



The Illusion Of Electricity Generation Without Primary Energy

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Is it possible to generate electricity without input of primary energy? The answer is no. According to the 'law of conservation of energy', energy can neither be created nor destroyed; it can only be converted from one state to another [1].

We use this principle every day to generate electricity. Solar panels convert energy from sunlight into electricity. Power plants convert heat into electricity. Coal, diesel, LNG, and uranium contain energy that can eventually be converted into electrical energy. Hydropower uses the energy of flowing or falling water, while wind turbines use the energy of moving air.

One thing is common in all these methods, which is: there has to be an external energy input. Furthermore, all the input energy cannot be converted into electricity. Some energy is always lost to the environment, commonly as

heat, sound, friction, and vibration.

Recently, a news report with a heading along the lines of "Possibility of electricity generation without fuel using Flywheel Technology". The report appeared in well-known media outlets, including Shomoy TV, Dhaka Post, and Kaler Kantho [2], [3], [4]. Some presentation of the said news may leave an ordinary viewer with the impression that a flywheel can continuously generate electricity without oil, gas, sunlight, or other external energy source. That would be a misunderstanding of what this technology actually is. Let's discuss this technology with a bit more depth.

What exactly is a Flywheel? Think of the water tank on your roof

A pump using electricity (energy) moves water into the tank on your roof. Once the tank is full, you can switch off the pump. Water continues to flow out of

your shower. As long as enough water remains in the tank, you continue getting water. But once the tank is empty, water no longer flows out of the shower.

A flywheel works like the water tank. Physically, it is a heavy wheel. It stores rotational energy and releases in a continuous rate [5]. An external source, such as a motor or engine, makes the flywheel spin. The spinning wheel, due to its weight, stores a substantial amount of energy which can be later transferred to a generator to produce electricity. Similar to a water tank, as energy is drawn from the flywheel, its rotational speed decreases. Eventually, the flywheel will run out of energy, gradually coming to a stop at the end. Just like a water tank, it must be refilled using an external source to get constant output [5], [6].

Therefore, a flywheel should be understood primarily as an energy storage and management device, not

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as an independent source of energy [6].

Why do we use a flywheel?

The above discussion doesn't imply that a flywheel is useless. It is one of the fundamental technologies of mechanics. One of their major advantages is their ability to store energy and release it quickly when required [7]. Flywheels have been used in different forms in engine equipment, vehicles, machinery, and industrial systems for a very long time [8]. Modern flywheel energy-storage systems can also support electrical grids [9].

In most mechanical systems, the flywheel is used as an energy buffer that smooths out fluctuations in rotational energy supply (like a capacitor in electronics). Engines or motors normally generate fluctuating power. A flywheel absorbs this fluctuating supply and releases it constantly, helping the system run smoothly [8].

After understanding the basics of a flywheel, let's get back to the topic in discussion:

The Researchers May Not Be Making the "Free Energy" Claim

This is perhaps the most important part of the discussion.

The news reports identified Dr. Manirul Islam, Addl. Director of Rural Development Academy (RDA), Bogura, as one of the researchers of this technology. After looking into this matter, I came across an article by him published in Grain Feed & Milling Magazine titled "Flywheel-based Green Power: New Potential of Indigenous Technology in Bangladesh's Energy Security" [10].

Interestingly, the article gives a much clearer picture of the technology than the impression someone might receive from a headline about "electricity without fuel." The article describes the process where the energy is supplied by an electric motor, and the rotational energy is stored in the flywheel and turns a permanent magnet generator and supplies electricity when needed. It also indicates that the intended purpose of this technology is to provide backup power for adverse situations such as sudden high load demand, voltage and

frequency fluctuation, and short-term power shortage or load shedding. So, the system perfectly complies with the theory of conservation of energy; the flywheel can provide only the energy that was initially supplied to it through the motor.

The article also mentions that similar technology is already in operation at 20MW in the USA, 30MW capacity in China, and another system in Ireland installed for the same purpose, which is backup power.

The technology deserves research. Also, the public deserves clarity

Bangladesh should encourage its scientists, engineers and researchers to develop new technologies. If locally developed flywheel technology can reduce our dependence on diesel backup generators, stabilize renewable-energy systems, support irrigation, hospitals and industries, or help manage short-term power shortages, that could be extremely valuable for the country. The researchers themselves acknowledge that further pilot testing and independent verification are necessary. That is exactly how science should progress.

At the same time, a promising development should not accidentally be presented to the public as a false miracle. No technology can bypass the basic law of conservation of energy. A flywheel can store energy and release energy very quickly, smooth an uneven energy supply, improve grid stability, and provide short-term backup [5], [7], [9]. But it cannot create energy from nothing.

Therefore, I believe there may have been a misunderstanding or oversimplification somewhere between the scientific work and the way some of the news was presented to the public. The technology itself may deserve serious attention. The researchers deserve the opportunity to complete their testing and independently verify their results. ■

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