

DELMEC

Alternative Power Solutions

WHITE PAPER

NATALIA KONONOVA – SEPTEMBER 2022

Delmec energy consultant Natalia Kononova shares her thoughts on alternative power solutions in this latest in a series of white papers on challenges and opportunities in the telecommunications industry.

Introduction

Delmec is an international company that provides a variety of engineering services for telecom companies worldwide. With extensive knowledge and many years of experience in the telecom industry, we are inspired by opportunities to innovate, always keeping an eye on new emerging trends. Our clients trust us to look for new ways to improve their operations, while always maintaining compliance with government regulations and policies. Our vision is to be at the forefront of innovation in the telecom world, providing cutting edge solutions and unparalleled skills to our clients, customers, and communities.

Background

The COVID-19 pandemic reminded people around the world how very reliant we are on a strong, stable broadband connectivity. Safety recommendations and restrictions meant that most offices, schools, retail companies, and hospitals moved to online interaction with clients and colleagues. This led to a public recognition of the unique and essential role telco companies have in business and daily life.

However, these telcos found themselves struggling to maintain network operations KPIs at satisfactory levels, while dealing with unexpected demand for high-speed broadband. Mobile telco companies needed to expand their capacity overnight and required a huge increase in power to run their networks. These ongoing challenges have focused attention on the need for more innovation and expansion in the energy domain. Last but not least, global warming remains a major issue, leading to the industry as a whole exploring alternative solutions to reduce the impact of CO2 and lower operational expenses.

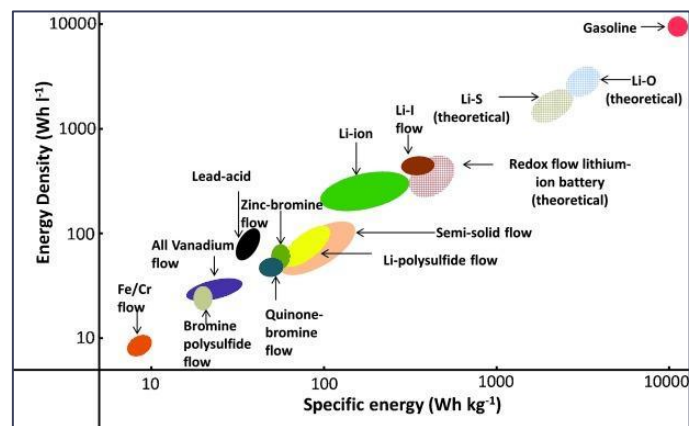
Delmec is a client-oriented company that listens to the needs of their partners and makes every effort to accommodate them. Having worked side by side with many clients across different markets, it's clear that almost all share a common struggle with backup power and power generation. In some African and Asian countries, the power grid is still unstable, leading to extended reliance on backup systems. Equally, in many European countries, the rising costs of KWh (up to 27% in the last two years), and the introduction of consumption-heavy 5G technologies also force us to evaluate new ways to ensure enhanced cost efficiency and sustainability for our clients.

In addition, as compliance with ESG objectives becomes more important, telecom operators are looking for alternative power solutions in renewable energy to gain independence and support their brand values in the long term.

Delmec's vision

In our opinion, in near future legacy power solutions will become redundant. These could include:

- VRLA batteries, due to their low power density and environmental pollution (Lead (Pb)).



- Diesel generators, converting 24-hour running generators into CDC hybrid power systems.
- Solar shaving, asymmetric grid day/night pricing (for example, that which is used in the Indian, Mexican, and Australian markets).

With combination energy sources and storage, telecom companies can reduce electricity bills and carbon emissions. This allows them to benefit from a reduction in carbon taxes and cost of credit — leading to profit increases and perhaps even additional brand value and recognition.

Possible alternative power solutions that can be used as a combination of the energy source / energy storage solutions include:

✓ Renewable energy: solar power and wind power

Telecom operators are showing a growing interest in hybrid renewable energy solutions as potentially the most gainful, efficient and scalable option for remote telecom sites. Harvesting clean solar and wind power energy is becoming the telecom operator preferred choice for environmentally friendly energy supply.

This is especially true in European countries where governments are focusing on carbon reduction initiatives and supporting their implementation by offering grants and tax relief.

✓ Hybrid diesel generator system (CDC)

On the telecom sites where a 24/7 diesel generator is the only source of energy, installation of high-capacity Li-ion batteries allow a reduction in generator running hours, hence fuel consumption, and consequently operational and maintenance costs. As a general rule of thumb, the implementation of a CDC solution to replace continuously running generators could enable savings exceeding 20%.

✓ Li-ion batteries / super capacitor batteries

As a result of technical advances and price reductions in the last few years, Li-ion batteries are now becoming widely deployed on telecom sites around the world.

Any initial reluctance on the part of MNOs (due to the perceived risk of fire) has faded, as integrated battery management systems (BMS) in every block guarantee that charge and discharge current is always within the admissible values, to avoid thermal runaway.

There are many different types of lithium batteries, and each of them has unique pros and cons that make them suitable for specific applications.

In the telecom industry, LiFePo₄ has become the standard solution and the vast majority of 48V block manufacturers trust this technology for their product line.

Telecom operators are substituting EOL VLRA batteries with Li-ion batteries due to their better performance in terms of cycles and DOD. Additional benefits include low maintenance, longer service life and reduced derating to high temperatures. As a further bonus, Li-ion batteries are less prone to theft, which is a growing issue for telecom operators in some markets, leading to replacement CAPEX costs, and a potential adverse impact on quality of service for end users.

The only real drawback for lithium batteries is a logistic one. Transportation of such batteries is strictly regulated, as they are listed as hazardous material.

✓ Supercapacitors

Supercapacitors are not new; they were adopted by some industries in the late 1970s, but due to their specific properties they weren't attractive to the telecoms sector for power backup.

This changed with the development of the EDLC (electrochemical double layer technology) and the use of graphene.

Supercapacitor batteries can store up to 10 times more energy than Li-ion ones, but their high manufacturing price and relatively unknown performance in the long term is still preventing them from being deployed in large-scale telecom projects. On the plus side, supercapacitors are promised to have much longer lifespan than conventional VRLA and Li-ion batteries (up to 1,000,000 cycles). However, limitations come from their discharge curves: such batteries are able to release extremely high currents without any damage, but they are not designed to provide a steady current over a long period of time unless they are coupled with another type of backup energy system.

This makes them the solution of choice for power systems that need to be supplied with high currents for a short time (circa 10 minutes). Examples might include protecting equipment from specific grid fluctuations or providing UPS for data centres.

✓ Green fuel cells energy

Contrary to common belief, fuel cells are not a power backup system such as VRLA batteries — they are an electric power generating system. They convert the chemical energy of the fuel (hydrogen/methanol/ammonia) into electric energy using the principle of electrochemical generation, making them comparable to a diesel generator. Advantages of fuel cell technologies lie in lower operational cost compared to batteries and an attractive CAPEX and OPEX compared to diesel generators. The latter benefit is due to the system's long life (over 15 years) and reduced maintenance overheads. Unfortunately, this technology still has limitations, mainly caused by the difficulty in storing and transporting fuel such as hydrogen, methanol, and ammonia.

Countries around the world are setting high bars for the reduction of carbon emissions and fuel cells are beginning to represent an attractive alternative to reach zero emissions for telecom operators. However, at this stage fuel cells aren't yet in use in large scale projects that could provide an ideal model for implementation.

Conclusion

At this stage, Delmec is focusing on providing customised solutions based on specific market scenarios and cost drivers. As part of our extensive services, we offer power solution analysis. This of course takes into consideration site power consumptions, future expansions, and the availability of grid power, as well as operational cost reduction.

Our goal is to provide our clients with valuable insight and qualified recommendations for energy cost reduction and consumption. To this end, we are currently adopting AI (artificial intelligence) and IoT (Internet of things) to identify the most efficient structural and architectural changes, and the cheapest and/or most sustainable energy sources available.

This is all part of Delmec's determination to make energy consumption a central priority for our research, development, and innovation teams: for our clients' portfolios, our communities' connectivity, and our planet's future.