

# Watt's Happening? #134

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## Electric Cars: *do they make cents?*



*Love the all-electric Tesla Model 3 interior! The large touch screen controls and monitors all car functions.*

**T**he future of transportation will be electric. Partly for environmental reasons, but mostly because electric vehicles (EVs) will have superb performance, will be cheaper to run and much less expensive to maintain.

### CHEAPER TO RUN

A detailed analysis at the U. of California, Berkeley, shows that mass-produced electric vehicles with advanced lithium-ion batteries (like those now being used) have a full lifetime cost per mile that competes with a gasoline vehicle when gas sells for more than \$2 a gallon.

With gasoline at about \$5 per gallon, if you drive 50 miles a

day in a vehicle that gets 30 mpg, it will cost you \$3,000 per year in fuel, and you will create 10 tons of greenhouse gasses each year.

EV will cost about \$400 per year at 9 cents per kilowatt hour (roughly the rate in BC), with zero pollution.

If you have your own solar array at home or at work (as I do), you can plug your EV into it and the "fuel" will cost you exactly nothing. The average Canadian home needs a 6 to 10 kilowatt grid-tied solar array to supply most or all of its electricity. Add another 3 kilowatts for your EV and you have free fuel for life!

### EV GROWTH

The total global population of electric and plug-in hybrid vehicles exceeded 3 million in 2017, up 54 per cent from the year before. China accounted for half of the new EVs sold. The International Energy Agency expects 130 million light-duty EVs will be on the roads by 2030.

Let's face it, when electric vehicles cost about \$20,000 (it's coming soon!), when they reach 400-500 km range on a charge, run for millions of kilometers with very little maintenance, run on free or very inexpensive fuel and produce no pollution . . . fossil-based vehicles will be obsolete. That is probably less than ten years away.

## RANGE ANXIETY

Will I run out of juice before I get to the next charging station?

Range varies with make and model, with more choices and longer range available every year. The lithium batteries now used in cars gives the Nissan Leaf EV a 200 km range, the Tesla Model S a 480 km range. New battery technologies promise to double and triple this. Most people run combustion vehicles until the gas tank is near empty, then fill it up again. Experience is showing that owners “refuel” their EVs differently. Remember, with an EV you essentially have a gas station at home and another one at work. Most people plug their EV in when they get to work, and then again when they get home, so for most driving it’s always nearly full.

Long distance driving requires fast charging stations along the route. These are small, simple gadgets that are quick and easy to install. Ontario just dedicated \$20 million to install some 20,000 fast-chargers across that province. Tesla is installing a chain of super-fast chargers along the full length of the trans-Canada highway. In China and the Netherlands EV chargers are everywhere, and range anxiety is gone for good.

## MAINTENANCE

All-electric vehicles are also cheaper to maintain. Much cheaper. A regular combustion engine pickup truck has about 1800 moving parts, all in need of maintenance and/or periodic replacement. The Tesla EV has 17.

Electrics have no transmission, no spark plugs, no pumps or pistons, no starter, no cooling system, no exhaust system, no more “changing the oil.” They are super-simple.

And if burning rubber is your thing, an electric vehicle will have acceleration to die for: zero to full rpm in a fraction of a second.

## WINTER PERFORMANCE

“Sure, electrics are great, but they’ll never work in the north!” Wrong again. The Nissan Leaf says their lithium batteries require no special attention down to -24C, and then a little battery warmer automatically kicks in to keep them cozy. No problem.

Right now, fossil fuels are king. It’s all we know. But soon that gas-guzzling polluting monster you drive will seem outdated, noisy, dangerous, sluggish, and absurdly expensive to run and maintain.

The change is on its way, and it will be better for our stressed-out planet Earth . . . and better for our pocket books too.

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