

## Re: electricity from a gym: quick calcs

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- *From:* Paul Mathews <[opto@xxxxxxxxxxxx](mailto:opto@xxxxxxxxxxxx)>
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On Sep 12, 11:56 am, mrdarr...@xxxxxxxxxx wrote:

I had a conversation with a co-worker about harnessing energy from folks dancing on a dance club, and from folks walking in a mall during the shopping season. I was skeptical, thinking the capital costs would outweigh any benefit, but decided to run the calcs just to be fair.

I was *\*sure\** I'd posted similar calcs on sci.physics or sci.chem a few years ago, but can't find them. So, I re-derived them.

Let's say we have a gym with 100 pieces of equipment, with generators on each of them. And let's also say the gym is open 24 hours a day, fully packed at all times.

Let's say each person exercises at a rate of 100 W (pretty hard work), or 0.1 kW.

Let's say electricity costs \$0.10/kW per hour. (More in the bay area, less here in wintertime...)

So, each person generates \$0.10/kW/hr x 0.1 kW, or one cent per hour. (Much less than minimum wage, I might add.)

That's 24 cents/day/piece of equipment.

\$0.24/day x 100 pieces of equipment = \$24/day, or \$8,760/year in electricity back to the grid.

Now for the equipment costs. Let's say that each generator thingie costs \$100, including installation labor costs. \$100 x 100 pieces of equipment = \$10,000.

Breakeven time is just over a year.

Key assumptions:

- gym is fully packed at all times. Not gonna happen.
- each generator thingie, plus grid-intertie-converter, breaks down to

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\$100/piece of exercise equipment. That's awfully generous. Probably more like \$1,000/piece of equipment is closer to the mark...

– 100% credit from the electric company for electricity. Probably in Minnesota, but not here...

Any thoughts, folks?

Michael (I'm \*not\* an electrical engineer, by the way)

1. Credit for power put into the grid is much higher than cost of power taken out of the grid in many states. For example, in WA, you get paid as much as \$.51/kW-hr to add solar or wind energy to the grid.

2. Many exercising machines convert effort more or less directly to heat. In winter, this can subtract from the heating requirements of the building, much as waste heat from lighting fixtures does. Of course, if taken too far, this heat can cause the cooling system to kick in, even in winter. In summer, the heat from exercising generally adds to the cooling load.

Paul Mathews

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