



## **TENSIONS OF EUROPE/INVENTING EUROPE**

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**TITLE:** Nuclear electricity networks in Eastern Europe: Political, social, and technological development. The case of Bulgarian nuclear program (1947-1989) (research design)

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### **Abstract:**

This article presents a project for dissertation, revealing East European nuclear power field in its technological and network establishment specifics. The author presents European integration in the Cold War time by investigating various types of links between the different transnational actors. The involvement, on one hand, of the USSR in its satellites' development is one perspective of what European integration in nuclear power field was. On the other hand organizations like IAEA (International Atomic Energy Agency) and CMEA (Council for Mutual Economic Assistance) served as catalysers for linking different partners. Bulgaria as a part of the Soviet bloc and a nuclear power producer serves as a good example for revealing what kind of nuclear technology network existed in Europe. The state was very closely connected to the USSR, but it became more emancipated recently by including different partners for its nuclear development.

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## *I. Introduction*

Inventing nuclear power was one of the most spectacular scientific achievements of the 20<sup>th</sup> century. At first it was considered a military weapon, but its later development transformed that power into a very strong social indicator. Many international bodies became responsible for the peaceful use of nuclear electricity power. Some of them considered themselves as European, while others tried to separate, for political reasons, from what we today call Europe.

After 1957 the creation of the IAEA (International Atomic Energy Agency) established a platform for peaceful development of nuclear technology in Europe. The UN was responsible for the creation of IAEA, and allowed the smaller countries to possess and use atomic energy. The agency was one of the most important actors that worked for integrating Europe by means of nuclear energy relations. The aims of IAEA were to help every country interested in establishing a nuclear program to be able to have such. The organization works on the basis of technology, knowledge, and material exchange between the members. The idea of a European and global entity was seen through spreading this new technology among every single country that wanted to have it.

During the second half of the 20<sup>th</sup> century Europe was politically divided by the Cold War. This division created a temporary union in the East based on ideological beliefs – the so-called Socialist bloc. Leader of that block was the Soviet Union. In fact the usage of nuclear technology for peaceful purposes was introduced in the USSR when the Russians built the first nuclear power station in Obninsk. It became operational in 1951, and after that some preliminary steps for institutionalizing the field were launched.

The socialist countries also established their own atomic commission in 1960 similar to the Western one and co-operating with it. The Standing Commission was set up under COMECON (Council for Mutual Economic Assistance), and was responsible for the use of atomic energy for peaceful

purposes.<sup>1</sup> During this period COMECON and its sub-commissions developed the field of nuclear energy in Eastern Europe following the USSR's leading role. That role consisted of providing technological and scientific assistance to the countries tied politically to the Soviet Union.<sup>2</sup>

This economic cooperation ensured integration that united half the European continent into an atomic community. In my future work I want to see if this community was more than a simple vehicle for the implementation of Soviet policy to build dependence in the Eastern European countries. I also want to test if the socialist community was different from what most historians consider national pride, when nuclear power plants were established on particular territory, or what they want to see in every single case as a unique national achievement. I want to reveal how and to what extent atomic energy in Eastern Europe was developed due to the Soviet Union. I would also like to show the relations that existed between the COMECON members in that field, and to indicate to what extent they were integrated.

To achieve these aims in my future work I here want to use the example of the Bulgarian nuclear program. This program is a very useful example because of the specific political situation in the country during the period.<sup>3</sup> Exploring the Bulgarian case will bring more clarity about the transnational network that existed between the socialist countries. Such exploration is possible because Bulgaria was a part and also a co-creator of this network.

Even more curious in the field of nuclear peaceful development, are the formerly existing connections between Eastern Europe and Western Europe, connections based upon knowledge transfer, electricity transfer and even standardization agreements. This leads my research to an important question: Was there a kind of pan-European atomic energy movement in the second half of 20<sup>th</sup> century and who were the main actors in this process?

## **II. Literature review**

### **a) Building a New Technological Europe**

#### *Introduction*

The aim of this literature review is to explain in some points the fields I want to examine. It is understandable that I am unable to present all of the available works in that sphere. For that reason I collected what I found to be the most important literature for my thesis. Taking into consideration the term "Europe" I would like to show that the concept of the 'Old continent' requires a lot of assumptions. This immediately leads me to the second part of the essay where I reveal the contribution of some authors who describe the role of

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<sup>1</sup> "Peaceful uses of atomic energy", Proceedings of the Fourth International Conference Geneva, 6-16 September 1971, part I, Published by United Nations and the International Atomic Energy Agency, p. 695

<sup>2</sup> "Nuclear power Experience" Proceedings of an International Conference Vienna, 13-17 September 1982, Part I, Published by IAEA, Vienna, 1983

<sup>3</sup> Bulgaria was one of the closest satellites of the USSR during the Cold War, and its nuclear program was almost entirely built by Soviet specialists.

technology in the recent world. Not surprisingly I am finishing the section with a discussion about Europe and its various meanings. That discussion serves as a bridge to my next point where participation in nuclear technology appears on the European map. In that section I start from one national case and walk through the role of USSR in delivering nuclear technology in Eastern Europe. In that way I want to show how a particular technology could influence one region's political, economical, and social development.

### *Ideas of Europe*

It has always been very complicated task to define Europe. There have been many historical attempts at describing what Europe could be. Some of these efforts try to see a common space united by religious values, while others pay attention to the geographical positioning of the continent. Actually the European continent has had many faces, related to various political, cultural or technological transformations during the centuries. One could recognise Europe through its civilizing role in the "Great discoveries", when some kingdoms became responsible for social, political and cultural changes that influenced the world. It was also the motherland of ideas for freedom and equality, proclaimed by the French revolution and its spiritual leaders.

Europe was subject to many debates, the role of which was to a great extent to explain the various ideas that existed in the historical field and try to cope with the complicated picture. For example, Stuart Woolf in his article "*Europe and its Historians*" says that the idea of Europe is an attempt to create a particular identity among the continent's population.<sup>4</sup> According to his arguments, "Europe" was an artificial construct that was recently created for particular purposes, to unify permanent political opponents under one ideological umbrella.

Another contemporary attempt to create common European history was made by Norman Davies. In his book "*Europe, A Panorama of Europe, East and west, from the Ice Age to The Cold War, From The Urals to Gibraltar*", the author tries to unify most of the main political historical events in one geographically assumed Europe.<sup>5</sup> Of course Davies pays attention to the problematic of strongly defining Europe, but his efforts to unite the "Old continent's" political history could be a good example for making political Europe possible.

"*The history of the Idea of Europe*" is one accomplished effort that tries to describe the various transformations through which the idea of Europe passed.<sup>6</sup> In this work the authors Pim den Boer, Peter Bugge and Ole Waever strictly explain the periodization of the understanding what Europe could be in past epochs. They try, by taking into consideration the social, political, and cultural changes, to answer some significant questions.<sup>7</sup> Namely, how will the

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<sup>4</sup> Stuart Woolf, "*Europe and its Historians*", Contemporary European History, 12 (2003)

<sup>5</sup> Norman Davies, *Europe, A Panorama of Europe, East and west, from the Ice Age to The Cold War, From The Urals to Gibraltar*, Oxford University Press Inc, 1996

<sup>6</sup> Wilson, Kevin and Jan van der Dussen (eds.), *The history of the idea of Europe*, ROUTLEDGE, London and New York, (1995)

<sup>7</sup> See also: Malmberg, M., and Bo Strath eds. *The meaning of Europe. Variety and Contention within and among Nations*, Oxford, New York, 2002; Bo Strath eds., *Europe and the other and Europe as the other*, PIE Lang, Oxford, New York, 2000

appropriation of Europe as an entity cope with the strong nation state policy? What will the meaning of Europeanness be, when the huge diversity of national and cultural differences rises on the stage? Is there a possibility for a particular country to recognise itself as a part of bigger community within a world with strong national traditions? Who could say that the idea of Europe was not created to prevent the rise of nationalism? Were shared values recognised on every organizational level, or did politicians frequently go around ideas like human rights, democracy and independent judgement? These and many other questions are embedded in this book but what is most valuable is that the authors only put the problematic on the table, without giving any strong suggestions as to where they see the truth. In that sense Europe stays as an open definition to which we could attach unexplored connotations.

### *Technology and shared space*

With the Industrial revolution in the 19<sup>th</sup> and 20<sup>th</sup> centuries, technology emerged as one of the most important factors, influencing the political, economical, and social world. That influence was far stronger than in the previous centuries. Decade after decade the engineers' achievements conquered the living space in almost every possible human area. The opportunities that emerged from new innovations opened more and more fields for future development. Being deeply involved in everyday life, engineers very soon became actors with unique public positions. Their innovative decisions and creativity were quickly recognised as bearers of power.

Langdon Winner remarks in his inspirational work *The Whale and the Reactor*: that "a number of social movements have chosen one technology or another as a focus of their hopes or fears"<sup>8</sup> After a particular period the nations or some organizations appropriated technology as the best salvation for many challenges. Using the strength that technology allowed, these actors started to dictate, or to negotiate about, the rules. The policy making power, hidden behind the technology, Winner maintains, explaining "the theory of technology politics", was mainly recognised with the momentum of large-scale technical systems.<sup>9</sup> The variety of actors involved in the technological policy also grows with the development of the engineering field and the complication of quickly emerging systems.<sup>10</sup>

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<sup>8</sup> Winner L., *The Whale and the Reactor*, The University of Chicago Press, London, 1986 (x)

<sup>9</sup> Ibid, p.21

<sup>10</sup> These issues of juxtaposing policy and technology with the various actors that participate, especially when we speak about the society and its recent historical dimensions are also described in other significant works like: Чалъков, И., *Да направиш холограма*, Издателска къща 'Марин Дринов', София, 1998; (Tchalakov. I., *Making a hologram*, Marin Drinov Academic Publishing House, Sofia, 1998); Sisondo, S., *An introduction to Science and Technology Studies*, Blackwell publishing Ltd, 2004; Latour, B., *We Have Never Been Modern*, Harvard University Press, (1993); Krige, John, *American hegemony and the Postwar Reconstruction of Science in Europe*, The MIT Press, Cambridge Massachusetts, (2006); Stephen, G., and Simon Marvin, *Splintering urbanism, networked infrastructures, technological mobilities and the urban condition*, Routledge Taylor & Francis Group, London, 2001

Thomas Hughes created one of the most significant concepts - *Large Technical Systems* (LTS) - in the field of history of technology in his famous work "*Networks of Power*", where he contributes to the theory of technological development by bringing not only the technical elements from one system but also involving the so called 'human factor'.<sup>11</sup> In his work, Hughes outlines how one electrical system emerged driven by the innovator's struggles for establishing new production.

Taking into consideration Edison's efforts to invent and develop the electric light system, the author finds that simple invention is an answer to constantly emerging problems. The inventor himself is obliged to struggle with his devices, meeting not only natural and technical obstacles, but also problems from fields that are not familiar to him. For instance he has to, after the successful start of his invention, test it in the market.<sup>12</sup> That was the reason, Hughes says, why Edison acted simultaneously in pushing the technology and pulling the market.<sup>13</sup> These complicated relations reveal how one system built upon heterogeneous relations appeared in the recent social reality. By using Edison's model, the first electricity-developed areas were connected through various human and non-human actors.<sup>14</sup>

Thomas Hughes also explains: "when the inventor's work finishes and one system becomes relatively stable, the specialists, responsible for that, appropriate future developing of it."<sup>15</sup> I will use this concept in my work to show how particular Soviet nuclear technology was invented, tested and finally utilized for political and technological purposes in Eastern Europe. I will try to exemplify how systems grew up from research scale to a national, and later to a transnational scale. Due to that extension, united areas emerged on the maps. These areas were products of developing a particular system step by step and transforming it into an interconnected net that covered cities, states, and even continents.<sup>16</sup>

The most important concept of *Large Technical Systems*, created by Thomas Hughes, is the assumption that many components from different fields are interwoven into creating such systems. That was the base of Edison's system success. Through governing juxtaposed technological artefacts and social components, consisting of actors and organizations, he developed a system that finally influenced a major part of the world.

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<sup>11</sup> Hughes, Thomas P., *Networks of power, Electrification in Western society, 1880-1930*, Baltimore: John Hopkins University Press, (1983)

<sup>12</sup> Ibid, p.19

<sup>13</sup> Ibid, p.20

<sup>14</sup> Latour, B., *We Have Never Been Modern*, Harvard University Press, (1993)

<sup>15</sup> Hughes, Thomas P., *Networks of power* p.21

<sup>16</sup> For example the COMECON electricity grid was created step-by-step. At first there was an agreement between Hungary and Czechoslovakia to connect their electricity systems, signed in 1953. After that Poland and DDR joined the group in 1960. In the same year the Standing Commission in COMECON was created and three years later all of the members were in parallel connection; See: Савенко, Ю., Самков, М., *Объединенные электроэнергетические системы стран-членов СЕВ*, Совет Экономической Взаимопомощи, Москва, 1983; (Savenko, J., Samkov, M., *Unification of electro-energetic systems of the COMECON members*, COMECON, Moscow, 1983); Непорожного, П., ред. *Электроэнергетика европейских стран-членов СЕВ*, Энергия, Москва, 1978 (Neporojnego, P., *Electricity industry in European members of COMECON*, Energy, Moscow, 1978)

Transferring the technology across national borders created permanent continuous flow, which on its turn met other obstacles unable to stop it.<sup>17</sup>

Borders have always been double entendres. Their role, no matter if they were political, cultural, or natural, was on one hand to stop the flows of people, knowledge, goods, or ideas, and on the other hand to allow their passing, thereby establishing quite new alliances and unique configurations between some actors and organizations. In their article: "*Inventing Europe: Technology and the hidden integration of Europe*," Thomas Misa and Johan Schot explain these significant flows of knowledge, artefacts and people using the term *circulation*.<sup>18</sup> In addition they create a second term – more important and exact - *appropriation*, which lies in the foundation of their understanding of circulation. "Here, appropriation refers to the process in which users – including governments, companies, organization, and citizens – variously explore, signify, reproduce, communicate, and integrate knowledge into their daily life and business."<sup>19</sup>

The authors clearly explain that the development of technology leads to the concept of Europe imagined or even created by various actors, governmental and non-governmental. Those agents were depicting Europe by means of railroads, electricity systems, highways, communication networks or consumer products.<sup>20</sup> But workers, consumers, professionals, and citizens that maintain sometimes positive or negative positions also viewed Europe in their perspective.<sup>21</sup> By accepting a particular position, the actors evolved into the process of making common spaces, Europe for instance, actually make some transnational infrastructures, like the above mentioned, included or excluded.

By using the terms of *linking* and *de-linking* or *re-linking*, the two authors explain the process through which many infrastructures were included or excluded. According to them it was during the Cold War when the establishment of some transnational infrastructures followed the model.<sup>22</sup> The Cold War acts as one of the most significant contemporary factors when we speak about technological diffusion in Europe, and worldwide. The Cold War also influenced nuclear development in Europe and the creation of networks in the field.

It is not only the work by Thomas Misa and Johan Schot that explains comprehensively the role of technological development in recent history. Another significant work taking into consideration the integration processes occurring particularly in Europe. "*Networking Europe*" is a book edited by Erik van der Vleuten and Arne Kaijser. In this volume, the authors use ten different cases to reveal the specifics of European space shaped by transnational

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<sup>17</sup> Ibid p. 49

<sup>18</sup> Misa, Thomas and Johan Schot, , "*Introduction – Inventing Europe: Technology and the hidden integration of Europe*", *History and Technology* 21, no. 1 (2005): 1-20

<sup>19</sup> Misa, Thomas and Johan Schot, , "*Introduction – Inventing Europe*": p.10

<sup>20</sup> Ibid, p.9

<sup>21</sup> Such relations and especially the positioning of the customers are also explained in: Ruth Oldenziel, Adri Albert da la Brunze, and Onno de Wit, "*Europe's Mediation Junction: Technology and Consumer Society in the 20<sup>th</sup> Century*" *History and Technology* 21, no. 1 (2005): 107-139

<sup>22</sup> Misa, Thomas and Johan Schot, , "*Introduction – Inventing Europe*", p.9

infrastructures.<sup>23</sup> In their work the authors stress that the building of infrastructures is in their greater part a matter of policy, economy and social changes.

Highlighting the role of some of the most significant organisations during the period, they try to discover to what extent the existence of some agencies was crucial for establishing common space like Europe, and how they discover it. Organizations involved into the European meanings were “the League of Nations, the United Nations Economic Committee for Europe (UNECE), and the Organization for European Cooperation and Development (OECD)”<sup>24</sup> The usage of the concept *transnational networks* leads to two alternative concepts: Large Technical Systems (LTS), and infrastructures that united together with the contestable term of Europe, try to illuminate the influence of technology over the continent.<sup>25</sup> The book is moreover a historical volume that aims to reveal past historical processes, strongly related to technology and infrastructure networks development, across the nation state boundaries.<sup>26</sup> Unfortunately in this volume the problem of peaceful nuclear networks in Europe is only briefly touched on.

## **b) History of nuclear peaceful development in Europe**

### *Nuclear electricity issues*

With the introduction of nuclear power used for peaceful purposes several issues emerged on the European stage. It was obvious that unless the strongest states such as France, USSR or Britain had the technology, the possibility for the other continental countries to have nuclear technology arose. It was not a question of whether they wanted to have nuclear energy, especially in the beginning, but how to appropriate this technology?<sup>27</sup> Another question strongly related to the proliferation of nuclear technology, was the power it contains. Who wanted that power? What kinds of connotations were situated behind the decision to use nuclear technology? How would the great political leaders react, and how would they use their position as providers of nuclear technology? What kind of interactions would appear between the smaller possessors? These and many other questions are hidden behind nuclear peaceful development in the European continent.

One really strong attempt to answer some of them is made by Gabrielle Hecht in her book *The Radiance of France*. In this work the author sees defeated France searching for its re-creation as a world power and as a

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<sup>23</sup> Vleuten, E. van der, & Kaijser, A., *Networking Europe. Transnational Infrastructures and the Shaping of Europe 1850-2000* Science History Publications/ USA Sagamore Beach, (2005)

<sup>24</sup> Vleuten, E. van der, & Kaijser, A., *Networking Europe*, p.3

<sup>25</sup> For better understanding of the integration processes that occur because of some organizations work in Europe, over the fields of electricity, railroads, and highways see: Van der Vleuten, E., Anastasiadou, I., Schipper, F., Lagendijk V., “*Europe’s system builders. The contested integration of transnational road, electricity, and rail infrastructures*”, *Contemporary European History* 16, 3 (2007), 321-347

<sup>26</sup> Vleuten, E. van der, & Kaijser, A., *Networking Europe*, p.7

<sup>27</sup> The ‘beginning’ that is mention here, appears to be “the First Geneva Conference” in 1955, launched by the United Nations. See: David Fischer, *History of the International Atomic Energy Agency: the first forty years*, IAEA, Vienna, Austria, 1997.



strong proud nation.<sup>28</sup> The way in which the French government wanted to achieve these goals was recognised by their possession of nuclear technology. Technical and scientific experts, who promised to bring back the glorious reputation of the nation state, made that re-creation possible. They claimed: "Industrial, scientific, and technological development would not only rebuild the nation's economy but also restore France to its place as a world leader."<sup>29</sup>

France developed its nuclear technology basically by means of its own resources. As a result, a French atomic energy commission Commissariat à l'Énergie Atomique (CEA) was established in 1945.<sup>30</sup> With a strong beginning like this the specialists put their abilities into nation state development and identity. They became policy makers and represented what was going to be France on the European stage. Such process was possible because of the weak governments that ruled the country immediately after the war. Of course to achieve their aims they needed state support and they saw it in the De Gaulle cabinet.

In addition the book examines the labour participation in the creation of the French nuclear electricity system. A public and social echo is also related to that technological system. Hecht also reveals the confrontation and the collaboration of the two major agencies involved in the creation of independent nuclear electricity community in France: CEA and Electricite de France (EDF). She outlines their confrontation about the technology that would be applied, but also in their interactions Hecht recognises the difference between military and peaceful discourse. What is the most important in *The Radiance of France* is that the author uses not only methods and theories from technology studies, but also from political and cultural history. The juxtaposition of these approaches answers some of the questions stated above, and depict in very good way the socio-technical environment in which the French atomic program was created.<sup>31</sup>

### *Nuclear relations in Eastern Europe*

When we speak about nuclear electricity in the Eastern European region we cannot understand its development without taking into consideration the role of the former USSR. From the earliest years of the establishment of peaceful nuclear relations, the Soviet Union was a leader in producing and providing nuclear technology. That development of the atomic field is well described in the edited collective volume: *Атомная наука и техника в СССР (Atomic*

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<sup>28</sup> Hecht, Gabrielle, *The Radiance of France. Nuclear Power and National Identity after World War II*, The MIT Press, Massachusetts Institute of Technology, (1998)

<sup>29</sup> Hecht, Gabrielle, *The Radiance of France*. p.2

<sup>30</sup> Ibid, p.2

<sup>31</sup> Such problematic about national nuclear movements is also revealed in: Ielsen H., Ielsen, K., Ersen, F., Iccaard, H., "Riso and the Attempts to Introduce Nuclear Power into Denmark", Centaurus 1999: Vol. 41, p.64-92; Kaijser, A., "Redirecting power. Swedish Nuclear Power Policies in Historical Perspectives", *Annu. Rev. Energy Environ.* 1992, Vol.17, 437-62  
Copyright© 1992 by Annual Reviews Inc.; Lagaaij, J., Verbong, G., "Different visions of power. The introduction of the nuclear power in the Netherlands 1955-1970", Centaurus 1999: Vol. 41, p. 37-63

*science and technology in the USSR*)<sup>32</sup> In that issue the problematic of establishing nuclear power reactors in USSR is explained from its early beginning, taking into consideration the contribution of all the leading Soviet scientists that created them. The book also discusses most of the areas related to the nuclear field including: types of reactors, usage of nuclear power in the economy, nuclear and radiation safety, scientific experiments and fundamental theories as well as the international cooperation in the field of nuclear electricity. The work is full of communist propaganda, but this does not mean it is not useful.<sup>33</sup> On the contrary, it reveals the specific atmosphere in the field, as it more or less existed in the period. It also shows the specifics of the development of nuclear technology in the early stages and explains the role of COMECON and USSR for Central and Eastern Europe.<sup>34</sup>

For better understanding of the Soviet Union's role in the field of peaceful nuclear development, we should examine another version of what that development looked like. The Russians very quickly recognised the advantages of developing nuclear technology. Being one of the greatest promoters for peace in the world, the Soviet Union not surprisingly established the first nuclear power plant that produced electricity.<sup>35</sup> Later they constructed various nuclear power plants but their social and political destiny was completely different in comparison to those built in the West.

Paul Josephson is one of the authors who describe the fate of the Soviet Union's nuclear program from a Western point of view. In his book "*Red Atom*" he reveals the whole path from the establishment of the USSR's nuclear program to recent days.<sup>36</sup> He takes into consideration not only the technological development of that nuclear program, but also the specific ideological and political environment that existed in the USSR. Josephson's arguments are similar to those of Gabrielle Hecht that: "...state leaders and scientists in the USSR, like those in France, the United Kingdom, and the United States, sought to demonstrate the peaceful intentions of the nation."<sup>37</sup> He also tries to reveal the international relations between the Soviet Union and the rest of the world in the field of peaceful nuclear development.<sup>38</sup> Most importantly, this work appears to be the most comprehensive study of Soviet nuclear technology. This is important because this technology was distributed throughout Eastern Europe, and some other countries.

During the second half of the 20<sup>th</sup> century, the Eastern European region was a part of the communist bloc. There were exceptions as some countries remained outside the bloc but as a whole the Soviet Union's ideological and political line was appropriated. Moreover, there was a technological presence that obliged most of these countries to accept decisions comfortable for the "Big Brother". After the Geneva Conference that was organised by the United Nations (UN) in 1957, the smaller countries

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<sup>32</sup> Морохов, И., А. Задикян, и др. *Атомная наука и техника в СССР* (Morohov, I., A. Zadiqyan et al. (eds.) *Nuclear science and technology in USSR*), Атомиздат, Москва (1977)

<sup>33</sup> Морохов, И., Задикян, А., и др. *Атомная наука и техника в СССР* (*Nuclear science and technology in USSR*), p.18; p.325

<sup>34</sup> I am conscious that the issue is an official version but it is still very useful.

<sup>35</sup> The term 'promoters for peace' is in fact grounded in the Soviet propaganda.

<sup>36</sup> Josephson, P., *Red Atom. Russia's Nuclear Power Program from Stalin to Today*, W.H. Freeman and Company, New York, 1999

<sup>37</sup> Josephson, P., *Red Atom.*, p.3

<sup>38</sup> Ibid, p.150

received the opportunity to possess nuclear reactors. This process concerning Eastern Europe is well described in Sonja Schmid's work *"Nuclear Networks: Technological colonization in the Second world"*. In her paper she argues that the colonial model is not appropriate for the Second World, as it does not explain the relations between the USSR and its European satellites.<sup>39</sup> However, she also insists that in many spheres, including the nuclear field, the relations between the Soviet Union and other countries were based on unconditional acceptance of the centre's rules.<sup>40</sup> One very significant transformation makes these nuclear relations unique, and it was the "shared idea of technological progress that allowed this cooperation to be perceived as a domain of scientific rationality that was essentially apolitical."<sup>41</sup> Of course there were other proofs showing that some of the Eastern European countries tried to act as independent actors.<sup>42</sup>

### c) Conclusion

In my conclusion, I would like to use one issue to explain one important approach for examining some historical processes. By revealing the essence of transnational history I want to tie up my research interests with a particular body of scientific literature. This could help me easily to understand exactly what kind of relations existed in the field of nuclear electricity in Eastern Europe. In spite of being a work that explains some non-governmental organizations' relations I found it a good model for understanding similar relations between other organizations.

A field of history that appeared during the second half of the twentieth century started to examine relations, connections, and interwoven linkages between some non-governmental agencies. Since these agencies were slightly outside the nation state political or economy interrelations, scientists were able to establish a new *transnational* approach.

As an example of this progressive movement, we can see the work of Mathew Evangelista, *"Unarmed forces"*, which was brilliantly presented in Akira Irie's volume *"Transnational History"*.<sup>43</sup> Evangelista's work is an example of the influence, of some non-governmental organizations, "that were dedicated to ending, or at least controlling, the nuclear arms race during the Cold War".<sup>44</sup> The establishment of international networks, being created by non-state actors, appears to be the most interesting moment in this story. Moreover their participation in the historical processes is very important and strongly influential. As Akira Irie claims, transnational history is basically a question "of confrontation, accommodation and conversation between civilizations", and with the rising of such international non-state organizations

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<sup>39</sup> Schmid, S., *"Nuclear networks: Technological Colonization in the Second World."* Paper presented at conference, *Bodies, Networks, and Geographies: Colonialism and Cold War*, TU/e Eindhoven, 19 April 2007

<sup>40</sup> Schmid, S., *"Nuclear networks"*: p.5

<sup>41</sup> *Ibid*, p.7

<sup>42</sup> Czechoslovakia and Romania attempted for appropriating different nuclear technology even while being part of the COMECON network. Schmid, S., *"Nuclear networks"* For better understanding about the nuclear networks see also: Hecht, G., *"Colonial Networks of Power. The far reaches of systems."*, Buletin d'histoire de l'ecricite, 2004

<sup>43</sup> Irie, A., *"Transnational History"*, *Contemporary European History*, 13, 2, 2004 p. 211-222

<sup>44</sup> Irie, A., *"Transnational History"* p. 215

a possibility for making global history seems more doable.<sup>45</sup> Having accepted this assumption we could easily recognize the contemporary history of Europe as relations between non-governmental or intergovernmental organizations that communicate or do not communicate with each other.

#### **d) Positioning**

In the literature review I presented above, I aimed to take into consideration the role of particular non-governmental or intergovernmental organizations in the field of nuclear electricity, in order to reveal what kind of relations and linkages existed in Europe, and more precisely in Eastern Europe. Furthermore I would like to position my future work in the field of history of technology with all of its specifics.

First of all, the term of Europe is very contestable. It was for a long time a matter of discussions and the reason for me to use it is to reveal one specific form of constructing Europe, on the base of techno-political networks. That means Europe is going to be more an actor category than a framework for my future research.

My second point is related to the emerging of technology and furthermore to the technological systems. I would like to reveal one common space, Eastern Europe, which for instance, existed as politically, economically, and socially determined by some Large Technical Systems. The LTS I want to investigate are in the peaceful nuclear development sphere. The authors I have already mentioned introduce substantial approaches for the history of transnational infrastructure networks, making immense contributions to that field. In that sense I want to use their approaches to outline my theoretical frameworks.

The third point is that I would like to see if the Eastern part of the European continent emerged as a unique space based on nuclear energy networks and what kind of such networks existed. The region is almost unexplored from such a point of view. The political, economical and social consequences that occurred due to the division of Europe into two ideological blocks and the presence of the communist USSR make the region a very peculiar case. Also by revealing the role of COMECON as a leading economic organization among these Eastern European countries could bring more clarity into the processes that took place there.

In that sense my work will try to reveal what kind of nuclear electricity networks existed in Eastern Europe, by taking into consideration the authors mentioned above. To what extent the processes of integration and fragmentation took place in the region could be another significant part of the picture.<sup>46</sup> It will also try to contribute to a better understanding of the nuclear peaceful development that influenced the region in its political, technological and social aspects. To achieve the already mentioned aims I am going to use the Bulgarian case of nuclear development as clear example of East European Soviet satellite.

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<sup>45</sup> Ibid, p.222

<sup>46</sup> Vleuten, E. van der, & Kaijser, A., *Networking Europe*, p. 17

### III. *Research question and hypothesis*

Having in mind the very complicated political, ideological, and technological direction that Europe followed after World War II, and the most significant role that nuclear power had, I will try to answer some questions that appear in my work.

By taking into consideration various social, technological and political interactions in a particular area, I am going to investigate Europe. The efforts will concentrate on *techno-politics*, which was crucial for what we experience today as Europe.<sup>47</sup> Atomic power used for peaceful purposes was very important in the second half of the 20<sup>th</sup> century. At the time it was an innovation and the expectations of its potential were really enthusiastic.<sup>48</sup> Many countries saw the role of nuclear technology as a path for gaining a stable national economy or even as a path for reinforcing their national pride.<sup>49</sup>

In Eastern Europe the establishment of a shared economic space COMECON (Council for Mutual Economic Assistance) was the foundation of forming relations between the so called socialist countries. At the time the USSR was the leader in producing nuclear technology. This leadership predetermined the fate of the other countries in the field. But the question, to what extent the power of the USSR influenced the nuclear movement in Eastern Europe, is one interesting starting point for exploration.

Another important direction I choose is to ask how the new technology came to each country and why for some countries it was impossible to possess that power. COMECON as economic organization was based on mutual help but in fact the Communist party in Moscow had the last word.<sup>50</sup> Moscow was the first instance for taking such decisions and it is not clear enough why some countries had nuclear programs and reactors, while others did not. My hypothesis for why those countries did not have nuclear reactors is their political relations with and furthermore, their political proximity to the Soviet Union. Furthermore the strategic geographical position a particular state has could have been the main reason for receiving nuclear reactors.

Bulgaria, which I took as an illustration, was during the period one of the closest satellites of the Soviet Union. The country was one of the first Eastern European countries that established its own nuclear program. It was completely based on Soviet technology, and was conducted mainly by Soviet specialists until the Bulgarian nuclear scientific generation became well

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<sup>47</sup> Hecht, Gabrielle, *The radiance of France*. p.15 The term is used for particular country but I think that such relations existed also in particular political block like the socialist one.

<sup>48</sup> Hecht, Gabrielle, *The radiance of France*; Морехов, И., Задикян, А., и др. *Атомная наука и техника в СССР (Nuclear science and technology in USSR)*, Атомиздат, Москва (1977); Josephson, P., *Red Atom. Russia's Nuclear Power Program from Stalin to Today*, W.H. Freeman and Company, New York, 1999; see also Langdon, W., *The Whale and the Reactor. A search for limits in an Age of High Technology.*, The University of Chicago Press, (1986)

<sup>49</sup> Hecht, Gabrielle, "The radiance of France"

<sup>50</sup> Wilson, Kevin and Jan van der Dussen (edit.), *The history of the idea of Europe*, p.155-156

trained. All the other Eastern European countries had the same path of nuclear development; moreover, they appropriated the same technology.<sup>51</sup>

That is why I choose the Bulgarian case as a main example for explaining what was happening with the nuclear field at that time. On the other hand, looking at exceptions like Czechoslovakia or partly Romania could be useful for revealing some differences.<sup>52</sup> The Bulgarian case is also a good starting point for examining the connections and relations that existed firstly between a particular country and the USSR and secondly between the other COMECON members. Furthermore, Bulgaria was an exporter of electricity as well as other socialist countries that had nuclear power plants (NPP). In that sense Bulgaria could be a good example as well.<sup>53</sup> Based on the Bulgarian example we could also explain the role of agencies, scientific institutes and university departments, which existed in other socialist countries in the region, and which above all were internationally related and had good scientific exchanges.<sup>54</sup>

The cooperation that existed in the region is also important: cooperation in various directions, such as knowledge and scientific exchanges, material and technology exchange or electricity exchange, because another one of my hypotheses is that there was a well-established network that sometimes worked outside the political dogma.

I would also like to reveal the existence and organisation of nuclear community in Europe. The exploration of the Bulgarian case in that sense will provide me with the most significant documentation, and will answer more or less how Europe appropriated peaceful nuclear technology. This hypothesis is also related to some establishments of electricity connections between the two blocks, which means that the European continent could be integrated in the field of nuclear technology despite being ideologically separated.<sup>55</sup>

When I speak about Eastern European networks and furthermore of European networks in the field of nuclear electricity my research questions are formulated as a whole:

*How and why did the Bulgarian nuclear program begin? Which were the most significant moments of its creation and who were the main actors involved? Which organizations participated in the establishment and how did they interact? What kind of support did Bulgaria receive from its foreign*

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<sup>51</sup> Most of the reactors established in the socialist block were from the type WWER, which is also the most appropriated nuclear technology in the world. See: "Peaceful uses of atomic energy", Proceedings of the Fourth International Conference Geneva, 6-16 September 1971

<sup>52</sup> Czechoslovakia started its nuclear program with attempting to build heavy water reactors but this attempt was not successful. See: Schmid, S., "Nuclear networks": p. 14

<sup>53</sup> There is one more journalistic work about the Bulgarian NPP in which these relations are described: Семов, М., *Изповедта на една атомна централа*, Козлодуй, 2002 (Semov, M., *Confession of a nuclear power plant*, Kozloduy, 2002)

<sup>54</sup> These relations are well described in the COMECON literature and the IAEA conferences proceedings. See: "Peaceful uses of atomic energy", Proceedings of the Fourth International Conference Geneva; Lavigne, M. *International political economy and socialism*, Cambridge University Press, Cambridge, 1991; Никова, Г., *Съветът за икономическа взаимопомощ и България 1949-1960*, София, 1989 (Nikova, G., *COMECON and Bulgaria 1949-1960*, Sofia, 1989); Никова, Е., *Балканите и Европейската общност*, София 1988 (Nikova, E., *The Balkans and the European Community*, Sofia, 1988)

<sup>55</sup> See: Van der Vleuten, E., Anastasiadou, I., Schipper, F., Lagendijk V., "Europe's system builders. The contested integration of transnational road, electricity, and rail infrastructures", *Contemporary European History* 16, 3 (2007),

*partners and also what kind of obstacles plagued international relations in the field? What kind of social impact did the nuclear program have and in what direction? How did the program become relatively stable and adapt to the changing political environment?*

These questions can lead to some sub-questions related to the transnational dimension of the nuclear program. Taking into consideration the research I have already done, the sub-questions will appear naturally.

How did nuclear technology integration and disintegration occur in Eastern Europe? What networks for distribution of knowledge, technology and specialists existed? Who were the main actors involved in this process and what was the role of COMECON, IAEA and the USSR in establishing different relations in the field? Finally, how was the European continent linked and de-linked by the nuclear technology through the Iron Curtain?

#### **IV. Research time frame work – explaining the period**

At this point I will clarify why I examine the particular period: 1947-1989. Of course the framework is very contestable, but I decided to use two significant years to examine what I call nuclear enthusiasm. These were the years in which the atomic movement gained its momentum. On the other hand during these years in Bulgaria the opportunity to possess its own nuclear reactors were realised.

Nuclear development started from the early beginning of the 20<sup>th</sup> century, but that development did not have the momentum to transform the achievements into useful technology. Even at the end of World War II, nuclear technology was appropriated only for devastating aims. For those reasons I choose to examine the nuclear development after its institutionalization for peaceful purposes.

In 1957 the *International Atomic Energy Agency* was established. That organization started to build the nuclear society in the form in which we know it now. Its efforts created communication between most of the countries that had nuclear technology, and due to their support, many countries were also able to use reactors and build nuclear power plants.<sup>56</sup> The UN created the organization after the famous speech of president Dwight Eisenhower in 1953. The first conference of IAEA was held on July 29, 1957 and after that the creation of a nuclear community began.

In 1960 the COMECON countries signed an agreement for establishing a Standing commission for nuclear development as one of the COMECON responsibilities. After that the Soviet Union's technology and the Eastern European countries' achievements began to build a nuclear community in the region.

In 1986 one devastating catastrophe in the peaceful development of nuclear technology occurred. On April 26 1986 a failure in the Chernobyl nuclear power plant in Ukraine harmed 4000 people. The whole nuclear community was shocked; some of the countries with reactors decided to stop them and to freeze their nuclear programs. In that sense the nuclear development field

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<sup>56</sup> David Fisher, *History of the International Atomic Energy Agency: the first forty years IAEA*, Vienna, Austria, 1997

was changed significantly. From enthusiastic and optimistic adjustment the mood in the field became suspicious and distrustful.<sup>57</sup> Moreover, public opinion after the catastrophe changed increasingly against nuclear technology.<sup>58</sup> After the Chernobyl crisis, the future of nuclear electricity production was not that clear at all. In this sense the Chernobyl disaster marked the end of a specific period in the development of nuclear power in Europe. The consequences for the socialist bloc were a loss of power and stability. After 1986, European politics were transformed, culminating with the fall of socialist governments.

## V. Methodology

When I take into consideration the period in which my dissertation will be based and the specifics of the political problematic that existed in the field, I need to explain some basic characteristics of the planned research.

First, my research looks at the Eastern European region through the lens of its nuclear technological development. More precisely the aim of my work is to reveal not only the technological transfer and relations that existed in the field but also the networks built from the early peaceful nuclear development to one significant moment in that field.<sup>59</sup> This significant moment is 1989 after which the whole discourse was changed.

Second, to achieve the above-stated aims, I will use the Bulgarian case as an example of what the specifics in this area were. Bulgaria was a very close satellite of the Soviet Union and from that cooperation it profited very much in the spheres of politics and economy.<sup>60</sup> Especially in the field of nuclear technology, all of the socialist countries were able to have the latest Russian achievements.<sup>61</sup> In that sense the dissertation will show the transformations in the field through a particular case. That strategy is also a necessity because the available data, which I am able to use, are mainly in Bulgaria. Moreover there are most of the documents about the Bulgarian case, which means I will have a full-investigated case toward which I could test my hypothesis and answer my research questions.

Third, the above choices make the whole work look like a particular case study and by using analytical methods I aim to reveal to what extent this nuclear program possessed transnational characteristics. Also by using these methods I will be able to investigate most of the existed nuclear networks in Eastern Europe and to create a historical narrative.

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<sup>57</sup> About the change of the mood and the expectations from nuclear power I spoke with engineers from the Bulgarian NPP.

<sup>58</sup> Marples, D., *The Social Impact of the Chernobyl Disaster*, Macmillan, 1988

<sup>59</sup> Networks established at first by USSR but after particular amount of time developed by all of the interested countries in the region of course not without the help of IAEA. In these networks mentioned here the electricity connections between the nation states also play significant role. (NA)

<sup>60</sup> Никова, Г., *Съветът за икономическа взаимопомощ и България 1949-1960*, (Nikova, G., *COMECON and Bulgaria 1949-1960*.); Никова, Е., *Балканите и Европейската общност*, (Nikova, E., *The Balkans and the European Community*)

<sup>61</sup> Even Cuba and Poland had their attempts to establish nuclear programs. They were not successful, but government representatives visited USSR to negotiate in that direction. See: *"Peaceful uses of atomic energy"*, Proceedings of the Fourth International Conference Geneva; Съставителска комисия. *Атомна наука и техника в СССР*, Атомиздат, Москва (1977) (*Nuclear science and technology in USSR*, Atomizdat, Moscow, 1977)



That historical narrative will have the following specific features:

- It will be based upon the establishment and development of Bulgarian nuclear program and its foreign (both Eastern and Western) transnational relations. The Soviet Union's impact and various educational institutions established because of the program. The social environment it created and its specifics.
- It will be based upon a variety of international agencies and administrative bodies that were responsible for peaceful nuclear development. COMECON is going to be the most important agency that conducted these nuclear relations but there existed also local bodies that sometimes worked independently of COMECON.<sup>62</sup>
- It will include international institutes, universities and laboratories that were interrelated during that time. These bodies also had exchanges of specialists and held a lot of conferences in the field of nuclear technology, making in that sense a well-established actor network.
- It will also try to sketch the electricity flow between the Eastern European countries and also their westward connections. That part will try to embed rich variety of electricity links between different political partners.
- It is going to explain the raw material distribution, particularly between Bulgaria and the USSR. That story includes the double transfer: first raw uranium from Bulgaria to the USSR and then enriched uranium from the USSR back to Bulgaria.

Simultaneously, and this will be the most challenging part of my dissertation, I will try to reveal these relations that existed between the 'two Europes'. The peaceful nuclear movement was intended to unite a divided world.<sup>63</sup> But the world at that time was separated by the Cold War tensions. In that sense one of the aims of that work is to explain to what extent the Western and the Eastern Europe were connected, related or separated in the field of nuclear electricity technology. For that purpose I will pay attention to the work of IAEA, Euroatom, *Central Dispatch Organization of The Interconnected power Systems* (CDO/IPS) or *Electrical Energy Committee of the United Nations*

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<sup>62</sup> For example the electricity connections from Bulgaria to Yugoslavia and Greece were outside the COMECON economy structure.

<sup>63</sup> The establishment of IAEA and the "Non-proliferation treaty" are two significant moments in that direction.

*Economic Commission for Europe* (UNECE), as well as to nation state relations that were in the sphere of local bodies and organizations.<sup>64</sup>

Taking into consideration the Bulgarian case in the field of peaceful nuclear technology development, I will try to show the fate of the other countries in the region. I will also investigate the role of the agencies that were involved in the establishment of nuclear electricity networks in Bulgaria and in Eastern Europe such as IAEA, COMECON, The Standing commission, EUROATOM etc. Finally I will try to include the East-West relations in the field in the narrative, of course based on the Bulgarian case. The main question will be whether there were integration processes in Eastern and Western Europe, or whether the political environment did not allow that.

## **VI. Sources:**

I have chosen four different kinds of possible material sources. They include Kozloduy NPP, Bulgarian nuclear institute, some organizations and their libraries, various archives and of course people who were involved in the Bulgarian program and the East European nuclear network. I have already visited some of the archives and people and planned out what could be useful for my topic and how I can embed it in my work. These sources reflect the current state of my project, thus the list is naturally open to additions.

### ***List of sources:***

Kozloduy NPP and the Bulgarian Institute for Nuclear Research and Nuclear Energy (INRNE)

Central State Archive – Sofia

Archive of the Bulgarian Academy of Sciences - Sofia

Archive of the Ministry of Foreign Affairs - Sofia

Vienna IAEA library

Nuclear Regulatory Agency

Oral history

## **VII. Preliminary structure of dissertation:**

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<sup>64</sup> Sometimes these relations were governmental. For the other organizations in the electricity field see: Lagendijk, V., “*Height Voltages, Lower Tensions. The Interconnections of Eastern and Western European Electricity Networks in the 1970s and Early 1980s*”. Unpublished

The structure I present here is based upon the material I already have and for sure my future investigations will help me to refine this version. The structure may change as my research continues.

## Introduction

1. Socialism and technological progress.
2. Socialist electricity network
3. The Soviet Union's nuclear achievements and their role for Eastern Europe
4. Formation of Bulgarian nuclear physics and nuclear energy fields – transnational relations and organizations. Bulgarian research reactor IRT – 2000 - appearance of nuclear society
5. Nuclear Power Plant – Kozloduy
  - a. *From Sovietization to Bulgarization*
  - b. *COMECON, Interatominstrument, Interatomenergo, and IAEA - transnational cooperation*
6. Bulgarian Nuclear Power Plant – *Crossing the Iron Curtain – the 1980s period technological exchange*

## Conclusion

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