

# THE POLITICAL ECONOMY OF ENERGY SECURITY AND NUCLEAR ENERGY IN JORDAN

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*ABSTRACT: In 2007 the Jordanian government announced its intention to build one nuclear power plant by 2015 and a number of others by 2030. The objective of this nuclear energy programme was to provide a sustainable domestic energy supply and relieve the burden of reliance on external energy sources. This burden has led to a massive strain on the government budget and produced domestic discontent, due to rising living costs which has negatively affected regime stability - this latter point is especially important in light of the current geopolitical changes sweeping across the Middle East and North Africa (MENA). This work explores the political economy of energy security in Jordan and the potential role of nuclear energy in the coming decades and argues that there is an energy security dilemma in Jordan and this determines the nature of nuclear technology proliferation there. In this study a number of theoretical assumptions are posited concerning the impact of resource scarcity on economic and political stability which help shed light on Jordanian interests and policies. The nature of energy security and resource scarcity in other states in the MENA are often very similar. As such this case study offers some insights into the political economy of other nuclear energy programmes which have been announced in the past few years in that region, such as in Yemen and Egypt.<sup>1</sup>*

**KEYWORDS:** Jordanian energy security, civilian nuclear power, nuclear proliferation, hydrocarbon dependence

## INTRODUCTION

Since the 1960s the issue of nuclear technology proliferation in the Middle East and North Africa (MENA) has been high on the political agendas of both regional actors and those further afield. A number of MENA states have pursued nuclear technology programmes, some with a measure of success, such as Israel and Iran, while others have, more recently, declared their intention to develop such

a programme (in some cases, as in Egypt, this is a resurrection of previously shelved plans which date back several decades). On 04 July 2006 (the then un-challenged) Yemeni President, Ali Abdullah Saleh, announced his government's intention to develop a nuclear energy programme in order to produce nuclear energy for civilian use. The announcement came as Saleh registered his candidacy for a next presidential term for elections held later that year. Official international reaction to this declaration was rather slow and largely muted. However, the announcement of the plan did not go completely unnoticed, even though it was declared that only civilian and not military nuclear technology was to be sought.<sup>2</sup> In the years since Saleh's announcement a number of states in the MENA region have declared their intentions to develop nuclear energy programmes of their own, with work well underway in some cases. In December 2006 the six Gulf Cooperation Council (GCC) states issued a statement declaring their intention to pursue nuclear energy programmes (they also reiterated their call for a nuclear weapons-free MENA).<sup>3</sup> This was followed by the GCC's 2007 request to the International Atomic Energy Agency (IAEA) to assist in developing civilian nuclear capacities.<sup>4</sup> In mid-2006 Turkey announced plans to construct a series of nuclear power stations by 2015<sup>5</sup> while, in October 2007, Egypt presented its plans to develop a number of nuclear power plants to generate electricity.<sup>6</sup> Iran's nuclear programme has rapidly gathered pace since 2006 and has come under increasing scrutiny internationally, resulting in heightened tensions with both global powers, like the US and Britain, as well as with MENA states including Israel and Iran's Muslim neighbours.<sup>7</sup> The Jordanian government has been caught up in the emerging regional proliferation of nuclear technology and has been amongst the keenest to establish a nuclear programme. On 01 April 2007 (then) Energy Minister Khaled Sharida announced that Jordan intended to build one nuclear power plant to produce electricity by 2015.<sup>8</sup>

The wave of plans for national nuclear energy programmes that has swept the region has raised many questions by observers concerned with economic development, environmental sustainability, military security, and energy security.<sup>9</sup> Indeed, the sensitive balance of political, social and economic relations within MENA ensures that the proliferation of nuclear technology will remain a politically and economically sensitive issue for the foreseeable future.

Significantly, a major dilemma in intra-MENA relations is the perception-disparity problem faced by most, if not all, regional actors with regards to the nuclear programmes of their neighbours. The majority of governments in the region have varying perceptions of the need for nuclear energy, the purpose of specific nuclear programmes and the opportunities and challenges such programmes entail. In particular, whether the intention of developing a national nuclear energy programme becomes a major regional political issue or not depends largely on the *perceived* objectives of such a programme and the *perceived* rationale behind it, by both regional and global actors. While all states in the MENA region that have developed plans for nuclear programmes (except Israel) are signatories of the Nuclear Non-Proliferation Treaty (NPT) concern over the pursuit of nuclear technology remains a sensitive area of discussion. A common theme that has emerged in the issue of nuclear proliferation in the MENA region is the challenge of meeting domestic energy demands and the need for energy security. This has often been a stated rationale in the emerging nuclear energy programmes in the region, with the Jordanian government often highlighting energy security as the main challenge it faces in the post-2003 environment.<sup>10</sup>

This work explores the problem of energy security in Jordan, what the political economy of nuclear energy there is and how this programme can help to meet the country's energy demands. The key questions addressed here relate to what the Jordanian government's rationale for pursuing a nuclear energy programme appears to be and whether such a programme is likely to positively affect Jordanian energy security. This work argues that Jordan faces a severe energy security problem, that this is the most significant security threat currently faced by Jordan, and that the pursued nuclear energy programme is intended to attend to this challenge. The first section of this work reviews relevant energy security literature. The following section discusses energy security in Jordan and the political and economic challenges this entails. An analysis of Jordanian policy and the nuclear programme comes in the third section and conclusions are drawn at the end.

CEJISS  
1/2012

In 1979 Deese argued that energy security was 'a widely discussed but little understood problem.'<sup>11</sup> In some ways that is still the case today, although much research has been conducted on the issue and significant strides have been made towards theoretically understanding energy security. Deese defines energy security as 'a condition in which a nation perceives a high probability that it will have adequate energy supplies at affordable prices.'<sup>12</sup> One might add to this that this perception has to be held for the medium- to long-term future. The issue of perception is very important but is largely based on the rational assessment of the realities of energy production/sourcing and consumption in the domestic market.

Deese's model claims that there are two key levels of analytical relevance to energy security: the domestic and international levels of analysis.<sup>13</sup> Any analysis of energy security in Jordan must consider the economic, political and social conditions within Jordan as well as conditions and processes of a more regional or global scope. Furthermore, we need to consider the relationship between these two levels of analysis as deeply interconnected. Indeed, as Ohmae has argued, we are increasingly living in a world where national borders no longer serve to insulate domestic from international affairs.<sup>14</sup> Deese highlights that where problems with domestic energy supply exist, as in the case of Jordan where there are no reserves of hydrocarbons of any significant amount (or any other form of fossil fuel), pressure for energy imports increases and it is this that has the most significant impact on energy security.<sup>15</sup> Bosworth and Gheorghe demonstrate that interdependencies in large energy systems, such as an energy importing state's national system, are abundant and add to the complexity of the energy security problem.<sup>16</sup> These interdependent relationships exist between actors involved in the production, transport and consumption of energy. At each stage there exists a myriad of actors and relationships which can often be in competition with each other. Even when cooperation is evident the interdependency found in such an energy system leads to challenges in ensuring coordination between the different actors. Furthermore, Bosworth and Gheorghe argue that 'interdependencies also cross international borders'<sup>17</sup> thus linking the domestic and international levels of analysis. International hydrocarbons

pipelines as well as shipping infrastructure ties Jordan's domestic energy transport system to those in Iraq, the GCC states, and Egypt.

Resource scarcity can negatively influence international relations due to heightened competition for resources at the international level.<sup>18</sup> Thus, the energy insecurity felt by some states can lead to policies aimed at securing the required resources which bring the state into conflict with others. Energy security can, therefore, be of importance at both the domestic and international levels of analysis. The importance of energy security can partly be identified in the ways in which it impacts other issues of concern to national governments and private sector actors. It impacts on economic well-being (growth, stability, income), which in turn impacts on domestic political stability (re: regime survival in Jordan) and also directly impacts on military security (through the military industry, military fuels, and strategic constraints and objectives – defence of supply routes, stability of producing states etc.).<sup>19</sup>

In order to pay for their energy needs, developing states that rely on imports for the majority of their energy supply also have to rely on exports of their own goods and services in order to raise adequate revenue and foreign exchange. This increases their vulnerability to external events and processes (and actors). During a period of global recession, for example, levels of international trade decline and the revenue earned from exports will subsequently decline also. Since mid-2008 this has been the experience of Jordan. In particular the decline in exports to the US – due partly to lower levels of imports to the US market since the financial crisis, and partly due to increased competition in the goods Jordan exports to that market (mostly textiles and clothing) – is noteworthy. Events limited to single trading partner states and not at a global level also add to the vulnerability of small developing states. Due to the limited agency of small developing states at the international level there is little scope for the employment of foreign policies to deal with these vulnerabilities.<sup>20</sup> As a result, policy focus turns inward towards domestic policies aimed at managing energy demand. Governments that pursue liberal economic policies encourage a system which does not easily allow for significant subsidies for domestic consumers. Limitations on government budgets also hinder the opportunity for subsidising domestic energy consumption. Since the late 1980s the Jordanian government has adopted economic liberalisation and

since King Abdullah II came to power (1999) these policies have been pursued with more vigour. Record budget deficits each year for the past decade have also left the Jordanian government little room to provide subsidies to the domestic market. An alternative major policy direction is, therefore, to encourage greater efficiency in energy consumption and lower demands in inefficient and non-essential sectors.

The impact of bilateral and/or multilateral relations between energy importers and exporters can determine the nature of energy security within the importing states. A bilateral relationship between an oil importer and an oil exporter, for example, that is characterised by animosity, mistrust or outright conflict (such as economic sanctions or military engagement) is likely to lead to a reduction in, or cessation of, trade in oil between them. The case of the European Union's (EU) embargo on Syrian oil exports due to the Syrian government's violent suppression of a pro-democracy movement (at the time of writing) is a case in point.<sup>21</sup> At the same time however, positive relations between energy importing and exporting states does not necessarily equate to enhanced energy security for the former.<sup>22</sup> There is certainly a correlation between the nature of international relations and domestic energy security; but energy security cannot be guaranteed simply by having good relations with exporters. The relationship between Jordan and Iraq since the mid-1990s, for example, was characterised by close cooperation in economic (and political) affairs and an agreement between the two governments ensured Iraq supplied Jordan with oil at a heavily subsidised price (at a fraction of the international market price).<sup>23</sup> That was up until the 2003 war in Iraq which ended trade in oil between the two states. Bilateral trade in oil has not recovered as of the time of this writing. Changes in international relations and/or domestic affairs are generally beyond the control of small states, such as Jordan, which may play a role in regional affairs, but this is often limited by the state's level of agency at the international level and the behaviour of more powerful external actors.<sup>24</sup> As such, the energy security of small states relies, to a large extent, on unilateral domestic and foreign policies.

It is generally accepted that the most effective ways to ensure energy security include managing domestic demand (such as increasing efficiency in consumptive practices), improving the reliability

of external sources (diversification of sources, supporting stability in producing states and so on), and/or increasing domestic energy supplies.<sup>25</sup>

Energy importing states can develop domestic supplies in order to lower their reliance on external sources, which is the primary challenge for energy security. However, the success of this policy direction in advancing energy security relies entirely on the availability of domestic resources. In terms of hydrocarbons this is limited to states that have significant recoverable reserves that can be exploited cheaply enough for it to be economically and strategically beneficial. Renewable energy resources are more widely available, in particular wind and solar energy. However, the development of these requires significant investment and this is often unavailable in developing states. Private sector investment is usually required, bringing in domestic and international non-state actors, which adds to the complexity of ensuring energy security. The technology required for renewable energy is constantly developing and also requires the long-term involvement of the private sector. Nuclear energy technologies are much the same in that non-state actors as well as governments must be involved in the building and maintaining of crucial infrastructure. The technologies required for nuclear energy often have to be procured by developing governments from developed states, leading to the internationalisation of domestic nuclear energy programmes. Nevertheless, in the medium- to long-term, renewable and nuclear energy programmes require significantly less involvement from international actors and external relations related to importing energy are significantly reduced and the key factor in energy insecurity is largely removed. The Jordanian government has a small number of sources of energy in the MENA region (currently led by Saudi Arabia and Egypt) but these *external* sources account for virtually all of Jordanian energy. In recent years, however, private sector involvement in the energy sector within Jordan has been growing with involvement in the renewable energy sector and now the nuclear energy sector.

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#### ENERGY INSECURITY IN JORDAN

Jordan is an extremely resource poor state with limited renewable freshwater supplies, no reserves of crude oil and very limited

natural gas supplies. While there are some supplies of shale oil in Jordan, estimated at over 65 billion tonnes,<sup>26</sup> these are currently not readily recoverable in large quantities at viable prices.<sup>27</sup> The total consumption of hydrocarbons in Jordan is approximately 108,000 barrels per day for the former and 2.97 billion cubic metres per year for the latter. All of Jordan's oil needs are imported while 2.72 billion cubic metres of gas are imported each year at a total cost of over \$3.5 billion (USD).<sup>28</sup> Indeed, the problem of resource scarcity in Jordan has resulted in a near total reliance on energy imports. For much of Jordan's modern history hydrocarbons have represented its main form of energy supply with alternative, domestic renewable energy sources only being used in any meaningful manner in more recent years. Jordan finds itself in a rather peculiar situation in the MENA region, neighbouring states with the world's largest oil reserves and production levels as well as some of the world's largest gas supplies, but being almost completely devoid of these resources itself. The fact that Jordan's neighbours have large supplies of hydrocarbons has historically helped Jordan import these resources at lower than-international market prices and to alternate, relatively quickly, between suppliers. The problem however, has been the unstable nature of these supplies over the past decade or so coupled with the fact that Jordan has had to switch suppliers due to disruptions in production and transportation in other states – events and processes which cannot be influenced by the Jordanian government. Added to these problems has been the continued reliance on one or two main sources of energy imports for much of Jordan's history since independence. An undiversified supply structure has left Jordan in a vulnerable position and sensitive to changes in one state or another, such as Iraq in the 1990s and post-2003, or Egypt since the January-February (2011) revolution that toppled Hosni Mubarak. A policy which is increasingly acknowledged as key to promoting energy security is the diversification of energy supplies to reduce any reliance on one or two sources and to have access to other suppliers should there be a disruption in any supplying state(s).<sup>29</sup> The Jordanian government has not yet managed to fully consider this challenge.

For much of the past three decades Jordan has relied heavily on imports of oil from Iraq. Under Saddam Hussein the Iraqi government had maintained close economic ties with its Jordanian



counterpart and had supplied virtually all of Jordan's oil imports. Furthermore, these supplies were fixed at a constant and low price for many years, with Jordan having to pay only a third of international market prices.<sup>30</sup> This was particularly the case through the 1990s after the 1990-1991 Operations Desert Shield and Storm when Hussein's regime was keen to reinforce its relationships to the few states that remained friendly to it. However, following the 2003 US-led invasion and occupation of Iraq, oil exports plummeted as the war itself led to the damage or destruction of much infrastructure and the years of insurgency that followed it led to further damage and hindered reconstruction efforts. With the change of regime in Iraq the agreement regarding oil supply between Jordan and Iraq was cancelled and the latter's oil industry liberalised. This resulted in Jordan having to seek oil supplies elsewhere. In 2003 Saudi Arabia, Kuwait and the UAE agreed to offset the loss of oil supply from Iraq and maintain low prices for Jordan. However, these agreements were only temporary and had expired by 2006,<sup>31</sup> after which Jordan had to enter the international market for oil and compete for supplies on a level playing field with others. This meant unstable and much higher prices for oil than the Jordanian market was used to and was in a sense a form of shock therapy for that market.

Since the early 2000s the Jordanian government has sought to somewhat diversify its energy imports by importing oil from more than one major supplier and by moving to natural gas consumption. In the case of the latter, supplies of gas from Egypt through the Sinai Peninsula section of the Arab Gas Pipeline (which supplies Jordan, Syria, Lebanon and Israel with Egyptian natural gas) began in late 2003. But these attempts to adjust to greater consumption of natural gas and rely on Egypt for this source have been fragile. During the Mubarak regime, Jordan and Egypt (as well as Egypt and Israel) had signed an agreement for gas supplies that allowed Jordan to buy gas at around half the international market price. This preferential agreement came under much scrutiny following the fall of the Mubarak regime in February 2011 and for several months the Jordanian and Egyptian (transitional) governments sought to renegotiate the terms of the agreement. This dispute was finally settled in July 2011 when the two sides signed a new twelve year agreement that contains new terms on the price that Jordan will pay, which reflects an amount that is much closer to international market

prices.<sup>32</sup> A series of attacks on the gas pipeline in the Sinai Peninsula through 2011, following the revolution in Egypt, led to significant halts in gas supplies to Jordan, costing the economy \$3 million (USD) each day that the supply was shut off.<sup>33</sup> Combined, these two developments in Egypt have weakened Jordanian confidence in the ability of Egyptian natural gas supplies to contribute to Jordanian energy security.

In addition to broader economic pressures, the Arab Spring has affected the political environment in Jordan and increased pressure on the Jordanian regime. While Jordan has not faced the level of instability as witnessed in Libya, Syria and Yemen, the pro-democracy movement in Jordan is well established and popular sentiment implies that the government has to act on political and economic reform. People want better living conditions, higher salaries, more jobs, a better general economic situation as well as political transparency and less corruption. This has been the case in Jordan for a number of years, especially in terms of economic issues, dating back to the structural adjustment programmes that followed the 1989 financial crisis. Protests/demonstrations over rising food prices and the reducing of government subsidies on food occurred in Ma'an and Amman in 1996<sup>34</sup> and protests against soaring fuel prices have been experienced across Jordan since 2008 as government subsidies have been removed in stages and international market prices have risen.<sup>35</sup> The exceptionally high post-2003 market prices for hydrocarbons have presented the Jordanian government with the dual problem of a sky-rocketing energy import bill and domestic discontent by the masses because of the subsequent increase in living costs, thus affecting regime stability.

While domestic fuel price volatility is impacting upon many facets of Jordan's political economy, there is growing economic and political pressure on the government to find ways of increasing electricity supply while at the same time lowering and stabilising energy prices. According to the Jordan Atomic Energy Commission (JAEC) this has furthered the impetus driving the development of the Jordanian nuclear energy programme.<sup>36</sup> As with any nuclear energy programme the Jordanian case has involved a large number of domestic and international state and non-state actors. By early 2011 the JAEC was seeking an international partner (private sector MNC) to help manage and maintain Jordan's first nuclear energy

plant, which is expected to be a 1000 megawatt generation 3 reactor and is planned to be fully operational by 2018.<sup>37</sup> A further four nuclear power plants are intended to be completed by 2030 providing 30% of Jordan's energy needs. Furthermore, the JAEC has been assisted by the Australia-based consultancy firm Worley Parsons in receiving and evaluating the bids from the private sector.<sup>38</sup> Through 2011 three bids were shortlisted: a joint bid with AREVA (French) and Mitsubishi Heavy Industries (Japanese), Canadian AECL, and the Russian firm Atomstroyexport. However, selection of the successful bid has been stalled somewhat by alterations to the selected site of the intended nuclear plant, which was initially to be constructed near Aqaba in the south of the country but is now planned for an area near Mafraq in the north<sup>39</sup> (the reassessment of where to build the plant came after the Fukushima Daiichi nuclear plant disaster in March 2011 in Japan). The site location and safety studies were carried out by the Belgian firm Tractebel Engineering, lasting for 2 years from September 2009 to late-2011.<sup>40</sup> In 2010 the French firm AREVA signed an agreement with the Jordanian government to begin mining uranium ore from the central region of Jordan and to continue to explore for further reserves elsewhere in the country.<sup>41</sup> As discussed below, exploration has led to the discovery of up to 120,000 tonnes of uranium ore within Jordan.

In terms of inter-governmental cooperation, in early 2010 the US government helped fund the construction of Jordan's first (and only) nuclear waste storage facility through the US Department of Energy's Global Threat Reduction Fund.<sup>42</sup> Furthermore, in March 2010 the Jordanian and South Korean governments signed a \$70 million (USD) soft loan agreement to support the purchase from the latter of a nuclear research reactor which is being built at The Jordan University of Science and Technology in northern Jordan and which is expected to be completed by 2015.<sup>43</sup> The reactor is being built by Daewoo and the Korean Atomic Energy Institute. In addition to the involvement of international actors in the physical development of nuclear energy infrastructure capabilities the Jordanian Nuclear Regulatory Commission (JNRC) – established in 2007 and which has responsibility for creating the legal framework for any nuclear-related matters in Jordan – has created or revised 26 laws determining the scope of the nuclear energy programme and the nature of international relations regarding this sector.<sup>44</sup>

According to the Director of the JNRC, Jamal Sharaf, the commission has expanded its staff from 250 in early 2011 to over 300 and expects to have 600 full-time employees by 2018 and the expected completion of the first nuclear power plant.<sup>45</sup>

Over the past 4 years the Jordanian government has pursued a number of bilateral agreements with other governments aimed at forging frameworks for cooperation in the nuclear energy sector. These agreements have included text on the exchange or sale of technology, know-how/expertise, equipment and infrastructure. They have also contained text on the monitoring of the Jordanian nuclear programme and mechanisms to ensure its transparency. At the time of this writing, eleven such agreements have been signed with: Argentina, Canada, China, France, Japan, Romania, Russia, Spain, South Korea, Turkey and the UK, and negotiations are ongoing with the Czech Republic, Italy and the US.<sup>46</sup> The Jordan-UK agreement, signed in 2009, directly refers to the need for both countries to meet their energy security needs and that this is recognised by both governments.<sup>47</sup> It also refers to their rights and responsibilities to pursue nuclear energy for peaceful purposes while managing and safeguarding nuclear material and technology as signatories to the NPT.<sup>48</sup> Of particular importance in highlighting the spirit of the agreement is Article II, point 1a) which states:

The Parties shall co-operate under this Agreement in the promotion and development of the peaceful non-explosive uses of nuclear energy in the two countries, in [any of] the following area[s]: the implementation of projects for the generation of electricity and water desalination.<sup>49</sup>

The other bilateral agreements all contain similar text acknowledging the core of the agreed upon frameworks for bilateral cooperation in this field and the boundaries of the Jordanian programme.

Negotiations with all prospective partners have not been as successful, however, and in particular Jordanian-US negotiations have proven problematic.<sup>50</sup> The Jordanian government approached the US administration before turning to other governments but an agreement has yet to be reached. While Jordan and the US have long had a constructive relationship and been close allies (with Jordan receiving *major non-NATO ally* status from the US on 12 November 1996<sup>51</sup>) the sensitivity of issues related to nuclear technology has proven to be insurmountable thus far. The key sticking point is

the Jordanian intention to enrich uranium ore within its own borders in order to provide itself with entirely domestically sourced fuel for its planned nuclear reactors. It should be noted that the key challenge of energy security for the Jordanian government has been the problem of importing its fuel needs, while access to domestic uranium ore presents the possibility to minimise fuel imports (discussed in more detail below). Thus the Jordanian government has sought to include a clause in its' bilateral cooperation agreements that allows it to process its uranium resources to fuel level. The Jordan-UK agreement does not include text that allows Jordan to enrich uranium, however, it does not include text that disallows this either. Rather, the decision on this aspect of Jordan's plans is deferred to a later stage in the programme's development. Article VI states that:

Each Party shall obtain the written consent of the other Party prior to the enrichment of any nuclear material subject to this Agreement to twenty (20) per cent or more in the isotope U235 or U233, or to the reprocessing of any nuclear material subject to this Agreement. Such consent shall describe the conditions under which the resultant uranium enriched to twenty (20) per cent or more, or the plutonium, may be stored, used or transferred. The Parties may establish an agreement to facilitate the implementation of this provision.<sup>52</sup>

The US government has argued that Jordan does not need to enrich uranium domestically but should instead sell its uranium ore resources on the global market and buy back enriched uranium from the cheapest supplier according to market mechanisms. It is important to note that a 2008 agreement of cooperation between the United States and the UAE for nuclear energy development in the latter included text which stipulates that the UAE will not seek to enrich uranium domestically but will purchase it on the global market.<sup>53</sup> This is seen as weakening the case for the Jordanian government.

#### JORDANIAN POLICY AND THE NUCLEAR OPTION

The Jordanian government's policies towards promoting national energy security are tied to broader domestic and foreign policies.

Energy security policies are seen to be interconnected with domestic policies relating to economic growth and stability, the raising of living standards, reducing poverty, the provision of public services, political stability and to some extent environmental protection. Internationally, Jordan's foreign policy has traditionally hinged on promoting peaceful relations with its neighbours and encouraging stability in regional international relations<sup>54</sup> (historically, with varying degrees of success) and securing energy supplies from the region features prominently here. Jordanian economic policy under King Abdullah II has been characterised by liberalisation, structural adjustment, privatisation and market-led practices. These policies have been driven by economic realities, such as the 1989 financial crisis when the Jordanian government defaulted on all of its external debt repayments.<sup>55</sup> The government then signed an agreement for assistance with the International Monetary Fund (IMF). This agreement stipulated that the Jordanian government must reduce (and remove in some cases) government subsidies on food, fuel and other basic commodities.<sup>56</sup> The Jordanian government has also sought to facilitate external trade, in particular exports to large markets such as the US and EU, in order to promote economic growth at home and raise foreign exchange to pay for its imports.<sup>57</sup> However, Jordan suffers from a trade deficit which reached over \$7.7 billion (USD) in 2009.<sup>58</sup> Energy imports accounted for approximately half of this figure at around \$3.5 billion (USD) in 2010.<sup>59</sup>

Due to the nature of Jordanian economic liberalisation and the open-market economic system emerging there, re-introducing the sort of energy subsidies that existed before reform began in the 1990s is unlikely. It would also be extremely difficult for the government to do this given record budget deficits (estimated at 5-6% of GDP in 2010<sup>60</sup>) and financial pressures stemming from Jordan's experience of the 2008 financial crisis and subsequent global recession. The conclusion, it would seem, is that the only viable policy option that compliments the liberal economic policies being pursued in Jordan is to limit reliance on international energy sources and on the global hydrocarbons sector more broadly speaking. Domestic, private sector driven, energy production makes a lot of sense given the type of economic policy decision-making in the Jordanian government and the energy security problems the country faces.

Within this context the Jordanian government has long expressed an interest in nuclear energy as a key domestic policy relating to energy production and ultimately energy security within a broader framework of policy. In 1990 the Jordanian government sought the help of the World Bank in conducting an advisory study on energy management and planning in Jordan. The World Bank in turn requested that the IAEA conduct an energy and nuclear power planning (ENPP) study which the latter completed later in that year. The IAEA's ENPP study concluded that due to the expected size of the electricity grid in Jordan, the availability of commercial reactors and their size, Jordan would not be able to pursue a nuclear energy programme for twenty to thirty years.<sup>61</sup> This study demonstrates that the Jordanian government's policies regarding nuclear power extend back at least to the late 1980s and that the current pursuit of a nuclear energy programme is in line with the estimated timeframe suggested by the 1990 IAEA study.

The discovery of up to 120,000 tonnes of uranium ore in Jordan since has spurred the Jordanian desire for nuclear energy as this domestic source of nuclear fuel is seen by many in decision-making circles in Amman as the key to ensuring Jordan's energy security for decades to come.<sup>62</sup> The availability of a domestic source of fuel, albeit not oil or gas, has the same effect on domestic energy production as the latter two have in hydrocarbons rich states. As discussed above, the most important element of national energy security is the sovereign access to, and control of, a domestic energy source which is not shared with other states and which is available if investment is made in the correct infrastructure.<sup>63</sup> Rather than importing large quantities of hydrocarbons from other states at market prices (and occasionally at below market prices, as has been the case with gas from Egypt), the Jordanian market would have a reliable, domestic source of energy. Furthermore, in theory at least, other states would not necessarily be involved in producing and transporting this resource. It must be noted, however, that foreign non-state actors will be required to develop this source and engagement with other governments in multilateral and bilateral settings is required in some ways; engagement with the IAEA for example. As discussed above, any nuclear energy programme in Jordan will not make the country entirely self-sufficient in energy production for electricity and energy imports will continue to be

necessary, including hydrocarbons, for both domestic and transport consumption. However, the availability of electricity produced domestically using a domestically sourced resource and domestic infrastructure can be seen as a way of minimising the impacts of external events or processes on domestic energy security as well as a means to diversify energy sources.

The interconnections between Jordanian policy, both domestic and foreign, with its energy policies over the past few decades has resulted in some success in balancing Jordan's international relations with regional and extra-regional powers. Furthermore, in many ways the Jordanian government has long acted as a stabilising actor in many of the region's key relations, for example, the Palestinian-Israeli conflict, with some success. However, the agency of Jordan as a small and relatively poor state, as well as one that is resource poor, is limited. The ability of the Jordanian government to help manage international relations in the Middle East in order to stabilise international energy relations is limited. For example, the Jordanian government could do very little besides publicly call for dialogue before the 2003 invasion of Iraq, and it could only publicly decry the bloodshed that followed there in the following years. On the one hand, the Jordanian government and in particular its intelligence services have been deeply engaged in counter-terrorism/insurgency operations in Iraq since 2003 and this has led to some results, including the 2006 assassination of Abu Musab Az-Zarqawi, one of the prominent leaders of Al-Qaeda in Iraq after 2003.<sup>64</sup> On the other hand, this type of agency has done little to preserve stability in energy supplies generally speaking – and in some ways Jordan's involvement in Iraq and elsewhere may even have negatively impacted upon its energy security. Certainly, there have been tensions between the Jordanian government and the Al-Maliki led Iraqi government in the past few years and Jordanian-Iraqi relations have not been as close as they had been in the mid-to late 1990s and early 2000s.

Consideration of agency aside, the Jordanian government has also had to reflect on its past experiences with economic policies aimed at managing domestic prices of goods and services and increasing self-sufficiency. For much of its post-independence history Jordan's government has pursued price subsidies for basic commodities and services, including food staples, fuel and electricity.<sup>65</sup>



The aim of these policies was to control domestic prices and ensure support for the Hashemite regime while limiting the impacts of external processes on the domestic market. However, given the small size of the Jordanian economy and its inherent vulnerabilities to external forces, public sector control of the economy and continued economic insulation were not possible indefinitely.<sup>66</sup> Following the 1989 financial crisis in Jordan the government was faced with the dilemma of how best to ensure economic stability and growth; would this be through macro-economic restructuring as advocated by the IMF and adoption of the Washington Consensus, or through continued governmental control of the economy? Through the 1990s the former direction was taken and Jordan's economy has continued to liberalise since.<sup>67</sup> At the same time this macro-economic dilemma impacted upon the energy security dilemma in Jordan. A key challenge that emerged through the 1990s was how the government could ensure energy security in Jordan at a time when concrete steps were being taken to liberalise the economy and fully integrate it into the global economic system.

Broadly speaking there are three policy directions that may be undertaken in such circumstances. The first is to reduce domestic fuel demands. This is extremely difficult for a developing country that is seeking to promote industrialisation and economic activity while facing a rapidly growing population. Secondly, Jordan may seek external assistance from major regional or global powers that can ensure sustained energy supplies at stable prices. However, this policy increases reliance on external actors and institutionalises dependence on these actors. Finally, Jordan can increase domestic energy supplies and production. This policy requires significant investment of time, financial resources and technology, which also entails some measure of reliance on external actors for these.

It is clear that the Jordanian government faces a major energy security challenge due to the country's resource scarcity. Furthermore, it is not possible for it to remain insulated from external processes and events, and engagement with international actors is necessary regardless of how Jordan's energy security problem can be met. However, there does seem to be some merit in adopting the third general policy option highlighted above. In particular reliance on domestic energy supplies and reducing dependence on external supplies removes the key obstacle to achieving energy

security. While it is true that reliance on external actors for the necessary investments to establish and maintain a nuclear energy programme (as well as alternative renewable energy programmes such as solar and wind energy sectors) cannot be avoided, these actors will likely be non-governmental, private sector entities. Bilateral and multilateral agreements between the Jordanian government and other governments have been pursued and signed (and others continue to be sought) and these agreements represent the framework for Jordan's nuclear energy cooperation with external actors, it is likely to be private sector multinational corporations (MNCs) that actually engage with the research, planning, construction and maintenance of the nuclear energy infrastructure. This involvement will be essential to Jordan's nuclear energy programme going forward and this presents an interesting dynamic. External supplies of hydrocarbons are fixed in location and are very sensitive to changes in domestic and international relations. At the same time the kind of MNCs involved in nuclear energy as discussed above are actually quite mobile, flexible and not nearly as sensitive to changes in international relations as those involved in hydrocarbons production and transportation. The commodities (knowledge, technology, expertise, financial resources, equipment and infrastructure) being sourced from these MNCs are also less fixed than the hydrocarbons resources that are sourced from external actors in those sectors. The result, therefore, is that domestic energy can be produced while at the same time reliance on external actors is transformed and made more stable thus contributing to energy security.

## CONCLUSIONS

In understanding the Jordanian nuclear energy programme it is necessary to identify the level of energy insecurity the country faces and the nature of the energy security issues that policy-makers in Amman contend with. The overall reliance on imports of energy from a small number of external sources has left Jordan facing economic and political problems due to the rising fuel bill and the negative impact on economic growth this presents. Furthermore, Jordan's reliance on just a small number of energy sources has left the country extremely susceptible to changes in the international

relations of the MENA region. In the face of such changes as the 2003 invasion and occupation of Iraq the Jordanian government has found that its limited agency at the international level has left it unable to influence international relations in order to promote its own energy security. At the same time new policy directions which have sought to diversify energy supplies, including the reliance on Egypt for natural gas, have also fell foul to instability in other countries which is outside of the influence of the Jordanian government. Faced with this situation and with few significant natural resources of its own along with growing budget and trade deficits the Jordanian government has turned to the development of domestic energy sources as a means to promote its energy security and by extension political and economic stability.

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It is hoped that the nuclear energy programme will help alleviate Jordan's energy insecurity by relying on domestic supplies of fuel (uranium ore) and by diversifying the involvement of both external state and non-state actors in the Jordanian energy market. These factors should increase Jordan's resistance to changes in the international system and regional relations in particular. The international legal framework that is being put in place, including bilateral and multilateral agreements, should contribute to the ways in which the programme develops and to the way it is perceived by external actors. The Jordanian case can be explained using an understanding of energy security as discussed above and we can conclude that energy security is a key challenge for policy-makers. Furthermore, a nuclear energy programme would use domestic supplies of energy, reduce the need for energy imports, and diversify the range of international actors relied upon (for technology, maintenance and so on).

Other states in the MENA region also fit this model of energy insecurity and stand to gain some of the same advantages that Jordan seeks if they develop their own domestic energy programmes be they nuclear or alternative renewable energy programmes such as solar or wind energy. The level of available domestic supplies of nuclear fuel and the extent to which they engage with other governments to develop a multilateral (and bilateral) legal framework for such programmes as well as the engagement with external non-state actors in the development of the infrastructure is important. These factors will help determine both the reality and the

perceptions of these nuclear programmes and their roles in combating energy insecurity for some countries.

CEJISS  
1/2012

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