THE QUEST TO PHASE-OUT BELGIUM'S NUCLEAR POWER SYSTEMS: A REALITY OR A MYTH?

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ABSTRACT: *Nuclear energy, one of Europe's reliable and sustainable energy mix sources for a generation of electricity, is at a crossroad. While some member countries are expanding its use in their energy policies, others like Belgium through a legislative act are planning to phase it out. Based on the Act adopted in 2003, it is expected that all seven nuclear reactors in Doel and Tihange will be shut down by 2025. According to the IEA 2009 Energy review, nuclear energy supplies more than half of Belgium's electricity and also contributes to effort to reduce air pollution and avoid CO_2 emissions. Thus a nuclear phase out will obviously pose a challenge as impact assessment studies conducted by the Commission for the Analysis of the Belgian Energy Policy towards 2030 (CE2030) and the Group of Experts on Energy Mix (GEMIX) have concluded higher electricity prices, risk of energy security and ability to meet climate change mitigation targets as possible consequences. The purpose of this paper is to examine if the yet to be implemented nuclear phase out will be a reality or a myth. The paper analyses the reports of CE2030 and GEMIX in the context of cost implications, security of energy supply and climate change mitigations together with other relevant sources of information. The conclusion reached is that the nuclear phase out will be a reality if Belgium incorporates into its energy policy measures to provide guaranteed reliance on efficient and sustainable alternative energy sources to replace the 5860 Megawatts power generation capacity of nuclear, in addition to meeting its reduction in CO_2 emission targets. Otherwise this phase out plan will only be a myth.*

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ABBREVIATIONS

AFCN	Agence Federale de Controle Nucleaire/Federaal Agentchap voor Nucleaire Controle
CE2030	Commission for the Analysis of the Belgian Energy Policy towards 2030
CO_2	Carbon dioxide
CSS	Carbon Capture and Storage
EU	European Union
GEMIX	Group of Experts on Energy Mix
GHG	Green House Gas
IEA	International Energy Agency
KWh	Kilowatts hour
MWe	Megawatts
NPOA	Nuclear Phase-Out Act
NNP	New Nuclear Plants
RES	Renewable Energy Sources
TPES	Total Primary Energy Supply
TWh	Terawatts hour

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1. INTRODUCTION

Nuclear energy, one of Europe's reliable energy mix sources for heat and electricity generation is at a crossroad. While member countries like France and United Kingdom have decided to expand its use in their energy policy, others such as Germany, Switzerland and Belgium are planning to phase it out from their power generation mix.[1] In actual fact Germany has already begun its nuclear phase out program by permanently shutting down eight power plants after the March 2011 Fukushima nuclear disaster in Japan.[2] This action has already raised questions concerning how Germany will replace its nuclear energy with sustainable sources of power generation to ensure security of energy supply, energy efficiency and climate change mitigation as per the Kyoto protocol.

The focus of this paper is on Belgium's nuclear phase out plan which is yet to be implemented. Belgium's power sector is based on 54% of nuclear fuel, producing a gross amount of 46 billion kilowatts hour (kWh) of electricity per year.[3] The remaining main sections based on natural gas and coal, generate 24 billion kWh and 7 billion kWh of power per year, respectively.[4] Thus the reliance of Belgium on nuclear power is paramount in its energy policy.

The aftermath of the Chernobyl disaster in 1986 motivated the Belgian government to impose a moratorium on new nuclear power plants in 1988 and subsequently adopted the Nuclear Phase-Out Act (NPOA) ("the Act") through parliament in the year 2003.[5] The law prohibits the construction of new nuclear plants (NNP) and sets a 40 year limit on the operation of existing plants. This implies all seven nuclear power plants in Belgium would have to be shut down between 2015 and 2025.[6]

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[1] Koranyi, D., *After Fukushima: The Future of Nuclear Energy in Europe and the United States*(Undated) <http://transatlantic.sais-jhu.edu/publications/books/Transatlantic_Energy_Futures/ch09-Koranyi.pdf (last visited on 26/4/12)

[2] Nuclear power on Germany (December,2011) < http://www.world-nuclear.org/info/default.aspx?id=332&terms=nuclear%20power%20in%20germany> (last visited on 26/4/12)

[3]Nuclear power in Belgium (December,2011) <http://www.world-nuclear.org/info/inf94.html> (last visited on 26/4/12)

[4]Ibid

[5] Geldhof, W. and Delahaije H., *To phase out or not to phase out, that is the question* (undated) <http://www.stibbe.be/assets/publications/articles/hs%20nuclear%20energy%20compendium%20belgium%20article.pdf> (last visited on 26/4/12)

[6] *Ibid*

It is obvious the phase out plan poses a challenge as comprehensive studies beginning as early as 1999 with Ampere[7] Commission (Commission d'Analyse des Modes de Production d'Électricité et de Redéploiement des Énergies) to the recent reports of Commission for the Analysis of the Belgian Energy Policy towards 2030(CE2030) and the Group of Experts on Energy Mix (GEMIX) have assessed the impact on the electricity sector and on Belgium's energy and environmental policies. The studies concluded and recommended that, the government has to review the 2003 law on nuclear phase out as this will increase electricity prices and endanger Belgium's energy security and ability to meet its climate change mitigation targets.[8]

Since 2003 a lot of changes in economic, geopolitical and environmental conditions have occurred with energy security being more acute and Belgium's climate change mitigation even more challenging.[9] With increasing scarcity and prices of fossil fuel resources (especially crude oil) and the growing political tensions associated with energy supplies, countries with nuclear capabilities are resorting to nuclear energy to guarantee domestic energy security, reduce import dependence while addressing challenges on climate change.[10] Thus the highlighted consequences of the yet to be implemented law brings to bear the question of whether the nuclear phase out program will be a reality or just a myth for Belgium by the year 2025? This paper seeks to analyse various key elements that will be affected and their impact on Belgium's energy and economic system as per the implementation of this law. These include climate change mitigation based on the European Union 2020 target, cost implications and security of energy supply.

The paper is structured into five (5) chapters with chapter 1 serving as the introduction. Chapter 2 highlights the overview of the Belgian nuclear power sector. Analysis of the Belgium phase out law is captured in chapter 3 with focus on its origin, implications on Belgium's energy security, economic costs and climate change if implemented by 2025. Chapter 4 brings to bear the current standpoint of Belgium on the nuclear phase out plan, leading to a conclusion in chapter 5.

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[7] The AMPERE Commission (Analysis of Methods for the Production of Electricity and Re-evaluation of Energy Vectors) made of a group of Belgian energy specialists; in a final document published October 2000 recommended the preserve of nuclear option through maintenance of the scientific and technological conditions for safety and performance. A similar conclusion was also reached by an international Peer Review Group in April 2001.

[8] Energy Policies of IEA Countries – Belgium 2009 Review (2009) http://www.iea.org/textbase/nppdf/free/2010/belgium2009.pdf (last visited on 26/4/12)

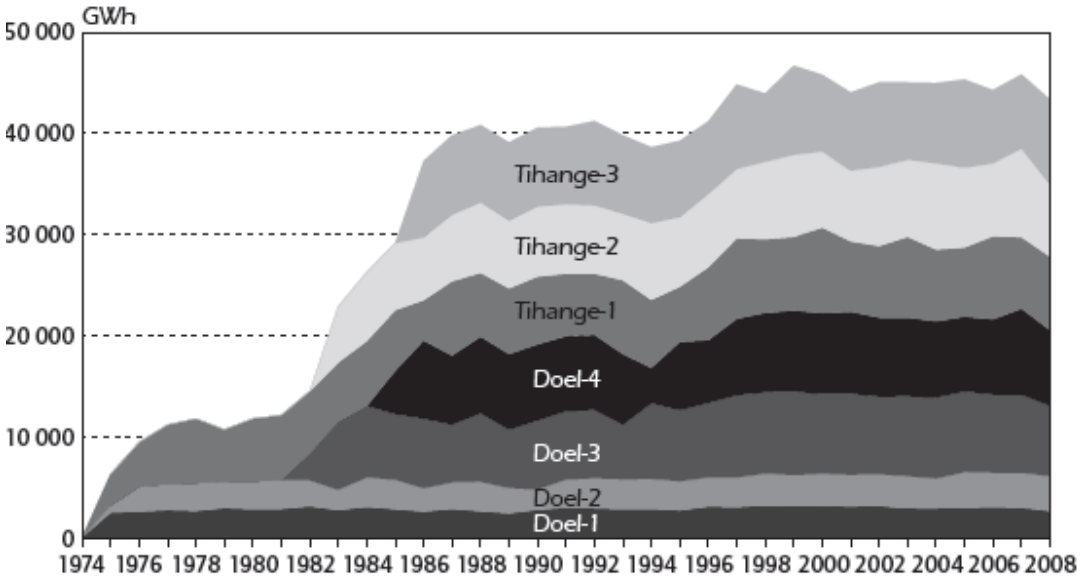
[9] *Ibid* page 154

[10] *Ibid*

2. OVERVIEW OF BELGIUM'S NUCLEAR POWER SECTOR

Belgium began its journey into the utilisation of nuclear power through the receipt of a nuclear reactor (an 11 megawatts (MWe) pressurised water reactor) from the United States in 1962.[11] This subsequently ushered in the establishment of seven commercial reactors between 1975 and 1985 for the generation of electric power.[12] The seven reactors which are operating on pressurised water technology have a total generating capacity of 5,860MWe of power which ensures the provision of over 55% of Belgian electricity and over 20% of total primary energy supply(TPES).[13] In 2007 the reactors produced a total amount of 45.9 terawatts hour (TWh) of power which was more than half of the country's electricity generation.[14] This is normally the trend which signals the influence of nuclear energy on Belgium's electricity sector. The fleets of reactors are operated by Electrabel,[15] which is a subsidiary of GDF Suez.[16] Figure 1 below highlights the electricity production of all seven reactors from 1974 to 2008:

Figure 1: Electricity Produced by Nuclear Reactors in Belgium



Source: International Atomic Energy Agency, Power Reactor Information System database.

[11] *Supra* note 2
[12] The Nuclear Monitor*: Nuclear Belgium Present and Future*, (Jan, 2007) http://www.nirs.org/mononline/nm651.pdf (last visited on 27/4/12)
[13] *Supra* note 7 page 7
[14] *Supra* note 7 page 151
[15] GDF Suez holds 100% shares of Electrabel
[16] *Supra* note 2

Policy on nuclear energy is under the purview of the federal government. This policy as a subset of the energy policy of Belgium incorporates the objectives of energy efficiency, security of supply and environmental protection. Thus the nuclear power sector is observed as a reliable area for entrenching domestic power supply and meeting the reduction targets of greenhouse gas (GHG) emissions as nuclear power emits virtually no carbon dioxide (CO_2) in its operation.[17]

However the aftermath of the Chernobyl nuclear disaster in 1986 led Belgium to impose a moratorium on new nuclear plants in 1988.[18] This subsequently introduced a twist to the nuclear energy policy by bringing into law the nuclear phase out plan adopted by parliament in 2003, under the administration of the Green Party.[19] The law implies new nuclear plants would not be built and existing plants will have to be decommissioned 40 years after startup. Hence the implementation of this law will lead to closure of three plants in 2015 with the remaining four plants closed by 2025. Table 1 below displays the shutdown program of the reactors. Supporters of nuclear energy as a power source have been unsettled about the effect of implementing this act since nuclear energy supplies more than half of power generation in Belgium and thus its shutdown will lead to negative consequences.

Table 1: Shut-Down Program on Belgium's Nuclear Plants

Name of plant	*Start of commercial operation*	*Projected shut-down **	*Net capacity (MW_e)*
Doel 1	15 February 1975	2015	392.5
Doel 2	1 December 1975	2015	433.0
Doel 3	1 October 1982	2022	1 006.0
Doel 4	1 July 1985	2025	1 008.0
Tihange 1	1 October 1975	2015	962.0
Tihange 2	1 February 1983	2023	1 008.0
Tihange 3	1 September 1985	2025	1 015.0
Total			**5 824.5**

*Projected shut-down framework based on the nuclear phase-out law, which is described below.

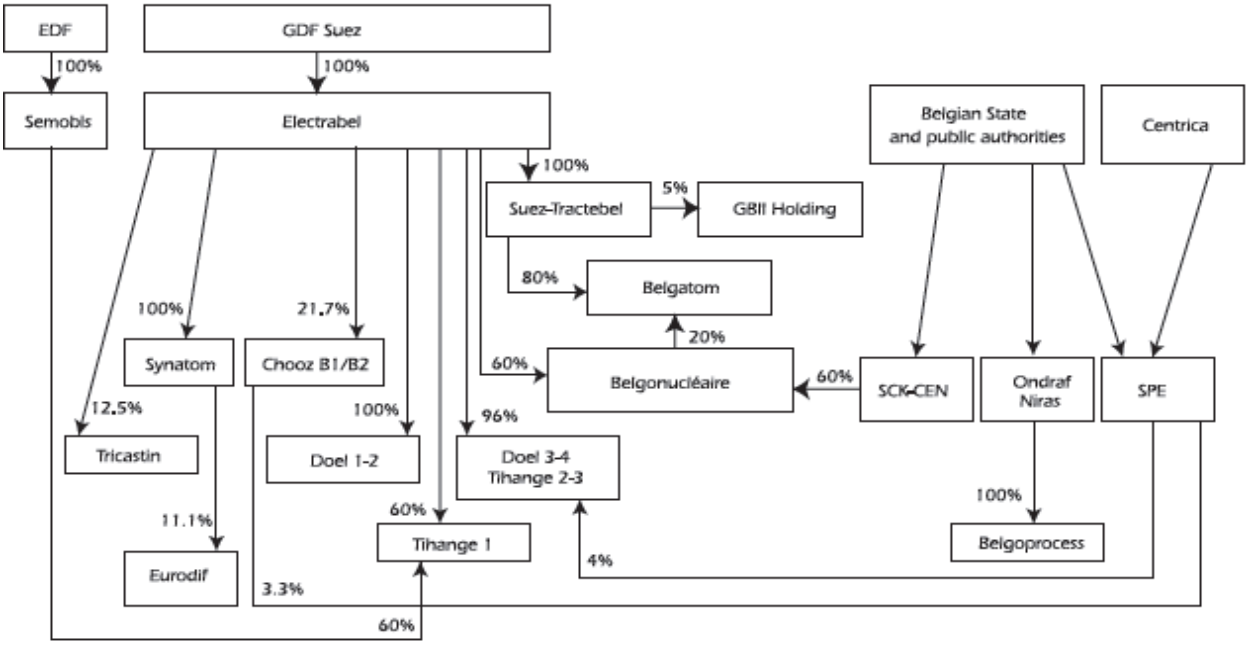
Source: IEA 2009

[17] World Energy Council: *The Role of Nuclear Power*, (January 2007) http://www.worldenergy.org/documents/wec_nuclear_full_report.pdf (last visited on 28/4/12)
[18] *Supra* note 4
[19] *Supra* note 10

With respect to the structure of the industry and key institutions, majority ownership of the Belgian nuclear sector is mainly under the control of Electrabel with 96% to 100% shares in six out of the seven reactors in Doel and Tihange with the other 4% owned by SPE.[20] The seventh reactor, Tihange-1 is also 50% owned by Electrabel and 50% EDF through its subsidiary Semobis.[21] As illustrated in figure 2 below, the ownership of Electrabel permeates into other key institutions for which the limit of this research won't provide space to express their strategic roles in the industry.

Lastly, issues on nuclear safety regulations are within the mandate of the Federal Nuclear Control Agency (AFCN-Agence Federale de Controle Nucleaire/Federaal Agentchap voor Nucleaire Controle) based on the law of 15th April 1994,[22] which stipulates the protection of the population and the environment against dangers of ionising radiations. AFCN reports to the Ministry of Interior which exercises regulatory control over all nuclear operations.[23]

Figure 2: Ownership of Belgium Nuclear Sector by Key Institutions[24]



Source: IEA 2009

[20] *Supra* note 7 page 156
[21] *ibid*
[22] *See* AFCN Regulation (2007) http://www.fanc.fgov.be/fr/page/reglementation/11.aspx (last visited 28/4/12)
[23] *Supra* note 7 page 158
[24] *Supra* note 7, page 157

3. ANALYSIS OF THE BELGIAN NUCLEAR PHASE OUT LAW AND ITS IMPLICATIONS

The purpose of this section is to make some observations on the existing nuclear phase out law and the context in which it was enacted. In addition the implications of this law, should it be implemented is also analysed. This will be based on the final reports of the CE2030[25] and GEMIX,[26] all mandated by the federal government to assess the consequences of phasing out nuclear.

As stated earlier, the Belgian nuclear phase out law was approved into law on January 31, 2003 and officially published in the Belgian official journal on February 28, 2003.[27] By means of this law or act political authorities chose to abandon the use of nuclear fission energy for industrial electricity production. This was done by prohibiting the building of new power plants and by limiting the operational period of existing power plants to 40 years. As a consequence, all seven power plants would have to be shut down between 2015 and 2025. However article 9 of the Act stipulates that in cases where security of supply is threatened due to closure of the plants, the government can take necessary corrective measures by Royal Decree.[28]

According to the Ampere 2000 Commission there is no predefined technical lifetime of a nuclear power plant. The only actual lifetimes are either economic which is based on safety regulations or political which is determined by authorities to shut down a plant. The latter applies to Belgium's situation as the nuclear phase out act was enacted through a political decision from a coalition government based on political circumstances prevailing at that time.[29] The political ignorance of pertinent considerations of the future impact of the 2003 law on electricity generation and the environment signaled the avoidance of the advice of the Ampere 2000 commission on keeping the nuclear option open as it is an economical method for electricity

[25]Set up by the Royal Decree of December 06, 2005 (Moniteur Belge / Belgisch Staatsblad 19/12/2005) to provide scientific and economic analyses for Belgium's energy policy up to 2030
[26] Commissioned in 2008 by the Belgian government to provide recommendations on ideal energy mix for Belgium in the medium and long term
[27]Belgium's Act on the Phase Out of Nuclear Energy (undated) <http://www.oecd-nea.org/law/nlb/nlb-71/099_117.pdf >(last visited on 5/5/12)
[28] *Ibid*
[29] *Supra* note 24 page 260

production.[30] The CE2030 debated that the phase out program, under a considerable post Kyoto constraint and in the absence of carbon capture and storage (CSS), would be expensive and perturbing for the economy; hence concluding that the government should reconsider the law.[31] GEMIX also added its call by recommending nuclear plants will be needed until at least 2025; until measures of efficiency and renewable sources are instituted to stabilise supply.[32]

Proponents of the Act sought to argue that the phasing out plan will eliminate the hazards intrinsic to nuclear power plants and support the development and sale of alternative energy sources, particularly renewables.[33] However it has been noted that Belgium has a relatively small potential for renewable energy sources (RES) with limited use. This is based on low relative prices of conventional energies; existence of centralised energy production systems with good grid connections enabling consumers to benefit from economies of scale, and limited RES in Belgium.[34] Despite this, government backing of renewables through subsidies has increased the share of RES in gross final energy consumption to 3.65 % in 2007 from a marginal 1.1 % in 2001.[35] With other sources of Belgium's TPES including oil, natural gas and coal, the commitment of the federal government to phase out nuclear from its energy mix will require increases of these fuels, notably gas, for sustainability of the energy sector in power provision.[36] This will come with implications which the proceeding section highlights.

[30] EUSUSTEL European Sustainable Electricity; Comprehensive Analysis of Future European Demand and Generation of European Electricity and its Security of Supply (August 2005) http://www.eusustel.be/public/documents_publ/WP/WP1/Belgium_WP1.pdf (last visited 1/05/12)

[31] Smith, H., *European Energy Review*, 2008 http://www.herbertsmith.com/NR/rdonlyres/E27B748B-30F5-4C58-B616-935E2E4A38C3/0/belgium.pdf (last visited 1/5/12)

[32] World Nuclear News on Nuclear needed in Belgium, (October 2009) http://www.world-nuclear-news.org/NP_Nuclear_needed_in_Belgium_0210092.html (last visited 1/05/12)

[33] *Supra* note 4 page 24

[34] Renewable Energy Policy Review, Belgium, (May 2004) http://www.erec.org/fileadmin/erec_docs/Projcet_Documents/RES_in_EU_and_CC/Belgium.pdf (last visited 1/05/12)

[35] RES 2020 Belgium Renewable Energy Policy Review (March,2009) http://www.erec.org/fileadmin/erec_docs/Projcet_Documents/RES2020/BELGIUM_RES_Policy_Review__09_Final.pdf (last visited 1/05/12)

[36] *Supra* note 7 page 69

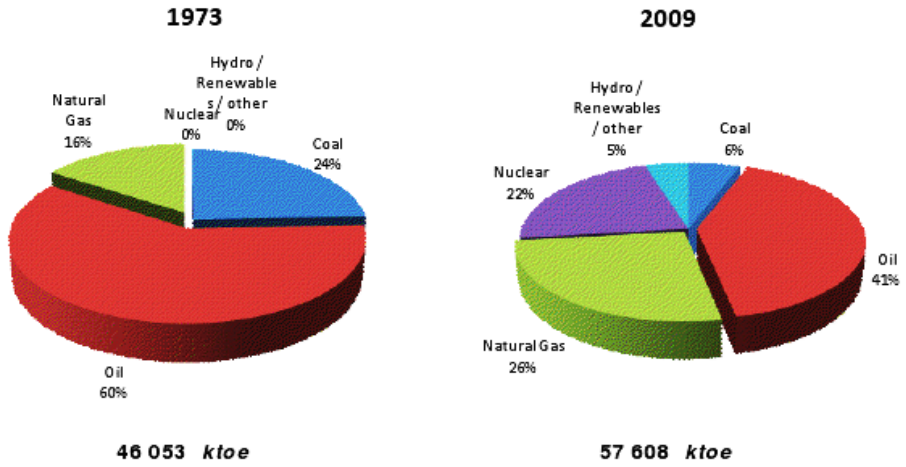
3.1 Implications of Implementing Nuclear Phase Out

The effects of implementing the phase out Act on Belgium's energy provision (especially with electricity) and climate change mitigation has been assessed through various spectrums with the focus of this paper being on the following key elements.

3.1.1 Security of Energy Supply

As explained earlier, one of the key objectives of Belgium's energy policy is ensuring security of energy supply, which is in line with the European Union energy policy,[37] and concerns adequate and reliable supply of energy at reasonable prices.[38] Apart from domestic production of nuclear energy and a small but increasing share of renewable energy, Belgium exhibits a strong dependency on imported energy with oil and natural gas representing two-thirds of the TPES.[39] Figure 3 below illustrates the shares of oil and natural gas relative to other fuel sources in the TPES.

Figure 3: Belgium's Total Primary Energy Supply Sources



Source: Energy Balances of OECD Countries, IEA

[37] Belgium Energy Mix fact sheet (January, 2007) http://ec.europa.eu/energy/energy_policy/doc/factsheets/mix/mix_be_en.pdf (last visited 2/5/12)

[38] Yergin, D., Energy Security in the 1990s, Foreign Affairs 67(1): 111 - 132 as referred to in Stares, B., (ed), Rethinking Energy Security in East Asia 21, (Tokyo, Japan: Japan Center for International Exchange, 2000)

[39] Oil and Gas Security Belgium (2010) http://www.iea.org/papers/security/belgium_2010.pdf (last visited 2/5/12)

In terms of electricity generation, natural gas is the second main source of fuel with a 30% share after nuclear energy with 55%.[40] As the demand for gas in the use of power generation is expected to increase due to intended replacement of ageing power facilities with gas fired plants by 2020,[41] the exposure of Belgium to erratic geopolitical and supply issues associated with fossil fuels will be challenging. Fossil fuels have the characteristics of being depletable and non-renewable which together constitute a risk factor to security of supply. Thus, insufficient domestic generating capacity in the wake of the phase out plan can result in power cuts and blackouts during peak periods of demand and upward pressure on electricity prices. The shrinkage of fossil fuel resources vis a vis the impending phase out plan can also cause political, social and economic mishaps.[42]

The issue of price volatility of fossil fuels is also another relevant risk factor for security of supply in electric power generation, with the effect of causing unpredictable electric prices. A sudden change in price with shock effects is a threat to supply security.[43] Thus the absence of predictability of electric prices based on fossil fuels clearly positions electric prices associated with nuclear energy in a more preferable and fronting lead.

With the sparse distribution of fossil fuels across the world,[44] the reliance of non-producing countries like Belgium on foreign imports exposes them to any geopolitical issue associated with fossil fuels. An example is the recent dispute between Russia and Ukraine which affected gas supply to Europe. This raises the red alarm on security of supply as any country supplying fossil fuel (especially gas) to Belgium can use any geopolitical circumstance and lack of timely investment in upstream production facilities to hamper a guaranteed and timely delivery of fuel for power generation.[45] On the other hand, the security of supply of nuclear fuel is less of a

[40] *Ibid* page 13
[41] *Ibid*
[42] Bodansky, D., Nuclear Power in the Context of Critical Global Problems in The Challenges of Nuclear Power in the Twenty - First Century by Kursunoglu, N., Mintz, L., Perlmutter, A., 65 (New York, USA: Kluwer Academic/Plenn Publishers, 2000)
[43] Supra note 35
[44] Khatib, H., *Energy Security* in Energy and the Challenge of Sustainability by Goldemberg, J (ed.) (New York, US: United Nations Development Programme, 2000) 125 &126
[45] Belgium's Energy Challenges Towards 2030 (June 2007) http://www.ce2030.be/public/documents_publ/CE2030%20Report_FINAL.pdf (last visited 5/5/12)

problem due to worldwide distribution of the resource, large amount of energy stored in nuclear fuel and the political stability of countries suppliers of nuclear fuel operate in.[46]

3.1.2 Climate Change Mitigation

The negative impact of energy activities on the environment is clearly emphasised especially with climate change due to greenhouse gas (GHG) emissions. The effects are normally realised in forms such as rise in sea levels, flooding, increase in global surface temperature and others.[47] According to the CE2030 report, 86% of all GHG is CO_2 and of that CO_2, 92% is energy related.[48] Thus the ratification of the Kyoto protocol by countries across the world including Belgium is a commitment approach to mitigate climate change hence reducing greenhouse gas emissions in their respective regions.[49] Belgium has agreed to reduce its emissions by 7.5% below the 1990 base year level for GHG emissions in 2008 to 2012.[50] At the European Union (EU) level, Belgium is also part of the EU's strategy of meeting the Kyoto protocol commitment in the form of Emission Trading Schemes under the burden sharing agreement. This is a mandatory cap and trade program to cap CO_2 emissions from the power sector and other industries.[51] In addition, the EU's 20/20/20 target mandates Belgium with other European countries to act in achieving a 20% reduction in GHG emissions, increase share of renewables in EU's energy mix to 20% and improve energy efficiency by 20%.[52] This poses a challenge as Belgium's legislation aims to phase out nuclear energy which emits virtually no CO_2. The phase out plan will definitely cause Belgium to rely on fossil fuels especially natural gas for its power generation.[53] This will lead to increase in CO_2 emissions, affecting Belgium's obligation to

[46] *Ibid* page 80
[47] ADAPT(2006)- General study and evaluation of potential impacts of climate change in Belgium (October, 2006) http://dev.ulb.ac.be/ceese/ADAPT/public_section/Doc/WP1_climate%20change%20in%20Belgium.pdf (last visited 5/5/12)
[48] *Supra* note 42 page 136
[49] Hecke, V.K.,and Zgajewski,T., *The Kyoto Policy of Belgium* (February 2008) at http://www.egmontinstitute.be/paperegm/ep18.pdf (last visited 5/5/12)
[50] *Supra* note 7 page 34
[51] Energy Policies of IEA Countries – Belgium 2005 Review (2006) http://www.iea.org/textbase/nppdf/free/2005/belgium2005.pdf ((last visited 5/5/12)
[52] Stoynova, D., *Roadmap for moving to a Competitive Low Carbon Economy in 2050*, (Oct, 2011) http://lowcarbon.inforse.org/files/resource_1/ENCI-BXL_11_oct25_roadmap_Stoynova_EC.pdf
[53] *Supra* note 7 page 166

reduce GHG emissions. Without nuclear power in the energy mix, the cost of emission reduction will be high.[54]

3.1.3 Cost Implications

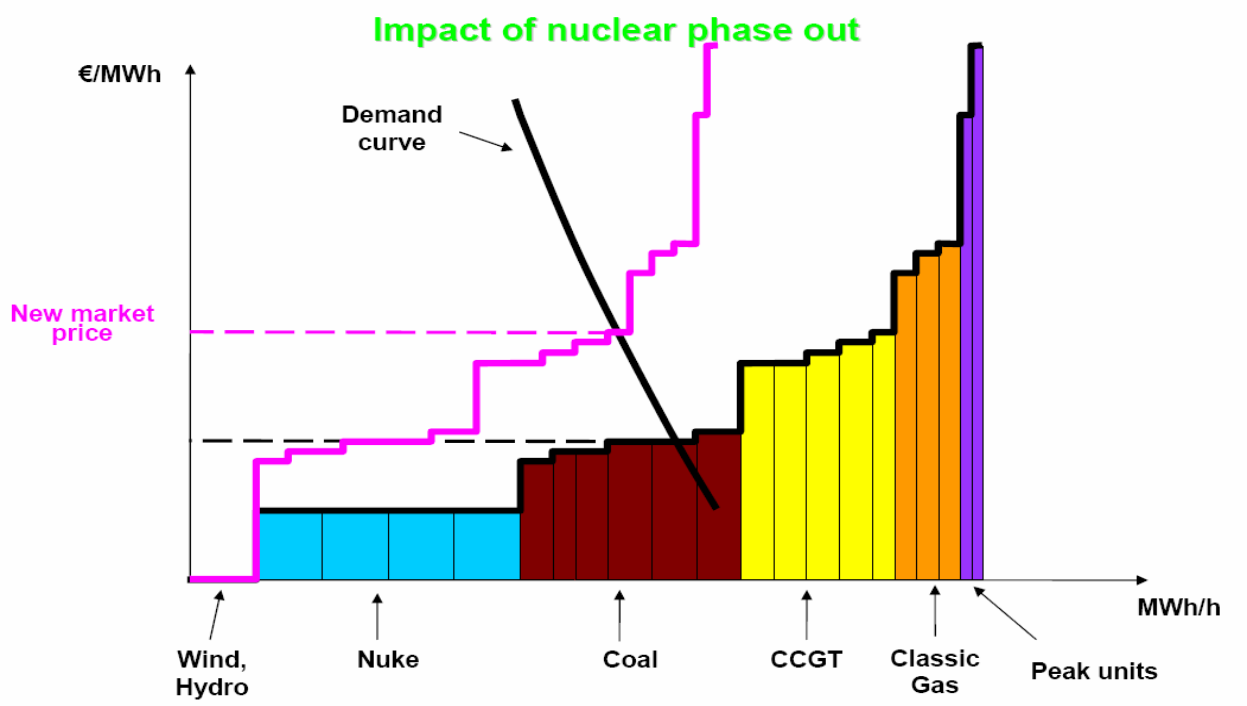
Nuclear phase out programs are expensive exercises with various cost consequences. In the context of Belgium's yet to be implemented nuclear shutdown act, the following cost ramifications have been considered based on the CE2030 report.[55]

3.1.3.1 Increase in the Prices of Electricity

In a liberalised electric power market, price is determined by marginal production units. The intersection of the two black curves in figure 4 below depicts that principle. In case of an overnight nuclear phase out, the marginal cost curve will shift to the left, becoming the pink curve (refer to figure 4). In an isolated market, the new price is the intersection point marked as "new price" in figure 4. Thus with this illustration, a complete phasing out of cheap base load capacity (nuclear) causes the electricity supply curve to shift to the left, exacerbating capacity imbalance. Therefore with limited transmission capacity or reliance on other energy mixes with higher cost of production, phasing out the 48billion kWh [56] generation capacity of nuclear energy will certainly lead to an increase in electricity prices.

[54] *Ibíd.*
[55] *Supra* note 45 page 266
[56] *Supra* note 3

Figure 4: Influence of Nuclear Phase Out on Electricity Prices



Source: CE2030 Report

3.1.3.2 Extra Cost for GHG Reduction

As highlighted earlier, a nuclear phase out in Belgium will lead to greater reliance on fossil fuel especially natural gas which will cause increment in CO_2 emissions. In the face of stringent GHG reduction, the International Energy Agency (IEA) 2009 Energy review stipulates that Belgium will incur higher cost in reducing its emissions if nuclear energy is phased out.[57] The CE2030 specifies in its nuclear phase out scenario analysis that a CO_2 abatement cost of 500 to 2000 €/ton will be incurred if 15% and 30% reduction respectively are to be achieved. Relatively these costs are extremely high when CO_2 abatement cost of 50 to 100 €/ton CO_2 (15% CO_2 reduction) and 200 to 500 €/ton CO_2 (30% CO2 reduction) are recorded under a non-nuclear phase out scene[58]. These high cost will inevitably deny Belgium a cheaper way of meeting its CO_2 emission reduction target. In addition, the high cost will be passed on to the Belgian people and companies which may hamper economic development and people's welfare.[59]

[57] *Supra* note 7 page 166
[58] *Supra* note 43 page 264
[59] *Supra* note 7 page 166

4. CURRENT STANDPOINT

The era post 2003 witnessed a decline in political support for the nuclear phase out plan. Government consideration of recommendations, especially by GEMIX through the Council of Ministers led to a political consensus to extend the shutdown plan by ten more years for the three oldest nuclear plants. In the words of Paul Magnette[60] when supporting an extension: "This would ensure security of supply in the country, avoiding substantial production of carbon dioxide and would maintain a price level that protects the purchasing power of households and the competitiveness of our businesses".[61] However an election in April 2010 occurred before the agreed proposals were passed by the Belgian parliament. Thus Belgium is currently still adhering to the legislation to phase out nuclear from its energy mix by 2025. The recent political decision in October 2011, through a cross-party agreement, has entrenched that position.[62] However the agreement to shut down nuclear is conditional on Belgium finding sufficient alternative energy supplies to fill the gap and ensure no capacity shortages or blackouts during periods of peak demands.[63] Though this will come with challenges already highlighted above, the withdrawal of nuclear power will prove as a boost for thermal plants and particularly gas. It will also act as a driver for additional renewable capacity especially if carbon reduction targets are to be achieved.

5. CONCLUSION

The importance and strategic role of nuclear power in Belgium's energy policy cannot be over emphasised. This is evidenced by nuclear energy generating more than half of Belgium's electricity and its contribution to the attainment of climate change mitigation targets. Thus the imminent implementation of the political decision to phase out nuclear plants between 2015 and 2025 will definitely impact the economy, energy security and environmental position of Belgium and in a wider scope the EU region. As studies and assessment reports have already shown, the

[60] Belgian Minister for Climate Change and Energy in the Van Rompuy I Government which took office on 30th Dec, 2008
[61] *Supra* note 32
[62] BBC News Coverage (Oct, 2011) http://www.bbc.co.uk/news/world-europe-15521865 (last visited 5/5/12)
[63] PWC: Global Green Policy Insight (Dec, 2011) http://www.pwc.lu/en/sustainability/docs/pwc-global-green-policy-insights-dec11.pdf (last visited 5/5/12)

2003 law will lead to higher electricity prices, endanger Belgium's energy security and ability to meet its climate change target. Hence based on these impending consequences, the nuclear phase out can only be a reality if Belgium incorporates into its energy policy measures to provide guaranteed reliance on efficient and sustainable alternative energy sources to replace the 5860MWe generation capacity of nuclear. In addition, the feasibility of meeting Belgium's climate change target under a nuclear phase out condition calls for more focus on CSS and other technologies to reduce the level of CO_2 in the atmosphere. Until these issues are handled effectively, nuclear energy will continue to contribute its positive quota to Belgium's energy matrix and even exist beyond at least 2025.

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