Can AI transform the way we use energy?

These are the highlights of Dr Mark Nasila's talk at the SingularityU South Africa 2020 Summit.

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In 1973, the world experienced its worst energy crisis ever when the Middle East world imposed an embargo on shipping oil to America and the Netherlands. The effects were devastating as the price of oil escalated from $3 to almost $12 per barrel, and ultimately over 35 per barrel.

This took a great toll on the American motor industry as cars are built around consumption of oil, which had previously been easily available. It also affected their exports and imports. Americans import many Japanese cars which are fuel efficient.

Countries like Britain appealed to their citizens to only heat one room at a time to conserve energy. American president Nixon started daylight saving as a means to achieve this goal.

In South Africa, load shedding started in 2007 when almost 176 GW hours were lost. In 2019, we lost 530 hours, totalling almost 1500 GW hours. Small businesses have suffered greatly due to this. Over 50% of small businesses have reported an estimated 20% business loss due to load shedding. Hospitals are being impacted tremendously, for example with operations

being rescheduled or patients not being able to access to services. When power is restored, the surge results in further losses, which destroys appliances and facilities.

South Africa is reliant on its manufacturing industry. This industry reported a loss of up to 9% in turnover due to load shedding. Also bear in mind that the productivity loss has led to job losses.

Every day South Africa has had load shedding, R1bn has been lost. This totals over R338bn almost in the past 10 years due to load shedding. Last year, the World Bank cut our economic growth by 1% due to load shedding.

The CSIR has forecasted that our energy availability factor is likely to be just over 60% in the years ahead. The future of our economy is driven by energy. We must reimagine the future of energy so that we can improve our future.

Traditionally, energy is generated by power plants, with transformers, transmission lines etc. Policies must be put in place to ensure green energy to ensure sustainability. This requires a rethink of these processes so that our energy can be provided in a more sustainable way

The future of energy

The question is 'How can Artificial Intelligence (AI) help this?', 'Is the energy green?' As the world gets more digitised, we can leverage AI capabilities. 3D silicon generated cables can ensure that renewables feed their energy back into the grid.

Internet of Things (IOT) capabilities are helping the energy grid with generating digital data through sensors and connectivity e.g. smart sensors measuring energy use in residential hubs or electric cars charging their batteries.

Energy storage has been a challenge in the past. Using intelligent energy systems, supported by smart AI, we can now store energy at a cheaper rate. Energy generation from renewables e.g. solar/wind energy is intermittent and must be integrated into the grid easily and cheaply. The processes must also be encouraging to other service providers.

AI and Machine Learning models are helping service providers with planning e.g. forecasting and supply. This is not just on a national level. It can even be done on a household level. In Europe, we have even seen forecasting been done on a device level, thanks to the data collected on IOT sensors.

At Dexma, in Europe, chatbots are used to manage energy. Sensors send information back to engineers and service providers to communicate any anomalies early enough to address any inconsistencies being seen. Energy providers also engage with these chatbots to understand customer needs.

Maintaining and servicing power plants is an intense process and not always done as frequently as it should be. AI can help predict faults and breakages which are likely to disrupt the energy supply in the future.

Using drone technology, organisations can collect data at power plants on an ongoing basis. Last year I met the CTO of Drone Deploy, a Silicon Valley company using drones to collect images of what is happening in power plants and using these to create 3D models. This enables engineers to understand what is wrong with the power plant and prevent faults.

Energy leakage and cable theft is rife in SA. Through anomaly detection, with data collected in IOT devices, we can start identifying which streets and areas are being affected due to theft and avoid losses due to theft in equipment.

Energy markets must also be addressed. These are affected by things like weather. There is tremendous benefit to be gained by an energy market. Using financial contracts with derivatives we can enable multiple players to hedge risks caused by energy and other factors.

The whole world is investing in AI and wants to be data driven. At the same time, the whole world is worried about privacy and data protection. The data we generate through IOT represents our lives, but this IOT is driven by energy. Therefore, it

is essential that we secure our energy to protect our information and improve our confidence in leveraging technology.

The future of energy is in our hands and rests in the decisions we make regarding these technologies. If we don't make the right decisions, we will reflect on moments like these with regret.