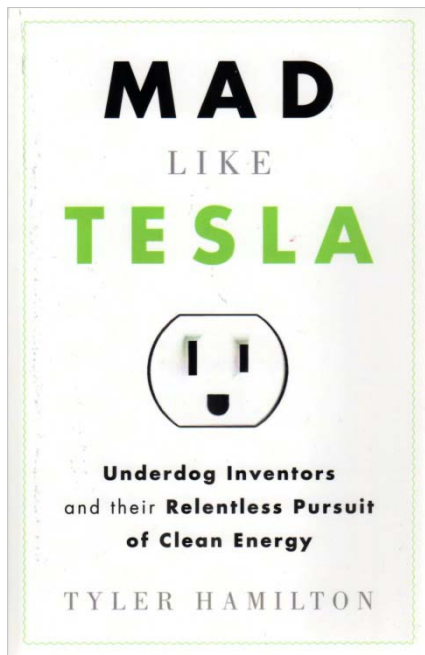


Mad Like Tesla

Underdog Inventors and their Relentless Pursuit of Clean Energy

Tyler Hamilton (ecw)



We'll often point to an article by Tyler Hamilton from the *What's New?* feature on our site. Hamilton is energy and technology writer for the Toronto Star and one of Canada's leading voices on green technology issues and trends.

In *Mad Like Tesla* Hamilton outlines projects that are underway in the field of green technology. To many, these projects - and the inventors and innovators driving them - fall clearly into the "mad scientist" genre.

Just like Nikola Tesla!

Whether he was debating DC vs AC with Edison, challenging Einstein's Theory of Relativity, inventing radio (surprise, it wasn't Marconi!), imagining a geothermal power plant, or beam weapons that could shoot down missiles, he found himself the subject of criticism, often ridicule!

A big part of Hamilton's message is that it often takes this kind of imagination to achieve the really big breakthroughs.

He tells how a physician named Damadian "... ignored the naysayers and built his own body scanner", performing the first MRI in 1977. When receiving an award from MIT, he talked about how, as Hamilton puts it "*criticism and skepticism come with the territory of invention and innovation*". Damadian went on to comment "*The bolder the initiative, the harsher the criticism.*"

Referencing those critics, Hamilton quotes *Time* magazine writer Grossman, "*There's nothing like the passage of time to make the world's smartest people look like idiots.*"

Having established the context, Hamilton moves to the 7 projects.

General Fusion is a private company in Vancouver that is working on a "hot" nuclear fusion reactor that gives off more energy, a lot more, than it takes to trigger it. Fusion has a 'sketchy' past filled with false claims, bad (or no) science, scandals. Add to that massive investments in the public sector with no results. So imagine the challenge *General Fusion* is facing attracting investors just for the demonstration project, but later to commercialize their creation. Their reactor is an interesting hybrid, a blend of magnetic fusion and inertial confinement fusion, both of which are being pursued by the mega-developers. So, bad history around fusion and now a bold, never-tried, and lately ridiculed innovation. You don't need to be a nuclear physicist to understand the principles as described by Hamilton. If you understand how a diesel engine works, by compressing the fuel to its ignition point, you'll get it. Aside from the challenge of attracting investors, this story also highlights another potential roadblock - attracting the critically-necessary talent to bring this to fruition, then to market. Who wants to risk their career on something that looks a bit 'off the wall'. Despite all of this, *General Fusion* puts its chances of success at better than 50% and hopes to have a couple of reactors in commercial operation around 2020.

Next up: *Solaren Corporation* in Los Angeles. Recall earlier reference to Tesla's notion of an energy beam to shoot down missiles. Well, *Solaren's* idea is to build a massive, highly-efficient solar array in orbit and beam the energy to earth. Giant mylar collector that sits well above the clouds, particulates, etc. Lenses to focus the sun's energy on super-efficient

PVs - and those are not far from reality, apparently. Solid state amplifiers that convert the energy to microwaves that are beamed to a massive array of thousands of rectifying antennas that convert the microwaves into electricity that flows into the grid.

Simple, eh? Supporters point out that *Direct TV*, for example, beams energy to earth already. To carry its content to thousands of satellite dishes scattered over a wide geography. BUT, the energy carrying the content is thrown away. So, what, then, do some think is so outrageous about harnessing the energy, and making the whole process much more efficient by focusing the microwave beams on a much more concentrated array of collectors?

How about this? Tesla, when in his late 70's, theorized about using explosives to break up tornadoes. What's green about that, you ask? A retired Canadian engineer in Ontario, *Louis Michaud*, is experimenting with creating tornadoes from waste heat to generate electricity. Nuclear power plants, according to Hamilton, convert one third of their fuel into electricity. The rest goes into the environment as waste heat. Now, other inventors have been working on solar chimneys. Picture, for example, a very large, and very, very tall clear tube sitting on a base. The sun heats it. Convection causes the warm air to rise. Install a turbine or two and presto!, you're creating electricity. Michaud says he can go one better by creating a tornado which acts as its own chimney. No clear tube needed! Start it with a source of heat at the base. Control it by reducing or withdrawing the heat. Capture the convection with turbines, and it's a much more efficient way to produce electricity. What? Create hundreds, maybe thousands of these tornadoes? Well, as Hamilton acknowledges, that's "*the elephant in the room.*" Nonetheless, there's lots of media interest and a growing number of scientists who believe this can work!

PAX Scientific was launched in San Rafael, CA in 1997 by Jay Harman. It has since spawned a number of subsidiaries that focus on products that *capture efficiency through biomimicry* - imitating nature. The company's Lily Impeller is based on the highly efficient spiral shape water makes going down a drain. Like so many of the other inventors and innovators Hamilton discusses, Harman has run in to some real challenges getting his products to market. The engineers he meets are enthusiastic ... but the C-suite, well, not so much. Another example of biomimicry .. *Velcro*. Swiss engineer George de Mastral took his dog for a walk and came back home with the dog covered with burrs. You can guess the rest. *REGEN Energy* is a Toronto company that has adopted "*swarm logic*" to energy management. A single bee is, as Hamilton puts it, "*just another dumb bug*". But a thousand bees form an intelligent collective that works together. Ants and crickets do the same. OneSun Solar in California is developing "extremely inexpensive" solar cells that function like the leaf of a plant.

A chapter titled "*Not Your Average Pond Scum*" focuses on making fuel refineries out of algae. Photosynthesis is involved. *Algenol Biofuels* ... is creating clean-burning ethanol fuel from genetically enhanced blue-green algae ... that's the pond scum. Not made from corn, from algae. As the price of oil goes ever-upward, the innovators argue this becomes economically sustainable. Hamilton talks open pond vs. covered pond - each has merits. For the covered variety, add CO₂, and, voila ... ethanol condenses on the cover for collection. It seems to be working at a lab level, but the next big challenge will be mass-production capacity and then commercialization.

Then there's energy storage. Giant batteries? Compressed air? Reservoirs pumped full of water during off-peak ready to be drained to generate energy in the peak times? *EESor* is looking way beyond that with a storage device that is a blend of battery and ultracapacitor. Can store twice the energy of the lithium ion batteries in the Tesla Roadster, at a fraction of the cost! Attracting interest for sure ... Lockheed Martin has apparently done a long-term deal.

Hamilton wraps the book with some hopeful, optimistic words about the need to keep an open mind, and to be patient to allow the "mad scientists" to invent and innovate, and then commercialize their ideas.

Provocative to be sure!

