Policy Forum 03-14A: Gas Fired Electrical Generation, Catalyst for DPRK Security and Development

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Gas Fired Electrical Generation, Catalyst for DPRK Security and Development

By John Fetter

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I. Introduction

This essay is by John Fetter, President of FSI Energy, a consulting organization specializing in energy and environmental improvement. Fetter asserts that a gas fired electrical generation strategy would benefit the DPRK for several significant reasons. Gas fired electric generation would provide the DPRK with clean, technologically appropriate, available generation capacity in a reasonable time frame. Gas would also supply industrial fuel and excellent power quality without relying on a limited transmission grid.

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II. Essay by John Fetter

"Gas Fired Electrical Generation, Catalyst for DPRK Security and Development"
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Long-term security and economic development of the DPRK depends on the availability of reliable energy supplies for both industrial as well as individual users. This means electricity as well as other sources of energy. As the DPRK seeks to develop industrial areas such as Sinuiju or Kaeson, there will be a need for gas, oil or coal to fire industrial boilers to make steam. As the transportation network becomes better developed, there will be an increasing need for gasoline, diesel and kerosene for fuel. But immediately, there is a critical need for reliable electricity.

It is important that these energy sources be appropriate for their intended application, and that they be as efficient and responsive as possible. By responsive, we want to have energy sources that are available as needed and can be built in a timely fashion, are appropriate technologically, are supported by existing or envisioned infrastructure and fit with the likely growth scenarios of the DPRK. We will address each area separately. We will first present an overview, then provide some of the underlying details to support our thesis.

The intent of this paper is to discuss the value of a gas based energy infrastructure for the DPRK. It suggests that incremental generation additions from gas should be considered.

A gas fired electrical generation strategy would benefit the DPRK for several significant reasons.

Gas could be constructed in between 4 and 5 years. Gas construction schedule would be realistic and achievable. Gas would provide power close to where the DPRK needs it. Gas would be easy to expand as needed to accommodate a growing DPRK economy. Gas would also provide fuel for other industrial uses. Gas would not be compromised by the existing transmission grid system. Gas would provide better power quality for industrial applications where it is needed.

Availability

The technology of choice would be gas fired combined cycle generation (GFCC). This is the most efficient technology for electricity generation available anywhere. It is the most popular form of power plant being constructed today in the world, because it is the most efficient, has the highest availability and is the most reliable. Typically a GFCC plant is available more than 95% of the time, and the technology can be "turned down" more than 50 %. In other words, as your demand changes over the course of a day or week, the plant can follow that load. The response time is the shortest of any technology.

Technology

There are two areas of technology that need to be considered. The first is the technology used for generating electricity, and the second is the technology applications that will want to be supported by the electricity generated.

From a generation standpoint, the DPRK wants reliable, low maintenance sources of electricity. Since maintenance is a part of any system, one needs to consider the impact of a single unit going down on the whole system in the DPRK.

The vast majority of the electricity generating capacity built in the world in the last 15 years has been gas fired combined cycle due to the efficiency, reliability, advances in technology and environmental acceptability of the technology. This has allowed the "distributed generation" strategy that has become the standard in the world to develop. This is the standard that would most benefit the DPRK.

This is critical because since the DPRK is looking to attract foreign companies to its industrial zones in Sinuiju and Kaeson, they will need high "power quality" for any manufacturing plant they would look to build. Today's manufacturing plants are highly automated, and have more control systems that are typically digital control systems. This means that any dips in the voltage or frequency of the electricity coming to the plant will cause problems for these control systems unless the manufacturing facility invests large amounts in onsite power quality maintenance. If this onsite power quality maintenance is required, it will be a reason why the foreign company would look to another site with better power quality.

Infrastructure

The DPRK transmission grid system will currently not support large amounts of power that would need to be moved across the country for long distances. It would be much less expensive, and far more responsive to the needs of the DPRK to build smaller power plants closer to where the power will be needed than to make large investments in the transmission grid. In addition, the further the power generation is from the eventual user, the harder it is to maintain power quality.

Growth

As the DPRK economy picks up, so will its need for electricity. If the electrical generation base is gas, GFCCs, then it will be relatively easy to construct incremental additions as needed. Typical GFCC plants are between 130 MW and 250 MW. If a larger plant is desired, you simply build two or

more plants side by side. Thus, if you want to increase the size of an electric generating plant from 250 MW to 500 MW, it is a relatively straightforward project to install another plant, or train, next to the first. They can share a control room and other plant services. The expansion can be built in 2 to 4 years, and thus go online reliably in a very short time. Gas plants have the smallest "footprint", and therefore take up the least space.

Construction timing

The construction of gas fired combined cycle plants is both predictable and controllable. Since many of the most critical components of a GFCC plant are manufactured prior to delivery to the construction site, the assembly of these components is very predictable. Further, since so many GFCC plants have been built over the last decade, the process and schedule are well known.

The gas pipeline and the GFCC generating plants in the DPRK could be built at the same time, so that both could be ready for commercial operation in the same 4 year time frame. This is a schedule in which the DPRK could be confident.

In summary, gas fired electric generation would provide the DPRK with available capacity in a reasonable time frame. Gas would be responsive to the needs of the DPRK, and could be built close to the loads, thus providing better power quality.

III. Nautilus Invites Your Responses

The Northeast Asia Peace and Security Network invites your responses to this essay. Please send responses to: napsnet-reply@nautilus.org . Responses will be considered for redistribution to the network only if they include the author's name, affiliation, and explicit consent.

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