

FULLY COMMITTED:

WHAT WE CAN LEARN FROM NORWAY'S
ROAD TO ELECTRIFICATION Kenneth K. Boyer

Norway believes in electric vehicles

so much that its official “Visit Norway” website proclaims it “the EV capital of the world,” and boasts almost six hundred thousand battery EVs and nearly two hundred thousand plug-in hybrid EVs by late 2023. That’s over 25 percent of the cars on Norwegian roads. Eighty percent of the vehicles sold in the country in 2022 were electric, thus seemingly on track to reach the political goal of making the entire Norwegian fleet of passenger transport emission-free.

An example the rest of the world can study? Absolutely. A finished project? Hardly.

A closer examination reveals that 72 percent of the cars still on roads are still traditional internal combustion engine (ICE) vehicles—and likely a decade remains before most cars on the roads are electric. But we can still learn lessons from the Norwegian experiment to speed up electrification.

A WILLINGNESS TO COMMIT

In 1990, while the rest of the world slept, Norway began abolishing import taxes on zero-emission vehicles, and soon exempted them from other taxes on polluting cars, providing nice perks like lower road tolls, free ferry crossings, access to bus lanes, and free public parking. With 127 ferry routes, a Norwegian is roughly sixty times more likely to ride on a ferry with their car in a given week, month, or year than in an American. Furthermore, battery electric ferries, or BEFs, have already been introduced—and some 70 percent of all ferries could be similarly converted.

Subsidies to housing associations to facilitate the installation of charging stations soon followed. The first municipal charging system was launched in Oslo in 2008; by 2015, there were over ten thousand charging stations, roughly one for every five hundred people, children included.

Interestingly, Norway is the longest European country at over one thousand miles north to south, far more densely populated than Iceland and Greenland, but virtually empty compared to the Netherlands. The U.S., a very large country by land mass and population, with wide stretches of less populated land, is still roughly two and half times as dense as Norway.

The shift to electric in Norway has occurred at warp speed relative to most similar large-scale societal and industrial transitions ...

To support long-distance trips, a target was set of at least one fast charging station every fifty kilometers on major roads. The first Super-charger was opened in 2016 in Nebbenes, roughly seventy kilometers north of Oslo: it could handle twenty-eight cars at a time. Notably, it was not built by Tesla, although Tesla is the country's bestselling brand (and traditional ICE manufacturers such as Fiat and Renault have seen sales plummet).

TRANSFORMING THE SUPPLY NETWORK

The chicken-and egg problem of building cars or charging stations first was solved through subsidies via Enova, the arm of the Norwegian government tasked with funding and advising energy and climate projects in the country. An initial investment of 7 million euros led to nineteen hundred charging stations by 2011.

In another critical policy move, Norway decided to provide financial support to housing associations to install destination chargers, covering 20 to 50 percent of the installation cost in Oslo, Skedmo, Asker, Baerum, and Trondheim. Furthermore, housing associations wanted to install chargers. Why? Because nearly all the electrical power in Norway is renewable and very cheap: the per-mile cost to drive on electricity is under 10 percent of the cost of moving a gasoline-powered car.

Today, Norway has over twenty-five thousand destination charging stations and over six thousand supercharging stations—2.5 times as many chargers per capita than in California.

THE KEY ABILITY TO PROFIT

In a capitalist society, the companies that produce the cars need to be able to profit, and the customers who buy them need to see advantages. Consider the Swedish giant Volvo, which sold over six hundred thousand cars worldwide and had slightly over \$30 billion in revenues in 2022. In Norway, the transition to electric catalyzed sales for the Swedish giant—and as Volvo's CEO Jim Rowan said, the Norwegian combination of incentives and ubiquitous charging "took away all the friction factors."

Ninety-six percent of the Volvos sold in Norway in 2021 were Recharge models. Given this growth, Volvo announced at the end of that year that it would only sell electric cars in the country, so good was its profitability. It was on a straight trajectory to be the first company in the world to completely dump conventional gasoline-fueled vehicles in a major market.

This democratic society has made the hard decisions to create a greener, more environmentally sustainable economy.

PROMISING BUT NOT PERFECT

The shift to electric in Norway has occurred at warp speed relative to most similar large-scale societal and industrial transitions, with several very positive changes. The air is much cleaner: a monitoring station near Oslo's waterfront found that levels of nitrogen oxides, produced when gasoline and diesel are the primary fuels and responsible for the smog that triggers asthma and other respiratory ailments, have fallen sharply.

While the electricity demand on Norway's grid has risen slightly, requiring the Oslo power company Elvia to install additional substations and transformers, there hasn't been any danger of the grid collapsing.

As for job loss, a common concern during swift societal change, that threat appears not to have been realized in Norway. ICE cars still need repairs, so mechanics have steady work. Others have been retrained. South of Oslo, a steel plant has become a battery recycling facility.

Of other challenges, there are still waiting lines at charging stations, particularly during seasons of high travel, such as summer weekends. But Circle K employee Marit Bergsland deals with customers in stride: "Sometimes we give them a coffee to calm down."

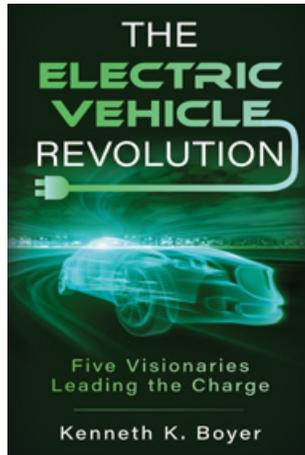
Many apartment dwellers also complain of being unable to charge at convenient times. But recently, Oslo's vice mayor, Sirin Hellvin Stav, said that the city's goal is to install further chargers while reducing the number of cars by one-third to enhance safety and walkability.

In *Hot, Flat and Crowded*, three-time Pulitzer Prize-winner Thomas Friedman suggests that if he were the all-powerful leader of America for a single day—with autocratic powers similar to Xi Jinping in China in 2023—he would implement a series of China-style laws and regulations aimed at greening the economy. Then he would revert to a democratic society, with all its messy political battles and debates.

Norway's approach to electric vehicles is essentially the opposite. This democratic society has made the hard decisions to create a greener, more environmentally sustainable economy. **Their lessons are well worth following.** 🇳🇴



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Kenneth K. Boyer combines a lifelong love of cars and engineering with a career focused on management and supply chain. He's the Fisher designated professor of operations and business analytics at Fisher College of Business, Ohio State University, was coeditor-in-chief of the Journal of Operations Management, and served on the faculty at Michigan State and DePaul universities. He's a member of the Academy of Management, Production and Operations Management Society, and the Decision Sciences Institute. Recently, he visited Vietnam to study Vinfast's rise. He's published numerous academic articles and two books. His latest is *The Electric Vehicle Revolution: Five Visionaries Leading the Charge*.

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