements, including Austria, Germany and Poland ([41]). Hungary argues that, relative to other Member States, Hungary is already a highly integrated electricity market within the European Union, with interconnection capacity standing at approximately 75 per cent of total installed domestic generation capacity, i.e., roughly 8 times higher than the EU target for Member States by 2020 and 5 times higher than the EU target for Member States by 2030. In Hungary's view, this is a sufficient reason to consider possible distortions of competition at a larger scale.

(107) As regards the deployment or new technologies both in the factual scenario and in the absence of Paks II, the NERA Study envisages CCGTs or OCGTs as entrant technologies whereas it presumes that the entry and exit of other technologies, such as renewables, coal and nuclear is unlikely purely on an economic basis for the following reasons:

(a) The current and historical entry decisions of renewable plant depend crucially on government subsidy programmes, rather than market prices. Accordingly, models that simulate market fundamentals are not able to determine whether renewable plant would enter or exit in practice.

(b) Due to climate change concerns, the installation of unabated new build coal and lignite plants in the EU is now highly contentious, with many projects subject to challenge through agency or court processes. It is therefore unclear to what extent new build projects are any longer feasible in the EU.

([41]) ENTSO-E (2015), All TSOs' proposal for Capacity Calculation Regions (CCRs) in accordance with Article 15(1) of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a Guideline on Capacity Allocation and Congestion Management, 29 October 2015, p. 9, Article 9.

(c) The development of new build nuclear power plant in the EU is also dependent on an energy strategy that includes nuclear power and requires significant government and regulatory interface in the planning and permitting process. For nuclear power plant, planning and development is a significantly larger undertaking than for gas CCGTs and OCGTs and the outcomes are much more dependent on national policies and regulatory discretion. It is therefore assumed that no new nuclear power plant is constructed other than those in countries that already have pro-nuclear energy policies and only for active projects that are already under-construction and/or have EPC contracts in place.

(108) The NERA Study shows that in the factual scenario (construction of Paks II), the following conclusions can be drawn:

(a) Electricity demand in Hungary is expected to grow significantly until 2040;

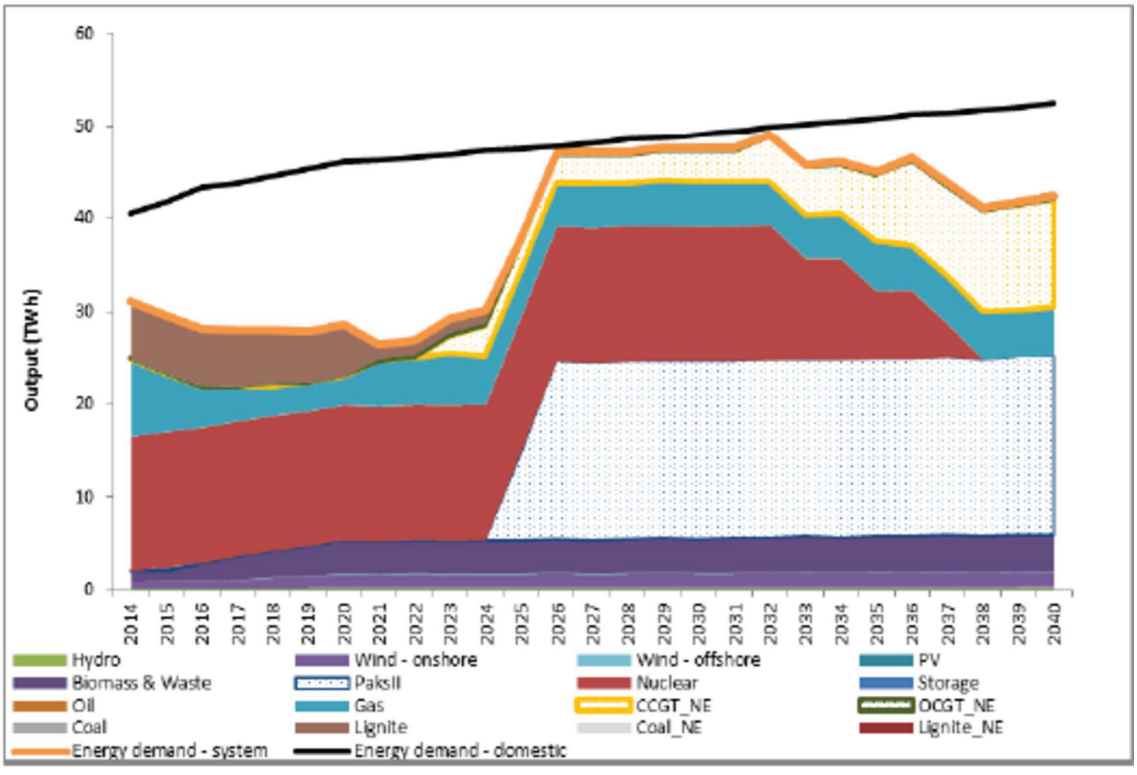
(b) Hungary is currently in a supply deficit and must import significant amounts of electricity. This deficit widens further between 2015 and 2025;

(c) Despite Paks II coming online in 2025, Hungary remains in a net import position throughout the overlap period with the currently operating units of Paks NPP, and then again begins to become more and more import dependent thereafter;

(d) Renewable resources in Hungary increase in the initial years of the factual scenario based on ENTSO-E projections, hitting the 2020 renewables target of 10,9 % of electricity consumed that Hungary adopted in its National Renewable Energy Plan.

Figure 7

Projected output per technology and national demand until 2040 (factual scenario)

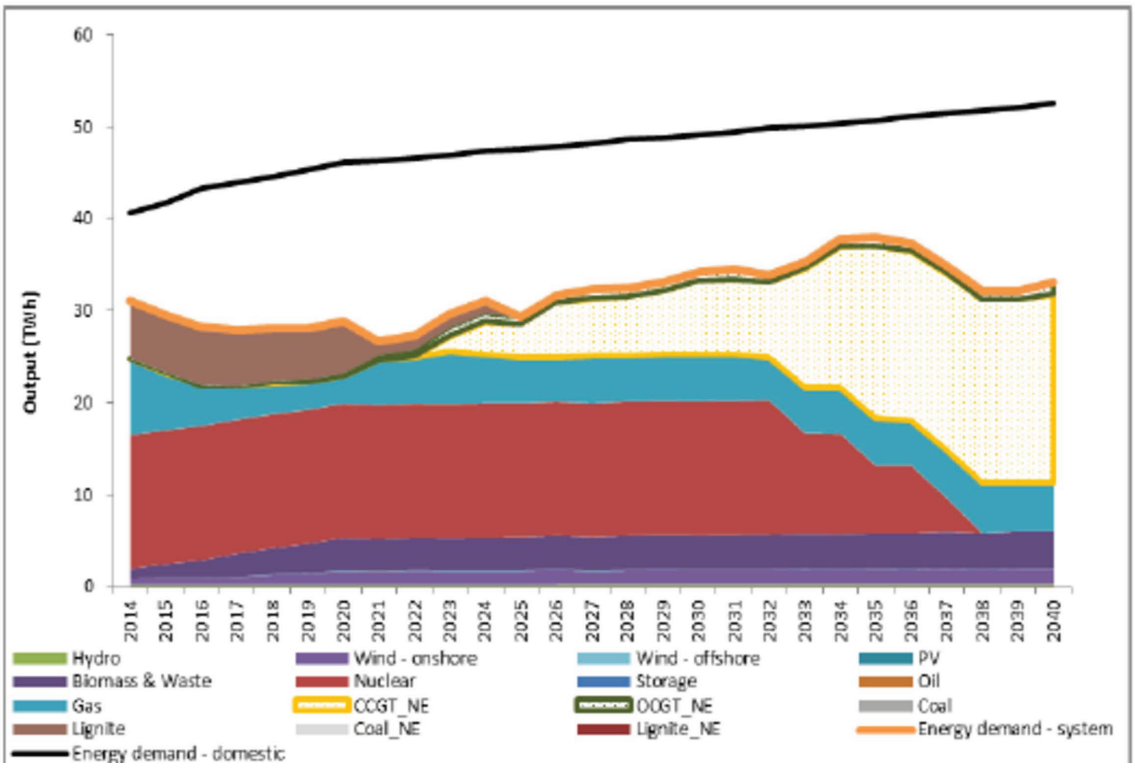


Source: NERA Study.

(109) As explained above in recital 93, the NERA Study reiterates that in the absence of the construction of Paks II, the similar capacity commercially preferable to other types of energy generation investments based on Hungary's market conditions would be provided by OCGT's and CCGT's. The NERA Study suggests that despite replacing most of the capacity of the Paks II plant with new gas capacity in Hungary, Hungary remains heavily dependent on electricity imports throughout the modelling period in the gas counterfactual scenario (see Figure 8).

Figure 8

Projected output per technology and national demand until 2040 (counterfactual scenario)

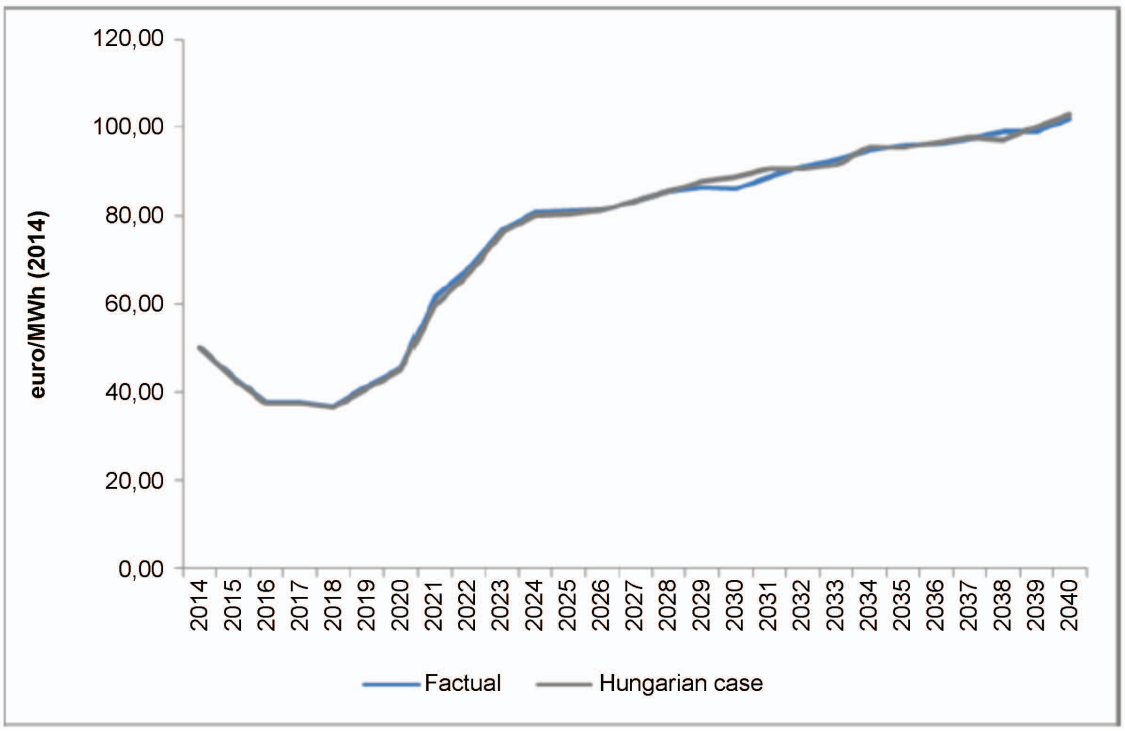


Source: NERA Study.

(110) Furthermore, Hungary contends that because of the strong convergence between market prices in neighbouring countries and Hungary, competitors are likely to be able to hedge their risks by trading electricity in neighbouring markets, without the need to trade Hungarian electricity directly. Hungary claims, based on the modelling in the NERA study, that the base-load electricity price in the regional market would remain the same in the counterfactual scenario (see Figure 9).

Figure 9

Difference in Hungarian Base load Prices between base case and the counterfactual



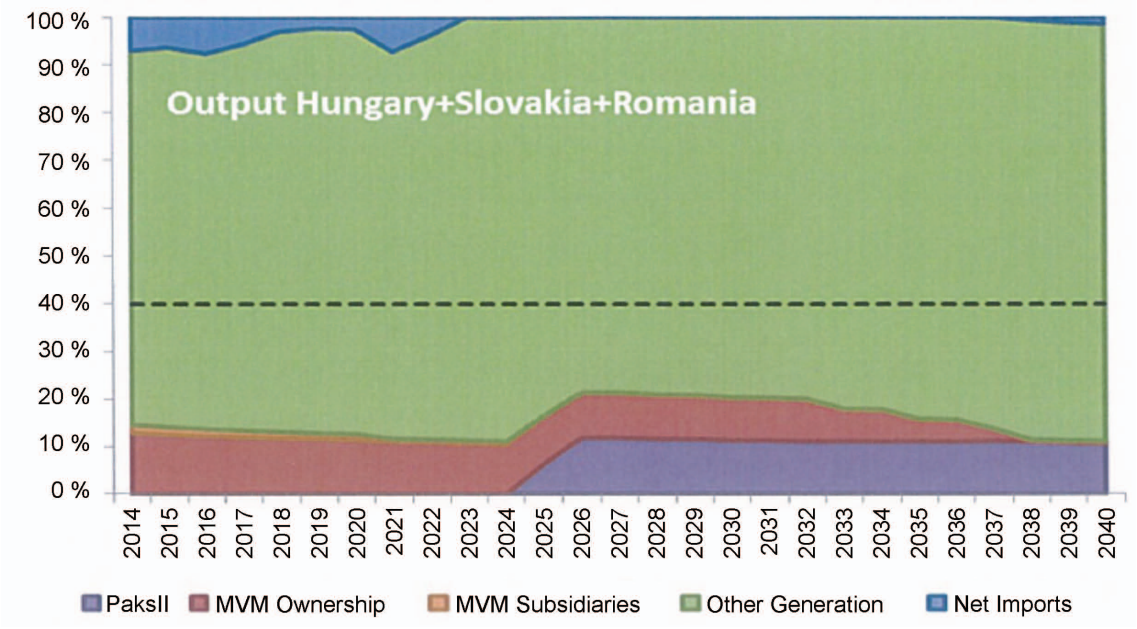
Source: NERA Study.

(111) Hungary emphasises that it has assessed Paks II's possible effects in a wider market context. It argues on the basis of the NERA Study that, as Slovakia is the smallest of the neighbouring markets with which Hungary is currently market-coupled, the possible effects of Paks II would be the most perceptible in this country. It argues that Paks II's market presence in this coupled market would remain at the level of approximately 20 % until 2040.

(112) The NERA Study also considers a possible wider coupled market (Hungary + Slovakia + Romania) arguing that these are the immediate neighbouring markets with which Hungary is currently market-coupled. On the basis of this, Hungary argues that even the combined market shares of MVM Group and Paks II (of between 10 and 20 %) in the coupled market of Hungary + Slovakia + Romania would be well below the threshold which would signify the possibility of dominance (see Figure 10).

Figure 10

Combined market shares of MVM Group and Paks II by production (MWh) on the markets of Hungary + Slovakia + Romania

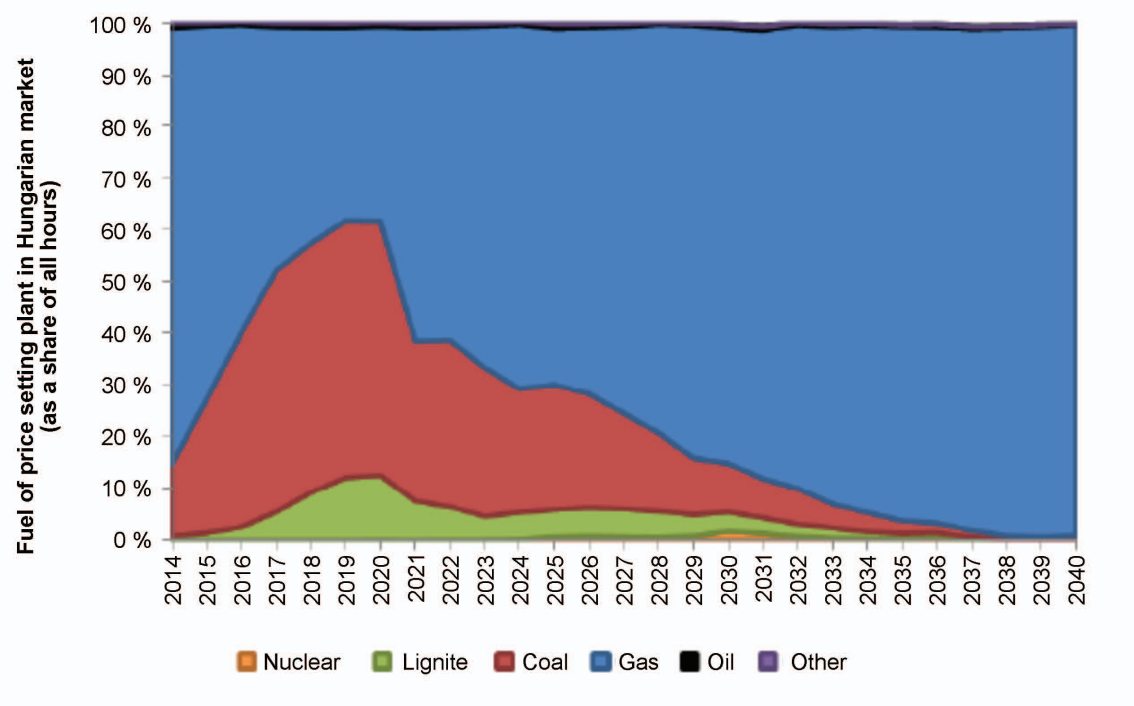


Source: NERA Study.

(113) In addition, Hungary highlights that, both in summer and winter, the price setting technology would be lignite and coal fired power plants with higher marginal costs than Paks II, which means Paks II is expected to remain a price taker rather than a price maker even during the overlapping operating period of Paks NPP and Paks II when the probability of nuclear being the price setting technology will stay well below 5 % of all hours (see Figure 11).

Figure 11

Price setting fuel in the Hungarian power market



Source: NERA Study.

(114) Hungary also states in opposition to the Commission's findings in recital 144 of the Opening Decision, that the Paks II nuclear power plant will not cause any wholesale market liquidity risk by limiting the number of supply offers. It contends that as a separate generating unit, the new power plant should enhance liquidity and diversity of generation supply. Hungary also notes that Paks II does not currently have a customer base to sell power directly to without market trading.

(115) Hungary relies upon a number of arguments presented by the United Kingdom in the Hinkley Point C case ([42]) on possible competition distortions and states that they would also apply to Paks II. Those arguments are set out as follows:

(a) The measure would preserve the beneficiary's exposure to market forces and offer incentives to it to compete in the wholesale electricity market. Hungary maintains this argument and adds that it would offer no operating support in the form of Contracts for Differences ('CfD') for Paks II;

(b) The measure would not have any significant impact on interconnector flows and incentives to invest in those interconnectors with neighbouring countries. Hungary reiterates that the Hungarian electricity market is already a well interconnected market and that there are four interconnection projects under development;

(c) The measure would have no impact on price differentials between Hungary and neighbouring markets which are currently connected by way of interconnectors.

(116) In addition, Hungary in its submission of 28 July 2016, provided additional information to address the concerns raised by the Commission in Section 3.3.7 of the Opening Decision regarding the overall balancing of any distortive effect of the measure on the internal market should the Commission find that the measure would comprise State aid.

([42]) Commission Decision (EU) 2015/658 of 8 October 2014 on the aid measure SA.34947 (2013/C) (ex 2013/N) which the United Kingdom is planning to implement for support to the Hinkley Point C nuclear power station (OJ L 109, 28.4.2015, p. 44).

(117) In this submission Hungary states that Paks II, its successors and affiliates shall be fully legally and structurally separated, shall be subject to independent power of decision within the meaning of paragraphs 52 and 53 of the Merger Jurisdictional Notice ([43]) and shall be maintained, managed and operated independent and unconnected from the MVM Group and all of its businesses, its successors and affiliates and other State controlled companies active in the generation, wholesale or retail of energy.

(118) In addition, as regards the sale of electricity from Paks II, in the same submission Hungary shows that Paks II's power output trading strategy will be an arms-length commercial profit-optimising strategy which is carried out through commercial trading arrangements concluded through bids cleared on a transparent trading platform or exchange. Hungary also submits that the strategy for trading of Paks II's power output (excluding own consumption of Paks II) shall be devised as follows:

(a) Tier 1: Paks II shall sell at least 30 % of its total electricity output on the day ahead, intraday and future markets of the Hungarian Power Exchange (HUPX). Other similar electricity exchanges can be used subject to the agreement or consent of the Commission's services to be granted or refused within 2 weeks from the request by the Hungarian authorities.

(b) Tier 2. The rest of Paks II's total electricity output shall be sold by Paks II on objective, transparent and non-discriminatory terms by way of auctions. The conditions for such auctions shall be determined by the Hungarian energy regulator, similar to the auctioning requirements imposed on MVM Partner (decision 741/2011 of the Hungarian Regulator). Hungary confirms that the Hungarian energy regulator shall also oversee the conduct of these auctions. Hungary also confirmed that the auction platform for this Tier 2 shall be operated by Paks II and it shall be ensured that offers and bids are equally available to all licensed or registered traders on the same market terms. Hungary commits that the bid clearing system shall be verifiable and transparent and no restrictions shall be imposed on the final use for the electricity purchased.

3.3. *FURTHER COMMENTS PUT FORWARD BY HUNGARY IN RESPONSE TO THE OPENING DECISION*

(119) Hungary states, that to the extent the project falls within the scope of the Euratom Treaty (e.g. Article 41 and Annex II, Articles 52 to 66 and Article 103), the Government of Hungary does not consider that TFEU and, in particular, the State aid rules in Article 107 and 108 TFEU are applicable to it. It alleges that the Euratom Treaty is lex specialis to TFEU. Therefore where the exercise of powers under the Euratom Treaty would be impeded by the exercise of powers deriving from TFEU, the provisions in the Euratom Treaty prevail. To support such a claim, Hungary relies upon the Commission Decision Kernkraftwerke Lippe-Ems GmbH ([44]).

(120) Hungary notes that although the Euratom Treaty does not establish a particular set of rules relating to State aid, point (d) of Article 6 and Article 70 of the Euratom Treaty illustrate that there is no general prohibition against State aid and that in specific cases subsidies from the Member States are encouraged.

(121) Hungary stresses that the financing of the project in the nuclear industry should fall under a notification obligation within the meaning of Article 43 of the Euratom Treaty. It further argues that pursuant to Commission Regulation (EC) No 1209/2000 ([45]) the data on the methods of financing should be provided in the event of any new project by the given Member State. Hungary argues that it had provided all the necessary information under Articles 41 and 43 of the Euratom Treaty and as the fuel supply agreement ([46]) was approved by the European Supply Agency in April 2015, Hungary believes that the Commission could not now claim that the financing of the project could be unlawful.

([43]) Commission Consolidated Jurisdictional Notice under Council Regulation (EC) No 139/2004 on the control of concentrations between undertakings (OJ C 95, 16.4.2008, p. 1).

([44]) Commission Decision of 21 February 1994 relating to a procedure in application of the second paragraph of Article 53 of the Euratom Treaty (OJ L 122, 17.5.1994, p. 30), paragraph 22.

([45]) Commission Regulation (EC) No 1209/2000 of 8 June 2000 determining procedures for effecting the communications prescribed under Article 41 of the Treaty establishing the European Atomic Energy Community (OJ L 138, 9.6.2000, p. 12).

([46]) See recital 13(c).

(122) Hungary compares the Euratom Treaty with the ECSC Treaty on the basis that they both are of sectorial nature and it argues that the ECSC Treaty contains a far reaching prohibition against State aid which was, in practice, aligned with Article 107 TFEU by virtue of Article 67 and Article 95 of the ECSC Treaty. Hungary states that in applying the rules on State aid laid down in the TFEU the Commission would misconstrue the regulatory goal pursued by the drafters of the Euratom Treaty which lacks any specific State aid provisions.

(123) Hungary further notes that no other equity investment in the construction of a nuclear power plant in the Union has ever been subject to a State aid investigation by the Commission, including those at Flamanville or Hanhikivi. In Hungary's view the investment at Hinkley Point C was subject to State aid scrutiny only because it had specific financial characteristics (such as a State credit guarantee and the CfD) unlike other investments in Europe.

4. COMMENTS FROM INTERESTED PARTIES

4.1. *COMMENTS ON THE EXISTENCE OF AID*

(124) The comments received by the Commission from the following third parties contained quantitative information and analysis in relation to the existence of measures:

— Submission by Hungarian Member of the European Parliament (MEP), Mr Benedek Jávor ('Jávor submission'),

— Submission by Green Peace ('GP submission') including a study prepared by its economic advisors, the Candole Partners ('Candole Study') ([47]),

— Submission by EnergiaKlub ('EK submission') including a study prepared by Mr Balazs Felsmann ('Felsmann study') ([48]).

The Jávor submission

(125) The Jávor submission concentrates on owner costs which are costs that are not included in the EPC contract (see Section 2.5.2 of this Decision), and claims that those costs may be heavily underestimated. In particular, the submission makes the following claims:

(a) As the EPC contract for Paks II was made on the basis of the 'Leningradskaya design ([49])', it is reasonable to believe that an additional investment in safety system will be required that would cost at least EUR 1 billion.

(b) The direct fresh water cooling system is insufficient to cool down the water in case of the parallel operation of Paks NPP and Paks II during hot summer days. This would put an extra burden on the environment, and would require investment in a more efficient cooling tower based cooling system which is about 40 % more expensive than a direct cooling system.

(c) The amount envisaged to be deposited in the Central Nuclear Fund is unlikely to be sufficient for the storage of radioactive waste and the decommissioning. In particular, the interim storage, the final depository for nuclear waste and the decommissioning would cost at least as much as EUR 150 million, EUR 1,54 billion and EUR 1,734 billion respectively.

(d) The grid upgrade required for the integration of the new nuclear power plant blocks, including investments both in the 400 kV cable-system and the 120 kV auxiliary high voltage cable can cost as much as EUR 1,6 billion.

(e) Investments needed to comply with the actual grid regulation, both in the form of a pumped storage power plant and additional generation units providing the security reserves, required by law to be equal to the biggest national electricity generating unit, would cost EUR 1,2 billion.

([47]) See Candole Partners — NPP Paks II, Economic Feasibility Assessment, Feb. 2016, available at http://www.greenpeace.org/hungary/Global/hungary/kampanyok/atomenergia/paks2/NPP%20Paks%20II%20Candole.pdf.

([48]) See Felsmann Balázs, 'Működhet-e Paks II állami támogatások nélkül? Az erőműtársaság vállalatgazdasági közelítésben', available at https://energiaklub.hu/sites/default/files/paks2_allami_tamogatas_2015jun.pdf.

([49]) A description of the Leningradskaya NPP can be accessed at: http://atomproekt.com/en/activity/generation/vver/leningr_npp/, accessed on 24 February 2017.

(f) Losses from reduction of operation of one of the two neighbouring nuclear power plants for system balance reasons could imply a total financial loss of around EUR 1,2 billion.

(g) Various taxes and duties not included in the EPC contract may add up to an additional EUR 1,8 billion.

(126) The submission argues that the cost items listed in recital 125 should be added to the costs of the project, which in turn would dramatically reduce the project's IRR. It also points out that delays and shorter lifetime of the plant would further reduce the project's IRR.

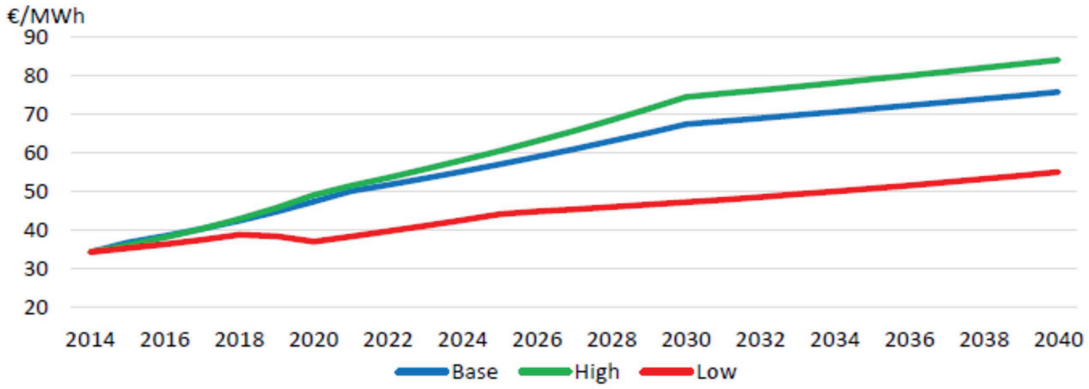
The Candole study

(127) The Candole study uses the assumptions and information included in the Economic Study and looks at the viability of the Paks II project. In particular, it argues that the price forecasts used by the Economic Study may be overly optimistic and that more realistic price forecasts would make the project loss-making even if the operational assumptions of the Economic Study are accepted.

(128) To illustrate this point, the Candole study develops its own long term electricity price forecast. In particular, it forecasts future long term electricity prices by using coal, oil and gas price forecasts from the 2015 edition of the International Energy Agency's World Energy Outlook (IEA WEO 2015) and calculates the marginal cost of production for various types of generators ([50]). Furthermore, it also constructs separate forecast for different future scenarios considered in the IEA WEO 2015 publication, i.e. (i) 'New Policy Scenario', corresponding to policies and implementing measures affecting energy markets that had been adopted until a few months before the IEA WEO 2015 publication went to press, together with relevant declared policy intentions, (ii) 'Current Policies Scenario', corresponding to policies enacted within a few months before the Candole Study's publication went to press, and (iii) 'Low Oil Price Scenario' that explores the implications of sustained lower prices (coming from lower oil prices) on the energy system ([51]). The following graph illustrates the derived long term electricity price forecasts for each of the three scenarios.

Figure 12

Long-run electricity price forecast curves (EUR/MWh)



Source: Candole Partners.

(129) The figure illustrates that the Current Policies Scenario implies slightly higher future prices for electricity, whereas the Low Oil Price Scenario implies substantially lower future electricity prices than the central New Policies Scenario, the one used in the submissions by Hungary.

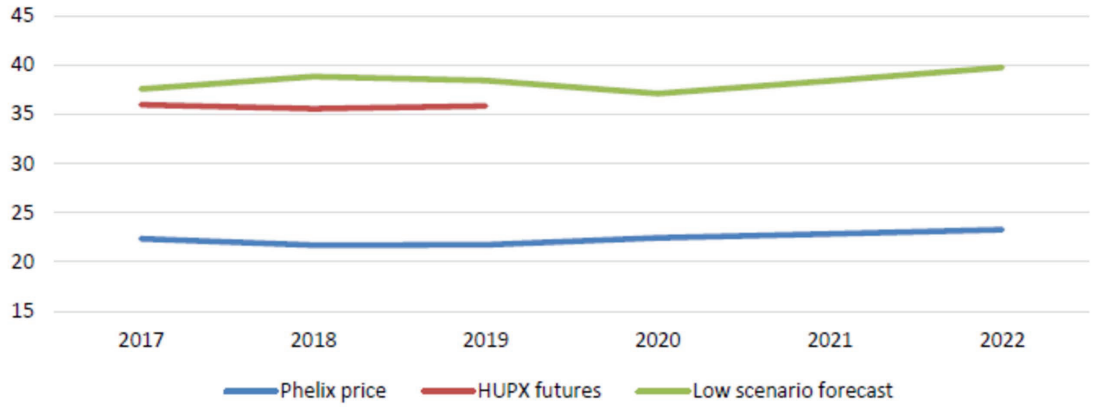
([50]) For the IEA WEO 2015, see http://www.worldenergyoutlook.org/weo2015/

([51]) The IEA WEO 2015 also considers a fourth scenario, the '450 Scenario' depicting a pathway to the 2 °C climate goal that can be achieved through the technologies that are close to becoming available at a commercial scale.

(130) In addition to the forecasts in Figure 12, the Candole study also compares IEA WEO 2015 Low Oil Price Scenario-based long-term electricity price forecast with the future contracts traded (as of February 2016) in the German and Hungarian electricity exchanges. Those curves are presented in Figure 13 below.

Figure 13

Long-run electricity price forecast curves (EUR/MWh)



Source: Candole Partners.

(131) The figure points out that up to 2022, when German-Austrian contracts can be traded, that German futures contract prices are below the IEA WEO 2015 Low Oil Price scenario price forecast. The same is true for the Hungarian exchange futures contracts that can be traded up until 2019 ([52]).

(132) Based on those considerations, the Candole study argues that under long-term electricity price forecasts as shown in the Economic Study, the Paks II project would be loss-making even if the operational assumptions of the Economic Study are accepted ([53]).

The EK submission

(133) The EK submission identifies potential shortcomings in the Commission's Opening Decision as well as problematic points in Hungary's Economic Study. It also highlights some risks that the project would face. Finally, it submitted the Felsmann study, as a quantitative analysis of the viability of the Paks II. The study calculates the net present value of the Paks II project by using the operating costs of the current Paks NPP and finds that in the majority of the considered scenarios the project would be loss-making.

(134) In relation to the Opening Decision, the EK submission points out that some cost items had been left out from the assessment presented in the Opening Decision or were not considered in their entirety. For example, it claims that it is not clear to what extent the amount in the EPC contract included the potential extra costs of nuclear safety, the costs of grid development required by the integration of the two new reactors of Paks II into the system or the construction of an appropriate cooling system. The submission also raises doubts whether the costs of preliminary studies, permits, communication have been accurately reflected.

([52]) The difference between German and Hungarian futures prices are argued to possibly come from the imperfect market coupling.
([53]) There is an additional section in the Candole study that makes a comparison between the costs of Paks II and the operating costs of EPR reactors estimated by the French Court of Auditors (2002) published in Boccard, N. 'The Costs of Nuclear Electricity: France after Fukushima', available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2353305.

(135) Furthermore, the submission argues that the cost figures of EUR 2,1-2,7/MWh for waste and decommissioning may be underestimated as this figure is EUR 4,5/MWh for the current Paks NPP. In addition, it also highlights the negative impact of the project for future central government budgets, which it claims would conflict with the statistical accounting system and the debt-increasing rule of the Union ([54]). Finally, the submission highlights the corruption risk, mostly associated with the size of the project and the information advantage of the supplier and owner ([55]).

(136) In relation to the Economic Study prepared by Hungary, the submission questions the high load factor (92 %) used in the calculations, especially during the operation in parallel of Paks NPP and Paks II, during periods of low demand as well as the validity of the price forecasts used in the study.

(137) In relation to various types of risks for the project, the EK submission highlights the potential impact of project delays and of cost overruns as well as the necessity of further state supports during the lifetime of the project.

(138) To support its concerns regarding the viability of the Paks II project, the EK submission makes reference to the Felsmann study. This study calculates the net present value of the Paks II project by using the operating costs of the current Paks NPP (that includes a major mid-term overhaul for the plant) and a number of alternative figures (i.e. 75 %, 85 % and 92 %) for the utilisation rate with some electricity price forecasts based on publicly available international sources (e.g. the US Energy Information Administration and the UK National Grid). The study finds that in a majority of the considered scenarios the project would be loss-making, implying the existence of State aid.

Government of Austria

(139) Austria contends that the construction and operation of nuclear power plants is unprofitable, given all the related costs which must be internalised under the 'polluter pays' principle. Austria considers that the MEIP principle is not complied with as regards Hungary's investment in Paks II. Austria argues that there is no evidence that the economic studies submitted by Hungary to the Commission have been carried out with due diligence or that the costs considered for the calculations contain all possible costs in compliance with the 'polluters' pays' principle.

(140) Austria also claims that the remaining conditions for the existence of State aid are met.

Other submissions on the existence of aid

(141) Paks II argued that the Opening Decision incorrectly used a single price forecast curve, especially considering the long time span of the project. It is also noted in some its observations that the Commission is incorrect to use the operation and maintenance costs (the 'O&M costs') of the current Paks NPP to justify O&M costs of the new Gen III+ units 5 and 6. Furthermore Paks II stresses that whilst their initial investment decision was made at the time of the signing of the EPC Contract and that such commitment was made only to the development stage of the expenditure as Paks II's final commitment to construction period expenditure occurs at a defined point in the future. Paks II states that up until this future point, the company may decide, where the economics of the project are varied due to external market changes, not to progress with the project, however this possibility is rather unlikely. Paks II also refers to the report prepared by Rothschild & Co for the Hungarian Government ('the Rothschild Study') ([56]) which concludes that the IRR range could reach 12 % which is significantly higher than the range of between 6,7-9 % referred to by the Commission in the Opening Decision. Finally, Paks II notes that the WACC and IRR ranges calculated by the Commission overlap and therefore the project can be expected to provide appropriate remuneration.

([54]) This is referenced by the Romhányi Balázs, 'A Paks II beruházási költségvetés-politikai következnényei', available at https://energiaklub.hu/sites/default/files/a_paks_ii_beruhazas_koltsegvetes-politikai_kovetkezmenyei.pdf

([55]) This is referenced by the study Fazekas, M. et al, The Corruption Risks of Nuclear Power Plants: What Can We Expect in Case of Paks2?, available at http://www.pakskontroll.hu/sites/default/files/documents/corruption_risks_paks2.pdf

([56]) http://www.kormany.hu/download/a/84/90000/2015%20Economic%20analysis%20of%20Paks%20II.pdf

(142) Enersense Group alleges that the WACC formula used by the Commission is not accurate insofar as the Commission used overly conservative factors in determining it. In its view, the appropriate cost of debt that should be applied to the WACC element of the MEIP assessment is 4,5 % pre-tax, or 3,6 % post tax with minor scheduled adjustments over time. It argues that as the Russian supplier provides approximately 80 % of the funding of the contract price, the return on investment should be based on a leverage of 80 % to reflect the source of funds of investment, in line with other nuclear power plants. Enersense Group states that when one assumes an 11 % cost of equity and a 3,6 % cost of debt post tax and apply an 80 % reduction on basis of leverage, the WACC should be 5,1 %. Furthermore it argues that this would rise to 6,2 % where a reduction on the basis of 65 % leverage was applied. As a conclusion it notes that the return on investment would be improved considerably by the choice of market based cost of debt and leverage factor.

(143) Further arguments were put forward by interested parties that the WACC is reduced significantly once the plant is connected to the grid whilst the enterprise value increases. Therefore parts of or the entire plant could be sold at a price comparable with other nuclear power facilities currently in operation. It is argued that the Commission's calculations in the Opening Decision do not reflect such investment flexibility.

(144) The Commission also received observations on the importance of fully assessing and including the opportunity costs of excluding nuclear technology in the national energy mix in the context of significant changes to the existing power generation capacity portfolio. According to those observations in addition to models on 'return on investment' or 'discount cash flow', it is important to consider that the Paks II project is a substantive investment in an existing sector which adds real value, not simply a 'portfolio investment' opportunity or by way of a short-term speculation. They argue that those features should also be reflected in the calculations of the Commission as to the project's viability.

(145) Several observations refer to the conclusion in the Rothschild Study that the project can be viable solely based on market terms, even where it is underpinned by very pessimistic assumptions. Some also argue that the key assumptions as regards future electricity prices are quite moderate and that those prices are expected to increase after 2025. On that basis Paks II would not receive an advantage.

(146) According to some observations the fact that the project is carried by way of an EPC agreement on a turnkey basis, that would make it attractive to any market economy investor and therefore Hungary would be investing also on market based terms.

4.2. *COMMENTS ON THE POSSIBLE COMPATIBILITY OF THE MEASURE WITH THE INTERNAL MARKET*

4.2.1. COMMENTS AS REGARDS THE OBJECTIVE OF COMMON INTEREST

(147) Austria, IG Windkraft, Oekostorm AG and other third parties contend that subsidising the construction and operation of new nuclear power plants is not provided for, under the principles laid down in Article 107(3) TFEU as being compatible with the internal market. Nuclear power would not be a new, innovative or sustainable technology for electricity generation which could contribute to achieving a goal of the Union of increasing the proportion of energy generation by renewable technologies. Therefore, the project should not be able to receive temporary support until it achieves market maturity.

(148) Austria claims that Article 2(c) and Article 40 of the Euratom Treaty do not allow for the promotion of new nuclear investments to be considered an objective of common interest due to the fact that no common interest within the meaning of Article 107(3) TFEU can be interpreted from the Euratom Treaty. In addition, such an objective would be in conflict with other objectives of the Union under TFEU, namely the precautionary principle under Article 191 and the sustainability principle under the Horizon 2020 programme ([57]).

(149) According to several submissions, the project would contribute to the Europe-wide objectives of deployment of nuclear installations as well as nuclear research which are also recognised by the Euratom Treaty.

(150) Many observations argue that the fact that nuclear energy would provide a clean, low-carbon source of energy should be recognised by the Commission as a common objective of the Union that justifies the investment.

([57]) https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020

(151) Some of the observations refer to Article 194(2) TFEU which permits Member States to determine their energy generation mix. The observations point out, that Hungary's envisaged energy generation mix forms part of its the National Energy Strategy and follows a nuclear-coal-green path. On this basis the investment could be justifiable.

(152) The Commission also received comments which point out that nuclear energy provides a very long term, safe and reliable source of energy in the Union energy generation mix. Those comments stated that electricity generated from nuclear sources, typically at high capacity levels (between 85-90 %) could contribute significantly to a long term security of supply. Other interested parties submitted that, due to the significant gap in future installed capacity expected to occur by 2030 with the phasing out of the existing units at Paks NPP and due to the reliance on electricity imports, the project could be an ideal option to ensure security of supply for Hungary and reduce fuel dependency.

(153) Arguments were submitted to the Commission that the completion of the project would contribute to growth in the region mainly by creating jobs. Additionally, some observations point out that there is a substantial opportunity for companies in the Union of all sizes to participate in the completion of the project thereby boosting the business supply chain. Those observations suggest that such envisaged growth is a common interest that could justify the completion of the project.

4.2.2. COMMENTS AS REGARDS THE APPROPRIATENESS OF THE MEASURE

(154) IG Windkraft and Energiaklub argue that the measure is inappropriate given the expense of the project when compared to the possible alternatives that would target the electricity gap in future installed capacity. A similar amount of subsidy could produce a much higher annual amount of electricity when invested in other sources of electricity, such as renewable technologies.

4.2.3. COMMENTS AS REGARDS THE NECESSITY OF THE MEASURE AND THE INCENTIVE EFFECT

(155) Austria claims that the Commission has incorrectly defined the relevant market in order to assess whether or not there may be an existence of a market failure, i.e. the nuclear power market in Hungary. Austria claims that the correct relevant market would be the liberalised internal electricity market of the Union. Austria further argues that there is no market failure in respect of electricity generation and supply on the internal market in electricity. On the contrary, electricity prices would be falling, due, in part, to sufficient generating capacities. Moreover, Hungary is well interconnected to the grids of neighbouring Member States.

(156) Austria and IG Windkraft argue that where Hungary was to face a security of supply issue, nuclear power plants may not be the appropriate means to address that issue. They argue that more environmentally friendly, flexible and cheaper energy sources in small, decentralised units may be more appropriate. Austria further argues that nuclear power plants are sensitive to heat waves due to cooling requirements and that Member States are almost 100 % dependent on imported uranium ore.

(157) Third parties have also argued that the market alone would deliver the construction of new generation capacities, in the electricity generation sector. The fact that Hungary is dependent on electricity imports would not constitute a market failure and, in particular, not one that a new nuclear power plant would address. The comments put forward show that imports of cheaper electricity from other Member States are a normal and acceptable effect of a functioning market and not a market failure. This simply indicates the ability to buy commodities at the lowest market price. According to the comments received, power prices are determined by many factors including commodity prices, supply and demand. In Europe, in particular, declines in the prices of electricity would be a reaction to chronic generation over capacities. Since this could be considered a reaction of an efficient functioning market, it could not be argued that the decrease in market energy prices as a result of imports would represent a market failure as a justification for the construction of new nuclear capacity.

(158) According to the comments received, even where there was a market failure in the electricity generation sector, Hungary should consider more options in a transparent and non-discriminatory manner.

(159) Other observations suggest that although the challenges for investment in nuclear power, including the large upfront capital investment and the need for public and political support are well known, recognising those difficulties is not equivalent to establishing that nuclear power development is associated with a market failure. The same observations highlight that whilst the Commission concluded that there was market failure in the case of Hinkley Point C, it should not be assumed that all nuclear investments could only be realised with subsidy regimes or that there are grounds to assume generic nuclear market failure.

4.2.4. COMMENTS AS REGARDS THE PROPORTIONALITY OF THE MEASURE

(160) Austria argued that since State aid must always be limited to the minimum amount required. In this instance, where the construction of the proposed project is being made without a call for tender, it could not be determined whether the total costs of the project would be limited to the minimum amount required.

(161) Energiaklub claims that the Hungarian authorities did not investigate the minimum level of financial support that would make the project deliverable. Instead the Hungarian authorities sought to finance the project in its entirety, possibility also including operational costs as well. Energiaklub also stresses that according to the calculations which Hungary has provided, State aid would not only be limited to the implementation of the investment but it would also be granted to the operation of the project which may overcompensate Paks II.

4.2.5. COMMENTS AS REGARDS THE EFFECT OF THE MEASURE ON THE INTERNAL MARKET

(162) Austria claims that State aid for a technology, which is not in itself profitable within the liberalised internal market for electricity, leads to excessive distortions of competition. In addition, it may prevent new, sustainable and more cost-effective market participants from entering the market or force those market participants out of the market. Austria argues that NPPs are deployed to cover high base load capacity and that is capacity is given priority when connected to a grid, since NPPs can only slightly vary their capacities. Whilst they have high construction and decommissioning costs, they have low operating costs which allows them to enter the merit order.

(163) The Austrian authorities and IG Windkraft argue that the construction of the new NPPs will create a significant market power for the operators of the power plants at the Paks site by increasing market concentration and, possibly, leading to an abuse of a dominant position under Article 102 of the TFEU.

(164) The MVM Group and Paks II argue that, following the 100 % sale of the shares of Paks II to the State by the MVM Group, the two companies became completely independent of one another. They highlight that the MVM Group has no control, directly or otherwise, over the management and operation of Paks II. They also stress that MVM Group and Paks II are two separate power generation companies, like any other competitors, and there is no reason to assume any coordination or activities or that the two companies would be combined. Moreover, the MVM Group argues that its own strategy includes possible investments that may compete with Paks II into the future.

(165) Paks II argues that the project is intended to be replacement capacity for the current four units of Paks NPP. Those current units are expected to be phased out by the mid 2030's, whilst the new units 5 and 6 (the Paks II project) would not be operational until the mid-2020's. Paks II argues that therefore the evaluation of market shares and claims of dominance are unfounded and cannot be considered at this time.

(166) Several interested parties stressed that that the energy market to be examined would be larger than the individual State's territory where there are a number of international competitors, given the large scale of Hungary's electricity imports and the country's very good interconnection level with neighbouring countries.

(167) Some parties explicitly argue that the project could have a potential downward impact on regional electricity markets, such as Germany where the annual base load price would be expected to fall by up to 0,6 % by 2025, by up to 1,1 % by 2030 and by up to 1,2 % by 2040. On the other hand, some parties also argue that renewable installations in Germany would earn lower revenues due to the new reactors of Paks II and that the burden for taxpayers to finance German renewable aid schemes would increase whilst suppliers of 'grey electricity' could face a saving of up to 1,02 % by the year 2030.

4.3. *ADDITIONAL COMMENTS RAISED BY INTERESTED PARTIES*

(168) Several observations highlight that the details of the project were not entirely shared with the public in Hungary. They also argue that the decision on Paks II is technically unjustified, as there were no preparatory investigations made about how an investment in energy efficiency measures and renewable energies on the same scale would help security of supply. Those observers therefore make the point that given the lack of wide public and professional involvement, the project should not go ahead.

(169) Certain submissions point to the potential danger of nuclear power plants. Some observations express concerns regarding Hungary's and Paks II's ability to deal with nuclear safety incidents, including the safe disposal of nuclear waste.

(170) Some observations stressed the absence of a tender process in the appointment of the constructor of the new generating units, which they believed, would conflict with the provisions of Union law. In addition, MEP Jávor alleges that the presumed violation of Union public procurement rules is inherent and intrinsically linked to the measure as, he believes Russia would not have granted a loan to Hungary for the Paks II project without securing the investment for Rosatom which would avoid Union public procurement rules. He concludes that the assessment of whether the use of the Russian loan constitutes an unlawful State aid could not be separated from the avoidance of public procurement rules, they are intrinsically linked and their effect should to be assessed together.

(171) Several comments were made objecting to the fact that the project is being carried out by way of a Russian loan. They argue that it would promote fuel and financial dependence whilst contravening the EU's Energy Security Strategy by curtailing Union market players from the development of a Union-wide energy network and infrastructure.

(172) Some interested parties allege that where Hungary decided that it needed new electricity capacities for the future, it should have complied with Article 8 of the Directive 2009/72/EC of the European Parliament and of the Council ([58]). In this instance there was no tendering procedure or any equivalent procedure in terms of transparency and non-discrimination providing for any new capacity. Thus, in their view, the Paks II investment could violate Union law.

(173) Some parties argue that State aid is not appropriate to be used in cases where it would relieve the polluter of the burden of paying for the cost of its pollution within the spirit of the Community Guidelines on State aid for environmental protection ([59]).

4.4. *RESPONSE OF HUNGARY TO THE COMMENTS RAISED BY INTERESTED PARTIES*

(174) Hungary submitted its response to third party comments on the State aid Opening Decision ('Response to third party comments') on 8 April 2016.

(175) In particular, Hungary strongly disagrees with the comments received from the Government of Austria, Greenpeace Energy, Energiaklub and MEP Benedek Jávor, where the various third parties alleged that costs relating to safety and environmental regulations, debt financing, insurance, safety, waste disposal, decommissioning, transmissions connections and retrofit investments had not been included in Hungary's analysis, saying that those parties were misinformed and that their claims unfounded.

(176) The response includes a detailed rebuttal of the comments submitted by MEP Benedek Jávor. In particular, Hungary points out that:

— the costs of all the necessary safety investments are included in the EPC contract;

— the choice of the direct cooling system is supported by the Environmental Impact Assessment of the project;

([58]) Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC (OJ L 211, 14.8.2009, p. 55).

([59]) Community Guidelines on State aid for environmental protection (OJ C 82, 1.4.2008, p. 1).

— the cost figures related to waste management and decommissioning were computed by the Agency of Radioactive Waste Management on the basis of Act CXVI of 1996 on Atomic Energy;

— the costs related to the grid connection for Paks II are included in the financial analysis of the project;

— there will be no reduction in the operation of either of Paks NPP and Paks II during low demand hours as Paks II should be replacing older and existing generation capacities that would be phased out;

— being a Generation III+ modern technology, it is safe to assume a relatively high (90+%) utilisation rate during the lifetime of Paks II;

— the 60 years operational period is widely accepted internationally as it is a standard assumption even for the more inferior Generation III plants;

— the project is VAT-neutral and as a large part of services will be provided by EU-localised suppliers, the presumption/calculation of custom duties is inaccurate.

(177) Hungary argues that they conducted extensive sensitivity analysis to consider the impact of assumptions and variables such as plant lifetime, O&M costs, waste management and decommissioning costs, load factors, macroeconomic factors such as foreign exchange and inflation, different market price scenarios, delays, etc. on the business case and this sensitivity analysis would fully support its conclusion that the measure would not amount to State aid.

(178) As regards the observations received on the possible compatibility of the measure, Hungary reiterates several arguments put forward in relation to the free choice and diversification of the generation mix, the need for replacement capacity, decarbonisation, job creation, affordability and claimed multiplier effects.

(179) Hungary states that the argument of the Government of Austria that the Euratom Treaty objective regarding the 'development of nuclear energy in the Community' is 'already achieved and cannot be used in support of a common interest within the meaning of Article 107(3) TFEU due to the developed technically and numerous nuclear power plants that have been built in Europe' is flawed. The argument, in Hungary's view, confuses the objective of developing nuclear generation with the concept of technology which cannot be claimed to have been a static. Hungary argues that the Euratom Treaty continues to form part of the constitutional arrangement of the Union and that this has not been repealed. Finally, Hungary stresses that Austria and Greenpeace did not bring forward any case-law to suggest that the objectives of common interest matters are necessarily finite or limited in duration.

(180) As regards the diversification of the energy generation mix, Hungary refutes Austria's and the Austrian Wind Energy Association's allegations about a Union-wide uranium dependency and stresses that there is wide diversity and availability of uranium from significant unmined sources. It also argues that the mere fact that a resource is finite would not mean that its use is unsustainable and replies upon commentaries made by energy economist Loreta Stankeviciute on behalf of the International Atomic Energy Agency (IAEA) ([60]) according to which 'nuclear energy compares favourably across many sustainability indicators'.

(181) Hungary highlights that some of the arguments put forward in relation to the need for decarbonisation through the use of nuclear sources of energy are valid as renewable technologies have high costs and they are intermittent in the type of energy generation. It also argues that fixed renewable subsidised tariffs are inconsistent with allowing free market conditions and quotes Greenpeace who argued that fixed power purchase price agreements would be less advantageous in scenarios of lower market prices, though this is not how Paks II would sell its electricity.

(182) Hungary recites several sources which claim that the measure will not unduly distort competition and highlights that the Commission did not have doubts as regards the compatibility of the measure with the internal market (as Greenpeace suggested) but rather on the question of the existence of aid.

([60]) https://www.oecd-nea.org/ndd/climate-change/cop21/presentations/stankeviciute.pdf

(183) In the same scope (possible distortions of competition), Hungary refutes the arguments put forward by Greenpeace that it would put in place a fixed tariff (similar to that of Hinkley point (C) in order to support the operation of Paks II in the long term.

(184) Hungary contests the observations which claimed that the project would crowd out renewables investments in Hungary and neighbouring countries. It argues that the national energy strategy includes renewables alongside nuclear and that the future gap in installed capacity cannot be fulfilled with nuclear energy alone. Therefore the additional nuclear capacities would not prevent the development of renewable energy. Hungary notes that the market analysis included as part of Greenpeace's submission by Energy Brainpool assumes renewable deployment along with Hungary's national renewable target.

(185) Hungary reiterates the views submitted by the MVM Group that no merger is envisaged between the MVM Group and Paks II and thus there will be no concentration of the market. It also reiterates the MVM Group's statement that MVM Group's business strategy includes possible investments that may be competing with Paks II in the future.

(186) Hungary also reiterates the submissions that the market to be examined should be more widely interpreted than the state of Hungary because of the high level of interconnection. In that context the measure's effect would be negligible. Hungary also challenges the methodology of the analysis conducted by Energy Brainpool on behalf of Greenpeace regarding the potential impact of the project on regional electricity markets, such as in Germany. It argues that the approach used involves an assessment of the impact of the project in an exclusively domestic context without taking into account of the role played by imports of energy into Hungary and extrapolating that to Germany on the implicit assumption that the impact on the German electricity market would be the same as on Hungary's. Hungary also states that the analysis has flaws insofar as it assumes the existing level of interconnection capacity, while ignoring further interconnections which form part of the objectives of the Union.

(187) As regards the observations pointing out safety issues, Hungary argues that there is significant knowledge and expertise in the country on the basis of the existing four nuclear units. It also notes that the Hungarian Atomic Energy Authority (who issues licenses for nuclear facilities) is already very familiar with the VVER technology and has developed a 2-year internal training programme on this technology. The programme involves members of the regulatory body who hold significant relevant academic and practical experience, training and developing new staff members with the tasks and duties they will undertake as part of the regulator.

(188) In addition, Hungary emphasises that both the environmental authority and the regulator are independent of one another, which ensures a sound and objective safety framework. Hungary also notes that the relevant technical requirements of the project regarding nuclear safety were developed by combining Hungarian law, European utility requirements, IAEA and Western European Nuclear Regulators Association safety recommendations, as well as lessons learnt from the Fukushima accident.

(189) As a response to the observations commenting on the apparent lack of transparency during the preparations of the project, Hungary explained that it achieved transparency as a result of the Parliamentary decision making process. The parliamentary process ensured access of all relevant information to all interested parties and authorities including the Commission. As part of the process all independent expert reports were published including the economic analyses of the project, and all environmental impact assessment materials were made available in multiple languages.

(190) Hungary also refers to public consultations held between 17 March and 4 May 2015 by the government commissioner responsible for the project addressing the potential environmental effects of the construction and operation of Paks II. Hungary also notified all its neighbouring (EU and non-EU) third countries about the project and held nine public consultations in a number of countries on the project.

(191) In relation to the observations which allege that the completion of the project breaches Directive 2014/24/EU of the European Parliament and of the Council ([61]) and Directive 2014/25/EU of the European Parliament and of the Council ([62]), the Hungarian authorities explain that the IGA and the implementation agreements fall outside the scope of TFEU and Directives 2014/24/EU and 2014/25/EU. In addition, they state that even where TFEU would apply, the IGA and the Implementation Agreements would fall within the specific exemption in respect of international agreements as set out in Article 22 of the Directive 2014/25/EU or the technical exemption set out in Article 50(c) of that Directive and therefore should be exempt from the application of Union public procurement rules. Hungary explains that the IGA sets out clear procedures for the award of the Implementation Agreements, including specific requirements for the appointment of companies and the award of sub-contracts.

(192) Hungary also refutes the observations which allege that it is in breach of Article 8 of Directive 2009/72/EC. Hungary argues that that Directive does not apply to the project because it falls within the exclusive remit of the Euratom Treaty, which takes precedence over the rules in the TFEU and any secondary legislation deriving therefrom. The Hungarian authorities also highlight that in their view, as the project would be State aid-free, the capacity tendering provisions of Directive 2009/72/EC would not apply.

(193) Hungary finally refers to the case law of the Court of Justice of the European Union ([63]) which states that the existence or absence of a breach of Union law cannot be taken into account in the context of a State aid investigation. In view of this, Hungary believes that any possible breach of the Electricity Directive should be examined outside the scope of the formal State aid investigation. Hungary also refers to the Commission's State aid decision in Hinkley Point C stating that, instead of specified tenders, equivalent procedures in terms of transparency and non-discrimination can be used within the meaning of Article 8 of Directive 2009/72/EC. Hungary submits that the award of sub-contracts would be conducted in accordance with the principles of non-discrimination and transparency.

4.5. *ADDITIONAL COMMENTS RAISED BY HUNGARY IN ITS RESPONSE TO THE OBSERVATIONS FILED WITH THE COMMISSION*

(194) Hungary argues in its response to the observations filed with the Commission that the Commission's own Communication on a Nuclear Illustrative Programme (PINC) ([64]) indicates that billions of euro (estimated between EUR 650 billion and EUR 760 billion) would need to be invested in nuclear power between 2015 and 2050 in order to secure a safe future of energy supply on a Union-wide basis.

5. **ASSESSMENT OF THE MEASURE**

5.1. *EXISTENCE OF AID*

(195) A measure constitutes State aid within the meaning of Article 107(1) TFEU, if it fulfils four cumulative conditions. Firstly, the measure must be funded by the State or through State resources. Secondly, the measure must confer an advantage to a beneficiary. Thirdly, the measure must favour certain undertakings or economic activities (i.e. there must be a degree of selectivity). And fourthly, the measure must have the potential to affect trade between Member States and to distort competition in the internal market.

(196) In Section 3.1 of the Opening Decision, the Commission made preliminarily findings that the measure may give an economic advantage to Paks II, that it would entail State aid as it was granted from State resources imputable to the Hungarian State, that the measure would be selective and that it may have the potential to affect the trade between Member States and to distort competition in the internal market. The Commission has not encountered any reasons to change its assessment in those respects during the formal investigation.

([61]) Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC (OJ L 94, 28.3.2014, p. 65).

([62]) Directive 2014/25/EU of the European Parliament and of the Council of 26 February 2014 on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/17/EC (OJ L 94, 28.3.2014, p. 243).

([63]) T-289/03 BUPA, paragraph 313.

([64]) http://ec.europa.eu/transparency/regdoc/rep/1/2016/EN/1-2016-177-EN-F1-1.PDF

5.1.1. ECONOMIC ADVANTAGE

(197) The Commission assessed whether the measure would entail an economic advantage to Paks II due to the fact that it would own and operate the two new nuclear power units fully financed by the Hungarian State. The Commission further assessed whether the existence of an economic advantage to Paks II could be excluded in the event that the Hungarian State's investment would be a market-based investment driven by a profit-making rationale.

(198) In its assessment, the Commission agrees with Hungary in what concerns the use of the MEIP test to determine whether a certain investment would be market-based. This test considers whether a market investor would have invested in the project on the same terms and conditions as the public investor at the time when the decision to make the investment was taken (see also recitals 53 and 54).

(199) This test acknowledges the existence of an economic advantage and hence the existence of State aid, when the expected IRR of the investment is lower than a market-based benchmark WACC for the same project as a rational private investor would not invest under such conditions.

(200) The MEIP analysis requires that the evidence used in estimating the IRR and the WACC is contemporaneous with the investment decision to reproduce the information held by investors at that time. The Commission established a timeline of the decision making process as regards the Paks II project in order to determine which information was and would be available to investors at the moment of taking the decision to proceed with the project ([65]).

(201) As of the date of this decision, Paks II has still not irrevocably commissioned the construction works of the two new reactors ([66]) […]. Therefore, the Commission considers that the data available as of February 2017 (hereinafter referred to as '2017 data'), would be the most relevant for the MEIP assessment and would be taken as a base case scenario.

(202) However, negotiations regarding Paks II started more than 2 years earlier. To provide a robustness check for the results of the MEIP test, the Commission has also made a separate assessment as of the date of the initial investment decision, i.e. the time when the EPC contract was signed on 9 December 2014 (hereinafter referred to as '2014 data'). The Commission illustrates that the outcome of the same analysis but for an earlier time, i.e. the date of the initial investment, is consistent with the outcome obtained using 2017 data.

(203) In order to assess whether the MEIP test is fulfilled, the Commission estimated the theoretical WACC for an investment with a similar risk profile to that of Paks II. The Commission then compared this estimated market WACC with the WACC of the project, first in the base case scenario using the 2017 data and then, for a robustness check, using the 2014 data, which is relevant for the initial investment decision.

5.1.1.1. ***Commission's assessment of the WACC***

(204) The Commission follows the two methodologies used by Hungary to estimate the WACC, i.e. the standard bottom-up approach that builds up a theoretical WACC by estimating all its components and the benchmarking analysis that draws upon references that may be relevant and comparable with Paks II. Notwithstanding the fact that identical methodologies were used, the Commission's outcome diverges from Hungary' conclusions due to the fact that the Commission questioned certain parameter values and references used by Hungary and rebutted their validity. Other parameters and references are accepted and taken at face value as proposed by Hungary. In its assessment the Commission will provide supporting evidence for any value that differs from the proposal of Hungary.

(205) Both methodologies employed in the Commission's assessment use the 2017 data as a base case and the 2014 data for a robustness check.

(206) Given the relatively high uncertainties inherent in financial estimations the Commission provides a range for the theoretical market benchmark WACC that should be used in the MEIP test.

([65]) Hungary did not establish a timeline in its submissions and used available figures from various points in time sometimes in an inconsistent manner. While the focus of the Hungarian submissions was an investment decision of December 2014, the Second clarifying letter submitted by Hungary also used equity risk premium figures from July 2015.

([66]) The EPC Contract provides that the development of the new reactors is split into two phases with the first one consisting solely of […] and the second one of […].

(207) In implementing both methodologies, the Commission took at face value the target through life average gearing of between 40-50 % proposed by Hungary in the MEIP Study and the Economic Study as being in line with reliable benchmarks. For the purpose of this decision, the reference to gearing is the ratio between debt and total capital of the project. Furthermore, the Commission also accepted the Hungarian corporate tax rate of 19 %.

(208) Before providing its own assessment, the Commission noted the following weaknesses regarding the final WACC benchmark put forward by Hungary:

(a) The ranges stemming from the two methodologies proposed by Hungary are not totally consistent. The interval [5,9-8,4 %] obtained in the benchmarking exercise in the Economic Study is wider than the one [6,2-7,0 %] derived in the bottom-up approach in the same study, including much higher values. Hungary does not show why the most accurate subset for the WACC should be limited to [6,2-7,0 %] which overlaps just with the lower part of the benchmarking interval.

(b) Moreover, the values of the various variables in Hungary's benchmarking analysis included in the MEIP study and the Economic Study are not consistent with the corresponding bottom-up approach variable values included in the same studies ([67]).

(c) Regarding the bottom-up approach, the Commission mainly rebuts three of the parameters used by Hungary, namely the equity risk premium, the risk free rate and the debt premium. Firstly, there is no justification as to why the last 10 years' historical equity market performance (used both in the MEIP Study and the Economic Study) is the appropriate benchmark for the Hungarian equity risk premium. The arguments for not using historical risk premium relate to the market behaviour after the 2008-crisis that was found to be at odds with pre-crisis periods ([68]). Secondly, the risk free rate submitted by Hungary in the Second clarifying letter (prior to the Opening Decision) is benchmarked with the 15-year HUF-denominated Hungarian government bond yield of 3,8 %, which was valid in November-December 2014. However, the Commission considers that, due to the large variation in the yield of the Hungarian government bond, it is more reasonable to calculate an average yield based on the monthly yield data available during the period of a whole calendar year preceding the investment decision. Thirdly, Hungary uses the OECD EUR-based Commercial Interest Reference Rate (CIRR) for a project of 18 years maturity as proxy for the debt premium of Paks II. However, as Hungary points out in the MEIP Study the OECD CIRR rate is computed based on rules under which export credits and trade-related aid can be used to finance nuclear projects. Potential State aid aspect of export credits may distort the market benchmark debt premium.

(d) Finally, the robustness of estimates is not discussed by Hungary in detail. The extra risk for nuclear power plants is neither factored explicitly into the estimates nor used in its sensitivity analysis. This is important because nuclear generation may entail different types of potentially larger risks as compared to other types of power generation technologies ([69]) ([70]).

([67]) For example, the equity risk premium is estimated to be 9,0 % in the benchmarking analyses included by Hungary in the cited studies as opposed to the 4,0 % for the estimated equity risk premium in the bottom-up methodology included in the same studies.

([68]) See Damodaran, A. 'Equity risk premium (ERP): Determinants, estimation and implications — The 2016 Edition' (2016), section Estimation Approaches — Historical Premiums, pp. 29-34, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2742186 Furthermore, the case of the Hungarian Stock Exchange's historical index, with a close value of 24 561,80 on 2 May 2006 and a close value of 26 869,01 on 2 May 2016 (data downloaded from https://www.bet.hu/oldalak/piac_most), seems to support these doubts.

([69]) According to the Moody's (2009) study, to the announcement of a nuclear power plant construction project by American generation companies implies an average downgrade of 4 notches. In turn, Damodaran in his databases estimates that a credit rating difference of 4 notches, e.g. A3 and Ba1, translates into a total equity risk premium of 2,0 % (Damodaran database, July 2016 version values).

([70]) The size of such risk is reduced for Paks II as it only has limited exposure to construction risk.

First methodology — bottom-up approach

(209) The bottom-up methodology uses the standard formulae (also used by Hungary) of the WACC and estimates its parameters:

$$WACC = \frac{D}{D+E}(1-t)R_d + \frac{E}{D+E}R_e$$

where D and E denote debt and equity values, R_d and R_e denote the costs of debt and equity respectively and t is the corporate tax rate, having a value of 19 % for Hungary. This formula is based on expected values of its parameters. R_d and R_e are costs of debt and equity capital at the time of the investment decisions and not historical costs.

(210) In turn, the cost of debt will be determined by the following formula (also used by Hungary):

$$R_d = R_f + (R_d - R_f)$$

where R_f denotes the risk-free rate in the market and (R_d — R_f) denotes the bond premium in the market.

(211) In turn, the cost of equity will be determined by the standard CAPM formula (also used by Hungary) ([71]):

$$R_e = R_f + \beta \times \left(E(R_m) - R_f\right)$$

where R_f denotes the risk-free rate in the market, denotes the equity market risk premium and β (beta) is a measure of the idiosyncratic, non-diversifiable risk of the project.

(212) The Commission endorses the following values for the parameters used to compute the WACC:

— To proxy the risk free rate the Commission uses the interest rate of the HUF-denominated 15-year Hungarian Government bond as this was the longest duration bond issued by the Hungarian Government. The volatility of the monthly interest rate was very high in the period when the initial investment decision of Paks II decision was taken. Therefore, choosing a value corresponding to a month only may deliver a result that is not robust. It would not reflect the reality and the complexity of a decision of such a large scale, where a holistic set of information is sought by investors. For this reason, the Commission uses an average value over the 12 calendar months preceding the focus point in time, as opposed to Hungary choosing the interest rate for the month immediately preceding the investment decision ([72]).

— For the reasons explained in recital 208(c) regarding the inappropriateness of historical market (equity) risk premiums as used by Hungary, the Commission calculated equity risk premium as the arithmetical average of equity risk premia from two sources that are widely recognised in the finance and business world.

  — The main data source is the global equity risk premium database developed by Professor Aswath Damodaran of New York University ('Damodaran risk premium database') ([73]),

([71]) CAPM stands for the Capital Asset Pricing Model, the standard Financial Model to estimate the expected return of an asset, see http://www.investopedia.com/terms/c/capm.asp.

([72]) The Commission looked at Government bond rates denominated in EUR and USD too, however, these Government bonds had a shorter duration and the last issuance date were May 2011 for the EUR-denominated bonds and March 2014 for the USD-denominated bonds. In times with so much variation in the rate of Government bonds the Commission decided not to include these bonds in the analysis. Furthermore, their inclusion would have increased the estimated value of the WACC, making their exclusion from the analysis a conservative choice.

([73]) For figures relevant for December 2014, see labels Risk Premiums for Other Markets > 1/14 on webpage http://people.stern.nyu.edu/adamodar/New_Home_Page/dataarchived.html. For figures relevant for February 2017, see labels Risk Premiums for Other Markets > Download on webpage http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datacurrent.html. The databases by Damodaran are widely used and cited in the finance practice.

— A second database is a market risk premium database by Professor Fernandez of the IESE Business School of the University of Navarra ([74]).

The findings are summarised in Table 6 below.

Table 6

Equity risk premium — Hungary

	December 2014	February 2017
Equity risk premium Damodaran	8,84	8,05
Equity risk premium Fernandez	8,30	8,10
Average equity risk premium	8,57	8,08

— For the estimate of beta, the Commission took at face value the proposal of Hungary in the MEIP submission, namely 0,92 ([75]).

— The pre-tax cost of debt would be the Hungarian risk free rate (the average value over the 12 calendar months preceding the focus point in time) plus a commercial debt risk premium on top of government bonds of 2,26 %, which is a measure for the country's debt risk premium ([76]).

— The gearing of the project was assumed to take on two values, 50 % and 40 %, as proposed by Hungary, both in the MEIP Study and the Economic Study.

(213) The WACC-input figures identified in recital 212 and the derived WACC-ranges are collected in Table 7. A separate column is used for each time period relevant for the assessment.

Table 7

Bottom-up WACC computation

INPUTS	December 2014	February 2017
Risk free rate Hungary	5,30 %	3,45 %
Equity risk premium Hungary	8,57 %	8,08 %

([74]) For 2014, see Fernandez, P., Linares P. and Acin, I. F., 'Market Risk Premium used in 88 countries in 2014: a survey with 8,228 answers, June 20, 2014, available at http://www.valuewalk.com/wp-content/uploads/2015/07/SSRN-id2450452.pdf. For 2016, see Fernandez, P., Ortiz, A. and Acin, I. F. 'Market Risk Premium used in 71 countries in 2016: a survey with 6,932 answers', May 9, 2016, available at https://papers.ssrn.com/sol3/papers2.cfm?abstract_id=2776636&download=yes.

([75]) The other beta values put forward by Hungary in the MEIP study and the subsequent Second clarifying letter and the beta values corresponding to Utilities, Renewables and Power sectors respectively in the Damodaran database, are all higher than 1. Therefore, using a beta value of 0,92 is a conservative choice as it leads to a lower WACC-value than the other, higher values of beta.

([76]) See http://www.mnb.hu/statisztika/statisztikai-adatok-informaciok/adatok-idosorok, sequence 'XI. Deviza, penz es tokepiac' > 'Allampapir piaci referenciahozamok' for the former and https://www.quandl.com/data/WORLDBANK/HUN_FR_INR_RISK-Hungary-Risk-premium-on-lending-lending-rate-minus-treasury-bill-rate for the latter. In relation to the latter value, some caution is recommended due to the small size of the Hungarian corporate bond market. The data refers to 31 December 2014. There is no data available for more recent periods.

INPUTS	December 2014	February 2017
Beta	0,92	0,92
Return on equity	13,19 %	10,88 %
Commercial debt risk premium on top of Hungarian Govt bond returns	2,26 %	2,26 %
Before tax return on debt	7,56 %	5,71 %
Corporate tax rate	19 %	19 %
After tax return on debt	6,12 %	4,63 %
Gearing (D/(D + E)) — Scenario I	50 %	50 %
Gearing (D/(D + E)) — Scenario II	40 %	40 %
WACC with gearing I	9,66 %	7,75 %
WACC with gearing II	10,36 %	8,38 %
WACC range	9,66-10,36 %	7,75-8,38 %

(214) The WACC-elements presented in Table 7 imply a WACC range of [9,66-10,36 %] for December 2014 and [7,75-8,38 %] for February 2017 ([77]). It must be noted, however, that the only sector specific input in those calculations is the industry beta (0,92). As a result, it is unlikely to include the full premium associated to the larger risk involved in nuclear projects (see footnote 68) and should therefore be viewed as a lower bound for the actual risk.

Second methodology — benchmarking

(215) The Commission agrees with Hungary that an alternative approach to find a relevant range for the market WACC would be to benchmark it against references that are comparable to Paks II project. However, for the reasons stated in recital (a) the Commission did not find the references and the ranges presented by the Hungarian authorities sufficiently robust. Therefore, the Commission has developed its own benchmarking analysis, which derives a sector and country specific benchmark WACC based on the Damodaran database ([78]) ([79]), using both the 2017 and the 2014 data.

([77]) These figures are higher than the ones derived by Hungary mostly because of the higher risk free rate and the higher equity risk premium used by the Commission (Hungary's choices are criticised in recital 208).

([78]) For country specific WACC figures relevant for December 2014 see 'Data' >'Archived data' > 'Cost of capital by industry' > 'Europe' > '1/14' on http://pages.stern.nyu.edu/~adamodar/. For country-specific WACC figures relevant for February 2017, see labels 'Data' > 'Current data' > 'Cost of capital by industry' > 'Europe' on http://pages.stern.nyu.edu/~adamodar/. For risk premium figures, see footnote 72. It must be also noted that this database is part of a global database and it includes European countries (labelled as Western Europe). However, countries are further grouped and Hungary is part of a subgroup called 'Developed Europe' — see worksheet 'Europe' or 'Industries sorted global' in Excel file http://www.stern.nyu.edu/~adamodar/pc/datasets/indname.xls

([79]) Hungary also developed a brief benchmarking analysis based on the Damodaran data in the Second clarifying letter (in its Appendix 2). However, that piece of analysis is not relevant as it is based on posterior information to substantiate an investment decision taken in 2014.

(216) In particular, this approach follows the following three steps (figures for all three steps are computed separately both for December 2014 and February 2017):

(a) The first step uses Damodaran's industry-level WACC database for Western Europe to identify the costs of debt and equity for industries that could be argued to be good proxies for the nuclear power generation industry ([80]).

The proxies used for the nuclear power generation industry include the sectors 'Green and Renewables', 'Power' and 'Utilities (General)' for the 2017 database and the sectors 'Power' and 'Utilities (General)' for the 2014 database ([81]). Any cost of debt and equity figures calculated based on those sectors can be considered as a conservative estimates for the nuclear power plant Paks for two reasons. Firstly, there is no distinction in the Damodaran database between regulated and non-regulated segments in those sectors. Paks II is in the non-regulated segment which implies higher risk, and therefore, higher costs of debt and equity values than regulated firms within the same sector. Secondly, due to their large size and scale, nuclear power plants are riskier than the average power generation or utility company ([82]).

Table 8 sets out the pre-tax debt and equity costs taken directly from the Damodaran WACC database for Western Europe, as well as the sector level beta-values ([83]). The table also includes the cross-industry average figure for these industries ([84]).

Table 8

Industry level costs of debt (pre-tax) and equity for western Europe

Year	Cost	Green & Renewables	Power	Utilities (General)	Generation and utilities (average)
2014	Debt	—	5,90 %	5,40 %	5,65 %
	Equity	—	9,92 %	9,84 %	9,88 %
	β	—	1,09	1,08	
2017	Debt	4,41 %	3,96 %	3,96 %	4,11 %
	Equity	9,31 %	9,82 %	9,82 %	9,65 %
	β	1,01	1,08	1,08	

([80]) The figures in these tables are adjusted by applying the Hungarian corporate tax rate of 19 % to debt.
([81]) Data on the sector 'Green and Renewables' was not available for the 2014 database. In 2016 this sector had a higher WACC than the average of the other two sectors included, indicating that its inclusion would have increased the value of the 2014 WACC estimate if it was available.
([82]) See footnote 68.
([83]) The figures in this table use beta values taken from the Damodaran industry level WACC database.
([84]) A simple average, rather than a weighted average using the number of firms included in each segment, is taken in this case as the focus is on proxy segments rather than proxy firms. Taking a weighted average would not make a difference for 2016 whereas it would lead to slightly higher values for 2014, implying in turn higher WACC values. Therefore, the choice of simple rather than weighted average is a conservative one in the present context.

(b) The second step uses Damodaran's risk premium database to calculate the average debt and equity risk premia that Hungary requires over the other western European countries belonging to the subgroup 'Developed Europe' (see footnote 77) as set out in Table 9 which has companies operating in sectors considered in Table 8 and that are included in the industry-level WACC database ([85]). This will be added to the debt and equity cost figures presented in the first step (a).

Table 9

Risk premia for Hungary

(%)

Year	Risk premium	Developed Europe	Hungary	Difference
2014	Country risk premium (bonds)	0,99	2,56	1,57
	Country risk premium (equity)	1,48	3,84	2,36
2017	Country risk premium (bonds)	1,06	1,92	0,86
	Country risk premium (equity)	1,30	2,36	1,06

(c) In the third step, the respective difference in country risk premia for Hungary identified in the second step (b) are added to the cost of debt and equity obtained in the first step (a), resulting in cost of debt and equity figures for Hungary ([86]). Subsequently the WACC is derived for the two levels of gearing proposed by the Hungarian authorities. Table 10 summarises the results.

Table 10

Cost of debt, equity and WACC (*) for Hungary

(%)

Year	Cost	D/ (D + E)	Green & Renewables	Power	Utilities (General)	Generation and utilities (average)
2014	Debt pre-tax			7,47	6,97	7,22
	Debt post-tax			6,05	5,65	5,85
	Equity			12,50	12,40	12,45
	WACC	50		9,28	9,02	9,15
	WACC	40		9,92	9,70	9,81

([85]) A key element of the estimation is that Damodaran defines the equity risk premium for a country as the sum of a mature market premium and an additional country risk premium, based upon the country's default spread and scaled up (by 1,5 in 2014 and 1,39 in 2016) to reflect the higher risk of the equity in the market. For more details, see the 'Explanation and FAQ' worksheet of Damodaran's country-specific equity risk premia database, available at http://www.stern.nyu.edu/~adamodar/pc/datasets/ctryprem.xls

([86]) Note that the Hungary-specific extra equity risk premium calculated in point (ii), will need to be multiplied by the beta values presented in Table 8: in order to be incorporated in the cost of equity derived in point (iii).

(%)

Year	Cost	D/ (D + E)	Green & Renewables	Power	Utilities (General)	Generation and utilities (average)
2017	Debt pre-tax		5,27	4,82	4,82	4,97
	Debt post-tax		4,27	3,91	3,91	4,03
	Equity		10,38	10,97	10,97	10,77
	WACC	50	7,32	7,44	7,44	7,40
	WACC	40	7,93	8,15	8,14	8,07

(*) The WACC formula uses post-tax cost of debt.

(217) This methodology suggests a project WACC for Paks II in the range of between 9,15-9,81 % for the initial investment decision date in December 2014 and a range of between 7,40-8,07 % for February 2017. This range is based on the gearing values of between 40-50 % as set out in the MEIP Study. It also must be noted that the lower boundary of 9,15 % for the WACC for 2014 would probably need to be adjusted upward where data on 'Green and renewables' was available for 2014. Also, the explicit incorporation of an extra risk premium for nuclear power plants (see footnote 68) would increase both ranges.

Conclusion on the WACC

(218) The two methodologies used to estimate a market level benchmark for the WACC lead to overlapping intervals. The overall values for 2017 are on average lower than those for 2014, reflecting mainly the markets' evaluation of the Hungarian risk free rate. The relevant intervals are summarised in Table 11.

Table 11

Summary on WACC

(%)

	December 2014	February 2017
Bottom-up approach	9,66-10,36	7,75-8,38
Benchmarking approach	9,15-9,81	7,40-8,07
Overall range	9,15-10,36	7,40-8,38
Midpoint	9,76	7,89

(219) Table 11 indicates WACC figures in the range of between 9,15-10,36 % for the initial investment decision of December 2014 and a figure in the range of between 7,40-8,38 % for February 2017. All those WACC-values should be viewed as conservative because they do not include the potential risk premium that nuclear power plant projects require ([87]).

([87]) Furthermore, the lower boundary of 9,15 % for 2014 would probably need to be adjusted upward if data on 'Green and renewables' was available for 2014.

5.1.1.2. ***The Commission's assessment on the IRR of the project***

(220) In its assessment of the IRR, the Commission used the Financial Model submitted by Hungary. In particular, the Commission accepted the methodology used in the Financial Model as well as the inputs of the Model, except for the electricity price forecast, for the considered central scenario. However, the Commission notes:

(a) The value of the IRR is very sensitive to the chosen price forecast for the computation. For example, applying the November 2014 EUR/USD exchange rate ([88]) rather than the October 2015 exchange rate (the choice of the Hungarian Government) to derive the EUR-based IEA price forecast of 2014 (that was based on forecast data in the IEA WEO 2014) decreases the project IRR by more than 0,8 %. This requires a re-assessment of the price forecast underlying the computation of the IRR of the project.

(b) The value of the IRR is also sensitive to (i) the load factor (or utilisation rate) of the nuclear power plant's units, (ii) the various cost items related to the project, including both owner costs during the construction period as well as subsequent O&M cost during the operation period and to (iii) potential delays in construction. The impact of changes in these factors need to be carefully assessed, i.e. beyond some small deviations examined by Hungary in the Financial Model, in a sensitivity analysis providing robustness check for the main results.

(221) Therefore, in order to ensure more accurate estimation results for the IRR of the project as well as for the accompanying sensitivity analysis and robustness checks, the Commission performed certain refinements in the components used for the IRR estimation. In particular, the Commission revised and completed the price forecasts submitted by Hungary. In addition, besides using the values of costs and load factor proposed by Hungary for the central scenario of the Financial Model, the Commission also incorporated information submitted by interested parties to improve the accuracy of the results. Finally, the Commission performed a thorough sensitivity check of the results, by simulating changes in all the relevant parameters of the model.

(222) Similarly to the WACC, the relevant IRR ranges were computed both based on information available in February 2017 (the 2017 data) and at the time of the initial investment decision on the 9 December 2014 (the 2014 data).

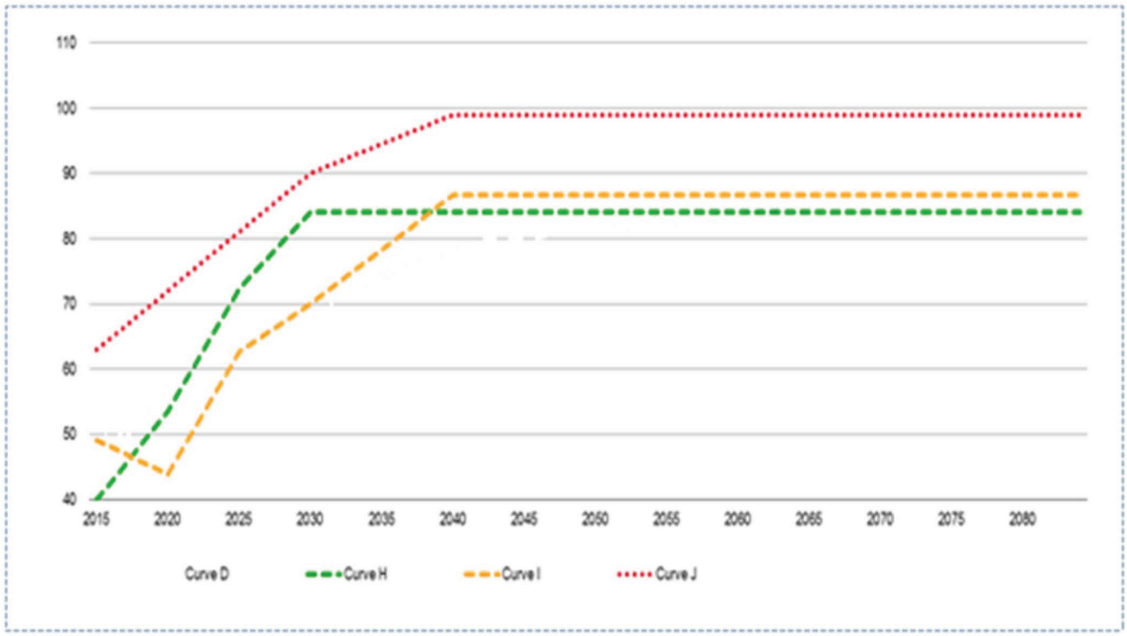
Price forecasts

(223) The starting points of the Commission's assessment of price forecasts are the price forecast curves presented in Figure 16 of the Economic Study submitted by Hungary, together with the IEA WEO (2014) based price forecast used by the Commission in the Opening Decision. In order to cover the entire expected operating period of the units of Paks II, the Commission extended those graphs to include only those that only covered the periods up to 2030 and 2040 respectively by keeping the forecasted price levels constant as at their termination (i.e. 2030 and 2040) values. Those price forecasts are illustrated in Figure 14.

([88]) The date when the IEA price forecast of 2014 was issued.

Figure 14

Long-run electricity price forecast curves (EUR/MWh) ([1])



([1]) Curve D is considered as confidential information/business secret.
Source: Economic Study and the Financial Model (see recital 69).

(224) Curve D in Figure 14 was used in the Opening Decision by the Commission to compute the project IRR. Furthermore, Curve H represents a 2014 BMWi (German Economic Ministry) Market Study forecast, Curve I represents a 2014 BMWi Reference scenario forecast, Curve J represents the IEA WEO (2014) electricity price forecast with the conversion from USD figures to EUR figures having been made with the approximate average EUR/USD exchange rate for September 2015 of 0,9 ([89]). The IRR-computations submitted by Hungary were principally based on those curves, H, I and J.

(225) The Commission performed the following adjustments to the curves presented in Figure 14. Curve J was corrected on the basis of on the average EUR/USD exchange rate available at the time of the IEA WEO (2014) USD-based forecasts published in November 2014. At the time, the average EUR/USD exchange rate over the preceding 3 months was 0,79. Curve L in Figure 15 also makes that adjustment ([90]).

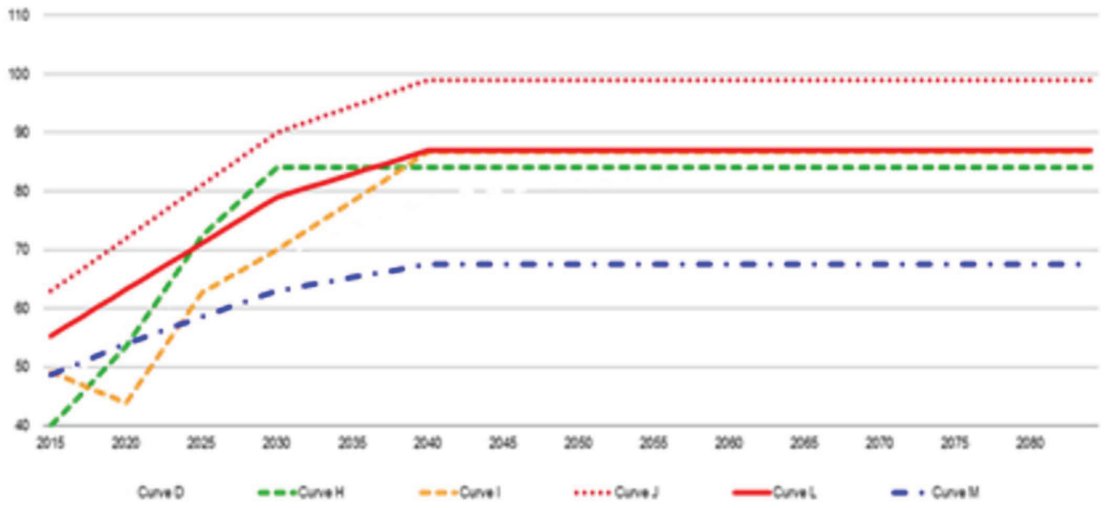
([89]) No details of the used exchange rates were provided by the Hungarian Government. The applied value of 0,9 can be deducted from the Financial Model. The average monthly exchange rate was 0,89 for September 2015. This EUR/USD exchange rate value (together with the other values used in this document) were taken from the website of the ECB at http://sdw.ecb.europa.eu/quickview.do;jsessionid=B13D3D3075AF28A4265A4DF53BE1ABC0?SERIES_KEY=120.EXR.D.USD.EUR.SP00.A&start=01-07-2014&end=15-11-2016&trans=MF&submitOptions.x=46&submitOptions.y=5.

([90]) Due to the large variation in the EUR/USD exchange rate, the Commission chose an average exchange rate through the 3 months preceding the initial investment decision date of 9 December 2014, which also includes the publication of the IEA WEO (2014). Alternatively, one could use annual average exchange rates. The annual average exchange rate preceding December 2014 is 0,75, which would lead to a slightly lower IRR value, making the choice of 3-month average exchange rate instead a conservative choice for the current analysis.

(226) Furthermore, in order to estimate an accurate IRR for February 2017, the Commission plots the price forecasts included in the International Energy Agency's World Energy Outlook 2016 (IEA WEO 2016) publication released on 16 November 2016 ([91]). As the original figures were provided in USD, the Commission used the 3-month (mid-August 2016 to mid-November 2016) average EUR/USD exchange rate of 0,9 relevant for that publication date to construct the EUR-based figures ([92]) ([93]). Curve M in Figure 15 below shows this price forecast.

Figure 15

Long-run electricity price forecast curves (EUR/MWh) ([1])



([1]) Curve D is considered as confidential information/business secret.
Source: Economic Study and the Financial Model (see recital 69) and computations by the Commission.

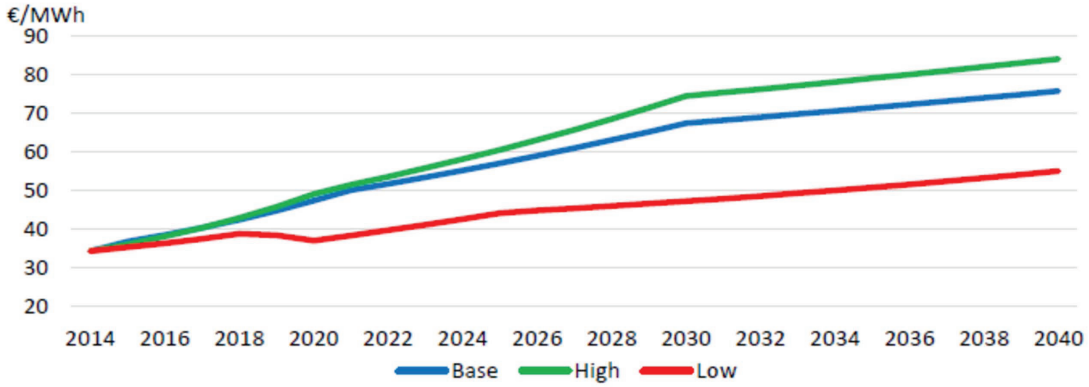
(227) This figure provides two main insights. Firstly, in applying the correct exchange rate for the conversion of USD values into EUR values, the price forecast for Europe of the IEA WEO 2014 becomes approximately 12 % lower (Curve L lies below Curve J). Secondly, the IEA WEO price forecast published in November 2016 is on average slightly more than 20 % lower than the price forecast published in the same publication 2 years earlier (Curve L and Curve M). This can be attributed to the falling electricity prices in 2014 and 2016 and the required forecast adjustments ([94]). Accordingly, any assessment made as regards the 2016 forecast and any related IRR calculation should take into account this drop in price forecasts and should focus on Curve M in Figure 15 ([95]).

([91]) See http://www.worldenergyoutlook.org/publications/weo-2016/.
([92]) See the wholesale electricity price figures in Table 6.13 on page 267 of the IEA WEO 2016.
([93]) Again, the relevant annual average exchange rate is 0,89 for this case, making the choice of a 3-month average exchange rate a more conservative one for the current analysis.
([94]) A similar downward adjustments to electricity price forecasts between 2014 and 2015 was also undertaken by the UK National Grid — See, for example, page 46 of the 2014 UK Future Energy Scenarios by the UK National Grid, available at http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/FES/Documents-archive/ and page 36 of the 2015 UK Future Energy Scenarios by the UK National Grid, available at http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/FES/Documents-archive/, denoting an average decrease of 12 % for the electricity price forecasts over the 2016-2035 forecast period. No such comparison was found for the BMWi data.
([95]) In its quantitative analysis, the Commission accepts the assumptions made by Hungary about electricity prices increasing until 2040 and staying constant afterwards. This is a conservative choice. Alternatively, one could build price forecast scenarios taking into account more explicitly the large scale deployment of renewables on wholesale electricity prices, when low prices as currently experiences would be the norm with high but weather-dependent scarcity prices. Such a scenario would result in future prices that are close to present prices, implying lower return on the investment than the ones explicitly considered in the subsequent sections.

(228) In relation to the IEA WEO-based price forecasts it must be noted that they were based on the evaluation of the 'New Policies Scenario' ([96]). A comprehensive assessment should also include the other scenarios considered by the IEA WEO, such as the 'Current Policies Scenario' and the 'Low Oil Price Scenario' as was carried out by the Candole study in relation to the IEA WEO 2015 price forecasts ([97]). This is important because choosing a different policy option leads to different price forecast paths as shown in Figure 12 and reproduced in Figure 16 below.

Figure 16

Long-run electricity price forecast curves (EUR/MWh)



Source: Candole Partners.

(229) The Base, High and Low cases in Figure 16 correspond to the New Policy Scenario, the Current Policies Scenario and the Low Oil Policies Scenario in the IEA WEO 2015 (also see recital 128). It can be seen from Figure 16 that the Current Policies Scenario predicts slightly higher prices for electricity in the future than the New Policies Scenario, whereas the Low Oil Price scenario predicts substantially lower electricity prices in the future than the central New Policies Scenario (forecasts made in 2015). A comprehensive sensitivity analysis for the computation of the project IRR for Paks II must take this into account ([98]).

(230) Furthermore, for an accurate interpretation and assessment of the long-term price forecast figures prepared by different institutions, those figures should be linked to the future electricity contract prices signed in power exchanges, even if the latter refers to much shorter time horizons as illustrated in Figure 12. The price curves in Figure 13, comparing German and Hungarian futures price contracts with the lowest IEA WEO price forecasts (the one corresponding to the Low Oil Price scenario), suggest that even the most recent IEA WEO 2015 price forecasts may be too optimistic as they may overestimate future electricity prices. This fact also needs to be taken into account in determining the IRR of the Paks II project as well as any supporting sensitivity analysis.

Load factor, various cost items and delays

(231) Due to its large size, the complexity of the construction works and its long-life operation time, nuclear power plants are exposed to uncertainties regarding the load factor, the construction time and various cost items, amongst others. This, in turn has a substantial impact on the IRR of the project.

([96]) See recital 128 for a definition of the 'New Policy Scenario'.

([97]) See recital 128 and footnote 53: The Current Policies Scenario takes into account only policies enacted by a few months before the publication went to press. The 450 Scenario depicts a pathway to the 2 °C climate goal that can be achieved through the technologies that are close to becoming available a t a commercial scale. Finally, the Low Oil Price Scenario explores the implications of sustained lower prices (coming from lower oil prices) on the energy system.

([98]) The Commission did not undertake such comprehensive quantitative analysis due to lack of high quality relevant data. Nonetheless, it can be seen that the price curve corresponding to the Low Oil Price Scenario would lead to a substantially lower IRR value than the price curve corresponding to the New Policies Scenario.

(232) The difficulty in assessing such uncertainties lies in the fact that Paks II is a Generation III+ nuclear power plant design and there are currently none in operation ([99]). Therefore, any benchmarking is hypothetical. The technological difference between Generation III and Generation III+ nuclear power plants are sufficiently large to contend that the uncertainties mentioned in recital 231 do not concern Paks II.

Load factor

(233) The IRR estimates of the Hungarian Government are based on the assumption of an average load factor of [90-95]% (*) for Paks II. This is a much higher figure than the 72 % average annual load factor for all nuclear power plants in the world as highlighted in 'The World Nuclear Industry — Status Report 2015' (WNISR2015) ([100]). In turn, the IEA WEO 2014, in its Outlook for Nuclear Power, notes that '[b]etween 1980 and 2010, the average global capacity factor for reactors increased from 56 % to 79 %. This has been a result of better management, which has significantly shortened outage periods for planned maintenance and refuelling. The best-performing reactors achieve capacity factors of around 95 %. As plants age, however, such high levels may be difficult to reach as more frequent inspections and testing of components is required.' ([101]).

(234) It should be noted that such high load level figures can be easily jeopardised by incidents during the lifetime of the plant. For example, the incident in 2003 in Unit 2 of Paks NPP decreased the average load factor for the 1990-2015 period by almost five percentage points, from 85,3 % to 80,7 %.

(235) A further challenge for the two new reactors of Paks II in maintaining a load factor in excess of 90 % is that it is envisaged to operate at the same time as some of the Paks NPP units. The environmental impact of the close proximity of the two nuclear power plants on the Danube river during hot summer days may require a decrease of production for one of the plants. As it is assumed that the two new reactors of Paks II will constantly operate with a high load factor, this would result in decreased production and decreased revenues for Paks NPP, an economic cost that needs to be taken into account when evaluating the economic viability of the Paks II project.

Costs

(236) Costs over the lifetime of a long-term project can substantially deviate from the forecasted long run values presented during a project's initial business plan. The typical reasons for this are the failure to incorporate all the relevant cost items in the business plan or using overly optimistic assumptions and cost estimates.

(237) Due to the complexity of those projects, the actual cost of constructing nuclear power plants is often much higher than forecasted. For example, the construction costs of the AREVA EPR Generation III+ power plants in France and Finland were almost triple the initial costs included in the construction contract ([102]). The Westinghouse AP1000 reactors being built in China and the US also experience considerable cost overruns of around 20 % or more and the costs of the Rosatom AES-2006 nuclear power plant in Belarus experiences an almost doubling of the initial construction costs ([103]).

(238) While in principle fixed price turnkey contracts may provide protection for the owner for increased construction costs, they often do not cover the entire costs of the new reactors. Accordingly, owner costs, including cost of obtaining the required permits, cost of connection to the grid, cost of waste management and decommissioning and

([99]) See Section 2.3.
(*) *The load factor is considered as business secret and replaced by a wider load factor range.*
([100]) See p. 25 of the WNISR2015.
([101]) See p. 350 of the IEA WEO 2014.
([102]) See http://www.world-nuclear-news.org/NN-Flamanville-EPR-timetable-and-costs-revised-0309154.html and http://www.theecologist.org/News/news_analysis/2859924/finland_cancels_olkiluoto_4_nuclear_reactor_is_the_epr_finished.html.
([103]) See p. 66 of the WNISR2015.

environmental costs are not fixed and may increase. In turn, the supplier may decide not to absorb extra costs beyond certain limits and may suggest that the increase in costs is due to changes requested by the owner. Such a dispute may end up in arbitration and in the court, thus further increasing the costs related to the investment.

(239) The business plan for the Paks II nuclear power plant seems to also contain some cost assumptions that could be considered optimistic. Submissions by interested parties suggest that the provisional figures may be too optimistic for the following items:

— Cooling of the nuclear power plant: the Financial Model assumes a fresh water cooling system as supported by the Hungary, rather than a more expensive cooling tower based cooling system that MEP Jávor argues is needed; the Environmental Impact Assessment Study (EIAS) of the project does not present a detailed quantitative cost-benefit analysis of the two systems. There may also be a need to install a more expensive cooling tower during the parallel operation of the two plants ([104]).

— Connection to the grid: the Financial Model includes a total figure of HUF [43 000-51 000] (*) million or EUR [124-155] million (*), which falls short of the figure of EUR 1,6 billion submitted by MEP Jávor; neither party submitted detailed information about how those figures were computed.

— Cost of reserve: the Financial Model does not include an item that could be assigned to the costs of the impact of the Paks II nuclear power plant on the Hungarian electricity system, for example additional reserve requirements; additional reserves will be required by law due to the large size of the individual units of Paks II, according to MEP Jávor.

— Costs of insurance: insurance that covers large-scale accidents that nuclear power plants can cause, beyond design basis accidents (BDBAs), could cost more than HUF [15 000-20 000] (*) million or EUR [45-60] (*) million shown in the Financial Model ([105]).

— Cost of maintenance: no major refurbishment costs during the lifetime of the nuclear power plant are anticipated; refurbishment costs may be needed because of premature ageing of some of the nuclear power plant's elements or because of incidents or accidents occurring during the lifetime of the plant ([106]).

(240) The Commission notes that any deviation motivated by the concerns listed in recital 239 from the figures provided by Hungary as presented in Paks II's business plan (and the Financial Model) would lead to a decrease in the value of the IRR of the project ([107]).

Potential delays

(241) The construction of nuclear power plants is prone to delays and this increases construction times ([108]). The primary reasons for delays in construction include design issues, a shortage of skilled labour, the loss of expertise, supply chain issues, poor planning and first-of-a-kind (FOAK) problems ([109]) ([110]).

([104]) See Section 6.3 of the EIAS, available at http://www.mvmpaks2.hu/hu/Dokumentumtarolo/Simplified%20public%20summary.pdf.

(*) *The figures in the Financial Model are considered as business secret and replaced by wider ranges.*

([105]) The costs of such BDBAs can easily exceed EUR 100 billion and potentially reaching values at the magnitude of many hundreds or even thousands of bn Euros (see pp. 20-24 of 'The true costs of nuclear power' by Wiener Umweltanwaltschaft and Österreichische Ökologie-Institut, available at http://wua-wien.at/images/stories/publikationen/true-costs-nucelar-power.pdf). With a BDBA happening once every 25 years (1986 (Chernobyl) and 2011 (Fukushima)) and almost 400 nuclear reactors operating across the globe, there is a probability of 2 × (1/400) = 0,5 % that of a BDBA happening to one of the two reactors Paks II in the first 25 years of its operation. The cost of an insurance covering for such a damage is typically much higher than the expected value of the damage associated to such an accident, i.e. than 0,5 % × EUR 100 bn = EUR 500 m (taking the more conservative estimate for the value of the damage caused by a BDBA actually happening).

([106]) The Felshmann study identifies such a major refurbishment for Paks I. While the Hungarian Government excludes the need of similar refurbishments for Paks II, the grounds of such exclusion are not clear.

([107]) The Commission did not undertake a detailed quantitative analysis of the impact of any such deviations because of the lack of high quality relevant data. Instead, some of the information presented in recital 239 was used to motivate the sensitivity analysis underlying the determination of the project IRR (see recitals 245 and 246 in the next section).

([108]) See p. 33 of the WNISR2015.

([109]) See pp. 58-60 of the WNISR2015.

([110]) The IEA WEO 2014 also notes that first-of-a-kind designs can take much longer to build and involve much higher costs than more mature designs because of the lack of experience and learning — see p. 366.

(242) Regarding delays in the construction period, the first two Generation III+ power plants that were actually commissioned and built, the Oikiluoto-3 plant in Finland (start of construction: 2005) and the Flamanville power plant in France (start of construction: 2007) both experienced delays of more than 5 years each ([111]). Both power plants are Areva EPR-models.

(243) Rosatom's four Generation III+ AES-2006 projects in Russia, for which construction started between 2008 and 2010, also experienced delays, as it is outlined in Table 3 in recital 99. For example, the construction of one of the two V-491 units (the Paks II design) in Leningrad phase II at St. Petersburg (whose commissioning was originally due in October 2013) was interrupted when a steel structure for containment collapsed on 17 July 2011 ([112]) thus its commissioning is now expected in mid-2017, whereas the other unit was expected to be commissioned by 2016 and is currently scheduled to be switched online in 2018 only ([113]). The construction of another unit in Niemen in Kaliningrad was suspended in 2013 ([114]).

(244) As a result, the recent history of building Generation III+ power plants suggests that delays during construction are not uncommon ([115]). This, in turn, has an impact on the IRR. This impact can only be mitigated to a certain extent by stipulating damages payments under certain circumstances.

Computation of the IRR

(245) The Commission used the Financial Model submitted by Hungary to compute ranges for the appropriate IRR values for December 2014 and February 2017. In particular, the Commission:

— relied on the cost figures included in the Financial Model by the Hungarian Government as a starting point;

— updated the price forecast curves in the Financial Model along the lines discussed in the Price forecasts subsection (see recitals 223-230) — price forecast curves H, I and L were used to compute the IRR for December 2014 and price forecast curve M was used to compute the IRR for February 2017;

— developed a Monte Carlo-based sensitivity analysis to obtain relevant ranges for the IRR-figures corresponding to the two points in time namely December 2014 and February 2017 ([116]).

(246) The Monte Carlo-based sensitivity analysis was used to estimate deviations of the IRR from its central value following small changes in the values of the various inputs of the model. The following deviations from the inputted values by Hungary were assumed:

— Small symmetric deviations for future inflation, foreign exchange rate, operation costs, fuel costs, maintenance capex, waste management and decommissioning costs, expected lifetime and price forecast curve used ([117]);

([111]) For delays for the Olkiluoto-3 plant, see http://www.world-nuclear-news.org/C-Olkiluoto-EPR-supplier-revises-compensation-claim-1002164.html. For delays for the Flamanville plant, see http://www.world-nuclear-news.org/NN-Flamanville-EPR-timetable-and-costs-revised-0309154.html

([112]) See p. 64 of the WNISR2015.

([113]) See http://www.world-nuclear.org/information-library/country-profiles/countries-o-s/russia-nuclear-power.aspx

([114]) See p. 63 of the WNISR2015 as well as press articles http://www.osw.waw.pl/en/publikacje/analyses/2013-06-12/russia-freezes-construction-nuclear-power-plant-kaliningrad and http://www.bsrrw.org/nuclear-plants/kaliningrad/

([115]) In fact, Hungary itself is expecting delays (see recital 99).

([116]) This is a more robust sensitivity analysis than the ones included by Hungary in the Financial Model (see recital 177) as that one only looks at the impact on the WACC and IRR of changes in one underlying variable only. Instead, the Monte Carlo analysis allows the identification of the impact of changes in the value of more than just one underlying variable.

([117]) These deviations were drawn from normal distributions with the mean equal to the baseline values included in the Financial Model and the standard deviation equal with the deviations included in the sensitivity analysis in Financial Model — 95 % of the values drawn from these normal distributions fall within a distance of 2 times the chosen standard deviation of the distribution. The chosen mean-standard deviation pairs were the following: (i) inflation ([0-2] %*; 0,25 %), (ii) foreign exchange rate (HUF/EUR) [300-310]*; 10 %), (iii) price sensitivity (each individual curve; EUR 2,5/MWh) and (iv) plant lifetime (60; 5). For the various periodic cost items, (i) operational costs, (ii) fuel costs, (iii) maintenance capex and (iv) decommissioning and waste management costs a standard deviation of 10 % from the respective periodic value was chosen.
* *In this footnote, the chosen methods in the Financial Model are considered as business secret and replaced by wider ranges.*

— Small asymmetric deviations for future down time rates — downward deviations are constrained by full (100 %) capacity utilisation and are taken to be smaller than upward deviations from the baseline value of [5-10] % (**) (i. e. [90-95] % (**) capacity utilisation) ([118]);

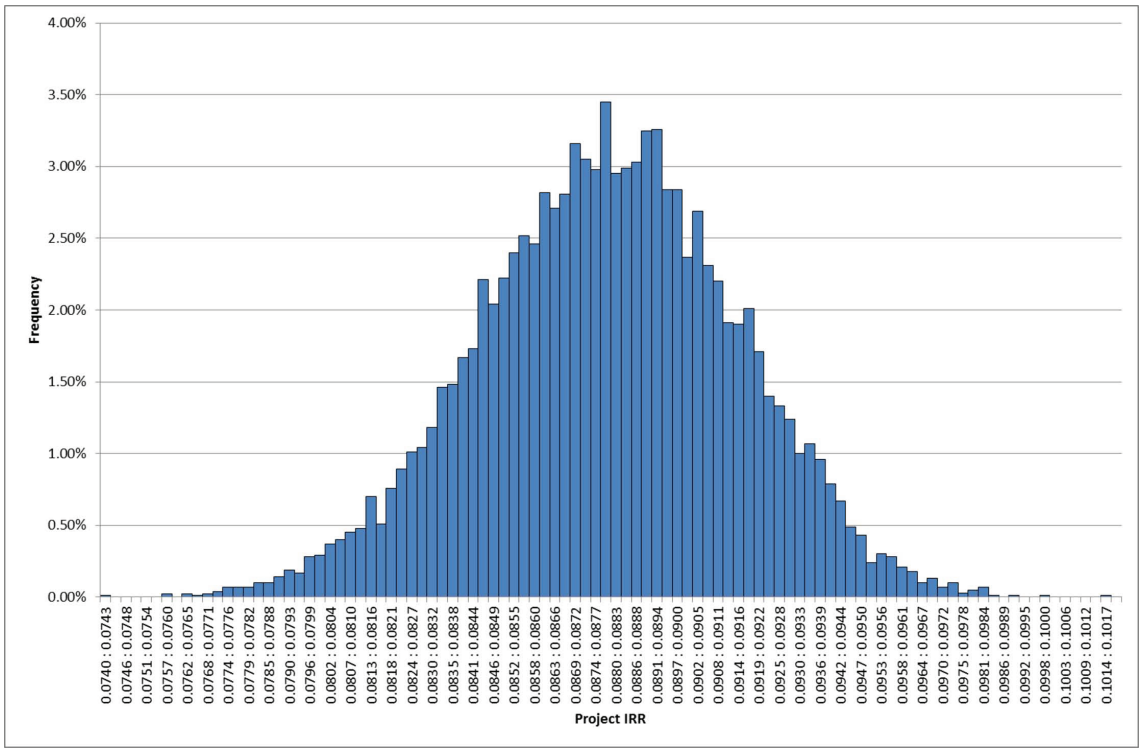
— Project delays were not included in the Monte Carlo analysis because of the incomplete way of treatment of delays in the Financial Model (see recital 249 below).

Figure 17 and Figure 18 below show the distributions of the project's IRR values for the two periods of the assessment. In each case, the outcome is based on 10 000 simulations ([119]).

(247) For December 2014, the distribution of the estimated IRR is centred on 8,79 %, whereas 90 % of the computed IRR values fall inside the interval [8,20 %; 9,36 %].

Figure 17

IRR values for December 2014



Source: Computations by the Commission.

(248) For February 2017, the distribution of the estimated IRR is centred around 7,35 % and 90 % of the computed IRR values fall inside the interval [6,79 %; 7,90 %] ([120]):

(**) *The baseline value and the capacity utilisation are considered as business secret and are replaced by wider ranges.*

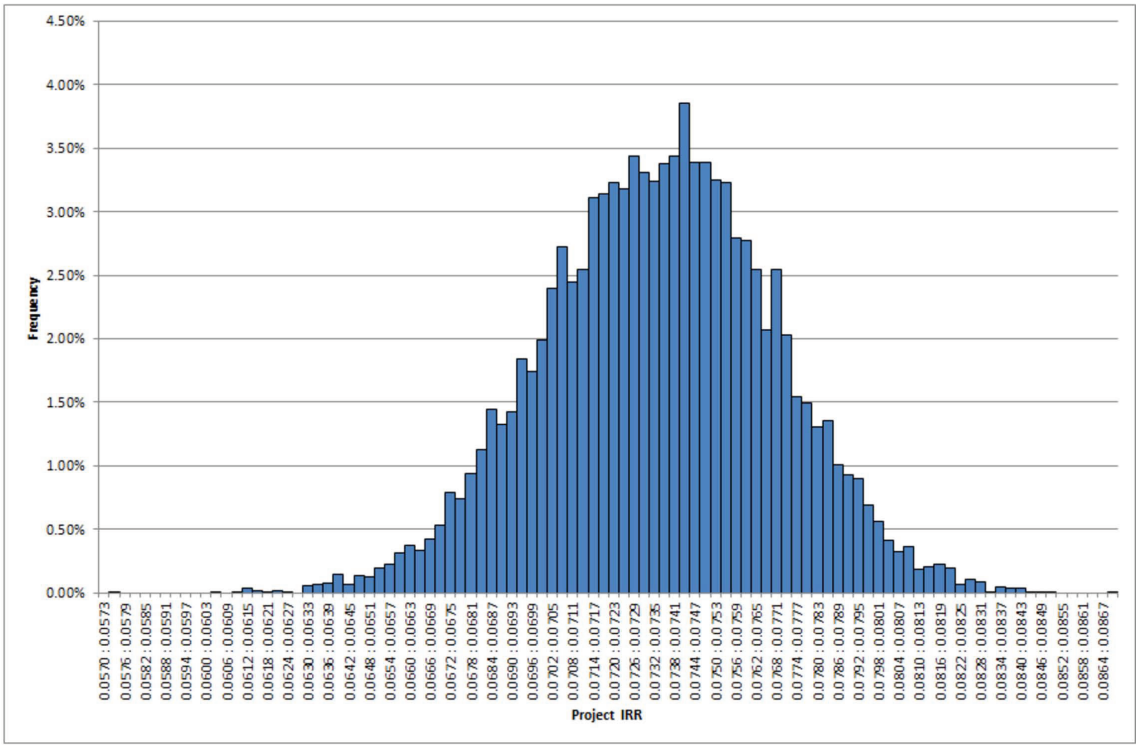
([118]) As the baseline down time rate is small at [5-10]*** %, upward deviations, i.e. larger down time rates, can be potentially higher than downward deviations, i.e. smaller down time rates. A triangular distribution with endpoints of 5 % and 12 % (corresponding to load factors of 88 % and 95 %) and central peak-point at [5-10]*** % (the baseline value) was chosen.
*** *In this footnote, the baseline value is considered as business secret and replaced by a wider range.*

([119]) It must be noted that no correlation was assumed during these runs between the various variables.

([120]) For both years, the IRR values estimated by the Commission are lower than the ones submitted by Hungary mostly because of the lower future price forecasts and also because of a more general sensitivity analysis (see recital 246).

Figure 18

IRR values for February 2017



Source: Computations by the Commission.

(249) It must be noted that the impact of potential delays is not included in the IRR-computations underlying Figure 17 and Figure 18. The main reason for this is the incomplete treatment of delays by the Financial Model. In particular, the Financial Model allows for the following types of delays:

— delays, which had already occurred before the start of construction work (labelled 'during construction' in the Financial Model);

— delays occurred after the construction work has been finished (labelled 'post contract price expenditure' in the Financial Model).

(250) The Commission notes that those two delay scenarios included in the Financial Model are basic ones and cannot be used to adequately model the true impact of most common types of delays, for example when delays of various lengths occur in different stages of the construction period ([121]).

(251) The IRR ranges for the two points in time relevant in the assessment are summarised in Table 12 below. The estimated IRR is lower for February 2017 due to a decrease in the electricity price forecast between 2014 and 2017. However, both estimates can be considered conservative given that certain qualitative elements described in recitals 238 and 239 and flaws in the estimates of the Hungarian authorities could not be quantitatively incorporated in the Financial Model.

([121]) Furthermore, such delays would most likely be coupled with cost overruns. In particular, cost overruns can occur in spite of the fixed price turnkey nature of the EPC contract for two reasons: (i) the fixed price only refers to the suppliers' costs but not to the owners' costs, and (ii) if the supplies is debating some cost escalations being its own responsibility a possible legal dispute will definitely increase the project costs.

Table 12

IRR summary

(%)

	December 2014	February 2017
Range	8,20-9,36	6,79-7,90
Midpoint	8,79	7,35

5.1.1.3. ***The Commission's assessment of the LCOE.***

(252) For the sake of completeness and in order to reflect all the information submitted by Hungary (see recitals 69 and 81-82), the Commission also briefly considered the economic viability of Paks II by using the LCOE measure (see Section 3.1.1.3).

(253) In assessing the LCOE for a Hungarian nuclear power plant such as that of Paks II, the Commission used the OECD/IEA/NEA 2015 study (see recital 81) as a starting point. In that study, the LCOE for a Hungarian nuclear power plant is estimated to be EUR 80,95/MWh for an interest rate of 7 % and EUR 112,45/MWh for an interest rate of 10 %, given a load factor of 85 % ([122]). As those figures were published in August 2015, they can only be used for the assessment of the LCOE in 2017 but not in 2014.

(254) The Commission notes that increasing the load factor to [90-95] % (*), the central load factor figure in Hungary's submissions, the LCOE figures in the previous recital change to EUR 74/MWh and EUR 103/MWh respectively ([123]).

(255) Based on the above, the Commission concludes that the LCOE of a Hungarian nuclear power plant is higher than EUR 74/MWh, which is in turn higher than the price forecast of EUR 73/MWh computed in 2015 or the EUR 68/MWh price forecast computed in 2016 ([124]).

5.1.1.4. ***Conclusions on the economic advantage***

(256) The Commission uses the WACC and IRR estimates derived in the Sections 5.1.1.1 and 5.1.1.2 to assess whether the MEIP is fulfilled. Table 13 below summarises the relevant information for both points in time:

Table 13

Comparison of the WACC and IRR

(%)

	December 2014	February 2017
WACC range	9,15-10,36	7,40-8,35

([122]) The figures of EUR/MWh were derived by applying the average monthly EUR/USD exchange rate of 0,9 for August 2015 (the month of the OECD/IEA/NEA publication) for the USD/MWh figures in the publication.

(*) *The load factor is considered as business secret and replaced by a wider load factor range.*

([123]) These adjustment in the LCOE-value can be obtained by multiplying every term in the denominator of the LCOE-formula LCOE= (Sumt(Coststt × (1 + r) — t))/(Sumt(MWht × (1 + r) — t)) (see footnote 32) by 93/85.

([124]) The price forecast of EUR 73/MWh is obtained by multiplying the wholesale electricity price value of EUR 81/MWh for 2040 in Figure 8.11 on p. 327 of the IEA WEO 2015 with the average monthly EUR/USD exchange rate of 0,9 for September-November 2015, the date of the IEA WEO 2015 publication. Similarly, the price forecast of EUR 68/MWh is obtained by multiplying the wholesale electricity price value of EUR 75/MWh for 2040 in Figure 6.13 on p. 267 of the IEA WEO 2016 with the average monthly EUR/USD exchange rate of 0,9 for September-November 2016, the date of the IEA WEO 2016 publication.

(%)

	December 2014	February 2017
IRR range	8,20-9,36	6,79-7,90
WACC midpoint	9,76	7,88
IRR central value	8,79	7,35
Percentage of IRR-simulated cases when IRR<min (WACC)	85	55

(257) Table 13 offers the following key insights:

— The IRR central value is substantially lower than the midpoint of the WACC range (8,79 % versus 9,66 % and 7,35 % versus 7,88 %), in both periods;

— The IRR central value is even lower than the lower boundary for the WACC range (8,79 % versus 9,15 % and 7,35 % versus 7,40 %) in both periods;

— The IRR falls below the relevant WACC range for a majority of cases, namely the estimated IRR values from the Monte Carlo simulation are lower than the lower boundary of the WACC range for a majority of cases (85 % for December 2014 and 55 % for February 2017) ([125]) ([126]).

(258) The Commission emphasises that those results are conservative given that:

— The Commission does not have the means to accurately assess the possibility of additional costs, in particular of the magnitude suggested by the comments it received from Interested Parties following the publication of the Opening Decision; the variations in costs that were included in the Monte-Carlo simulations were of a much smaller magnitude than the ones suggested in the comments;

— The price forecasts for low future oil price scenarios put forward in the comments received by the Commission were not included in the sensitivity analysis, nor was any correction made to take into account the deviation of future electricity contract prices signed in power exchanges from the considered price forecasts;

— No risk premium for nuclear power plants in excess of standard risk premia for power generation and utilities was included;

— For 2014, no estimates for WACC for the 'Green and renewables' sector were available in the WACC-benchmark analysis.

This suggests that in reality, the potential difference between the IRR values and the WACC values corresponding to each of the points in time is very likely to be even larger.

([125]) One needs to also take into account that the distribution of WACC values is most likely not uniform in the indicated range. Instead, it is more likely to be centred around the midpoint of the interval, i.e. more likely taking values close to the midpoint of the range and less likely taking closer to the endpoints of the range, indicating that the overlap between the IRR figures and the WACC figures is even smaller than the ones suggested by the figures in the last row of Table 13.

([126]) It must be noted that this overlap was only computed for statistical purposes. A market economy investor would typically compare the central values (or ranges) of the WACC and IRR intervals. The reason for this is that the overlap of the two ranges covers the somewhat extreme conditions when the IRR is high and at the same time the WACC is low. As both measures are connected to the same market conditions and the same one particular project, i.e. Paks II, they tend to move together (i.e. a high IRR value within the IRR-range most likely coincides with a high WACC-value within the WACC-range is realized), potentially ruling out the simultaneous realization of a low WACC value together with a high IRR value.

(259) In addition, the underlying calculations for the estimation of the project IRR, combined with the estimated WACC values, can also be used to quantify the net present value (NPV) of the total losses expected to accrue over the lifetime of the project if it was financed by a market economy investor. In particular, the project is expected to produce losses of EUR 600 million in the baseline case of a 7,88 % market WACC and a 7,35 % IRR, the mean values for the 2017 data ([127]).

(260) Furthermore, besides the WACC-IRR comparison, the brief analysis of the LCOE also confirmed that the levelised costs of electricity produced by Paks II would not be covered by the forecasted prices.

(261) Based on those results, the Commission concludes that the project would not produce sufficient returns to cover the costs of a private investor who could only obtain financing at market prices. Even though the February 2017 data is the most relevant for running the MEIP test, the results derived from the analysis of this data are valid even when the analysis is made using data available at the time of the initial investment decision in December 2014.

(262) Based on the assessment developed in this, the Commission concludes that a private investor would not have invested in the project under the same terms and conditions. Therefore, since Paks II benefits fully from a new asset with an economic value, the Commission finds that the measure entails an economic advantage for Paks II.

5.1.2. TRANSFER OF STATE RESOURCES AND IMPUTABILITY

(263) As explained in the Opening Decision, Hungary would finance the construction of the project with State funds, of which 80 % is a loan from the Russian Federation and 20 % is Hungary's own funds. Hungary would directly finance all investments which are necessary for the commission, design and construction of power units 5 and 6, as set out in the Financing IGA. Therefore, the Commission concludes that the measure would entail a transfer of resources by the Hungarian State.

(264) The Commission also recalls that the measure is imputable to the Hungarian State as Hungary has taken the decision to invest in the project and it will decide on the disbursement of the necessary funds for the payment of the EPC Contract Purchase Price and the equity financing of the two new reactors of Paks II.

5.1.3. SELECTIVITY

(265) A measure is deemed selective if it favours only certain undertakings or the production of certain goods. The Commission reiterates that the measure is selective because it concerns only one undertaking insofar as Hungary appointed Paks II under Government Resolution 1429/2014 (VII. 31.), as the Hungarian Authorised Organisation will be the owner and operator of the new nuclear generation units. Therefore, the advantage is deemed to be selective.

5.1.4. EFFECT ON TRADE AND DISTORTION OF COMPETITION

(266) As it was pointed out by the Commission in the Opening Decision, the electricity market has been liberalised in the Union and electricity producers are engaged in trade between Member States. In addition, the Hungarian electricity infrastructure is relatively strong, containing robust interconnections (equal to 30 % of domestic installed capacity) with its neighbouring Member States. Although Hungary is a net importer, Figure 5 in recital 49 illustrates that Hungary also exports electricity not only to the coupled Czech-Slovak-Hungarian-Romanian day-ahead market (operational since 2014) but also to Austria and Croatia.

(267) The notified measure would enable the development of significant capacity which might otherwise have been subject to private investment by other market operators using alternative technologies, from either Hungary or other Member States. Furthermore, as electricity is traded across borders, any selective advantage to a company has the potential to affect trade within the Union.

([127]) These estimates of this NPV are conservative since they do not take into account the impact of certain types of delays (see recitals 99, 246 and 0) and the factors listed in recitals 239 and 258 that could substantially increase costs or decrease future revenues, and therefore, they are likely to substantially underestimate the eventual losses. Any deviations on these factors would further increase the net losses of the project.

(268) Therefore, the Commission reiterates that the measure threatens to distort competition.

5.1.5. CONCLUSION ON THE EXISTENCE OF STATE AID

(269) Given that the Commission concludes that the measure entails an economic advantage for Paks II and that the rest of the elements for the existence of State aid are present, the Commission concludes that in the project, the Hungarian State is granting aid to Paks II which is State aid within the meaning of Article 107(1) TFEU.

5.2. *LEGALITY OF THE AID*

(270) As found in the Opening Decision (see recital 116), the Commission maintains its assertion that although a series of agreements have already been signed and the initial investment decision has already been taken, the final investment decision by which Paks II commissions irrevocably the construction works of the two new reactors is still to be taken and no payments have been made as of yet under the EPC Contract. Therefore by notifying the measure before its implementation, the Hungary has fulfilled its stand-still obligation in accordance with Article 108(3) TFEU.

5.3. *COMPATIBILITY*

(271) Given that the measure was found to entail State aid, the Commission has further examined whether the measure could be considered compatible with the internal market.

(272) The Commission notes that Hungary considers that the measure does not constitute State aid, nonetheless it submitted arguments as regards the compatibility of the measure with the internal market as a response to the Opening Decision and to the observations of third parties received by the Commission following the publication of the Opening Decision (see Section 3.2).

5.3.1. LEGAL BASIS FOR ASSESSMENT

(273) As explained in Section 3.3.1 of the Opening Decision, the Commission may declare a measure compatible directly under Article 107(3)(c) TFEU if the measure contributes to the achievement of a common objective, it is necessary and proportionate for the attainment of that objective and it does not adversely affect trading conditions to an extent contrary to the common objective.

(274) The measure needs to satisfy the following conditions: (i) it aims to facilitate the development of economic activities or economic areas in accordance with point (c) of Article 107(3) TFEU; (ii) it is targeted at bringing about a material improvement that the market alone cannot deliver (for example addressing a market failure); (iii) the proposed measure is an appropriate policy instrument to address the objective of common interest; (iv) it has an incentive effect; (v) it is proportional to the needs based on which it is deployed; and (vi) it does not unduly distort competition and trade between Member States.

(275) In their response to the Opening Decision, the Hungarian authorities argued that State aid rules, and in particular the general prohibition from granting State aid, do not apply to measures falling under the Euratom Treaty.

(276) The Commission acknowledges that the investment at hand is an industrial activity falling within the scope of the Euratom Treaty (see Annex II thereof); however, this very fact does not render Articles 107 and 108 TFEU inapplicable when assessing the financing method of such activity.

(277) In fact, whilst Article 2(c) of the Euratom Treaty creates an obligation on the Union to facilitate investments in the field of nuclear energy and Article 40 of the Euratom Treaty obliges the Union to publish illustrative programmes in order to facilitate the development of nuclear investments, the Euratom Treaty does not foresee any specific rules to control the financing, by a Member State, of such investments. According to Article 106a(3) of the Euratom Treaty, the provisions of the TFEU shall not derogate from the provisions of the Euratom Treaty.

(278) Indeed, Articles 107 and 108 TFEU do not derogate from any of the provisions of the Euratom Treaty, as no different State aid control rules are foreseen in the Euratom Treaty, nor the State aid control performed by the Commission pursuant to Articles 107 and 108 TFEU impedes the fulfilment of the objective of promotion of new nuclear investments enshrined in the Euratom Treaty.

5.3.2. COMPLIANCE WITH UNION LAW OTHER THAN STATE AID RULES

(279) Numerous interested parties raised comments regarding the compliance of the measure under Directives 2014/24/EU and 2014/25/EU (especially with Directive 2014/25/EU due to the sector specific rules) and Article 8 Directive 2009/72/EC (the Electricity Directive); the Commission, therefore, has assessed to what extent a (possible) incompatibility with the provisions of Directives 2014/24/EU and 2014/25/EU and Article 8 Directive 2009/72/EC concerning the direct award to an undertaking for the construction of the two new reactors of Paks II could impact the State aid assessment under Article 107(3)c TFEU.

(280) According to the settled case-law, 'when the Commission applies the State aid procedure, it is required, in accordance with the general scheme of the Treaty, to ensure that provisions governing State aid are applied consistently with specific provisions other than those relating to State aid and, therefore, to assess the compatibility of the aid in question with those specific provisions. However, such an obligation is imposed on the Commission only where the aspects of aid are so inextricably linked to the object of the aid that it is impossible to evaluate them separately. (…) If the Commission were required to adopt a definitive position, irrespective of the link between the aspect of the aid and the object of the aid at issue, in a procedure relating to State aid, on the existence or absence of an infringement of provisions of EU law distinct from those coming under Articles 107 TFEU and 108 TFEU, (…) that would run counter to, first, the procedural rules and guarantees — which in part differ significantly and imply distinct legal consequences — specific to the procedures specially established for control of the application of those provisions and, second, the principle of autonomy of administrative procedures and remedies. (…) Accordingly, although the aspect of aid at issue is inextricably linked to the object of that aid, the Commission must assess its compatibility with provisions other than those relating to State aid in the context of the procedure provided for in Article 108 TFEU and that assessment may result in a finding that the aid concerned is incompatible with the internal market. By contrast, if the aspect at issue can be separated from the object of the aid, the Commission is not required to assess its compatibility with provisions other than those relating to State aid in the context of the procedure provided for in Article 108 TFEU' ([128]).

(281) In light of the above, as regards the notified measure, its assessment on compatibility could be affected by a possible incompliance with Directive 2014/25/EU if it produced additional distortion of competition and trade on the electricity market (market on which the beneficiary of the aid — Paks II — will be active).

(282) On this point, the Commission notes that Directive 2014/25/EU is of relevance as regards the direct award of construction works for the two new reactors to one specific undertaking. In the case at hand, while JSC NIAEP, an undertaking active in the nuclear construction sector, has been directly granted the construction works of the two reactors by the IGA, JSC NIAEP is not the beneficiary of the aid. Indeed, the beneficiary of the aid is Paks II, a market participant in the electricity market, which will own and operate the two new nuclear reactors. As already stated in the Opening Decision, JSC NIAEP is not deemed a potential beneficiary of the measure at hand.

(283) Thus, a possible inobservance of public procurement rules in the case at hand might produce distortive effects on the market of nuclear construction works. However, the object of the investment aid to Paks II is to enable it to generate electricity without bearing the investment costs for the construction of nuclear installations. Therefore, no additional distortive effect on the competition and trade on the electricity market has been identified that would be created by the non-compliance with Directive 2014/25/EU, as regards the direct award of the construction works to JSC NIAEP.

(284) Therefore, in absence of 'indissoluble link' between the possible infringement of Directive 2014/25/EU and the object of the aid, the compatibility assessment of the aid may not be affected by this possible infringement.

(285) In any event, Hungary's compliance with Directive 2014/25/EU has been assessed in a separate procedure by the Commission where the preliminary conclusion on the basis of available information is that the procedures laid down in Directive 2014/25/EU would be inapplicable to the entrustment of construction works of two reactors on the basis of its Article 50(c).

([128]) ECJ, 'Castelnou Energía v European Commission', T-57/11, ECLI:EU:T:2014:1021, paragraphs 181-184.

(286) As regards the possible breach of Article 8 of Directive 2009/72/EC, the Commission considers that the requirement of applying a tendering procedure or any procedure equivalent in terms of transparency and non-discrimination for providing new capacity is not an absolute one. In fact, the first sentence of Article 8(1) requires Member States to provide in domestic law for possibility to use tendering procedure for new capacity. Hungary has complied with this requirement by transposing this requirement within its Act on Electricity ([129]). In addition, in accordance with the second sentence of Article 8(1), a tendering procedure must not be required if the generation capacity to be built on the basis of the authorisation procedure laid down in Article 7 of Directive 2009/72/EC were sufficient to ensure security of supply. This is the case at hand: the project has been authorised (following the authorisation procedure described in Article 7) precisely to cover, inter alia, the gap in the envisaged future domestic total installed capacity and the Commission does not have elements available showing that the installed capacity would be insufficient. Thus the tendering or equivalent procedure requirement pursuant to Article 8 Directive 2009/72/EC does not seem to apply to the project at hand. In light of the above, the Commission does not have sufficient element to point at a possible applicability of Article 8 of Directive 2009/72/EC.

(287) Therefore, the Commission considers that the assessment of the notified measure under State aid rules is not affected by the compliance with other provisions of Union law.

5.3.3. OBJECTIVE OF COMMON INTEREST

(288) As explained in Section 3.3.2 of the Opening Decision, the measure must aim to achieve a well-defined objective of common interest. When an objective has been recognised by the Union as being in the common interest of the Member States, it follows that it is an objective of common interest.

(289) The Commission noted that the measure entails specific support for nuclear technology. In this regard, the Commission noted that Article 2(c) of the Euratom Treaty provides that the Union shall 'facilitate investment and ensure, particularly by encouraging ventures on the part of undertakings, the establishment of the basic installations necessary for the development of nuclear energy in the Community'.

(290) The Commission considered that the investment aid to Paks II envisaged by Hungary aimed at promoting nuclear energy could, therefore, be viewed as pursuing the objective of common interest by promoting new nuclear investments.

(291) Several interested parties have submitted comments claiming that the investments in nuclear energy by Hungary under the Euratom Treaty cannot be considered an objective of common interest.

(292) The Commission, however, finds that the provisions of the Euratom Treaty were expressly confirmed by the Treaty of Lisbon and therefore, the Euratom Treaty cannot be considered an outdated or antiquated Treaty without applicability. The parties to the Lisbon Treaty considered that it is necessary that the provisions of the Euratom Treaty continue to have full legal effect ([130]). The preamble of the Euratom Treaty recognises that the conditions necessary for the development of a powerful nuclear industry should be created. As recognised in previous Commission decisions ([131]), the Commission concludes that the promotion of nuclear energy is a key objective of the Euratom Treaty, and therefore the Union. As set out in the preamble to the Euratom Treaty, the Commission is an institution of the Euratom Community and is obliged to 'create the conditions necessary for the development of a powerful nuclear industry which will provide extensive energy resources'. This obligation should be taken into account in exercising its discretion to authorise State aid in accordance with Article 107(3)(c) and Article 108(2) TFEU.

(293) Furthermore, although the development of nuclear energy is not mandatory for Member States, and some Member States have chosen not to construct and develop nuclear power plants, the promotion of nuclear investments can be considered to be an objective of common interest for the purposes of State aid control. In fact, many objectives acceptable and recognised under State aid rules and in practice, such as regional development, are relevant to only one or a few Member States.

([129]) See paragraph 8 of Act LXXXVI. of 2007 on the Act of Electricity.
([130]) Protocol No 2 to the Treaty of Lisbon.
([131]) See Commission Decision 2005/407/EC of 22 September 2004 on the State aid which the United Kingdom is planning to implement for British Energy plc (OJ L 142, 6.6.2005, p. 26) and Commission Decision (EU) 2015/658 of 8 October 2014 on the aid measure SA.34947 (2013/C) (ex 2013/N) which the United Kingdom is planning to implement for support to the Hinkley Point C nuclear power station (OJ L 109, 28.4.2015, p. 44).

(294) The Commission therefore concludes that the measure envisaged by the Hungarian authorities pursues the objective of promoting new nuclear investments as enshrined in the Euratom Treaty.

(295) Following the Opening Decision, the Hungarian authorities submitted updated information from TSO studies which take imports and the evolution of demand into account. According to the study issued by MAVIR referred to in recital 50, the Hungarian market requires at least 5,3 GW of additional new electricity generation capacity by 2026 and somewhat more than 7 GW by the end of the forecast period in 2031. The Commission therefore finds that the measure aimed at promoting nuclear energy pursues an objective of common interest enshrined in the Euratom Treaty, while also contributing to security of electricity supply.

5.3.4. NECESSITY OF THE AID AND MARKET FAILURE

(296) The Commission recognised in the Opening Decision that nuclear energy is characterised by extremely high fixed sunk costs, and by very long time periods during which such costs need to be amortised. This suggests that investors considering entering the nuclear energy generation sector will find themselves exposed to considerable levels of financing risks.

(297) The Commission requested information regarding potential new nuclear investments (without State support), the timelines (given the specifics of the Hungarian electricity market), their expected development, as well as market modelling in that respect in order to assess whether there were any market failures that could affect new investments in nuclear projects in Hungary and what those projects would be.

(298) As explained in recital 129 of the Opening Decision, in order to determine whether State aid is necessary, the Commission has to determine whether the measure is targeted towards a situation where the measure could bring about a material improvement that the market alone cannot deliver, for example by remedying a well-defined market failure.

(299) The existence of a market failure is part of the assessment as to whether State aid is necessary for achieving the objective of common interest pursued. In the case at hand, Hungary pursues the promotion of new nuclear investments as enshrined in the Euratom Treaty in order to address the gap in the overall national installed capacity it will soon be facing. Therefore, the Commission has to assess whether State aid is necessary for achieving the objective of promoting new nuclear investments.

(300) In this respect, the Commission recalls the comments of interested parties as regards whether the Commission should assess if investments in electricity generation in general are characterized by a market failure. Some interested parties note that no market failure would exist for such investments and that the current low wholesale electricity price would merely be a response to the normal functioning of the market. Other interested parties put forward the argument that the Commission should define the relevant market on which the existence of a market failure is assessed as the liberalised internal market in electricity. Moreover, if there was a market failure on this relevant market, it would not be best addressed by a nuclear power plant.

(301) However, in its assessment of the necessity of the aid, the Commission examines whether the objective in the common interest could be achieved without State intervention or whether a market failure prevents this. In assessing the necessity of the aid, it is not necessary for the Commission to first define a relevant market. To establish whether a market failure exists, the Commission must first determine what objective in the common interest is being pursued by the Member State. The common interest objective of this measure does not concern the internal market in electricity in general or investments in electricity generation in general; rather it concerns the promotion of new nuclear investments, as enshrined in the Euratom Treaty, which are, of course, undeniably part of the electricity market and will help deal with Hungary's future gap in its overall installed capacity. Secondly, the Commission must investigate whether the free interplay of supply and demand on the electricity market in general ensures that that objective of new nuclear developments can be achieved without State intervention. The definition of a particular market is not necessary in that regard.

(302) The Commission has therefore assessed whether a market failure exists as regards the objective of promoting new nuclear investments in Hungary and whether it is a general feature of the Hungarian market or a specific feature related to nuclear energy alone.

(303) In Section 5.1.1.4 of this Decision, the Commission concluded that the project would not produce sufficient returns to cover the costs of a private investor who could only obtain financing at market prices as the expected IRR of the investment is lower than a market-based benchmark WACC for the project and a rational private investor would therefore not invest under such conditions without additional State support.

(304) Having regard to investments in nuclear energy, Hungary acknowledges that that technology is characterised by extremely high front loaded investment costs and by very long waiting times before investors are remunerated.

(305) The Opening Decision already contained a description of the Hungarian electricity market and the rationale behind the decision of Hungary to pursue a new nuclear power plant project, in particular given that it is estimated that the existing power plants will soon retire. As explained in recital 14 of the Opening Decision, the Feasibility Study developed by MVM Group exploring the implementation and financing of a new nuclear power plant was based on assumptions that in Hungary, 6 000 MW of the 8-9 000 MW gross installed capacity was anticipated to disappear by 2025 due to the shutdown of obsolete power plants.

(306) As explained in recitals 15 and 45 of the Opening Decision the Hungarian TSO, MAVIR, projected a significant gap in the future overall installed capacity in Hungary ([132]). Pursuant to the latest information available, as referred to in recital 50 of this decision, the new estimates point to an overall capacity need of over 7 GW by 2031. According to the Hungarian authorities, current local power production will therefore increasingly fail to satisfy the growing energy demand, and thus, Hungary will inevitably experience a gap between electricity demand and supply and an increasing dependence on power imports and increasing power prices for end consumers if no new investments in power generation facilities are made. The 2,4 GW Paks II project will contribute to fulfilling this requirement.

(307) The Hungarian authorities had further pointed to MAVIR's finding that despite the large capacity gap identified, relatively little new capacity is being built in Hungary, as explained in recital 46 of the Opening Decision and Table 2 of recital 51 of this Decision. The Commission therefore questions whether any market failure applicable to new nuclear investments in Hungary is specific for such types of investment.

(308) The Commission notes that new nuclear investments in Europe are characterised by uncertainties and in some cases, State support measures could be planned. The Commission has looked into the information submitted by Hungary as regards new nuclear projects in Finland, France and Slovakia which were claimed to be funded on market basis. Hungary claims that market funding of those projects would exclude the existence of a market failure for nuclear projects (at least for some Member States). The Commission notes, however, that in Slovakia, France and in the case of Olkiluoto 3 in Finland, the decisions to invest for the projects were made before the economic crisis in 2008 and before the Fukushima disaster, two events which may have significantly affected the parameters for investment. Furthermore, the investments in Finland are based on the Mankala business model ([133]) where the Finnish investors obtain all electricity output at cost price. The Mankala model gives the opportunity for the many shareholders who are part of the investing cooperative to share the risks involved, rather than have one or few major shareholders assume the entire risk of pursuing a project of constructing a nuclear power plant.

(309) Hungary argued that Paks II should be compared with the Hanhikivi-1 project in Finland which is a project to be built by Fennovoima. The Commission notes that the Hanhikivi-1 project, besides having a Mankala business model, also has a shareholding of 34 % belonging to the constructor of the plant, Rosatom. The Commission is not in

([132]) A magyar villamosenergia-rendszer közép- és hosszú távú forrásoldali kapacitásfejlesztése (Medium- and long-term development of generation assets of the Hungarian electricity system): https://www.mavir.hu/documents/10258/15461/Forr%C3%A1selemz%C3%A9s_2016.pdf/462e9f51-cd6b-45be-b673-6f6afea6f84a (Mavir, 2016).

([133]) Mankala is a widely used business model in the Finnish electricity sector, whereby a limited liability company is run like a zero-profit-making cooperative for the benefit of its shareholders. Available at: http://www.ben.ee/public/Tuumakonverentsi%20ettekanded%202009/Peter%20S.%20Treialt%20-%20Mankala%20principles.pdf, accessed on 26 October 2015.

a position to compare the two projects which appear to have a different risk profile, at least in terms of shareholding. Hungary, as an investor, would assume the risk of the Paks II project alone, whereas the Mankala investors will share the burden. Moreover, the constructor of the plant, as direct shareholder in the Hanhikivi-1 project, may behave differently in the Paks II project where it is held liable solely by the EPC contract not as an investor or shareholder.

(310) Therefore, nuclear projects that are already being constructed would appear not to represent good benchmarks for assessing whether any market failures exist in new nuclear investments.

(311) In addition, Hungary submitted information about plans in other Member States to develop new nuclear power plants: Lithuania, Romania, Bulgaria and Czech Republic. Those plans appear, however, to be either governed by uncertainty, still under negotiation as regards the necessary support measures and financing structure ([134]) or envisage covering price risk by way of contracts for difference ([135]). Given that those plans do not yet seem to have materialised, they do not seem to constitute a valid indicator for assessing the existence of a market failure.

(312) A study performed by ICF Consulting Services for the Commission Directorate for Economic and Financial Affairs on the Impact Assessment of the Euratom Loan Facility ([136]) ('the ICF study') finds that nuclear projects have certain unique characteristics which can make their financing particularly challenging. Those features include: the high capital cost and technical complexity of nuclear reactors which present relatively high risks during licensing, construction and operation; the long payback period; the often controversial nature of nuclear projects which gives rise to additional political, public and regulatory risks; and the need for clear approaches and financing schemes for radioactive waste management and decommissioning. Beyond the traditional challenges associated with financing, the ICF study finds that nuclear power plant developers face heightened scrutiny and conservatism from prospective financiers, due to current market conditions, namely the continuing effects of the global financial crisis of 2008, the Fukushima accident, Eurozone troubles, and Basel III. The challenges in financing have placed a renewed focus on project risk ([137]). The ICF study finds, on the basis of the opinions expressed by stakeholders consulted during that study, that the financing challenges derive less from the lack of availability of private sector finance but rather from the fact that the risks associated with such investments are too high compared to the alternative investment opportunities (namely in conventional and renewable energy infrastructure). The ICF study concludes that financing nuclear technology is consequently unattractive, resulting in a gap between the level of investment required and what the market is willing to provide.

(313) The financial risks related to new nuclear developments comprise: development and project preparation risk, construction risk, market and revenue risk, policy risks and regulatory risks. The ICF study finds that the risks specific to nuclear energy, by comparison with other types of electricity generation, concern safety standards required for nuclear which means higher construction costs and higher operation costs compared to other energy technologies and the average life cycle of a nuclear power plant which is significantly longer than comparable infrastructure investments, thus giving rise to associated financial risks. This finding is in line with the findings of the Commission in the assessment of State aid to Hinkley Point C ([138]).

(314) In the opinion of the stakeholders consulted for the study, market risks are the main obstacle preventing investments in nuclear. As regards market risks, the ICF study finds that compared to conventional energy sources which can be operational and generate revenue within 3 years, nuclear power plants take longer to construct and become operational in order to generate revenue. A longer plant lifetime also means that returns are earned over the longer

([134]) As regards Czech Republic see: http://www.world-nuclear.org/info/country-profiles/countries-a-f/czech-republic/, accessed on 26 October 2015, as regards Lithuania see: http://www.world-nuclear.org/info/Country-Profiles/Countries-G-N/Lithuania/, accessed on 26 October 2015, as regards Bulgaria see: http://www.world-nuclear.org/info/Country-Profiles/Countries-A-F/Bulgaria/, accessed on 21 June 2016.

([135]) As regards Romania see: http://economie.hotnews.ro/stiri-companii-20436128-nuclearelectrica-solicita-actionarilor-aprobarea-memorandumului-intelegere-care-semna-companie-chineza-pentru-construirea-unitatilor-3-4-cernavoda.htm, accessed on 21 June 2016.

([136]) Study from 2 November 2015, not yet published, p. 35.

([137]) Study from 2 November 2015, not yet published, p. 35.

([138]) SA.34947 (2013/C) (ex 2013/N) — United Kingdom — Support to the Hinkley Point C Nuclear Power Station.

term, as opposed to the short to medium term on investments in conventional energy sources. Since it is difficult to accurately forecast energy prices over a long timescale, investors rely on projections of future fossil fuel prices, the penetration of renewables in the sector and the access of renewables to the grid conditions and the future carbon price ([139]). While fossil fuel prices are set by the market and are intrinsically uncertain, the carbon price is, to some degree, determined by policy. The ICF study finds that there is uncertainty as to whether the carbon price will be sufficiently high in the future to ensure the competitiveness of non-fossil technology, including nuclear energy.

(315) In addition, the Commission takes note that there is generally great uncertainty about electricity prices in the long run since future prices in upstream markets for gas, coal and oil, as well as the future policies on renewables, nuclear and emission trading, will all influence future electricity prices and are very difficult to predict. That conclusion is also supported by the status of similar projects in the Union, where the certainty of revenue flow and ensuring an output for the electricity was crucial in taking investment decisions. Moreover, the current trend towards lower electricity prices in Europe and an increased need in electricity markets for the flexible generation of energy adds to the uncertainty regarding the future revenue flow of a nuclear power plant which produces an inflexible base-load.

(316) The ICF study also identifies an additional element of market risk covering the creditworthiness of the developer/utility responsible for the project and the Member State financially supporting the project. Creditworthiness affects the costs of finance and could make it too high for private investments.

(317) The ICF study also finds that the lengthy financial and initial design lifespan of nuclear power plants may make them open to risks deriving from public and political support shifts, thus affecting the commercial and financial viability of nuclear projects. Investors, therefore, look for reassurance and certainty that once built, the energy contract or estimated operational life of the plant will be fulfilled. Investor concerns are also linked to regulatory standards which can change during the life cycle of a nuclear power plant and could require additional capital investments or an increase in operational costs. Investors are wary of financing such projects unless sufficient contingency for safety improvements is made. This is particularly important when a nuclear power plant reaches the end of its normal life and is undergoing life extension, requiring a new license for which additional conditions must be met ([140]). Stakeholders consulted indicated that the political and regulatory risk was the third most important obstacle to investment in nuclear power plants.

(318) The study finds that market liberalisation can also have a negative impact on the level of investment in nuclear energy compared to other energy technologies due to the larger investment required. The regulatory framework in each Member State has a role to play as it affects the ability of the utility provider to generate profits and therefore affects the value of the company and its ability to finance nuclear development from its balance sheet or through long term loans from financial institutions. Another financing obstacle for new nuclear investments regards the latest Basel III committee rules on capital markets which increase the capital which must be held by banks to underpin long-term loans such as loans for the development of nuclear power plants ([141]).

(319) Those findings would be in line with the submissions of the Hungarian authorities who argue that private sector companies, as well as State budgets, have a limit with regard to the financial exposure they can take on individual projects with large funding requirements, long construction periods and risks regarding delivery and commission in the absence of protection against construction that runs over time or budget. Investment track record is higher in the oil and gas sector than amongst utilities, especially following the recent deterioration in those companies' valuations. If they do invest, it is also customary for utilities to invest alongside their peers in order to share risks.

([139]) Study from 2 November 2015, not yet published, p. 37.
([140]) Study from 2 November 2015, not yet published, p. 38.
([141]) Study from 2 November 2015, not yet published, p. 39.

(320) Modelling performed for the purposes of the ICF study shows that overall, nuclear power plant investments lack competitiveness up to 2030, but this lack of competitiveness decreases decidedly from 2040 onwards. In the worst case scenario of an adverse economic climate, however, new investments will be nearly absent over the whole period ([142]). It is also found by the ICF study that the market provides more competitiveness after 2030 as carbon and energy prices continue to increase after 2030. The ICF study uses sensitivity modelling to assess the evolution of the carbon price and its influence of investments in nuclear power plants. That study finds that none of the carbon price scenarios would hypothetically succeed in making nuclear profitable in the period 2020-2025.

(321) Moreover, information from credit rating services ([143]) made public shows that the construction of new nuclear power plants is generally credit negative while exiting the nuclear sector has been proven to be credit positive for utilities.

(322) The modelling and findings of the ICF study apply also fully to the market situation in Hungary which, as explained above in recitals 305 and 306, is expected to face a significant gap in the future overall installed capacity in Hungary. Considering the elements set out in this Section 5.3.4, the Commission therefore finds that there is a financing market failure affecting new nuclear investments which applies also to new nuclear investments in Hungary.

(323) It could, of course, be argued that in this Decision, the main risks related to the development, project preparation and construction are mitigated, at least to a certain extent, by the turn-key EPC Contract. However, this still does not mitigate market and revenue risks as well as policy and regulatory risks as regards the Paks II project. The measure appears, therefore, to be necessary for achieving the objective of promoting new nuclear investments in Hungary.

5.3.5. APPROPRIATE INSTRUMENT

(324) The Commission must determine in its assessment whether the proposed measure is an appropriate policy instrument to address the objective of common interest of the promotion of nuclear energy.

(325) The measure takes the form of an investment measure granted by the Hungarian State to Paks II for the development of the project. Hungary confirmed that it would not plan to grant any operating support to Paks II during its operation and that State aid would only cover the investments costs for the completion of the project.

(326) Following the Opening Decision, Hungary did not provide any information on potential alternative instruments that could incentivise new investments in nuclear energy.

(327) Other policy instruments and schemes, such as preferential loans or tax reductions would, in the Commission's view, not be sufficient to achieve the same result, given the specifics of the project and the magnitude of the necessary financial and other resources as well as the potential market failure identified.

(328) Consequently, the Commission considers that the measure would constitute an appropriate instrument for the construction of the two new reactors of Paks II.

5.3.6. INCENTIVE EFFECT

(329) In order for the measure to have an incentive effect, it must change the behaviour of the undertaking concerned in such a way that it engages in additional activity which it would not carry out without the measure or which it would carry out in a restricted or different manner.

(330) The Commission notes that Paks II is a company which was incorporated by the State for the single objective to develop and operate Units 5 and 6 of the nuclear power plant. As described in recitals 12, 26 and 27 above, the Hungarian State decided to provide the financial contribution to Paks II in order to carry out this objective.

([142]) Study from 2 November 2015, not yet published, p. 60.
([143]) Moody's Investor Service, Nuclear Generation's Effect on Credit Quality, available at: https://www.oecd-nea.org/ndd/workshops/wpne/presentations/docs/2_2_LUND_OECD_Sept%2019_Lund_Moodys_Nuclear_Generations_effect_on_Credit_Quality.pdf, accessed on 13 July 2016.

(331) In this respect, the Commission notes that the project would not go ahead either as the required financial and other resources would neither be available nor accessible to the beneficiary, who has no other revenue generating activities and whose capital structure is provided and designed entirely by the State. This was confirmed in the formal investigation, where the Commission found that the project would not produce sufficient returns without the support of the Hungarian State (see analysis in Section 5.1.1 of this Decision).

(332) Therefore, the State aid incentivises the achievement of the objective of common interest by way of the development of the nuclear power plant.

5.3.7. PROPORTIONALITY

(333) To assess the proportionality of a measure, the Commission must ensure that a measure is limited to the minimum that enables the successful completion of the project for the attainment of the common objective pursued.

(334) In the case in hand, the beneficiary would receive a financial contribution for the construction of generation assets without facing any risk linked to refinancing costs which other market operators would face.

(335) Various observations received by the Commission argue that as the project will be carried out without a call for tender, it cannot be determined whether measure to cover the total costs would be limited to the minimum required to realise the project.

(336) The Commission notes that State aid rules do not require a tender to estimate costs and revenues. A tender is only one of several means by which an estimation can be carried out. Therefore the fact that Hungary did not select Paks II as the beneficiary of the measure as a result of a tendering process does not, in and of itself, constitute overcompensation.

(337) As regards the allegations that the Hungarian authorities did not investigate the minimum support for making the project accomplishable and chose to finance the project in its entirety, the Commission indeed considers that due to the market failure present, the entirety of the financing for the construction of the two new reactors of Paks II is to be regarded as State aid as confirmed in Section 5.1 of this Decision.

(338) As regards the possible overcompensation of the beneficiary because of the measure, the Commission recalls its economic analysis in Section 5.1 which draws the conclusion that the project would not be profitable on its own as the expected IRR would not exceed the market WACC as the generated revenues are expected to fall short of covering the initial and subsequent costs of the project, even under fairly optimistic scenarios. In its assessment, the Commission estimated the level of IRR based on market price forecasts and other parameters considered market conform. When determining this gap between the cost of capital and the returns, the Commission has therefore fully taken into consideration the contribution which commercial revenues (sale of electricity) are expected to make to the viability of the project. In fact, the expected costs of the project have been compared with the expected returns whereas no additional State resources are envisaged by Hungary.

(339) Due to the fact that the cost of capital for the project is higher than the expected returns, the Commission is of the view that the State aid granted by Hungary is, in its entirety, necessary and proportionate for the construction of the project and that overcompensation is excluded in this respect. As it was confirmed by Hungary, no additional support is granted for the phase of operation.

(340) In this regard, as explained in recitals 96 and 97, Hungary committed that Paks II will use the State resources only for the project and any surplus generated would be channelled back to the State budget. In the view of the Commission, that commitment rules out any use of state resources giving rise to additional profits for Paks II going beyond what is necessary to ensure the economic viability of the beneficiary and ensures that the aid is limited to the minimum.

(341) Other observations stress that State aid would not only be limited to the implementation of the investment but that it would also be granted in the operational phase, which could lead to an overcompensation of Paks II. In this regard the Commission recalls that Hungary has indicated that it would not provide any additional State support to the notified measure in question. Additionally, the Commission recalls that according to the additional information submitted by Hungary on 28 July 2016, any new support to Paks II would, in any event, be subject to State aid approval.

(342) The Commission examined whether any overcompensation could occur if the beneficiary of the measure, realised, during the operation of reactors, returns which turn out to be higher than those estimated by the Commission in its IRR calculations (see Section 5.1). In particular, the Commission examined what would happen if Paks II could reinvest any profits that are not paid to the State in the form of dividends to develop or purchase additional generation assets and thus strengthen its position on the market. To this extent, the Commission notes that pursuant to the additional information submitted by Hungary on 28 July 2016 (see recital 96), the beneficiary cannot reinvest in the extension of Paks II's own capacity or lifetime or in the installation of additional generation capacities, other than those of reactors 5 and 6 which are subject to this Decision.

(343) Bearing in mind the elements set out in this Section 5.3.7, the Commission is of the opinion, particularly in light of the additional information of the notification referred to in recitals 96 and 97, that the beneficiary should recompense the State for having made available the plant and should not retain extra profits beyond what is strictly necessary to ensure its economic operation and viability. Consequently the measure is proportionate.

5.3.8. POTENTIAL DISTORTIONS OF COMPETITION AND EFFECT ON TRADE AND OVERALL BALANCING

(344) For the measure to be compatible with the internal market, the negative effects of the measure in terms of the distortion of competition and impact on trade between Member States must be limited and outweighed by the positive effects in terms of contribution to the objective of common interest. In particular, once the objective of the measure has been established, it is mandatory to minimise the potential negative effects of the measure on competition and trade.

(345) In the Opening Decision, the Commission identified three ways of possible distortions of competition. First, an increase of possible market concentration as a result of the merged future ownership and operation of the currently running Paks NPP and Paks II. Secondly, the Commission had doubts as to whether the new base-load capacities characterised by a high load factor may serve as a barrier to entry for new market players and displace further down the merit curve a certain amount of existing higher cost generation capacity. In this respect, the Commission has examined the following parameters: (i) the measure's potential effects in the Hungarian market; (ii) the measure's potential cross-border effects (iii) the potential effects of the parallel operation of Paks NPP and Paks II. Finally, a potential distortion was detected insofar the Commission suspected that Paks II might cause a certain wholesale market liquidity risk by limiting the number of supply offers available in the market.

5.3.8.1. ***Increase of possible market concentration***

(346) Following the Commission's expressed doubts on possible market concentration in the Opening Decision, some allegations by interested parties also refer to a possible merger of Paks II and the operator of the currently running four units in Paks NPP. This was denied by the MVM Group and Paks II as well as the Hungarian State.

(347) The Commission notes that the Hungarian electricity generation market is characterised by a relatively high market concentration with the current nuclear power station Paks NPP (MVM Group) providing some 50 % of domestic generation. Such market concentrations could be detrimental to efficient market competition as it may serve as a barrier to entry for new market players and may pose a liquidity risk by limiting the number of supply offers available.

(348) The two new nuclear reactors of Paks II are planned to become operational at a time when the existing four nuclear reactors have not yet been phased out. The Commission pointed out in the Opening Decision that unless the operators of Paks NPP and Paks II are held entirely separately and can be considered independent and unconnected this could have a distortive impact on the Hungarian market.

(349) The Commission accepts that Paks II is currently legally independent from the MVM Group. However, the Commission was concerned that such legal separation was insufficient or that it might not be maintained without additional guarantees in this respect. The Commission was also concerned of future possible links of Paks II with State controlled companies active in the field of energy which could have reinforced their influence on the Hungarian energy market.

(350) Firstly, the Commission notes that the objective of the Hungarian measure is the gradual replacement of the existing nuclear capacities at Paks NPP between 2025 and 2037. It is indeed expected that there would be a period of time when all the four reactors currently in use would run in parallel with those of Paks II; this period shall be limited to a period between 2026 and 2032, however, and with the retirement of all its nuclear capacities by 2037, MVM Group's market share would significantly decrease.

(351) Secondly, the Commission recalls (see recital 102) that Hungary submitted that the MVM Group and Paks II are independent and unconnected on the following grounds:

(a) They are managed by different government departments (the MVM Group by the Ministry of National Development through the Hungarian National Asset Management Inc. and Paks II by the Prime Minister's Office);

(b) There are no shared or common directorships on the governing board of each company;

(c) There are existing safeguards to ensure that commercially sensitive and confidential information are not exchanged between the companies;

(d) The decision making powers of each company are separate and distinct from one another.

(352) This was also reiterated by the MVM Group who stressed that MVM Group and Paks II are two separate power generation companies, like any other competitors, and there is no reason to assume any coordination or activities or that the two companies would be combined. Moreover, the MVM Group argues that its own strategy includes possible investments that may compete with Paks II into the future.

(353) Thirdly, the Commission recalls the additional information submitted by Hungary and referred to in recital 117, according to which Paks II, its successors and affiliates will be fully legally and structurally separated within the meaning of paragraphs 52 and 53 of the Merger Jurisdictional Notice, and will be maintained, managed and operated independent and unconnected from the MVM Group and all of its businesses, its successors and affiliates and other State controlled companies active in the generation, wholesale or retail of energy.

(354) The Commission is satisfied that this additional information addresses all its concerns as regards possible future concentrations and links between incumbent energy entities on the Hungarian electricity market. There is no possibility for Paks II to be now linked to either MVM Group or other energy State controlled companies and thus there is no possibility for it to increase its market influence during the operation of the currently running four units in Paks NPP and beyond.

5.3.8.2. ***Barrier to entry for new market players***

(355) As regards the Commission's doubts on whether the new capacities may serve as a barrier to entry for new market players, some observations stressed that NPP's are deployed to cover high base load capacity that is given priority when being fed into the grid and thanks to their low operating costs they are also better positioned on the supply side of the market.

(356) The Commission has analysed the competition impact of the measure on other market players in the Hungarian market as well as in neighbouring markets. It has also looked specifically at the term of the parallel operation of the currently running four units of Paks NPP and Paks II, i.e. the envisaged period between 2026 and 2032.

(a) *The measure's potential effects in the Hungarian market*

(357) The Commission recalls that the operation of units 5 and 6 of Paks II is intended to compensate for the loss in capacity when units 1-4 of Paks NPP which will retire gradually until the end of 2032, 2034, 2036 and 2037 respectively, without envisaged prospect of further lifetime extension (see recital 10). The two new units 5 and 6 of Paks II are meant to start operation in 2025 and 2026 respectively. This evolution of nuclear capacities is also assumed in the study issued by MAVIR in 2016 (see recital 20).

(358) The Commission recalls that the electricity currently generated by Paks NPP provides 36 % of Hungary's overall electricity consumption, which will decrease in view of the expected growth in demand mentioned in recital 50, and the production output of Paks II is expected to produce a similar output once Paks NPP has been phased out.

(359) Taking into account the capacity replacement nature of the Paks II project, the Commission notes that once all four units of Paks NPP have been phased out in 2037, the forecast future gap in overall national installed capacity envisaged by the TSO, as explained in recital 50, would return to previous levels (see also Figure 7 of recital 108), i.e. the 2,4 GW capacity of Paks II will not lead to long term increase in the total level of installed nuclear capacity in Hungary.

(360) The Commission also notes that the list of ongoing investments or approved new investments in electricity generating installations is rather short (see Table 2 in recital 51). Considering these data, the Commission considers that Hungary will remain a significant net importer following the phase out of the four units of the currently running Paks NPP.

(361) As explained above in recital 93, Hungary submitted that, according to NERA's analysis, in the absence of the notified measure, the 2,4 GW capacity provided by Paks II would instead be provided by commercial OCGTs and CCGTs. Even with Paks II, there will be room in the market for new gas or other capacity. The NERA Study suggests that despite replacing most of the capacity of the Paks II plant with new gas capacity in Hungary, Hungary would remain heavily dependent on electricity imports.

(362) As regards the deployment of possible technologies besides Paks II, the Commission recalls Hungary's claim that the current and historical entry decisions of renewable plant depend crucially on government subsidy programmes, rather than market prices (see recital 107(a)). The Commission acknowledges that Hungary's National Energy Strategy ([144]) foresees renewable energy in its energy mix in accordance with the Union's 2020 climate and energy package ([145]), the national renewable targets sets out in the Renewables Energy Directive ([146]) and the key targets of 2030 climate and energy framework ([147]). The Commission notes that the variable costs ([148]) of renewable technologies are traditionally lower due to their fuel-independent nature than those of nuclear technology. In addition, in view of the mentioned European and national renewable targets and obligations, Hungary is not an exception from deploying support mechanisms in order to bring online new power plants which generate electricity from renewable sources. The Commission notes that a part of Hungary's renewable scheme called METÁR has been operational since January 2017 ([149]), whereas other parts of the scheme related to larger producers from renewable sources are currently pending for State aid approval before the Commission.

(363) The Commission recalls that according to the study issued by MAVIR in 2016 (see recital 20), the current coal (lignite) generation fleet (see Figures 1 and 2 of recital 43) will have gradually retired between 2025 and 2030 which would allow additional installations to come online, especially as the intermittent technologies mentioned in recital 362 would require the coexistence of complementary, flexible capacities too.

(364) The Hungarian measure is designed as an investment support and once the generating units have started operating, no further operating support will be granted to Paks II, therefore it will be exposed to market risks.

([144]) See recital 20.
([145]) http://ec.europa.eu/clima/policies/strategies/2020/index_en.htm
([146]) Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (OJ L 140, 5.6.2009, p. 16).
([147]) http://ec.europa.eu/clima/policies/strategies/2030/index_en.htm
([148]) Variable costs of an electricity generating unit are those which typically determine the final price of one unit of electricity generated.
([149]) Reported to the Commission under SA.47331 (2017/X) pursuant to the General Block Exemption Regulation (Commission Regulation (EU) No 651/2014 of 17 June 2014) declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty (OJ L 187, 26.6.2014, p. 1).

(365) Electricity prices are mainly determined by the marginal costs of the generators participating in a certain market. Renewables technologies have low marginal costs as most of them can operate without fuel costs. Nuclear technology also has low running costs and follows the renewables in the ranking of the so called merit order. Although due to their fuel costs, coal plants run typically at a more expensive marginal cost rate than nuclear power plants, however, for low carbon permit prices, the running costs of a coal plant are typically lower than those of a CCGT plant. This means that technologies of higher operating costs can increase prices, therefore the presence of nuclear power in the energy mix, in itself, is not expected to increase the electricity price in Hungary and nuclear power will be a price taker rather than a price maker.

(b) *The measure's potential cross-border effects*

(366) Both Hungary and several interested parties pointed out that the energy market to be assessed is larger than the individual State's territory, mainly given the very good interconnection level and that the measure entails competition distortions that affect, at least, Member States close to Hungary.

(367) The Commission notes that, as shown by Figure 5 in recital 49 of this Decision, the import-export balance of Hungary's electricity trade is negative towards almost all the neighbouring Member States. The Commission also takes note of the fact that Hungary is an overall net importer, Figure 1 in recital 43 shows that approximately 30 % of the country's demand derived from imports in 2015 amounting to around 13 TWh. The Commission recalls that, as it was explained in Figure 2 in recital 43 of the Opening Decision, the level of import was at the same height in 2014.

(368) The Commission considers that Hungary is a highly integrated electricity market within the European Union, with interconnection capacity standing at approximately 75 per cent of total installed domestic generation capacity. In addition, as shown in Tables 4 and 5, of recital 105, interconnection capacities will significantly increase by 2030 which would allow trade flows to continue to reach the Hungarian price region.

(369) What is explained above in recital 365 is viewed true in a cross-border context as well. The construction of Paks II will create a downward price pressure on the Hungarian market in future because the marginal cost of power produced by Paks II is relatively low cost compared to the alternative OCGT and CCGT capacity that would otherwise be constructed in NERA's view. However, the NERA study has demonstrated that Paks II will remain a price taker, and prices in Hungary will continue to be set at higher levels by other plants. Therefore imports to Hungary will continue to be profitable.

(370) The Commission has taken into account the submissions of Hungary regarding Paks II's possible effects in a wider market context. As it is explained in recital 112, NERA's assessment on the immediate neighbouring markets with which Hungary is currently market-coupled (Hungary + Slovakia + Romania) shows that the combined market shares of MVM Group and Paks II in the coupled market of Hungary + Slovakia + Romania would not exceed 20 % (see Figure 10 of recital 112).

(371) As regards other neighbouring markets, the effects of the new Paks II are expected to be less significant due to the lack of market coupling with those price zones as well as the more limited (existing and planned) interconnection capacities towards those Member States (see Tables 3 and 4).

(c) *The potential effects of the parallel operation of Paks NPP and Paks II*

(372) As explained in recitals 98-99 as well as in recitals 241-244 the construction of nuclear power plants is prone to delays for several reasons which increase construction times. The Commission acknowledges that there is already a significant delay in the implementation of the project compared to the original schedule, […]. Additionally, as it is visible from Table 3 in recital 99, the technology offered by JSC NIAEP suffers an average of 2 years in delays in Russia, the home market of the contractor, where it has built the majority of its plants. These delays are significantly higher when the project is carried out outside Russia (in India, up to 7 years). Hungary submits that Paks II is expected to be the first nuclear power plant with VVER III+ technology commissioned in the EU, where the highest

nuclear safety requirements shall be fulfilled and the technically non-exempted part of the project shall be procured in line with EU procurement requirements. It is reasonably expected that this might cause additional delays. Therefore, in the Commission's view, the length of the originally identified 6 years parallel operation period of all four units of Paks NPP and both units of Paks II is expected to decrease significantly. In addition, a certain overlap of the operation of the existing and the new units — realistically rather limited in time for the reasons just set out-, while creating an obvious impact on the domestic market, may be considered proportionate in view of the objectives of security of supply and the need to carefully prepare the decommissioning of the units of Paks NPP, taking into account that the nuclear generation capacities constitute more than 50 % of the domestic electricity generation in Hungary.

(373) In any event, the Commission recalls the findings of the NERA Study (see in particular Figure 7 of recital 108) which shows that even during the parallel operation of Paks NPP and Paks II (between 2025 and 2037) the expected growing national peak demand will not be solely satisfied from domestic power plants as the additional renewable and gas capacities' overall power output together with those of nuclear will remain below the projected domestic demand (indicated with a black line in Figure 7). The study considers that his is mainly because Hungary is currently in a supply deficit and must import significant amounts of electricity. NERA explains that this deficit is identified to widen further between 2015 and 2025 as electricity demand in Hungary is expected to grow significantly until 2040 and Hungary's second largest constantly functioning power plant (Mátra Power Plant — see Figures 1 and 2 in recital 43) is expected to close between 2025 and 2030, as envisaged by the TSO's study (see recital 20).

(374) Consequently the system will require domestic or imports capacities additional to the mentioned nuclear, renewable and gas fired ones to meet the domestic demand as well as to ensure system stability against expected capacity shortages. Additional capacities are also required for the mandatory reserve creation prescribed by ENTSO-E (see recital 50).

(375) In addition, the Commission recalls that, as explained in recital 105, Hungary's already high level of interconnection with neighbouring countries will continue to increase as a result of new interconnectors which will become operational between 2016 and 2021 between Slovakia (2 × 400 kV and 1 × 400 kV) and Slovenia (1 × 400 kV), i.e. long before the two new units of Paks II will have come online. The Commission considers that these new interconnectors referred to by Hungary are likely to improve the availability of cross-border commercial flows, in particular those from imports.

(376) As described in recital 369, the Commission also took into account the findings of the NERA Study according to which nuclear technology is expected to remain a price taker rather than a price maker even during the overlapping operating period of Paks NPP and Paks II when the Probability of nuclear being the price setting technology will stay below 5 % in all hours (see Figure 11 of recital 113).

5.3.8.3. ***Wholesale market liquidity risk***

(377) As seen in Section 2.6, the most common transactions of the Hungarian wholesale power sector are concluded via bilateral PPAs and the HUPX has not yet triggered an adequate level of liquidity. The Commission had initial doubts insofar as, in a scenario where a dominant supplier (MVM Partner) and a significant amount of new generation capacity (Paks II) are owned by the same entity (Hungarian State), markets could become less liquid as the players involved could limit the number of supply offers available in the market.

(378) The Commission also considered that depending on the way the electricity produced by the new reactors is sold on the market, liquidity could be significantly affected and the costs borne by downstream rivals may be increased by restricting their competitive access to an important input (input foreclosure). This could happen if the electricity produced by Paks II would be sold primarily by way of long term contracts to only certain suppliers, thus moving Paks II's market power in the generation market to the retail market.

(379) The exclusion of links of Paks II with State-owned operators in the retail market, as explained in recital 353 helped to address some of the Commission's concerns.

(380) The Commission notes that Hungary confirmed, as explained in recital 118, that Paks II's power output trading strategy would be an arms-length commercial profit-optimising strategy which is carried out through commercial trading arrangements concluded through bids cleared on a transparent trading platform or exchange.

(381) In particular, Hungary confirmed that such a trading strategy (excluding its own consumption of Paks II) would be devised as follows:

(a) Paks II would sell at least 30 % of its total electricity output on the day ahead, intraday and future markets of the HUPX. Other similar electricity exchanges may be used subject to the agreement or consent of the Commission's services which is to be granted or refused within 2 weeks from the request by the Hungarian authorities.

(b) The rest of Paks II's total electricity output shall be sold by Paks II on objective, transparent and non-discriminatory terms by way of auctions. The conditions for such auctions shall be determined by the Hungarian energy regulator, similar to the auctioning requirements imposed on MVM Partner. The Hungarian energy regulator shall also oversee the conduct of those auctions.

(382) The Commission also notes that Hungary would ensure that offers and bids are equally available to all licensed or registered traders on the same market terms in the auction platform to be operated by Paks II and that the bid clearing system of that platform is verifiable and transparent. No restrictions would be imposed on the final use for the electricity purchased.

(383) Therefore, it has been ensured that the electricity produced by Paks II will be available on the wholesale market for all market players in a transparent manner and that there is no risk that the electricity produced by Paks II would be monopolised in long term contracts posing a risk to market liquidity.

(384) Consequently, the Commission considers that, as the measure is currently designed market liquidity risks which could possibly arise are minor.

5.3.8.4. ***Conclusion on competition distortions and overall balancing***

(385) Following a careful assessment in Section 5.3 of this Decision, the Commission acknowledges that the measure is aimed at promoting new investments in nuclear energy, therefore it pursues an objective of common interest enshrined in the Euratom Treaty, while it also contributes to security of supply.

(386) The aid will be granted in a proportionate way. Hungary will ensure that Paks II compensates the State for the new generating units and Paks II will not retain extra profits beyond what is strictly necessary to ensure its economic operation and viability. The Commission also notes that the profits generated by the beneficiary will not be used to reinvest in Paks II's capacity extension or to purchase or construct new generating capacities without State aid approval.

(387) The Commission also examined whether the measure could serve as a barrier to entry for other types of generating capacities, especially in the limited period of the parallel operation of Paks NPP and Paks II. It is of the view that any barrier to entry is limited due to the fact that the gap in future overall installed capacity identified by the TSO would permit the penetration of other generating technologies (both renewable and non-low-carbon sources) irrespective of whether Paks II is constructed or not.

(388) The Commission also examined the possible cross-border effects of the measure, however Paks II's similar size to the currently running four units of Paks NPP is not expected to play a strong cross-border role, even in view of the good interconnection level of Hungary as Hungary will remain to be a net importer with one of the highest prices in the region. In addition to the expected remaining import/export deficit in Hungary, the Commission considers that Paks II's effects on electricity price regions falling outside those directly neighbouring Hungary would be limited due to the distance and network constraints which render electricity generated in Hungary even more expensive for more distant regions.

(389) The Commission also took note of the finding that during the parallel operation of Paks NPP and Paks II, which is expected to be shorter than originally envisaged, the expected growing national peak demand will not be solely satisfied from domestic power plants.

(390) The Commission reiterates that other possible market distortions, such as the increase of possible market concentration as well as the lack of market liquidity have been minimised on account of the confirmations made by Hungary on 28 July 2016.

(391) Therefore the Commission concludes that all the potential distortions of competition are limited and offset by the identified common objective pursued to be attained in a proportionate manner, in particular taking into account the confirmations made by Hungary on 28 July 2016.

6. **CONCLUSION**

(392) In light of those considerations, the Commission finds that the measure notified by Hungary involves State aid which, as amended by Hungary on 28 July 2016, is compatible with the internal market pursuant to Art 107(3)(c) TFEU,

HAS ADOPTED THIS DECISION:

Article 1

The measure which Hungary is planning to implement to financially support the development of two new nuclear reactors that are fully financed by the Hungarian State for the benefit of the entity MVM Paks II Nuclear Power Plant Development Private Company Limited by Shares ('Paks II') which would own and operate those nuclear reactors, amounts to State aid.

Article 2

The measure is compatible with the internal market, subject to the conditions set out in Article 3.

Article 3

Hungary shall ensure that Paks II shall use any of the profits deriving from the activity of units 5 and 6 of Paks II nuclear power plant ('Paks II NPP') for only the following purposes:

(a) The Paks II project ('the project'), which is defined as the development, financing, construction, commissioning, operation and maintenance, refurbishment, waste management and decommissioning of two new nuclear power units with VVER reactors 5 and 6 at Paks II NPP, Hungary. Profits shall not be used to fund investments in activities that are not within the scope of that defined project.

(b) The payment of the profits to the Hungarian State (for example by way of dividends).

Hungary shall ensure that Paks II refrains from (re-)investing in the extension of Paks II's own capacity or lifetime and the installation of additional generation capacities, other than those of reactors 5 and 6 of Paks II NPP. Should such new investment be made, they would be subject to separate State aid approval.

Hungary shall ensure that Paks II's power output trading strategy will be an arms-length commercial profit-optimising strategy which is carried out through commercial trading arrangements concluded through bids cleared on a transparent trading platform or exchange. The strategy for the trading of Paks II's power output (excluding own consumption of Paks II) shall be as follows:

Tier 1. Paks II shall sell at least 30 % of its total electricity output on the day ahead, intraday and future markets of the Hungarian Power Exchange (HUPX). Other similar electricity exchanges can be used subject to the agreement or consent of the Commission's services to be granted or refused within 2 weeks from the request by the Hungarian authorities.

Tier 2. The rest of Paks II's total electricity output shall be sold by Paks II on objective, transparent and non-discriminatory terms by way of auctions. The conditions for such auctions shall be determined by the Hungarian energy regulator, similar to the auctioning requirements imposed on MVM Partner (decision 741/2011 of the Hungarian Regulator). The Hungarian energy regulator shall also oversee the conduct of these auctions.

Hungary shall ensure that the auction platform for Tier 2 is operated by Paks II and that offers and bids are equally available to all licensed or registered traders on the same market terms. The bid clearing system shall be verifiable and transparent. No restrictions shall be imposed on the final use of the electricity purchased.

In addition, Hungary shall undertake that Paks II, its successors and affiliates are fully legally and structurally separated and subject to independent power of decision within paragraphs 52 and 53 of the Merger Jurisdictional Notice ([150]) and shall be maintained, managed and operated independent and unconnected from the MVM Group and all of its businesses, its successors and affiliates and other State controlled companies active in the generation, wholesale or retail of energy.

Article 4

Hungary shall submit to the Commission annual reports on the fulfilment of the undertakings referred to in Article 3. The first report shall be submitted 1 month after the closing date of the first financial year of commercial operation of Paks II.

Done at Brussels, 6 March 2017.

For the Commission

Margrethe VESTAGER

Member of the Commission

([150]) Commission Consolidated Jurisdictional Notice under Council Regulation (EC) No 139/2004 on the control of concentrations between undertakings (OJ C 95, 16.4.2008, p. 1).