

The Third Industrial Revolution Expanded

by Humphrey Boogaardt ¹

Look around now in 2015 most people are comfortably using their smartphone (by the way the iPhone is only 8 years old). On that smartphone people text, facebook, google, bank, get directions, you name it. This technology has been very disruptive for telcos, newspapers and many others. The younger generation prefers to log on and access free blog sites like the *Huffington Post* to stay informed, instead of hardcopy newspapers. Honing in on the younger generation Dutch company *Blendle* makes it possible instead of subscribing to a whole newspaper just to buy an article of choice.

In the last couple of years we have seen new wave of services and products coming on the market that are disruptive for the established and incumbent businesses. To name a few, *Uber* 'taxi service', *Airbnb* 'accommodation' and *Tesla* 'electric luxury cars' (who see themselves as a software company) and battery storage systems. MOOC courses, invented at Stanford University in California, will be likely be disruptive to the current model of higher education. These disruptive industries have one thing in common, namely ICT. Without the modern form of communication, the "internet", they would not have been possible.

Another interesting fact is that many were funded by the first wave of ICT entrepreneurs like Elon Musk (co-founder PayPal), Paul Allen (co-founder Microsoft), Peter Thiel (co-founder PayPal) or Steve Wozniak (co-founder Apple).

This is all part of what activist economist thinker Jeremy Rifkin calls the "Third Industrial Revolution". The 1st IR starting in the 18th Century was based on coal and steam. Followed by the 2nd IR starting late 19th Century based on oil & gas. "*The co-joining of Internet communication technology and renewable energies is giving the rise of a Third Industrial Revolution (TiR). In the 21st century, hundreds of millions of human beings will be generating their own energy in their homes, offices and factories and sharing it with one other across intelligent distributed networks – an intergrid – just like people now create their own information and share it on the internet*" (Rifkin, 2011). According to Rifkin the TiR is based on five pillars:

1. Shifting to renewable energy
2. Transforming the building stock of every continent into micro-power plants to collect renewable energies on site
3. Developing hydrogen and other storage technologies in every building and throughout the

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- infrastructure to store intermittent energies.
4. Using Internet technology to transform the power grid of every continent into an energy-sharing intergrid that acts just like an Internet.
 5. Transitioning the transport fleet to electric plug-in and fuel-cell vehicles that can buy and sell electricity on a smart, continental, interactive powergrid.

Korea's Hyundai just release hydrogen fuel vehicle in California. Japan and Germany are putting a lot of money and effort in hydrogen fuel cell technology and planning to have commercial applications in vehicle and as backup storage for solar/wind out in the next few years.

In addition we have disruptive projects in agriculture. For example, there is Sundrop Farms in South Australia. They did a deal with Coles supermarket to supply vegetables. This project is underwritten by KKR (formerly known as Kohlberg Kravis & Roberts), an American multinational private equity firm specializing in leveraged buyouts, headquartered in New York. Using concentrated solar thermal generated energy to create desalinated sea water for growing of hydroponic vegetables. All will be computer controlled. This setup has the potential to disrupt conventional farming. They will be able to operate wherever is renewable energy and salty water. Additional environmental benefits are that this process will also not introduce salination of the soils. It will also stop wastage of and pollution by the element Phosphor, an essential element from plant growing. In conventional farming only 15% of fertiliser Phosphor is absorbed by the plant, the rest runs off via rivers into the sea. Even where there is heavy air-pollution clean vegetables can be grown in glasshouses where air quality can be controlled.

There are entrepreneurs farming algae for human consumption on rooftops in Bangkok part of an agricultural operation that contributes to an innovative form of urban farming. Made possible by sustainable food production company Energaia. Their product, an edible algae called spirulina, has high protein content could potentially provide an alternative to meat, and can be added to the main ingredients of pastas or smoothies. The company has links with hotels and building owners in Bangkok.

Bill Gates invests in plant-based versions of meat, because raising livestock traditionally has a vast impact on the environment. Beef farming has been criticized for increasing methane emissions, since cows are ruminants fermenting food during digestion and producing carbon gases as a waste by-product. Google co-founder Sergey Brin has made an investment in lab-grown meat, which has been developed and tested, cultured from the stem cells of living cows.

One important reason for need to changing agricultural practices is the amount of fresh water available

for agriculture is diminishing. With the growth of affluence in Asia, this is especially true for the production of meat. As an example, 1 kg beef in Europe and the USA takes 16,000 liter of water to produce. Why is this so much, well the cattle are fed soyabean which are grown in Brazil, resulting in clearing of the Amazon (Smil, 2013). All the water used in the food chain, from soybean to beef at the butcher is called Virtual Water. The term was originally created by Prof Tony Allan of Kings College London, UK. A lot of modelling is carried out by Prof Arjen Hoekstra in the Netherlands. Probably soon you get a Virtual Water Star rating for the food you buy. Recently it has been in the news that USA's chief nutritionist told US Congress that we should eat less meat because livestock production has a bad effect on the environment. The UN has been producing similar reports. So all this is in favour the Sundrop Farms, urban algae farming and plant-based artificial meats which will be disruptive industries to the whole of the agricultural complex. Virtual water is not only relevant for food, but for everything we produce. By recycling more we will have an impact of the amount of Virtual Water needed. Proper water management is essential for any civilisation to survive. Diamond (2011) describes the collapse of many civilisations in history due to water mismanagement.

Back to Jeremy Rifkin's TiR which is defined on renewable energy and the internet. Another advantage of the envisaged renewable power generation is that most countries do not have to import energy or at least only part of it. So for example Europe cannot be held hostage because its dependence on Russian gas. A report by the Rocky Mountain Institute (2015) notes that retail prices for grid electricity are climbing while costs for solar PV and batteries are declining, *The Economics of Load Defection* projects the coming electricity load and revenue loss that utilities could well face in the coming 10–15 years. The report details how regulators and utilities are affected and gives some possible ways for the future.

As part of TiR new business models are created, for example collaborative business practices, like “Performance Contracting” is a good case in point. A company like Philips Lighting might contract with a city to install LED lights in all public and outdoor facilities. Philips finances the project and the city, in turn, pays back Philips over a series of years through energy savings. If Philips fails to achieve the energy savings projected, the company takes the loss. (Rifkin 2011).

If we cannot use fossil fuels where does all the energy come from and will it last? The amount of renewable energy available to us is nearly infinite, until our sun dies. By that stage we may be able to do inter-stellar or inter-galactic travel to another “earth” in order to survive as a human race. So there is and will be no energy shortage. All energy systems will be based on electrical output. By the way growing crops for biofuels is an inefficient way of creating energy, it may solve part of an energy problem but it will create a Virtual Water problem which is very much larger and avoidable.

The effect on society will be enormous and result in industrial and social upheaval because of all the disruptive technologies implemented now or in the near future. The first part will be the demise of the fossil fuel industry with coal going first. And at first there will be a slow change in the agricultural practices. There will be an enormous shift in types of jobs needed. The earlier we are prepared for TiR and participate in it the least disruptive and most beneficial it will be.

In respect to Australia the TiR will go ahead independent of Australia's government is going to participate or not. Its current science, agriculture and technology policies will be a major setback for the participation in the TiR. Continuation of these policies will likely result in Australia becoming a third rate consumer instead of being a leader.

All the incumbent industries will fight tooth and nail to stop this and to discredit the new industries, partially by sponsoring "research" in climate denial. However the TiR will win. As former very powerful Saudi oil minister Sheikh Yamani put it: "*The stone age did not end for lack of stone, and the oil age will end long before the world runs out of oil*" (Dunlop, 2015). The TiR has and will have an impact, because it is backed by serious money. It is not a "feral hippy" movement. What will the impact be on us? In the short term we will see a decline of stockmarket value of fossil fuel companies. Their values are based in saleable resources they have in the ground, so if no-one want these, the companies are worth nothing. All this will likely have an impact on the value of your superannuation portfolio too.

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