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Mr. Sun-Rae KIM
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Dear Mr. Kim:

SAVE International stands with you in opposition to the proposed Ganghwa Tidal Power Plant and Incheon Bay Tidal Power Plant. Our Executive Committee and our colleagues at the University of California, Berkeley, have been studying the economic and environmental effects of this style of tidal power plant (tidal barrage) and concluded that the tidal barrages currently proposed are not in Korea's best interest. Although tidal power appears to suit the government's Renewable Portfolio Standard (RPS) as a non-carbon-emitting source, these tidal barrages would further damage the nation's beleaguered tidal-flat ecosystems, eliminate sustainable jobs, and simply cost more than other methods of generating power or reducing demand for power. Other developed countries have chosen not to pursue large-scale tidal barrages because of similar drawbacks.

SAVE International is an international non-governmental organization (NGO) dedicated to the endangered Black-faced Spoonbill (*Platalea minor*) and other migratory waterbirds in Asia, and to the health and integrity of communities throughout the migratory flyway of those birds. Founded in 1997, SAVE campaigns against threats to spoonbill habitat, conducts research on spoonbill habitat requirements, raises international awareness to stop threats to habitat, promotes alternative plans for sustainable development, and collaborates with local groups to develop such plans.

The proposed Ganghwa and Incheon Bay Tidal Power Plants would disrupt the natural tidal processes that support rich ecosystems of mudflats and adjacent aquatic habitat. Populations of shrimp, clams, various fishes, and other aquatic life would drop. Endangered Black-faced Spoonbills and other birds depend on these creatures for food, whether the birds are nesting nearby and are foraging for their young or are refueling during a long migration. The Ganghwa South Tidal Flat, at 130 km², is the largest remaining tidal flat in Korea, the largest on the Yellow Sea, and home to 13 species of birds considered globally threatened. According to a report by Korea NGO Network for the Ramsar COP10 meeting (2008), from 1910 to 2007, 2,907 km² of tidal flats in South Korea were drained/filled or were in the process of being drained/filled—more than the 2,550 km² of tidal flats that remained. As tidal wetlands become scarcer, they support smaller populations of birds, and already-fragile species face the risk of extinction.

Weakening the legal protection of these ecosystems would undermine the reputation of South Korea among developed nations. These ecosystems are officially protected under Korean law; "Ganghwa Tidal Flat and the Black-Faced Spoonbill Habitat" was designated in 2000 as Natural Heritage Site no. 419, the nation's largest natural heritage site, and Black-faced Spoonbills themselves are protected as Natural Heritage Species no. 205. In addition, in 2003, the government designated the Jangbongdo Tidal Flat as a Wetland Preservation Area (68.4 km², the largest of Korea's Wetland Preservation Areas) by acknowledging its habitat values for various marine life and its unique geomorphology, with high tidal ebb and flow and a vast delta. Although the wording of the Wetland Conservation Act allows the Ministry of Land, Transport, and Maritime Affairs (MLTM) to rescind or reduce protected areas when the public interest or military security is at stake, we are not convinced the Ganghwa or Incheon Bay Tidal Power Plants are a national imperative. South Korea would be taking a step backward, even as its peers in the international community adopt stronger laws for environmental protection.

The Korean government claims that tidal barrages such as the proposed Ganghwa and Incheon Bay Tidal Power Plants will be widespread throughout the world, but other developed nations are choosing not to build tidal barrages because they are not feasible economically or environmentally. The proposed Severn Barrage in the United Kingdom is a telling example. Although it would have provided power equivalent to 5% of that nation's electricity, it drew heavy criticism from environmental NGOs, and the government finally abandoned the plans for Severn Barrage last November when a revised study showed the costs to outweigh the benefits.

The Severn example raises further questions about the advisability of these two proposed tidal power plants in Korea. Given their huge size, the Ganghwa plant or Incheon Bay plant alone would have a dramatic effect on the tidal ecosystem, but the cumulative effects of multiple tidal barrages proposed around Incheon Bay have not been studied adequately. Sihwa (Shihwa) Tidal Power Plant, recently completed south of Incheon, is now the largest such plant in the world, with a capacity of 254 MW. The tidal barrage at La Rance, France, used to be the world's largest, with a capacity of 240 MW. Ganghwa Tidal Power Plant (recently reduced from 840 MW to 420 MW) would be 1.7 times as large as La Rance, and Incheon Bay Tidal Power Plant (1,320 MW) would be 5.5 times as large. With only 60 km separating these three, the tidal ecosystems would be affected cumulatively, and individual assessments of those effects would not reveal the true story. In advanced countries, laws prohibit piecemeal evaluation and require an environmental assessment of the projects as a whole.

The government has suggested recreational uses ("marine leisure facilities", as your letter states) for the reservoir impounded by the proposed Ganghwa Tidal Power Plant, but our studies indicate that eutrophication and algal blooms, including red tides, are likely and would be incompatible with recreation. Water in the Han River is rich in nutrients, but its turbidity blocks sunlight and hinders the growth of algae, and tidal mixing disperses the nutrients into the sea. With the gates of the tidal power plants closed at high tide, the impounded water would move more slowly, turbidity would be reduced, and sunlight would foster the growth of algae in the nutrient-rich water. The crystal-blue waters shown in the artist's rendering could easily become green from algal blooms or red from a red tide and would repel rather than attract boaters or swimmers.

Building the proposed Ganghwa and Incheon Bay Tidal Power Plants would enrich a few construction companies in the short term, but at an unnecessarily high cost to taxpayers and to the environmental "commons". The construction jobs created by building the barrages would not last long, and jobs in recreation and tourism would be tenuous because of the risk of algal blooms, while the current jobs in fishing and the potential for other sustainable occupations would be lost forever. Since the proposed Ganghwa and Incheon Bay Tidal Power Plants would destroy 2,555 hectares of tidal wetlands, the economic value of these wetlands should also be accounted for: not only fisheries but also habitat and water purification. Estimates of this value have varied but have been increasing over the years as scientists understand the processes better: from roughly US\$10,000/ha/yr (Costanza, 1997) to \$32,660/ha/yr (Korean Ocean Research and Development Institute, 2006) to more than \$56,000/ha/yr (Mang et al., Korea Environment Institute, 2007).

Finally, we urge the Korean government to pursue other energy strategies besides tidal power that would allow the Korean government to meet its RPS at a lower capital cost and environmental impact. It is more than 3 times more expensive to build a new tidal barrage in Korea (US\$0.08/kW-h) than to achieve the same level of savings through investments in energy efficiency (\$0.025/kW-h). Additional renewable energy (solar, wind, or other), in appropriate locations, could also contribute to achieving the RPS with a smaller physical footprint. The Sihwa, Ganghwa, and Incheon Bay tidal barrages would impound a total of 305 km², but generating the same amount of energy with solar photovoltaic panels would require 62 km² of land area, while wind turbines would require only 2.5 km² (if other land uses were allowed between the turbines). A distributed network of power generation—many small systems throughout a city—would have a lower environmental impact and could be more economical than a large centralized system, even if government subsidies were required to overcome a higher capital cost. Furthermore, alternative methods of generating power from tides and currents are being developed that could take the place of the proposed tidal barrages without disrupting the ecosystems of Korea's western coast; building the tidal barrages now could have immediate, drastic, and irreversible effects on some species.

As you know, SAVE International sent a delegation to Korea on May 16, to present our study at the 2011 International Symposium for Black-faced Spoonbill Conservation and Cooperative Network. This study included the results of research developed in collaboration with professors and graduate students in the Department of Landscape Architecture and Environmental Planning at the University of California, Berkeley. We enjoyed the opportunity to discuss our research further with you, your colleagues, and interested parties in the Korean government and media.

For a related analysis of Korea's plans for tidal power around Incheon, please read the article recently published in *Environment Magazine*, written by Yekang Ko, Randolph Hester, and me: "A Conflict of Greens: Green Development Versus Habitat Preservation — The Case of Incheon, South Korea". The article is available online at the following address:

<http://www.environmentmagazine.org/Archives/Back%20Issues/2011/May-June%202011/conflict-of-greens-full.html>
<http://www.environmentmagazine.org/>

Respectfully,

Derek Schubert
President, SAVE International

CC (version of letter dated May 12):

Birdlife International / BirdLife Asia Regional Office, Japan
IUCN (Simon Stuart, Chair, Species Survival Commission)
Partnership for the East Asian-Australasian Flyway (Roger Jaensch, Chief Executive)
Southwest Coast National Scenic Area, Taiwan (Michael C. Y. Chang, Director)
Shanghai Chongming Dongtan National Nature Reserve (Chen Dong Tang, Vice Director)
UNEP (Hussein Abaza, Chief of the Economics and Trade Branch (ETB) of DTIE)
WWF (Tobai Sadayosi and Mr. Wang Songlin)