



# THE POLITICS OF RENEWABLES



*The geopolitics of energy is changing as the world shifts towards a green economy.*

The UAE formally ratified the Paris Climate Agreement in September 2016. The landmark agreement is aimed at combating climate change and is designed to accelerate and intensify the actions and investments needed for a sustainable low carbon future.

Although the UAE has the world's seventh largest oil reserves it has long focused on a future beyond oil by diversifying its economy into new, knowledge-based industries. The Masdar Institute, for example, is the Gulf's first research institution dedicated to advanced energy and sustainable technologies. Since 2009, the UAE has geared its economic free zones towards encouraging the transfer of clean technologies and the overall growth of the sector. To date, the UAE's free zones have attracted more than 400 international companies including General Electric and Siemens.

Furthermore, the UAE has led the region in deploying clean energy, with pioneering projects and policies in renewable and nuclear energy, energy and water efficiency, and was the first in the region to set a clean energy target of 24% by 2021. To reach these goals, the UAE will invest \$163 billion into renewable, clean fossil and nuclear energy technologies over the coming years.

This foresight will pay dividends in the years to come as the world increasingly moves towards renewable energy.

The geopolitics of energy, usually defined as the impact of energy flows on the power and influence of nations, has largely been about the world's thirst for oil. The International Energy Agency (IEA) sees oil demand rising more than 10% to 103.5 million barrels a day by 2040, while the Organisation of the Petroleum Exporting Countries (OPEC) predicts even faster growth.

There is a problem with this forecast. About 60% of oil is used in transportation, but governments concerned about climate change or air pollution are pushing tighter fuel-efficiency standards. In total, efficiency improvements could eliminate the need for about 11.6 million barrels a day of supply, according to the IEA.

Then there is the rise of electric vehicles. France and the United Kingdom intend to ban the sale of petrol and diesel vehicles by 2040. China's latest auto industry plan sees all new vehicle growth coming from electrics, while India plans to sell only electric cars by the end of the next decade. China is already buying more electric cars than any other nation. By 2035, Bloomberg projects a 43% penetration >





**Above:** The Chuquibambilla open-pit copper mine in Chile

## *Metals demand could double due to the growth in wind turbines and solar panels and there could be a more than 1000% increase in lithium demand for batteries*

of electric vehicles in the light-duty vehicle market, which will be roughly equal to 110 million cars.

The electricity grids of many countries are also undergoing a radical transformation to renewable energy. In 2016, \$200 billion was invested into renewables and more net renewable capacity was added than coal and gas put together. According to the United Nations' Environment Programme, China's investments in renewable energy topped \$78.3 billion in 2017 while the US spent \$46.4 billion.

The EU has set itself a clear goal to decarbonise all energy by 2050. Germany was one of the first major economies to take significant steps to transition from nuclear and fossil fuels to clean energy, beginning in the 1990s. Between 1990 and 2016, total greenhouse gas emissions in the nation dropped 27.4%, even as its GDP grew 50.5%. Last year, Germany generated 36% of its electricity with clean energy, an increase of nearly 4% from 2016.

Germany is not alone. In Costa Rica, renewable energy supplied five million people with all their

electricity needs for a stretch of 300 consecutive days. The UK broke 13 green energy records in 2017 alone, and California's largest grid operator announced it got 67.2% of its energy from renewables (excluding hydro) on May 13, 2017.

In the UAE there are also numerous large renewable energy projects. Dubai's Mohammed bin Rashid Al Maktoum Solar Park, which is currently in its third phase, will have a capacity of 5000 MW by 2030, offsetting 6.5 million tonnes of CO<sub>2</sub> emissions and generating enough energy to power 800,000 homes.

Miguel Arias Cañete, the EU's commissioner for Climate and Energy, said: "We are on an irreversible pathway to renewable energy... those who don't embrace the clean-energy transition will be losers in the future."

This shift from oil, natural gas and coal to zero-emission energy generation and transport means

**Right:** The Masdar Institute is the Gulf's first research institution dedicated to advanced energy and sustainable technologies



a new set of elements will become key, with major implications not only for geopolitics but also mining and the world's supply chains. To fully transition to a green economy the world needs vast amounts of metals such as copper, silicon, aluminium, lithium, cobalt, rare earths and silver.

Solar energy primarily uses silicon technology, for which the major raw material is the rock quartzite. Lithium is the key limiting resource for most batteries, while rare earth metals, in particular "lanthanides" such as neodymium, are required for the magnets in wind turbine generators. Copper is the conductor of choice for wind power, being used in the generator windings, power cables, transformers and inverters.

This energy transition has set off a global race for the best technologies and raised concerns about access to the rare earths and critical minerals needed to make the necessary hardware. According to the World Bank, metals demand could double due to the growth in wind turbines and solar panels and there could be a more than 1000% increase in lithium demand for batteries.

Wind turbines require up to 14 times the iron needed for fossil fuel power generation, and solar photovoltaics require up to 40 times the copper than traditional coal, oil or natural gas-fired power plants, according to a new study by the Norwegian University of Science and Technology. For every MW of wind power about 3.6 tonnes of copper is needed – and for every MW of photovoltaic solar capacity, about four to five tonnes of copper is required.

Even more significant is the copper used in the production of hybrid and electric vehicles. A fully electric automobile contains three to four times as much copper as a standard vehicle, and a hybrid about twice as much. As the market for fossil-fuel-free vehicles expands, so does our need for copper.

In late 2017, the world's largest mining company, BHP Billiton, estimated that conversion of just 8% of the global auto fleet to electric vehicles would increase global copper use by more than 40%. The World Energy Council estimated an even greater impact on copper demand.

This means the transition to renewable energy has plenty of scope to cause geopolitical friction. The most obvious example is the challenge it will pose to economies that depend on hydrocarbons. A new book, *The Geopolitics of Renewables*, edited by Daniel Scholten of Delft University of Technology in the Netherlands, argues that the clearest losers will be those blessed with ample fossil-fuel reserves and those who bet on oil for too long without reforming their economies.

On the other hand, resource rich countries stand to benefit.

The largest reserves of quartzite (for silicon production) are found in China, the US and Russia – but



also Brazil and Norway. Chile also has, by far, the largest reserves of lithium, ahead of China, Argentina, Australia, Zimbabwe and Portugal. Factoring in lower-grade "resources" – which can't yet be extracted – bumps Bolivia and the US onto the list. Rare earth resources are greatest in China, Brazil, Russia, India, Australia and Vietnam. Yet South Africa, Canada, Malawi and Malaysia also have sizeable deposits. The world's largest copper reserves are found in Chile, Australia, Peru, Mexico, USA, Democratic Republic of Congo, Zambia and Canada.

The World Bank sees the growth of alternative energy technology, and the corresponding need for supplies of rare-earth metals, as an opportunity for resource-rich but developing countries to grow their economies.

Riccardo Puliti, Head of the Energy and Extractives Practice Group at the World Bank, said: "With better planning, resource-rich countries can take advantage of the increased demand to foster growth and development. Countries with capacity and infrastructure to supply the minerals and metals required for cleaner technologies have a unique opportunity to grow their economies if they develop their mining sectors in a sustainable way."

The wise leadership of the UAE has already embraced the fact that its future lies in a diversified, knowledge-based economy and not hydrocarbons. In his keynote address at the 2015 Government Summit in Dubai, His Highness Sheikh Mohammed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Deputy Supreme Commander of the UAE Armed Forces, said: "The question is, 50 years from now after we have loaded the last barrel of oil, are we going to feel sad? If our investment today is right, I think – dear brothers and sisters – we will celebrate that moment." ♡

**Above:** By 2035, Bloomberg projects a 43% penetration of electric vehicles in the light-duty vehicle market, which will be roughly equal to 110 million cars