

Energy production from a wastewater treatment plant and water filtration plant

*10:30 AM, Tuesday, June 21, 2022, Oh Young-min, Director of Renewable Energy TF
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Hello, everyone. Today, I will present a roadmap of the Ministry of Environment to expand biogas and hydropower production utilizing environmental facilities.

For today's presentation, we will go through the Ministry of Environment (ME) 's roadmap for expanding biogas and hydropower through environmental facilities.

Let me give you a quick update on the energy production and use of South Korea's environmental facilities.

The ministry currently operates 1,341 environmental facilities nationwide. Of these, there are one hundred ten public waste resources management facilities that produce biogas. Five hundred metropolitan and local water filtration plants and 678 wastewater treatment facilities, and 37 dams are operating.

These facilities treat waste and water resources while producing about 3,264 GWh of renewable energy. However, at the same time, they also consume 7,625 GWh of energy annually for wastewater treatment, filtration, and dam operation. Accordingly, these facilities are classified as excessive energy-consuming facilities.

The Ministry of Environment plans to convert these energy-consuming facilities into energy-producing ones. We will increase their renewable energy production by 1.7 times by 2026, the end of the Yoon's administration, and by 2.7 times by 2030 to make them produce more energy than they consume.

According to the 2026 plan, the amount is equivalent to the amount of electricity that 1.38 million households can use yearly based on a four-person household.

I'll proceed with a brief outline of our plans for biogas and water.

First is our plan to expand biogas production.

Over 90% of organic wastes with high carbon content, including food wastes, sewage sludge, and livestock excrements, were processed in simpler ways, such as animal feed and compost. However, waste resources mentioned above can be converted into energy called biogas through a process similar to human digestion.

From now on, the Ministry of Environment will recycle organic waste with high potential into energy. We will subsidize the biomass gasification plants.

We will increase the number of biomass gasification plants from the current 110 to 140 by the end of the current administration, which will result in a gas production rate from the current 360 million Nm³ to about 400 to 500 million Nm³, which is roughly a 40% increase.

The amount is nearly 2% of the total domestic gas supply, lowering the annual LNG import cost by about KRW 181.2 billion and reducing 1.1 million tons of greenhouse gases by cutting down methane gas produced from wastes.

To boost the use of biogas, we will take measures to substitute the traditional use of gas, heat, and electricity for biogas. The ministry will also support to production of green hydrogen from biomethane.

The Ministry of Environment supports projects in which green hydrogen is produced from improved biomethane in Jeonju and Changwon bio-gasification plants. The ministry plans to increase the number of biomass gasification plants producing green hydrogen to five.

We will also further support technology development.

The ministry will invest a total of KRW 42.8 billion for five years to develop technologies for generating energy from animal and plant wastes, which are abundant in quantity but less utilized due to lack of available technology.

Next, I will talk about the ministry's plan to expand hydropower.

The ministry manages numerous water treatment facilities across the country, including water filtration, sewage treatment, and dams. We intend to double the number of energy production facilities to retain their capacity to produce electricity up to 2.9 GW.

By accomplishing it, we will be able to generate 4,800 GWh of energy annually, equivalent to power valued at KRW 473.5 billion, and reduce 700,000 tons of greenhouse gases.

Since the module efficiency and construction techniques have significantly improved for building floating solar farms, the efficiency of energy production per area is rapidly increasing. It is expected to increase its energy production capacity up to 1.1 GW by the end of the current administration.

We will utilize river water as well as all water supply and sewage pipelines for hydrothermal energy and heat energy from wastewater, which take advantage of the difference in water temperature. We will add more than 0.3 GW to the energy production capacity and use the power to heat and cool nearby buildings.

We will also install small hydropower plants that use the hydraulic head in nine wastewater plants and water filtration plants, thus enhancing their energy independence.

We anticipate that all buildings and structures will generate their own energy and thereby reduce carbon emissions. The Ministry of Environment will exert more efforts to hasten the arrival of these reforms.

It concludes my briefing.

[Q&A]

<Q> I have two questions for you. It says the environmental facilities will turn into energy production facilities that supply 1,137 GWh of energy by 2030. In such a case, I am curious about how many households will be benefited from this.

The other one is that I want to know if the data is accurate. The data on energy use by environmental facilities is based on 2021. Still, according to your briefing, the Ministry of Environment plans to increase the number of biomass gasification plants to thirty by 2030. The same goes for the green hydrogen production plants, water and sewage treatment facilities, and dams. Were these reflected in your analysis? The energy consumption will surely rise, and I want to know whether there has been an analysis on expanding the actual energy use.

<A> Let me answer your questions. First, the calculation was based on 1.38 million households using 5,764 GW of electricity. Four hundred thousand households would be covered by the 1,137 GWh supply, which is roughly one-fourth of the given figures.

Second, expanding facilities offset the default value according to the increased energy consumption.

<Q> I don't think merely producing biogas will immediately replace gas. What is your plan for supplying biogas through the existing gas infrastructure?

<A> That's a good question. Since biogas is also a type of gas, it is most efficient to use it in that state. We can substitute gas with biogas of over 95% purity. We get 65% methane from the biogas produced at these facilities, with the other components being carbon dioxide, sulfur, and other substances. We can get 85 to 90% pure methane following high-pressure processing, comparable to natural gas with nearly 95% methane concentration. The Urban Gas Business Act stipulated standards for odorizers, methane contents, and gas calorific value. We currently use gas pipelines to supply biogas to more than ten sites, and they are supplied in compliance with the city gas criteria outlined in the Urban Gas Business Act.

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