Hong Kong's Green Innovations Impact its Energy Market

By Jan Deller & Julie Metta

Jan Deller and Julie Metta are PhD candiates at the School of Energy and Environment, The City University of Hong Kong. Metta may be reached at juliemetta@gmail.com

THE ENERGY MARKET AND ITS INFLUENCES ON THE ECONOMY AND CLIMATE CHANGE

Climate change is impacting local and worldwide nature, society, economics and politics. To mitigate climate change, one has to take a closer look at the energy market. Indeed, green house gas (GHG) is one of the main drivers of climate change and is mainly attributed to energy production. However, we cannot simply lower energy production to mitigate GHGs as energy plays a key role in the current development model of society and affects both the local and worldwide economy.

In Hong Kong, 70% of the local GHGs come from electricity generation. Moreover, in 2014, Hong Kong emitted 6.2 tons CO_2/capita, which is 22% more than that in 2005 and consumed 157 967TJ of electricity - 9% more than the level of 2005.[1,2] Building green infrastructure and retrofitting old ones are the keys to reducing electricity demand in Hong Kong, as they represent 90% of the electricity consumed.

To reduce the impact of energy production on the environment, and adapt to the increasing depletion of natural and especially fossil resources, a shift in energy production is inevitable. Green technologies are instrumental for climate change mitigation. Industries must develop new technology to generate energy from existing resources. The use of new technology to produce energy impacts the economy and environment at different scales. Indeed, those innovations use local existing resources to reduce the environmental impact not only globally – reducing transportation footprint - but also locally – such as waste to energy solutions, which enables the tackling of two issues at the same time by reducing the amount of waste while providing cleaner energy. Because local resources – such as sun or wind that are often free – are used, the maintenance cost is lower. Green technology also allows new employment opportunities for local residents while reducing their impact on air pollution, and thus creates higher social and health security.

These new energy innovations will lead– if they have not already - to new market scenarios. Europe and California have already seen negative power prices a few times while GHGs were lower than usual thanks to a high supply in renewable energy. However, such success stories depend on many factors. It is obvious that the strategies of the energy providers can influence the market environmentally positive or not. In Hong Kong, energy providers are represented by two companies: China Light Power (CLP) and Hong Kong Electricity. They are regulated under the Scheme of Control and Agreement (SCA) signed between them and the Hong Kong government which is monitoring the electricity market.[3] Other factors including political, geographic and climate affect the deployment of new technology in some areas, compelling some energy providers to invest abroad. CLP is an example for points mentioned above as the company is investing in renewable energy in China and Burma.

INNOVATIONS TO STABILIZE THE MARKET

The diversity of the energy mix will reduce the impact from price fluctuations of a single energy sources. It gives the provider more flexibility to find a replacement when one source experiences a crisis, assuring a more stable and secure energy market. That is the reason to study how energy is produced and how the mix can be diversified. This also applies for the grid. A multiple-scale energy grid is a better feedback loop between supplier and consumer thus a stable price. However, in Hong Kong the energy mix is composed of 48% coal, 27% gas and 23% nuclear, which relies mainly on fossil fuel imports.

One technology with high potential for Hong Kong is one that uses municipal solid waste (MSW) as a resource. In Hong Kong in 2015, 5.51 million of tons of solid waste were disposed in landfills, which is 1.6% more than in 2014.[4] Waste usually goes to landfills which are not sustainable. But MSW – which represents 67% of solid waste in Hong Kong - can be used as a resource to produce energy, either by being burned (T-Park) or transformed into biogas (Organic Waste Treatment Facilities). To deal with the emissions from wastes that are dumped into landfills, technologies such as Combined Heat and Power (CHP) plant can be considered. This solution is a good option for reducing greenhouse gas emissions (methane – which is a more potent greenhouse gas than carbon dioxide) from landfills of municipal waste and cutting the burning of fossil fuels to produce electricity. In Hong Kong since November 2016, Alice Ho Miu Ling Nethersole Hospital has been producing electricity using landfill gas. The plant could help save $2.7 million HKD and 2 000 tons of CO_2 (12% of the hospital's annual emissions) per year.[5]

CLP is awaiting approval from the SAR government for the installation of gas-fired 14 megawatts electricity generating units from a landfill in Tuen Mun. The first phase of the project includes five units, which can produce enough electricity to supply 17,000 four-person households for one year. A second

phase would add two more units to the site, which will cost more than 100 million HKD. The first phase is expected to start in the third quarter of 2018.[6]

Wasted oil can also be converted into low-carbon transport fuel for vehicles such as truck or airplanes– as it has been used at the Hong Kong International Airport (HKIA). With 14 grams of CO_2 equivalent per MJ, such biofuels are lower in terms of carbon emissions than most of the transport fuel currently available on the market. In Hong Kong, ASB Biodiesel, can produce up to 100,000 tons of bio fuel per year by collecting cooking oil from 4000 companies. This is enough to supply all Hong Kong' B10 diesel engines or to offset 257,000 tons of greenhouse gas emissions yearly.[7]

All these technologies diversify the energy mix, expand the portfolio of renewable energy projects and contribute to a more secure energy market. Moreover, such innovations using waste as energy fuel provide a significant improvement in fuel efficiency and so lower the environmental impact of both waste management and energy production. Since waste is used instead of imported raw materials, it may enhance local social and economic development by increasing onsite sustainable jobs. These green technologies usually lead to a structural shift of the economy from the linear model to the circular economy model. In fact, Hong Kong recycles 2 million tons of MSW per year (while 3 400 million tons are disposed in landfills) and 2% (45 600 tons) are recovered locally. It plans to recycle 35% of MSW by 2020.[8]

NEW ACTORS CREATING WAVES IN THE MARKET

So far, Hong Kong has developed very few policy and economic incentives to promote and support such green technologies. Nevertheless, increasingly, new actors from civil society are impacting the supply side of the power market. The former top-down system is now supplemented by inputs from the bottom. As an example, the World Wildlife Fund (WWF) is distributing photovoltaic panels in Tai O, a village in Hong Kong.[9] To prevent the grid from burning out, the supplier, in this case CLP, has to control this new input and thus adapt his tariff system by implementing a feed-in tariff.

These emerging players also create a market for companies to offset their energy production as part of a Company Social Responsibility (CSR) Strategy. NGOs work as middlemen to finance R&D and deployment of renewable energy. In Hong Kong, companies can buy a renewable energy certificate from the WWF as a means to support local renewable energy development. Meanwhile such a certificate allows a quantification and verification of the amount of consumed electricity that is generated from local renewable energy sources. This certificate was so successful that it was even adopted by the Hong Kong government, proving the importance of the civil society in the future market.

Moreover, some businesses are adopting new green technologies in order to reduce their energy consumption or their emissions. The Holiday Inn Express Hotel in Sheung Wan, owned by Yau Lee Holdings Limited, is a good example of such an economic feasibility and viability. Indeed, the building of the hotel that was constructed in 2012, uses 58.5% less energy than the EMSD Hong Kong hotel energy benchmark, saving about $3,400,000 HKD each year and providing a payback period of less than four years.[10] Another interesting example is that researchers from The Polytechnic University of Hong Kong have shown that integrating a solid oxide fuel cell cogeneration/trigeneration system to produce electricity and cooling system could guarantee a 6 years payback period.[11]

Through these initiatives, new actors not only demonstrate the potential of green technology in Hong Kong, but also create a bottom-up policy that tends to increase green technology development and thus affect the energy market. Thanks to such real-life insights, the civil society promotes green innovations and, energy policy and economy dialogue with the government and stakeholders to discuss the incentives for green technology.

Sources:

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