



Review

A world's dilemma 'upon which the sun never sets' – The nuclear waste management strategy (part I): Western European Nation States and the United States of America



Mark Callis Sanders ^{a,*}, Charlotta E. Sanders ^b

^a Sanders Engineering, 1350 E. Flamingo Rd. Ste. 13B #290 Las Vegas, NV 89119, USA

^b Department of Mechanical Engineering, University of Nevada, Las Vegas (UNLV), 4505 S. Maryland Pkwy, Las Vegas, NV 89154, USA

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ABSTRACT

The management of spent nuclear fuel (SNF) and nuclear wastes demands a strategy to provide for the safe, secure, and permanent disposal of radioactive material from power generation, defense uses, and other activities. Nation states have taken different paths to nuclear waste management and are at various stages of the development of a nuclear waste management strategy. A strategy may include developing a geological repository, nuclear fuel reprocessing, interim storage, as well as discussions of the creation of a multinational storage facility. The nation states have each developed (or are developing) a set of laws and regulations for the management of SNF and nuclear wastes within a constitutional framework and regulatory space. The paper provides an overview of the strategy used (or being developed) and its place within the legal framework. The paper concludes that though each nation state must look outward to its shared international obligations, there must also be an inward reflection of a nation state to its own traditions, customs, and legal/law making regimes. This is to assure a successful and stable outcome at the present period of time, and into the future.

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1. Introduction

"The laws of conscience, though we ascribe them to nature, actually come from custom."

- Montaigne

It is generally argued that the use of nuclear power is viewed as a means to produce electricity while remaining nearly carbon neutral (Svenne, 2012). Despite the events surrounding Fukushima,¹ this fact is forwarded by some as a suggested reason for

growth in the popularity of nuclear power in certain corners of the globe (Truelove and Greenberg, 2013).

In Europe for instance, the European Commission stated it would develop a roadmap to support "greater energy security and resource independence of the European Union (EU) by 2020" (European Commission). In the United Kingdom (UK), such sentiment is reflected by its parliament in "An Act to make provision for the setting of a decarbonisation target range and duties in relation to it."² On November 26, 2009, the State Council of China announced that China would "reduce the intensity of carbon dioxide emissions per unit of GDP in 2020 by 40–45% compared to [levels emitted in] 2005" (Zeng and Zhang, 2011).

However, no matter how lofty a goal among the nations of the earth to increase the use of atomic energy to reduce carbon release

* Corresponding author.

E-mail addresses: sanders.engineering-contracts@cox.net (M.C. Sanders), charlotta.sanders@unlv.edu (C.E. Sanders).

¹ "Fukushima" refers to the nuclear accident which occurred on March 11, 2011 following the earthquake and tsunami off the coast of Japan at the Fukushima Daiichi Nuclear site.

² Energy Act 2013.

into the atmosphere for producing electricity, there remains an issue ‘upon which the sun never sets’³ – the nuclear waste management strategy.

The paper presents an overview of the various options in strategy that is currently being looked into, used, or desired by nation states.⁴ Further, a brief review of the legislative and governmental structure of the nation state is presented, as well as a brief historical overview of the path to the use of atomic energy in the nation state. Finally, a review of the corresponding laws relating to nuclear waste management and permanent disposal is considered.

The overall intent and purpose of the paper is an overview/review of the current trends and conditions found among nation states in various regions of the globe. However, the paper arrives at the conclusion that each nation state must look not only outward to its international obligations, but also more importantly inward to its own traditions, customs, and law making structures to achieve stability in linking a nuclear waste management strategy to its rightful place in the chain of history of a particular nation state.

2. Background

“Brave lodgings for one, brave lodgings for one, A few feet of cold earth, when life is done...”

- The Pickwick Papers (Charles Dickens)

World energy consumption is expected to grow during this century. Nuclear power is a base-load low carbon source of energy and can contribute to the fight against climate change. It is vital that politicians take the lead and implement bold decisions regarding the energy mix;]. Developments in Finland and Sweden or the United Kingdom (UK) demonstrate that if the political decision to include nuclear in the energy mix is taken and presented in a manner consistent with a nation’s legal customs and traditions, as well as a connection to its past, then a population tends to become more favorable to nuclear power ([What people really think, 2012](#)).

It must be noted, that the decision-making processes between the nation states in determining a nuclear waste management strategy will no doubt vary. Some of the nation states “will not be as democratic as others, so that decisions to site a repository will

³ “The empire on which the sun never sets” is used in variation to describe certain global empires during periods of history. The extent of these empires is such that there is always at least one part of the territory that is in daylight. Original use occurred during the time of the Spanish Empire (mainly in the 16th and 17th centuries), as well during the era of the British Empire (mainly in the 19th and early 20th centuries). In the early 16th century, the phrase, “el imperio en el que nunca se pone el sol” (the empire on which the sun never sets) originated with a remark made by Fray Francisco de Ugalde to Charles I of Spain (r. 1512 to 1556). He was king of Spain and emperor of the Holy Roman Empire. The empire included many territories in Europe, islands in the Mediterranean and Atlantic, cities in North Africa and vast territories in the Americas. The British Empire was at its largest extent in 1919. Through the treaty of Versailles, Britain acquired Germany’s East and West African colonies and Samoa ([RM](#)). As nuclear waste management is an issue facing all nuclear power generating nations and all people everywhere, it is an issue upon which the sun is always shining twenty-four hours a day, seven days a week. In addition, spent nuclear fuel (SNF) will require storage for hundreds to thousands of years into the future. Thus, this is also an issue, in the course of human events, upon which the sun will not set for a lengthy span of time into the future.

⁴ Not every nuclear power generating nation state is presented within the confines of this paper. The authors have selected nation states, which they feel, provide for the broadest overview of the world dilemma. Part I covers the Western European Nation States and the United States of America. Part II will provide an overview of Asia and the Southern Hemisphere. This is to keep the papers within a reasonable and workable framework.

probably be in the hands of an elite with vested interests” ([Marshall, 2005](#)).

Each nation state, though it has international obligations, ultimately makes an independent choice regarding its use of atomic fission and a nuclear waste management strategy. The Swedish historian and author Geijer⁵ in the early 1800’s proposed the proposition that ‘human history is a chain of connections of people and ideas through the ages of time’. He suggested that in order to achieve stability between the bonds that link these connections, sudden large chasms should not appear between each link of this chain. Based on this model, each new action, decision, or discovery should therefore occur at a slow and steady pace in its progression. To achieve this sought after ‘stability,’ an incremental or step-by-step approach is therefore required. The Chinese have a similar philosophy, which is presented in the proverb that one should “cross the river by feeling the stones.”⁶

The origins leading to the discovery of atomic fission (pre-World War II) have a linkage to past discoveries in the preceding centuries. A particular problem in “stability through linkage” arose chiefly due to how the current use of atomic fission for peaceful purposes in energy production (post-World War II) came to fruition because of and through the discoveries occurring while in the darkness of secrecy for developing the atom bomb under the auspices of the Manhattan project.⁷ The sudden thrust of atomic fission on the conscious of humanity in August 1945 with the dropping of the atom bomb did not allow this new force to achieve a “stability through linkage” in humankind’s history chain. Instead, there appears to be a metaphorical gap in this period of history. It lies in stark contrast to Geijer’s “stability through linkage” proposition. Therefore, there exists a need to provide stability in the sustainability model for nuclear power generation, and more importantly, with issues surrounding nuclear waste management. Therefore, it is possible to jump the hurdles that seem to beset nuclear waste management programs and the dilemma faced.

3. The dilemma

“Stay committed to your decisions, but stay flexible in your approach.”

- Tony Robbins

The American poet Robert Frost⁸ refers to the concept of “dilemma” as “two roads diverging in a yellow wood,” in which the traveler is not able to “travel both” ([Frost](#)). In other words, the traveler must reach a point in his journey at which he must make a reasonably intelligent decision about which route to travel based

⁵ Erik Gustaf Geijer (1783–1847) was a Swedish writer, historian, poet, philosopher, and composer. His writings served to promote Swedish National Romanticism. Though he began his career on the “conservative” side of the political spectrum, he later changed belief systems, for which he was wildly attacked by colleagues. He became an influential advocate of “liberalism.”

⁶ “Cross the river by feeling the stones.” 摸着石头过河 Mōzhe shítou guòhé.

⁷ U.S. government research project (1942–45) - The U.S. Army Corps of Engineers established the Manhattan Engineer District to develop and build the atom bomb. Today, the U.S. Department of Energy continues to own and manage the Federal properties at most of the major Manhattan Project sites, including Oak Ridge, Tennessee; Hanford, Washington; and Los Alamos, New Mexico. This secret project was only revealed to the American people following the atomic bombings of Hiroshima and Nagasaki (Japan). At its peak, the project employed 130,000 workers and, by the end of the war, had spent \$2.2 billion ([Energy.gov](#)).

⁸ Robert Lee Frost (1874–1963), an American poet, whose work was initially published in England before it was published in America focused on realistic depictions of rural life. He is known for his command of American colloquial speech.

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