Domestic flywheel energy storage

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I"ve done some web searches, but I don"t see anything very current on how close we are to having a home energy storage flywheel system that"s comparable in price and performance to a battery system.

Also, as a bonus, what is the current state of a domestic-scale flywheel system in terms of maximum energy storage, power output, and usable energy (maximum energy minus minimum energy -- assuming there"s a minimum speed they must maintain, unless there"s not)?

Lets check the pros and cons on flywheel energy storage and whether those apply to domestic use (source):

Compared with other ways to store electricity, FES systems have long lifetimes (lasting decades with little or no maintenance;[2] full-cycle lifetimes quoted for flywheels range from in excess of 105, up to 107, cycles of use),[5] high specific energy (100-130 W?h/kg, or 360-500 kJ/kg),[5][6] and large maximum power output. The energy efficiency (ratio of energy out per energy in) of flywheels, also known as round-trip efficiency, can be as high as 90%. Typical capacities range from 3 kWh to 133 kWh.[2] Rapid charging of a system occurs in less than 15 minutes.[7] The high specific energies often cited with flywheels can be a little misleading as commercial systems built have much lower specific energy, for example 11 W?h/kg, or 40 kJ/kg.[8]

In conclusion: with all the effort put into development of rechargeable batteries and upscaling of a whole industry to massproduce and market them I would doubt that flywheels are ever going to fly (pun intended) any time soon in a residential setting. I would rather expect to see them as grid energy storage in utility-scale levels that would benefit from the advantage of a high power output and where a higher capacity warrants the complexity of such systems (moving parts, vacuum, mag-lev).

Domestic flywheels are unlikely to happen for 3 reasons:

They must be heavy to store significant energy. If you need a crane to install one at your house it"s never going to be super cheap, even with high volume manufacture.

The risk of the spinning mass fracturing requires special safety precautions - commercial operators put them in the ground but that would be super expensive on a domestic scale.Note that this isn"t the same as failed bearings where it might grind to a noisy halt. We"re talking heavy projectile at great speed.

Now if you"re off the grid, that"s a different story. Storage Batteries have trouble with high power - short duration loads such as when your fridge compressor starts up. A very small flywheel could help here in conjunction with normal batteries. It being very small eliminates the problems of weight, safety and energy loss over time. But the right battery already does the job cheaper - a low capacity, high power battery like the

one in your car (wired correctly; don"t try it!).

So for it to be cheaper it"d take a revolution in low cost, high speed bearings in tandem with a stalling in high drain battery development; and it"d still only be a very niche market.

We were looking into flywheel UPSes for my company and I read up on this a bit. Of note in recent developments:

Instead of traditional bearings, they"re using magnetic bearings to mostly eliminate friction.