

# Watt's Happening? #128

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## In Defence of Science



*Science makes technology possible. Wind and solar energy systems are examples of “good technologies” that provide the supremely useful energy we call electricity in the least harmful ways yet invented.*

**Like air,** science today is invisible, easily taken for granted, easily attacked. As a life-long science nerd, I take the present postmodern attack on science personally, and it scares me. Here's why.

From climate change denial to the nonsensical notion of “alternative facts” and our supposed “post-truth era,” (huh?), knowledge is being replaced with ideology, and the powers that be are making decisions that ignore what we know in favour of what we want to hear. This results, inevitably, in some

really, really bad decisions.

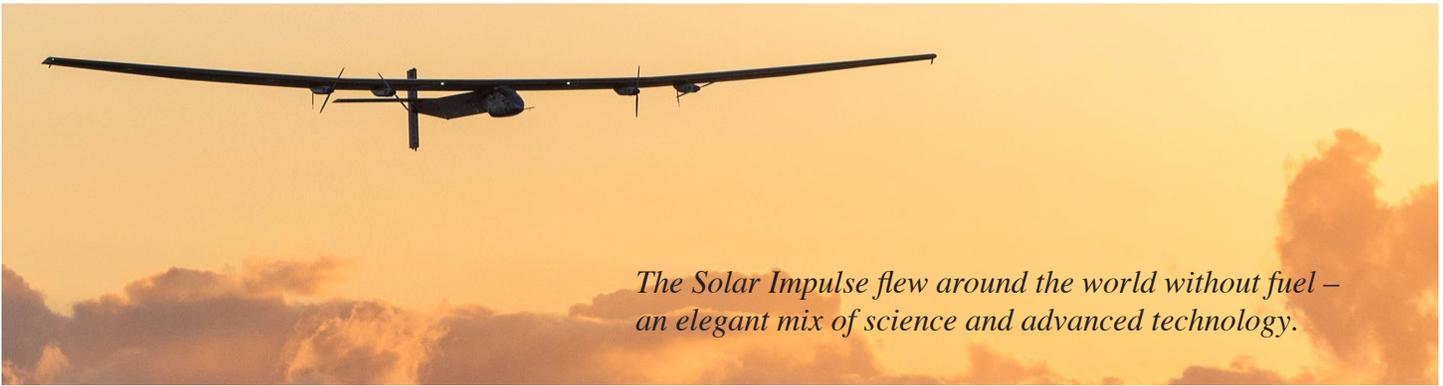
Science today is so all pervasive, so thoroughly imbedded in everything we do, that it is all too easy to think it's really not there and really doesn't matter. Like air, we never think about it, although our very lives depend on it.

### WHAT IS SCIENCE?

Science is a process of discovery. It's a process that the human mind has been working on for the last few thousand years, but just in the last few hundred, a process perfected.

It goes like this: 1) start with an idea, a “theory”, that says, “if I do this, then this should happen” 2) then you devise an experiment to test your theory 3) you perform the experiment, 4) observe the results 5) and then throw out, confirm or revise your original theory based on those results. What you have just learned then suggests more ideas, more experiments, and on and on, always building on what you have learned.

Each new theory has to build on, and encompass, the old. This is one of the most basic principles of the scientific method that is most



*The Solar Impulse flew around the world without fuel – an elegant mix of science and advanced technology.*

often misunderstood.

Einstein's theory of relativity didn't just pop out his mind all fresh and new. It was built on hundreds of years of scientific thought and experiment. It didn't replace Newton's theory of gravitation, it encompassed it and then took it further, building on it, expanding it, perfecting it. That's science.

The result is the ever-evolving, ever-growing body of scientific knowledge and understanding that we have built our present global civilization on. Science never reaches true certainty, but some of its insights have been so thoroughly investigated by so many people over such a long period of time, and the results have proven to be so astoundingly useful, that they can safely be considered scientific "facts."

"Technology" takes scientific knowledge and applies it to something useful: bridges, airplanes, smart phones, the internet, satellites, antibiotics . . . pretty well everything we need and use all the time. Science makes technology possible.

## **GPS and RELATIVITY**

Did you know that the GPS navigation system in your phone or car relies on Einstein's theory of relativity? Pretty nerdy stuff, I know, but bear with me.

Einstein proved mathematically that both space and time are relative to the observer, meaning that neither space nor time are absolutes, but are always

changing. When you speed up, time slows down and space contracts, for instance. When you reach the speed of light (186,000 miles per second) all time becomes "now" and all space becomes "here." Very strange.

Strange, but NOT very practical to you and me, you may think, crawling around on our little planet at nowhere near to speed of light. Nope, even a Tesla roadster won't go that fast.

But here's a cool nerdy fact: without relativity, the next time you relied on your GPS to get you to a Tim Horton's in a strange city, you would never get to that steaming cup of java. Without compensating for relativistic effects due to the speed of the GPS satellites, the speed of the user as the Earth rotates, and the changing gravitational field of the Earth that the satellites pass over, GPS would not work.

These Einsteinian time distortion affects must be accurately and continuously corrected for, or your GPS system would be utterly inaccurate. That's a fact.

Climate change is also a fact. The world is warming, causing our weather to get weirder, more unpredictable and more destructive. Carbon dioxide and methane are the main causes of this warming. Human beings are the main cause of these gasses.

When the scientific community is yelling at us that we are in trouble and need to do something, then we had better listen, get real and take action.

And that's a fact!

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