There is a growing body of literature on the relationship between technology and politics, but the majority of case studies tend to focus on the central role of the state in nurturing the industrial sector of strategic importance. By introducing the concept of technonationalism, for instance, Richard J. Samuels has examined the social and political function of technology in developmental states like Japan, where technology is viewed as a fundamental element in promoting national security and economic prosperity—something that should be indigenized, diffused, and nurtured within the nation.¹ Some historians and STS scholars have

¹ In the body of this paper I have followed the customary practice of writing the family name first for the Koreans. But in footnote I have adopted the way each name has been printed in the previous publications. To avoid any confusion, I have capitalized the family name, if necessary, like in my name. This paper would not have been possible without Professor Youngsoo Bae’s kind invitation and unfailing patience. I would also like to thank my colleagues at KAIST, Chihyung Jeon and Min Park, for their penetrating comments. I am also indebted to my students, Young-Kyu Kim, YeonSil Kang, Taemin Woo, and Kyuri Kim, for their insightful suggestions and editorial assistance. It is my
recently sought to move beyond the notion of technology merely as part of the government’s industrial policy, but seeing it as a political entity, per se. Gabrielle Hecht’s study of France’s nuclear program is a good example. Elaborating the concept of technopolitics, she draws our attention to “the strategic practice of designing or using technology to constitute, embody, or enact political goals.” To Hecht, French nuclear reactors are “hybrids” of technology and politics: i.e., technology is politically constructed as much as it is put to use politically. She convincingly shows that nuclear technology was developed as a key element in defining France’s national identity after World War II.\(^2\) In a similar vein, Sheila Jasanoff and Sang-Hyun Kim have coined the term sociotechnical imaginaries to illustrate the power of people’s collective image of atomic power in conscribing the nuclear programs of the U.S. and of Korea.\(^3\)

In this paper I contend that the intricacies of the politics-technol-
strong body of qualified professionals to follow through. Under these circumstances, which provide a notable distinction between Korea and other countries such as France and Japan, the government had to rely on a handful of elite scientists to build the nuclear program from scratch, while bankrolling the training of nuclear researchers and technological personnel in universities and nuclear facilities in the U.S. and the U.K. Foreign advisors came to help the installation of Korea’s first nuclear reactor, but it was entirely up to the Koreans to establish a research institute and create an administrative system to support its activities. Hence, amidst critical debates over whether scientists should be on top or on tap, a nuclear bureaucracy began to take a shape. Although the weak, emerging relationship between nuclear scientists and administrators in Korea is a far cry from the strong, “marriage” relationship between professional experts and government bureaucrats in post-World War II America, the Korean case can shed light on the process of bureaucratization in science and technology by an underdeveloped country that experienced a political transition from civilian to military regimes.

**“Atoms for Peace” and the Rise of Technocrats**

On July 14, 1959, the groundbreaking ceremony for the TRIGA Mark II atomic reactor was held at the Atomic Energy Research Institute (AERI) located in a suburban area adjacent to the campus of the School of Engineering at Seoul National University. It was not an ordinary ceremony, especially not for an institute that was less than a year old; the President, the Speaker of the National Assembly, Chief Justice, and other luminaries of the government were gathered with diplomatic envoys and representatives of the scientific community to celebrate the moment that was believed to promise a new era for South Korea, a country that had relied on aids from the United Nation’s Korea Reconstruction Agency until recently. Much elated, President Rhee Syngman (이승만) said during the address that “in the future, [this institute] should make a brilliant atomic, atomic machine.”

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6 Korea Atomic Energy Research Institute, Hangugwonjaryeokgigeo Samsinmyeongsasa [Thirty-Year History of Korea Atomic Energy Research Institute, 1959-1989] (Daejeon, 1990), 114. The official historical volumes were published in every ten years since its inception in 1959. See also Office of Atomic Energy, Wonjaryeokcheong 20Nyeonsa [Ten-Year History of the Office of Atomic Energy], (Seoul, 1969); Korea Atomic Energy Research Institute, Hangugwonjaryeok 20Nyeonsa [Twenty-Year History of Korean Atomic Energy] (Seoul, 1979); Korea Atomic Energy Research Institute, Hangugwonjaryeokgigeo 40Nyeonsa [Forty-Year History of Korea Atomic Energy Research Institute] (Daejeon, 2001); Korea Ato-
The house historian was hesitant to offer an interpretation of this remark, the President's message was loud and clear—the achievement of self-reliance in nuclear technology. In contrast to President Rhee's emotional statement, the three words on the banner that hung over the entrance to the reactor—“Peace, Research, Power”—looked more like plain, consensual goals. Yet they were a source of contention when it came to setting priorities. “Peace” obviously denoted the origins of the nuclear program in Korea—the “Atoms for Peace” speech that U.S. President Dwight D. Eisenhower made at the U.N. General Assembly in December 1953. The following year, the Korean government received two letters of invitation, one from the U.S. government proposing the training of Korean scientists in nuclear reactor facilities, and another from the U.N. inviting Korea to the International Conference on the Peaceful Uses of Atomic Energy in Geneva. Korea and the U.S. wasted no time in taking steps to lay a legal basis of cooperation for the peaceful uses of atomic energy, and signed the Agreement in February 1956. The U.S. promised to provide grants-in-aid of $350,000 for the purchase of a reactor, while Korea appropriated a matching-fund of the same amount for the purchase of the land, the construction of buildings and for other administrative preparations.7 It was apparent that Korea was embracing the Atoms for Peace program, even though its benign appeal to scientific internationalism and openness might have been intended to disguise U.S. interests in strengthening security and implementing regimes of surveillance.8

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7 Korea Atomic Energy Research Institute, Hangugwonjaryeogyeonguso 50nyeonsa [Fifty-Year History of Korea Atomic Energy Research Institute, 1959-2009] (Daejeon, 2009).
8 For the most recent discussion of the disguised intention of the U.S.’s Atoms for Peace program, see John Krige, “Atoms for Peace, Scientific Internationalism, and Scientific
This does not mean that Koreans blindly followed the U.S. lead on matters ranging from the selection of reactor type and location to the formation of bureaucratic structure. While a small group of consultants based at the University of Michigan’s Phoenix Memorial Laboratory—the team that put the Atoms for Peace program into action based on its experience in non-military research of atomic reactors—provided invaluable technical advice, it was always up to the Korean government to make key decisions. The Korean civil society was quite vocal as well. Some raised concerns about the conditions stipulated in the U.S.-Korea Agreement for Cooperation, and others argued in its defense. The 1955 debate between Chang Nae-Won (장내원) and Yoon Se-Won (윤세원), publicized in a series of op-ed articles of Dong-A Ilbo, Korea’s leading daily newspaper, illustrates the diversity of opinions concerning the future direction that the Korean nuclear program should take and the ways that decision should be made.

Chang Nae-Won, who initiated the debate that would later be dubbed as “the first press debate on scientific issues in Korea,” was at that time the executive director of the UNESCO Korean National Commission. Formerly an English teacher, Chang was worried that the majority of citizens, even those with considerable expert knowledge, would have difficulties in understanding the true meanings and consequences of the U.S.-Korea Agreement for Cooperation Concerning Peaceful Uses of Atomic Energy, which was initially signed by the two governments and then put before Congress for reviews. "I will give an extremely careful analysis and criticism of the atomic energy problem from the angle of political economy and from the standpoint of social sciences," he said at the outset. Chang’s analysis was focused on the benefits of the U.S.-Korea cooperation and the strings attached to the Agreement. The list of potential “benefits” included: having an experimental reactor; conducting a variety of research on neutrons; producing a small amount of radioactive materials.
tive isotopes; and being able to generate only three-day’s worth of electricity with 6 kg of 20 percent enriched uranium. Chang did not try to hide his disappointment about this prospect, as he figured that the benefits would be nothing more than obtaining skills for operating the reactor and producing skilled operators. Furthermore, he pointed out that the strings attached to the Agreement—the secrecy clause, the treatment of used fuel, and the use of enriched uranium as fuel—might seriously restrict the future development of both nuclear science and nuclear power industry in Korea.

Chang Nae-Won ultimately targeted his criticism at the U.S. and their intentions. Why did the U.S. want to provide only one kind of fuel, enriched uranium, given that many other countries, including the U.K., France, Canada, and Norway, had already developed reactors using natural uranium? He pointed out that the U.S. was also keen on developing natural uranium-based reactors, as evidenced in the 1000KW reactor at Oak Ridge along with others in Chicago. He surmised with confidence that the U.S. might have a two-track plan of taking natural uranium as its long-term solution for reactor fuel, and producing enriched uranium as an export commodity. “Therefore,” he contended, “why don’t we establish a national policy for self-reliance in nuclear fuel by knocking on, digging up, and processing natural uranium that is ample and dormant underneath our earth in our own country, instead of becoming a poor beneficiary-turned-consumer-turned-market of enriched uranium?”

14 Ibid., 13.

It should be borne in mind that Chang Nae-Won’s critical opinion came out at a time when the Korean government was scrambling to find a way to respond to the opportunities given by the Atoms for Peace program. The nuclear bureaucracy was non-existent at this point, not to mention scientists trained in nuclear fields. At the center of the government’s dual efforts to produce nuclear scientists as well as to form an administrative system was Park Chul-Jae (박철재), chief of the Office of Technical Education at the Ministry of Education (문교부 기술교육국). Park was one of the handfuls of Korean scientists with a doctoral degree at that time. He studied at Yeonhuijeonmoon (연희전문) before moving to Kyoto University where he received his Ph.D. in physics, working on the crystallization of natural rubber. Since his return to Korea in 1945, Park was involved in founding Seoul National University and serving as the chairman of the Department of Physics. His career took an important
to study nuclear science and engineering. The study group even conducted a comparative investigation of administrative systems in advanced countries, such as the U.S., the U.K., and France, and translated basic laws pertaining to their nuclear programs. As the volume of correspondence between the U.S. Atomic Energy Commission and the Korean government increased, Park Chul-Jae worked to create a new Division of Atomic Energy (원자력과) within the Office of Technical Education, and asked Yoon Se-Won (윤세원) to join him as its chief.\(^{18}\)

No sooner had Yoon Se-Won accepted Park Chul-Jae’s offer in October 1955 than he was faced with Chang Nae-Won’s critical articles. From Yoon’s point of view, Chang had no credentials whatsoever to discuss either the scientific or technical matters of the U.S.-Korea Agreement. In a series of op-ed pieces also published in *Dong-A Ilbo* under the title of “[True Intentions of the Agreement on Atomic Energy: A Scientist’s Criticism of Mr. Chang’s Opinion],” Yoon Se-Won contended that Chang Nae-Won had fatally underestimated the benefits that could be gained from the operation of a reactor, pinpointing the value of Enrico Fermi’s small reactor at the University of Chicago that had heralded the advent of the atomic age. The significance of neutron research in atomic physics, the utility of radioactive isotopes (even in small amounts) in agriculture, medicine, and physiology, and the circumstantial reasons behind the development of natural uranium-based reactors in advanced countries—all these factors had not been fully considered in Chang’s analysis.


\(^{18}\) For Yoon Se-Won’s study group, including its members and activities, see Korea Atomic Energy Research Institute, *Hangugui Wonjaryeokgi-gu Seollipgwajeonggwa Geu Baebyeong* (The Establishment of the Korea Atomic Institute), 72-73.
he maintained. As far as the issue of fuel independence was concerned, he apparently stepped back. Although having said that such a view was “quite correct” and “patriotic,” Yoon Se-Won nevertheless insisted that we should take into consideration the current level of our capacity:

But the reality is that our country is not ready in terms of material and intellectual resources . . . . It is therefore fortunate that this U.S.-Korea Agreement will enable us to have a reactor. We should take this opportunity right away and make ourselves more knowledgeable in the field and prepared for constructing one with our own resources, both material and intellectual. We can then pursue developing a natural uranium-based reactor.$^19$

What was most urgent to Yoon was to have a reactor installed in Korea, regardless of the type of reactor, in order to expand manpower and research experience in nuclear science. He was thus wary of “those who were ignorant of the true value of having a reactor and those who sang an ideology of scientific independence without understanding the internationalist aspects of science, the practice of international cooperation, and the progress of science and technology based on such internationalism.”$^{20}$ Chang Nae-Won came close to that category, Yoon Se-Won thought.

In a nutshell, the Chang-Yoon debate was about the uncharted territory of nuclear administration and, more generally, of emerging science administration in Korea. Who should make key policy decisions? Politicians or scientists? What should be the role of a scientist-turned-bureaucrat? Where should the boundary line be drawn between politics and science? Chang and Yoon were engaged in this “boundary work” from different perspectives. Whereas Chang Nae-Won regarded science administration as a political exercise, as something that should be practiced in the interest of the nation, not just for that of science, Yoon Se-Won placed policy for scientific progress ahead of political implications of the policy. Perhaps Chang Nae-Won did not consider the fact that Korea was a much weaker partner in the nuclear negotiation with the U.S. in comparison with India and Japan, the two countries that had the technological capacity to build their own reactors and were thus worried of the possible market dominance by the U.S. Similarly, Yoon Se-Won might be naïve about the intentions of the Atoms for Peace initiative and narrow-minded about “science-first policy,” as one observer of the debate noted.$^{21}$ Limited as they were in the scope of their personal viewpoints, it is important to note that Chang Nae-Won and Yoon Se-Won touched upon a matter of priority-setting in science administration—research vs. power, infrastructure-building vs. goal-oriented policy, and short-term vs. long-term planning—for the first time in Korean history.

$^{20}$ ibid., 30.

Ultimately in 1958, after many rounds of negotiations among stakeholders, the Atomic Energy Act mandated the establishment of the Office of Atomic Energy (OAE), a cabinet-level bureau under the direct supervision of the President; the Atomic Energy Committee (AEC) composed of five Presidential appointees for reviewing and voting on related policy, budget, and laws; and the Atomic Energy Research Institute (AERI). Kim Bub-Rin (김법린), a formidable politician who had served as the first Ministry of Education, President of Dong-guk University and the majority party's congressional whip, was appointed head of the Office of Atomic Energy. Kim Dae-Man (김대만), formerly a government officer charged with foreign currency, became the secretary general. Park Chul-Jae became part of the upper echelon of the nuclear bureaucracy by serving as director of the AERI. Yoon Se-Won soon followed him as chief of the AERI’s Division of Atomic Reactor.

With this bureaucratic arrangement, it was clear that the early technocrats like Park Chul-Jae and Yoon Se-Won were put to work under the supervision of political appointees and career administrators. This often caused frictions between AERI scientists and OAE administrators, as scientists were mostly graduates of top schools in Korea, who also had experienced research administration in the U.S. It was difficult for them to put up with the demand for monthly or bimonthly reports while it often took several months to have research instruments and machine parts ordered and delivered. The tension within the nascent nuclear bureaucracystarted to escalate.

Technocrats’ Challenges, 1960-1961

The Chang-Yoon debate reveals the knowledge-first attitude held by the emerging group of technocrats at a time when the nuclear industry market was wide open globally under the auspices of the Atoms for Peace program. This group, loosely organized around Yoon Se-Won’s informal study group, found its government outpost in the Division of Atomic Energy in the Ministry of Education and expanded their influence in the nuclear administration. In 1956, Yoon was selected as one of two people to receive a year-long training at a university in the U.S. and at the International School of Nuclear Science and Engineering run by Argonne National Laboratory, and he headed the Division upon his return to Korea. In the meantime, the study group drafted a bill for the Atomic Energy Act, drawing on U.S. and U.K. legislations for a general framework and on Japanese legislation for terminology. The key issue the group dealt with was where to locate the nuclear bureaucracy. One early draft, which was strongly advocated by Park Chul-Jae and Yoon Se-Won, proposed the creation of a Ministry of Science and Technology to take charge of nuclear administration and other matters related for science. Another draft proffered an idea of putting the office under the umbrella of the Ministry of Education. However, the Ministry of Trade and Industry was reluctant to follow these science-oriented proposals, insisting upon the commercial and industrial significance of atomic energy.


23 On the tension between researchers and administrators, see Korea Atomic Energy Research Institute, Hangugwonjaryeogyeonguso Samsimnyeonsa, 91. In his oral history, Yoon Se-Won even refused to comment on Kim Dae-Man. He also found the members of the Atomic Energy Committee meddlesome. Park Ik-Su, Hangugwonjaryeokchan-
cracy got intensified with the April 19 Revolution, a students-led popular uprising of 1960, which overthrew the corrupted and autocratic Rhee administration. Kim Bub-Rin stepped down, and Kim Dae-Man soon followed suit. Meanwhile, Park Chul-Jae was forced to resign under the pressure of the Government Accounting Office’s inspection for allegedly receiving money from companies in preparation of the groundbreaking ceremony for the reactor. This incident angered many followers of Park Chul-Jae, including Yoon Se-Won, who believed that administrators had unnecessarily blown up the case out of proportion. Subsequently, feeling that the overall research administration became slower, inefficient, and deteriorating, all the employees of the AERI wrote a letter of resignation. They put on a demonstration of solidarity by sending out the letter of resolution, the letter of petition, and the list of signatories to higher government offices and the press. Their major complaint was about the ignorance and incapacity of the nuclear administrators. Kim Yang-Soo (김양수), another powerful politician appointed to head the OAE, subsequently requested the resignation of top-level institute researchers. The blame game between the two sides continued without end while the construction of the reactor was yet to be completed. It was the “crisis” of the nuclear bureaucracy.24

Under these circumstances, a survey report on the status of the nuclear program in Korea caused a firestorm of criticisms, debates, and soul-searching. Submitted in late 1960 by Leonard Reiffel, a consultant to the U.S. Atomic Energy Commission, the report disclosed the deplorable level of laboratory facilities in the major universities and research institutes. It suggested that the urgent thing to do in Korea would not necessarily be an establishment of research infrastructure but an implementation of policy for training large numbers of Korean scientists in the U.S. or for inviting foreign experts as short-term solutions.25 Kyunghyang Shinmun, a daily newspaper, rattled the public with the headline, “Operation of Atomic Reactor Far Away: Old-Fashioned Trash Facilities.” Dong-A Ilbo gave a more detailed summary yet with a similar headline, “Korean Atomic Reactor Likely in Operation in Five Years: Facilities Are Old-Fashioned Trash,”26 which also underscored Reiffel’s advice on the need to mobilize more public support of the nuclear program by, for instance, including influential people from the business, political, and judicial sectors as members of the Atomic Energy Committee. It was not clear whether Reiffel was aware of the Korean government’s fellowship program for those who sought to study nuclear science and engineering abroad, and whether he heard about the recent feuds between researchers and administrators within the nuclear bureaucracy. At any rate, the Reiffel report was a bombshell dropped on the emerging community of nuclear scientists in Korea, as it certainly disparaged the current working conditions and discredited both the administrative and technological


capacities in Korea. On top of that, the pessimistic tone in newspaper headlines was provocative enough to invite reactions from nuclear scientists. Apparently written by one of the AERI’s researchers, a short op-ed piece mentioned in a metaphorical way that the problem lay in human interactions, not of machines: “we have nothing but the fact that our institute, divided into electron, nucleus, and neutron, has been engaged in partisan fighting.”

The AERI also immediately sought to do a damage-control by pinpointing that the “old-fashioned trash” had never been mentioned in the Reiffel report.

It was on this occasion that Park Ik-Su, a science teacher and writer, entered the fray. Park was no stranger to the public debate on matters related to science policy and administration. While he embarked upon his career as a college lecturer in introductory science courses after graduating the School of Education at Seoul National University, Park’s interest was in the philosophical and historical aspects of science, especially its interaction with society. He gave his opinion on the Chang-Yoon debate in a series of newspaper columns, and thereafter he continued to write about science and atomic energy. For this reason, Park was later called “the first science critic in Korea” and “the pioneer of Science and Technology Studies (STS) in Korea.”

The Reiffel report seemed to confirm what he had in mind since the Chang-Yoon debate: the Korean atomic reactor enterprise had been initiated and driven by technocrats in a hasty fashion without proper deliberations; the nuclear program should have been discussed as part of national policy planning. In an article titled “The Agony of Atomic Energy in Korea: Towards a More Reasonable Way,” Park Ik-Su asserted:

That is to say, the installation of a ready-made reactor (i.e., the introduction of technology to society) is a matter not in the realm of experts in science and technology but, rather, in the domain of sociologists, economists, and policy scholars. Nevertheless, however, the fact is that it was decided by the one-sided judgment of a few over-enthusiastic experts in science and technology, and that politicians merely followed.

At the outset, as we have seen, the scientists’ rationale for accepting a small reactor without hesitation was that it would allow them to make progress in learning the nuclear fields, to train future nuclear scientists and engineers, and thereby to develop nuclear power plants with our capacity. But it turned that this would take a long, long time, Park noted. So he wondered whether, given the government’s tight budget situation,
Lee Chang-Geon was indeed a stellar example of the recently carved-out path for elite nuclear scientists. A graduate of the Electrical Engineering Department of Seoul National University, Lee joined Yoon Se-Won’s study group where he was introduced to the field of nuclear science and engineering. In 1957 he was selected as one of the seventeen “atomic research fellows” to study either in the U.S. or U.K for one or two years. This fellowship program, run by the Korean government’s Division of Atomic Energy, was indeed a crucial means to produce a number of high-quality scientists. The International Atomic Energy Agency (IAEA), the U.S. International Cooperation Agency (ICA), and other international organizations provided support for this study-abroad program, and yet a majority of funding came from the Korean government. The program began in 1956, and by 1963, the number of fellows reached 189, 125 of whom were government-supported.

Lee Chang-Geon became one of the six Korean trainees at the U.S. Argonne National Laboratory in 1959, and on his return trip, Lee additionally received a two-month training at the General Atomic, the company that had just sold its TRIGA Mark-II reactor to Korea. He also earned an "ryeogui Gomineul Bakham" ["Korean Atomic Energy Stays Alive: A Rebuttal to Mr. Park Ik-Su’s ‘The Agony of Atomic Energy in Korea’"] in Dong-A Ilbo, 19 January, 1961.

It had been a sensible decision to spend such a large sum of money on the enterprise without considering its immediate benefit to the people. Park was no doubt an advocate of the nuclear program, and yet, he was critical of the way the nation’s nuclear policy had been set up by technocrats.

Park Ik-Su’s column rekindled public attention to the Reiffel report. The AERI’s new director, Choi Sang-Up (최상업) wrote an op-ed piece for Dong-A Ilbo with the title, “Trash Dispute of Atomic Reactor,” in order to stamp out any misconception about the reactor currently under construction. “A distorted criticism by laymen,” Choi maintained, “would be an obstacle to the emerging research enterprise for the peaceful uses of atomic energy and furthermore make a harmful effect on the progress of science and technology in this country.” He was certainly mindful of Park’s criticism, even though Park had already pointed out the phrase of “old-fashioned trash” as incorrect. A more elaborate attack came from Lee Chang-Geon (이창건), a young researcher at the AERI. The title of his newspaper column, “Korean Atomic Energy Stays Alive,” hints at how much he was upset about a layman’s foray into the highly guarded territory of nuclear experts.
official certificate for operating the TRIGA reactor by passing the U.S. Atomic Energy Commission’s examination. Proud of the first generation of Korean nuclear scientists, Lee Chang-Geon recalled their contributions in the installation of the reactor in Korea:

We, full of patriotism, conducted a spy operation. In principle, we just had to watch with our arms folded and received the key, because the General Atomic was in charge of installing the reactor and the Homes and Narver overlooked the construction of the surrounding facility. But we participated in all the installation processes including the one for the reactor core. There was no way to fix problems should they occur, because the contract did not stipulate we be given the design blueprints. Therefore, we carried out a spy operation of copying the drawings or taking pictures of them when the company employees were out for lunch or went home.38

An elite scientist armed with pride, patriotism, and passion, Lee Chang-Geon found in Park Ik-Su’s column not only simple factual mistakes, such as the description of Reiffel’s official position, but also serious misperceptions about the governance of science and technology. Lee wondered, “Why could scientists not make a decision on the matter of science, and why should the introduction of reactor be handled by sociologists, economists, and other policy scholars, not by scientists and engineers with expertise in that field?” He disparaged Park’s standpoint as “laughable” and “full of danger” of putting scientists and engineers subservient to politicians and others who had nothing to do with this field. Instead of talking about a “reasonable way” with no practical suggestions, he contended, laymen like Park should take notice of the real, hard way that the nuclear scientists of his generation strove to open the age of atomic energy for Korean people. In an inflamed tone, he said:

No matter what others would say, we have one belief. Like a barley seed that should be perished in order to bear fruits, we would like to live a short yet thick life rather than a long and thin one, even if excessive exposure to radioactivity might have our life shortened, make our body deformed, and affect our descendants. And there is one solace in that we can be the fathers of atomic seeds, even if we, after marriage, might

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38 Lee, “Daehanminguk Wonjaryeok Ppurireul Chajaseo”.

Figure 2. While a cadre of Korea’s elite nuclear scientists was trained abroad, the International Atomic Energy Agency offered on-site training opportunities for dealing with radioactive isotopes using its mobile facility. This picture was taken in 1960. [Source: Korea Atomic Energy Research Institute, Forty Years’ History of KAERI in Pictures (Daejeon: KAERI, 2000).]
have our children in peril because of becoming irradiated with radioactivity. Among the ‘agonies of atomic energy in Korea,’ the most serious and harmful is the one caused by those laymen, non-specialists, who are misleading the public.39

Lee Chang-Geon had ample reason to underscore personal sacrifice made on the part of nuclear scientists like him. A number of atomic research fellows decided not to return to Korea or opted to work instead in other areas of study. The risks of exposure to radioactive materials were also well publicized with the 1954 incident of *Fukuryu Maru* (Lucky Dragon No. 5), a Japanese fishing boat whose crewmen suffered from the radiation in the ashes of the U.S. nuclear test conducted on Bikini Island.40

Lee Chang-Geon’s remark did not go unnoticed by Park Ik-Su, who saw in it not only a lofty spirit of self-sacrifice and resolve—which sounded like *Yamato-Damashii* (大和魂) that had inspired the Japanese military special units like the *Kamikaze*—but also a “dangerous ideology of blind devotion and ignorant enthusiasm.” He was bewildered and concerned. To Park, a reasonable way of developing the nuclear energy program in Korea could be found not in this “one-sided enthusiasm and belief” but in the “recognition of reality” in which the entire society should live and develop together.41

Behind this war of words between Park Ik-Su and Lee Chang-Geon was the issue of nuclear governance in Korea. While Park maintained that policy for the nuclear program should be discussed not merely as part of science policy but as part of the nation’s social, economic, political, and military policy, Lee underlined the technical nature of nuclear governance that would definitely require expert knowledge. In this sense, the Park-Lee debate was a déjà vu of the one between Chang Nae-Won and Yoon Se-Won. An important distinction in this debate was the level of confidence that the nuclear technocrats had attained over the past five years; they had been both administrators and beneficiaries of the high-cost fellowship program; they had been deeply involved in the decision-making processes for the reactor type and the installation site; and they had received strong moral backing from President Rhee Syngman, filling key government positions.

But the rise of nuclear technocrats had its downside, too. Within the tripartite structure of nuclear bureaucracy—the Office of Atomic Energy (for general administration), the Atomic Energy Committee (for overall supervision), and the Atomic Energy Research Institute (for research)—the technocrats had to learn how to work side-by-side with political appointees and traditional bureaucrats, and how to deal with seemingly unfair administrative treatments in such matters as wages, promotions,

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39 Lee, “Hangugwonjaryeogeun Saraitda.”
40 For the problem of foreign-trained fellows not returning to Korea, see Korea Atomic Energy Research Institute, *Hangugwonjaryeogyeonguso 30nyeonsa*, 111-112; Koh, “The Establishment of the Korean Atomic Institute,” 77-78. Among the 237 trainees between 1955 and 1964, for instance, only 150 returned (66%); and among those who returned, there were also scientists who went back abroad or found jobs in fields other than the nuclear sciences. For the ways in which the Bikini incident raised public awareness of the danger of nuclear tests in Japan in particular, see Masakatsu Yamazaki, “Nuclear Energy in Postwar Japan and Anti-Nuclear Movements,” *Historia Scientiarum*, 19 (2009): 132-145.
and appointments. For this reason, Lee Chang-Geon’s reply to Park Ik-Su was also a technocrat’s criticism in disguise of the non-expert administrators within the nuclear bureaucracy. By the time the Reiffel report was released, the tension between new technocrats and old administrators had already boiled up. This local, institutional setting was crucial to understanding the invocation of nationalism by the technocrats.

The Nuclear Bureaucracy under the Military Regime

The political space in which nuclear scientists could contest for a technocracy was rather short-lived. In 1961, the May 16 military coup not only altered the direction of national policy by placing utmost emphasis on the development of a self-reliant economy but also reconfigured the state-society relations by considerably weakening societal autonomy. As a result, a developmental autocracy emerged in Korea. This new environment was a mixed bag to nuclear technocrats. On the one hand, the military government valued science and technology as an engine for the nation’s economic development, creating an all-around research institute in 1966 (the Korea Institute of Science and Technology), and establishing the Ministry of Science and Technology in the following year.

On the other hand, the government’s support of science and technology came to be more goal-oriented than open-ended, and strongly conscribed to the needs of industrialization. “Do science,” rather than “study science” or “learn science,” was the motto of the day, as it appeared time and again in President Park Chung Hee’s addresses. This “economic translation of science and technology” led to an uplifting of the social recognition of scientists and engineers as key partners of the nation-building enterprise. And yet, there was a price to pay for this partnership with the military government: taking a subservient position to economic planners.

The changes in the nuclear bureaucracy illustrate the new relationship being forged between science and government under the military regime. First of all, the shake-up of the bureaucracy effectively put an

42 For this kind of administrative problem, see Park, Hanguwonjaryeokhangeopja, 113-115.

45 Moon, “A Discourse Analysis,” 89-95.
end to unprecedented open-rebellions of rank-and-file researchers against their administrators. Head of the Office of Atomic Energy was replaced with another political appointee, Oh Won-Sun (오원선), a medical officer (captain) of the Navy. In his administrative capacity, Oh carried out a drastic purge of the AERI by firing its director and two division chiefs, including Yoon Se-Won, as part of the government-initiated general cleanup of high-ranking civil service employees, which was a means of restoring order in the institute. He then forced all members of the Atomic Energy Committee to resign—members who were some of the earliest members or former directors of the AERI.\footnote{Korea Atomic Energy Research Institute, 
Hangugwonjaryeongyeonguo Samsimnyeonsa, 91-92.} Gone were not only founding fathers of the Korean nuclear bureaucracy but also their sense of self-ruling and ambition for bureaucratic autonomy.

Two people soon emerged as key players in the newly manned nuclear bureaucracy: Choi Hyung-Sup (최형섭) as the AERI’s director (1962-63, 1964-66) and Park Ik-Su as a standing member of the AEC (1963-72). The appointment of Choi was controversial yet anticipated. A Ph.D. in metallurgical engineering from the University of Minnesota, Choi returned to Korea in 1959 and decided to work for a private company that produced auto parts, realizing that he would not be able to pursue his research interests in either university laboratories or national institutes. A few months before the outbreak of the military coup in 1961, he was offered the highest civil service position at the AERI, the same rank as the director’s. This offer in and of itself became a source of discontent among the AERI’s scientists, especially because it had been widely regarded as the one that Yoon Se-Won should take in time. Although Choi accepted the offer, he could not start his job at the AERI right away, mindful of the opposition from below and also being asked to work for the Ministry of Trade and Industry on a temporary basis for the project of starting up the steel industry in Korea. Eventually it took more than a year for Choi to work for the AERI as its director. While he did not carry common denominators that could easily be found among the first-generation nuclear scientists—e.g., participating in Yoon Se-Won’s study group, being selected as a prestigious atomic fellow, and earning a certificate to operate a nuclear reactor—Choi Hyung-Sup had one thing that they all lacked: the full, enthusiastic support from the OAE’s head and other
cleanup of the high echelon of the OAE and the AERI. Subsequently, upon Oh Won-Sun’s recommendation, Park Ik-Su moved on to work as the science advisor for the chief of the Korea Central Intelligence Agency, in which capacity he dealt with classified information like the status of science and technology in North Korea and other matters that might have had direct ramifications upon the nation’s science administration. For instance, he prepared a manuscript for a presentation under the title, “Atomic Energy in the World and in Korea” at a special session following the ceremony at the start of 1962. This presentation turned out to be instrumental in the creation of the Radiation Medical Institute as a separate entity from the AERI. As Park recalled, Oh Won-Sun expressed special thanks to him:

In fact, when I took office as head of the OAE [in 1961], I thought about what project would fit well with the government’s 5-year planning for economic development. I came up with an idea of establishing the Radiation Medical Institute after receiving a brief on the medical use of radioactive isotopes. I worked hard to convince the Prime Minister, the Minister of Economic Planning, and members of the Supreme Council for National Reconstruction, but it was rather all in vain. But the presentation at this special session made my dream come true. Your effort was crucial.50

Not surprisingly, in 1963, Oh Won-Sun appointed Park Ik-Su as one of the two standing members of the Atomic Energy Committee at

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50 ibid., 363-364.
the highest civil-service rank. Park was only 39 years old.

The organization of the AERI underwent a major change in October 1961, several months before Choi Hyung-Sup took office as its head: it went from its three-division (atomic reactor, basic research, and radioactive isotope) to a six-laboratory structure (physics, chemistry, biology, atomic reactor engineering, electrical engineering, and health physics). This discipline-oriented organization, which would remain intact until 1973, was clearly a reflection of what the early nuclear scientists had in mind regarding the nuclear program, i.e., an all-around scientific endeavor. The reality was, however, that the AERI under Choi Hyung-Sup’s leadership—and with administrative support from Oh Won-Sun and Park Ik-Su—took a practical turn, paying more attention to medical, agricultural, and industrial uses of radioactive materials, not to mention potential military applications in mind. The Radiation Medical Institute was established in 1963, growing out of a laboratory installed within the AERI in the previous year. The Radiation Agricultural Institute came into being in 1966 in the same fashion. This development was generally seen as a sign of the AERI’s institutional stature being weakened rather than augmented, as one nuclear engineer has recalled: “After a decade of the AERI in operation, it was beginning to lose its original glory with the fragmentation of the research institute into Radiation Medical Institute and Radiation Agricultural Institute.”

51 On the AERI’s organizational structure and research activities in the 1960s, see Korea Atomic Energy Research Institute, *Hangugwonjaryeogyoengusosaniminmyeonga*, 103-112.
52 On Oh’s and Park’s administrative support, see Park, “Atomic Energy and I,” 365-368.

It was an irony that the more the nuclear agency aligned itself with national goals that were set by the military regime, the greater support it received from the government but less likely it could build its bureaucratic autonomy. This irony manifested itself most forcefully in the development of the government endeavor to construct nuclear power plants. The feasibility of this project had been discussed from the start of the Atoms for Peace program in Korea, but it was under the military government that the idea was seriously explored. The Office of Atomic Energy took an initiative in 1962 by organizing a task force team in order to examine the prospects of energy needs in Korea, the significance of nuclear power in the world’s energy market, and the candidate sites for the construction of power plants. While the OAE’s study was well underway, the IAEA also sent technical consultants to Korea on three different occasions to provide advice on the selection of the reactor type, the maximum power capacity, and the site of the plant. The military government stepped up its effort in 1965 by dissolving the OAE’s task force team and replacing it with the Presidential Committee For The Nuclear Power Plant Planning, which was made up of government officials from the Economic Planning Board, the Ministry of Trade and Industry, the Ministry of Construction, and the Office of Atomic Energy, and also university professors and representa-
tives from state-run companies like the Korea Electric Company (KECO, later renamed Korea Electric Power Corporation). Appointed as chairman of the committee, Park Ik-Su teamed up with two researchers from the AERI, one of whom was Lee Chang-Geon, his counterpart in the previous debate, for a tour on nuclear power plants and financial companies in North America and Europe to assess merits of various reactor types and explore financial support. It is interesting to notice a sea-change in Lee’s perception of the role of a layman like Park. Lee Chang-Geon said:

The investigative team consisted of Park Ik-Su, chairman of the Presidential committee for the nuclear power plant planning; Lee Young-Jae, chief of the physics laboratory at the AERI; and Lee Chang-Geon, a researcher of the atomic reactor laboratory. This heterogeneous team was seen as a best set-up to gather opinions from diverse fields. First of all, Lee Young-Jae was a physicist trained in the U.K., thus favoring the gas-cooled nuclear reactor. In comparison, Lee Chang-Geon, a U.S.-trained engineer, preferred the light-water type. He was a junior researcher in comparison to the other members, and yet was selected as a team member because of his ample experience in producing various reports on technical assessment and economic feasibility of nuclear reactors. Park Ik-Su, a chemistry major, was appointed the team leader because he was believed to bring a fair conclusion from a neutral position between the two researchers—i.e., an advocate of the gas-cooled reactor and that of the light-water reactor, a senior-level researcher and a junior-level one, a scientist and an engineer, a power broker and a non-power broker, a man with no practical experience and a man with the experience.

The committee’s final report submitted in December 1967 made a cautious conclusion that the light-water type would be preferable from the economic standpoint, but that its dependence upon enriched uranium, a strategically important material, should be resolved through political and diplomatic efforts.

The significance of the committee report of 1966 was eclipsed by the deterioration of the nuclear bureaucracy’s standing in the government. The Office of Atomic Energy lost its cabinet-level status that year, and was supervised by the newly established Ministry of Science and Technology (MOST). The Atomic Energy Committee was also divested of its independent function of reviewing nuclear administration, but remained as a standing committee under MOST, the Minister of Science and Technology serving as its Chairman. The OAE office space in downtown Seoul had to be vacated for the MOST; it then found a new home on AERI grounds in the suburban area.

None was more devastating to the OAE, as the foremost nuclear agency in Korea, than the decision to put the Korea Electric Company in charge of the nuclear power plant enterprise. This decision came at the heels of the 1967 committee report, which raised a question concerning what kind of an administrative system would be most appropriate...
for pushing forward with the enterprise. The report recommended the establishment of a separate bureau to exclusively deal with both the production of electrical power and the development of nuclear reactors and fuel-cycle technologies. The OAE interpreted this recommendation as the creation of a new division under its umbrella or the overhaul of the OAE-led nuclear bureaucracy. The OAE’s future plan was to take charge of the power plant enterprise by creating a new state-run organization like the United Kingdom Atomic Energy Authority or the Commissariat à L’Énergie Atomique (CEA) of France. Meanwhile, the Korea Electric Company (KECO) had been in preparation for this enterprise by establishing a division dedicated to nuclear power in 1966. The KECO’s contention was that the production of electricity belonged to its business, regardless of the energy source.\footnote{ibid., 134-135.}

In February 1968, the military government organized a new Presidential committee (원자력발전추진위원회) in order to make final decisions on the reactor type and other jurisdictional issues. Unlike the previous committee that had been geared toward the investigation of candidate reactors and administrative systems, this committee was intended to put an end to all the deliberations and debates of the past few years. The Deputy Prime Minister was appointed its chairman to work with other high-ranking government officials like the Minister of Trade and Industry and the Minister of Science and Technology. Heads of the two operational bodies, the Office of Atomic Energy and the Korea Electric Company, were also included in the committee. Park Ik-Su, albeit serving in the committee, was rather suspicious of the political nature of the committee, for it could cause a drastic change in the nuclear bureaucracy in terms of its lawful prerogatives and administrative structure.\footnote{ibid., 134; Park, “Atomic Energy and I,” 371-372. Park wondered why this committee had to be formed under the Prime Minister, as the nuclear project had mostly been out of political interests.}

In defense of the standpoint of the MOST, Park wrote an op-ed piece for Dong-A Ilbo, in which he asserted the multi-purposefulness of the nuclear enterprise, implying that it should be regarded as more than just a means of production of electricity. Park mentioned the short history of nuclear research in Korea, for which the limited number of nuclear experts would better be managed by one administrative system rather than through competition between a government agency and a utility company. Therefore, he argued, Korea was not yet ready to follow the precedents set by other countries like Japan and the U.S., where the nuclear power plants tended to be privatized. He warned: “Ultimately, this issue should be decided in terms of high-level policy consideration, and yet we are not free from the characteristics of underdeveloped countries where power and politics are everything. I earnestly wish, however, that the decision on this issue will not be made unwisely under political pressure.”\footnote{Park Ik-Su, “The Standpoint of the Ministry of Science and Technology,” Dong-A Ilbo, 17 Feb. 1968 (in Korean).} In response to Park Ik-Su’s article, Yook Jong-Chul, a professor of Hanyang University and one of the early atomic fellows, wrote in favor of the Korea Electric Company’s position. Yook reiterated here the world-wide trend that separated the government agency’s supervision and regulation from the state-run or private company’s construction and management of nuclear power plants. He found it unreasonable to use a 500 MW-level reactor for both...
by pointing out that the decision was apparently not drawn out of the meetings where the desirability of creating a new bureau was the main topic; and that debates or discussions over who should be in charge of the construction of the second, or the third nuclear power plants never took place, as the decision was confined to the first one.\textsuperscript{62} To Park Ik-Su, the committee’s decision was made not only against the original law (Atomic Energy Act) that mandated the OAE to take charge of all the national programs pertaining to atomic energy and their legislations and regulations, but it also bypassed the lawful process that required the Atomic Energy Committee to review important policy issues. Why such a sudden decision after a long pondering? Park strongly suspected that there was a collusive deal between the military government and the Korean representative agent for a reactor provider, as the Cheongwadae (the executive office of the President) was deeply involved in this nuclear power plant enterprise to the extent that it was rumored to be the “Cheongwadae project.”\textsuperscript{63} By contrast, Lee Chang-Geon was far more acquiescent about the government’s explanation that the KECO had a definite advantage of being able to get a loan secured on landed property and the power plants it owned. Furthermore, he recalled that it was KECO’s decision, not the committee’s, to choose a pressurized water reactor manufactured by an American company, Westinghouse, which was one of the light water-cooled reactor types, over the gas-cooled reactor types that had been used in British and French nuclear power plants. It was partly because

\textsuperscript{62} Korea Atomic Energy Research Institute, \textit{Hangugwonjaryeonggu 30nyeonsa}, 134-135.

\textsuperscript{63} Park, “Atomic Energy and I,” 371-375.
the U.S. Export-Import Bank could offer a better interest rate on the loan. Although a detailed account of the KECO’s takeover requires a thorough historical investigation, it is nevertheless clear that the military government was able to redefine the function of the nuclear bureaucracy without taking legislative procedures. Like in many other cases, the military government was above the law.

**Conclusion**

The three-body nuclear bureaucracy of the Office of Atomic Energy, the Atomic Energy Committee, and the Atomic Energy Research Institute built its reputation for an all-around science administration in the early 1960s. However, its influence on the most significant nuclear enterprise of all—the planning and managing of the construction of nuclear power plants—had since ebbed, and so did its bureaucratic standing. If 1968 was a turning point for nuclear bureaucracy as it ceded its major territory of commercial nuclear power to the electric utility company, 1973 was then the year that sealed its downward movement. The once cabinet-level status of the OAE (원자력원), which had already been downgraded one step to the vice-ministry level (원자력청), was re-designated to the Ministry of Science and Technology’s Office of Atomic Energy (원자력국) in a much smaller size. The statutory authority of the AEC became concurrently obscure, existing in little more than a mere name. Some measures were taken to strengthen the AERI’s competitiveness. A new legislation made the AERI a government-funded yet private corporate entity, similar to the status of the Korea Institute of Science and Technology, changing its name into the Korea Atomic Energy Research Institute (KAERI) with the addition of the two previously detached organizations, the Radiation Institute and the Radiation Agricultural Institute. Director of the KAERI was then given more discretionary power in the personnel system, the creation and abolition of laboratories, and budget spending. These changes led to a notable increase in the number of employees (which more than doubled in seven years from 443 people in 1973, in contrast to a meager increase of 46 people in the previous seven years) and a longer tenure of directors (only four directors appointed between 1973 and 1990, in contrast to 13 directors between 1959 and 1973). Nevertheless, as long as the Korea Electric Company maintained the authority to plan, construct, and manage nuclear power plants, the KAERI’s role was limited to that of a sidekick—providing technical know-hows and producing a cadre of research personnel to accomplish the goal of localization, or “Koreanization,” of technologies for nuclear power plants and the fuels. In the years to come, the relationship between the KAERI and the KECO evolved into one of rivals as well as of collaborators. This cooperative yet contentious relationship was a product of the military regime.

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64 Lee Chang-Geon, “Naul Wonjaryeok Hoeogo,” 347-350. Lee Chang-Geon maintained that the Korea Electric Company’s Chief Technology Officer, Kim Jong-Joo, who had received nuclear training in both the U.K. and the U.S., made a decision on the reactor type. Unlike Park Ik-Su, Lee was generally positive about the KECO’s takeover, as he thought the company maintained a good working relationship with the OAE and the AREI for policy and technical advice.


66 For Koreanization, see Kim, *Wonjaryeokbidangil*; *Wonjeongisurui Guksanhwa*. 
The technology gap was unquestionably a significant policy issue to underdeveloped countries like Korea, for there were many technologies to acquire and develop, and multiple ways to fill the gap. Relevant decisions had to be made. Early technocrats like Park Chul-Jae and Yoon Se-Won, who played pivotal roles in the formation of the nuclear bureaucracy, were convinced that the operation of a small reactor would afford practical knowledge and research experience much needed to build commercial nuclear power plants and expand the area of nuclear studies. They conceived the nuclear bureaucracy as an all-around science bureaucracy, at least for the time being, which would allow them to fill the knowledge gap as well as the technology gap. To this end, they asserted, scientists should be on top rather than on tap in a nuclear administration. By contrast, Park Ik-Su was a different kind of bureaucrat: a science-writer-turned-science-advisor. Although he was never engaged in day-to-day administration of the research program, Park Ik-Su assumed an influential position as a science advisor—a role much valued because he was neither a technocrat nor an insider. Park Ik-Su's view that science policy should be considered in conjunction with other national policies had a strong appeal to the military government gearing up for an all-out effort to achieve economic self-reliance. He rendered his talent and energy in the service of the military regime, and yet he was also concerned about its innate problems—collusion, corruption, and ignorance of lawful procedures—and he continuously opined this outlook through the press, even when his service was no longer called for. Park never accepted the proposition that might handcuff the nuclear bureaucracy in the power plant project by transferring its prerogatives to a utility company like the KECO. From 1968 on, however, the military government laid out a clear bureaucratic arrangement—the division of labor between the AERI and the KECO—for constructing commercial nuclear power plants with indigenous technology. This governmental drive resulted in a significant expansion of the KAERI, but its autonomy nonetheless suffered. Even the word “atomic” was stripped from its name, as it officially came to be called the Korea “Advanced” Energy Research Institute throughout the 1980s.

In the course of the bureaucratic changes in Korea's nuclear program, one can notice the invocation of nationalism at the individual as well as governmental levels. Although nationalism might have diverse meanings in the social and political settings of the post-Korean War decades, it is safe to say that many of the first-generation nuclear scientists worked with nationalist fervor. They were willing to sacrifice themselves—their academic careers and even their health (for potential exposure to radioactivity)—for participating in the nation-building process with their specialized knowledge. For this reason, nationalism was sometimes employed as an ideological weapon in the demarcation of the line between experts and laymen. Under the military government, science and technology became increasingly important as a central piece in the ideology of developmental nationalism. Therefore, Richard J. Samuels's technonationalism, the view of technology as the source of national security and economic prosperity in an integrated way, may as well be applied here. Yet technonationalism can still entail diverse implications at the individual level. It will be interesting to see how technonationalism united people to work together in the unprecedented administrative arrangement between a state-funded private research institute and a state-run private company—a bureaucratic setup that was uniquely Korean.