# PREDIKTOR DRIVES THE STANDARDIZATION OF OPC UA IN SOLAR ENERGY PRODUCTION

Norwegian companies Prediktor and Scatec succeed with OPC UA in over 40 renewable energy assets.

**OPC UA**

Prediktor has brought OPC solutions to their clients since 1997. It was the first Norwegian member of the OPC Foundation. With the advent of OPC UA and its semantic capabilities in 2006, Prediktor made the field of solar energy assets one of their business foci.

# PREDIKTOR DRIVES THE STANDARDIZATION OF OPC UA IN SOLAR ENERGY PRODUCTION

**Scatec**   **prediktor**   **OPC FOUNDATION**

The Norwegian systems integrator Prediktor is a leading provider of asset management and real-time data management solutions to renewable- and energy asset owners. It is also a global technology leader in OPC and OPC UA. Mapping work- and production-flows with a view to automating management and control has been Prediktor's focus from the company's foundation in 1995. Since then, Prediktor has provided solutions for clients in a number of industries. Starting out with clients in the maritime industires – fishery, oil & gas – Prediktor now focuses on renewable energy asset owners. Prediktor has been a member of the OPC Foundation since 1997. Espen Krogh, CEO at Prediktor, is a long-standing OPC workshop instructor for Norwegian business associations and at the OPC Foundation.

# SCATEC

*"In a solar plant, you have more than 100.000 data points every second. If you don't have a system that helps you find out what you need to look into and assists in data-driven decision making, then there's not even a point in collecting that much data."*

**THOMAS PETTERSEN,**
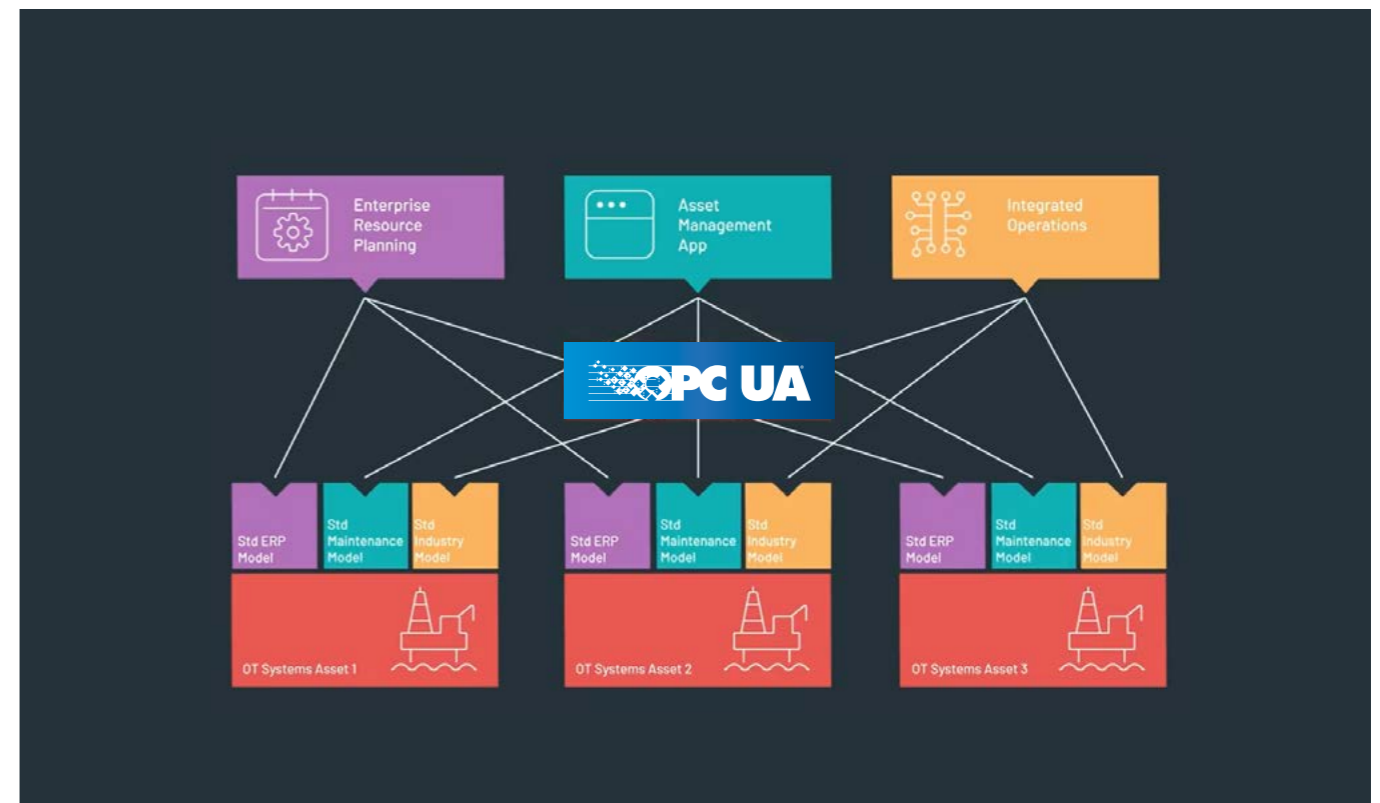Vice President Operations
Management at Prediktor

**POWERVIEW™ FOR ASSET MANAGEMENT**
At the plant level, PowerView™ captures the sensor data produced by all assets, e.g. by solar panels. Using OPC UA, it semantically standardizes and combines it into a single 'plant' structure. The combination of all 'plants' (assets) allows for a 'group view' of global operations and performances at a glance. The entrepreneur, then, can see a single set of standardized contextualized representations of data structures right across the entire fleet of assets. "If you don't have this type of system in place", says Thomas Pettersen, VP Operations Management at Prediktor, "the problem is that more and more data is not necessarily good for you because you're being overloaded with data points. You can have hundreds of alarms flashing, for instance, and not know how to respond to that. You need a system that can dig into these data streams and actually find out what the root causes are, and which then tells you in high-level suggestions what you should do." PowerView™ came into existence as a project commissioned by the Norwegian solar energy company Scatec.

**NORWEGIAN COMPANY SCATEC**
Scatec is a leading renewable energy solutions provider with more than 15 years of experience in developing, constructing, owning and operating large scale photovoltaic systems. Headquartered in Oslo, the company has 664 employees all over the world. Currently, Scatec's assets generate almost 3,5 GW in a combination of solar, hydro and wind energy plants; by 2025, Scatec aims to provide 15 GW in operation or construction.

# SCADA AND
# **MAP GATEWAY**

**IT GATEWAY FOR INTEROPERABILITY**
The mainstay of Prediktor's service is enabling customers to work with incompatible data sources generated by a range of different operational technology (OT) within an established context. For this purpose, Prediktor has created an IT gateway system. The MAP Gateway system is standardized with OPC UA. It aggregates all asset data, standardizes it and interprets it semantically using AI algorithms. Semantic data is data that is contextualized and expresses what it means in human rather than machine language. The asset owner who uses MAP Gateway can manage a large number of assets in a convenient, flexible and agile manner whilst greatly reducing operational costs.

**SCADA PROVIDES INTERFACES TO OPERATE PLANTS**
Prediktor is providing two kinds of services to renewable energy plant owners in particular. Firstly, Prediktor supplies a Supervisory Control and Data Acquisition system (SCADA). This is a solution that is installed locally at the site and provides the operators with the interfaces to operate the plant. It creates the interoperability of diverse equipments. Depending on the size of the asset, it takes between three to six months to understand what the different signals are on an existing plant, to map them using MAP Gateway and to install this system. The Centralized Asset Management system Power-View™ is then in operation.

Diverse pieces of equipment are assembled in Scatec's solar fields. OPC UA creates compatibility between them.

# OPERATING SOLAR FIELDS USING **OPC UA**

**VENDOR LOCK-IN AVOIDED WITH OPC UA**

Since OPC UA is an open interoperability standard that is platform independent and does not use proprietary formats, users need not worry about vendor lock-in. OPC UA Information Models enable the concept of 'unification'. This allows taking a single information element, for example current real-time value, and applying other information elements like alarm conditions and historical trends to that single item, using the same reference, even if they have different sources. They make up the context of an object. In this way, asset owners have a clearly defined interface to all their technical assets independent of whether the asset is delivered by vendor A or B. Scatec asset owners can switch to other operating systems or change individual protocols at certain data points. The OPC UA-based plug-and-play solution provided by PowerView™ still functions independent of those changes.

**ASSET MANAGEMENT WITH POWERVIEW™ AND OPC UA**

In order to keep costs low in the construction phase of a solar field, Scatec cooperates with local suppliers. As a result, there are many different equipment types in place at any one plant which were never meant to be operated in one system. All of these generate data: the solar panels, the rack system which holds the panels and the trackers which change their exposition to the sun; and associated inverters, batteries, charge controllers and cabling. Added to this is data generated by the substation, by a security system and by grounds maintenance protocols. The digital surface created by these individual assets is messy. Using the MAP Gateway turns this messy scenario into a plug-and-play setting whose information flows can be interpreted conveniently. This is absolutely necessary, says Thomas Pettersen, VP Operations Management at Prediktor: "In a solar plant, you have more than 100.000 data points every second. If you don't have a system that helps you find out what you need to look into and assists in data-driven decision making, then there's not even a point in collecting that much data."

# BENEFITS WITH
# **OPC UA**

**KEEPING HR COSTS LOW WITH OPC UA**

PowerView™ aggregates all asset data, standardizes it and interprets it semantically using AI algorithms. The result is a real-time picture of what is going on. This saves time and manpower. Instead of a worker physically striding across a vast solar field in order to assess a failure message, PowerView™ quickly and easily draws on reliable historical data and suggests real-time decisions which may not require the immediate use of manpower.

**OPC UA AND PREDICTIVE MAINTENANCE**

Traditionally, maintenance agreements for solar plants contain stipulations as to how often panels need to be cleaned, for instance once a month, in order to prevent losses due to soiling and other issues. Soiling means that layers of sand or other dirt have been deposited on on the PV cells and affect the panels' performance. It needs to be dealt with quickly. However, cleaning 500,000 or a million panels involves a high cost. A data-driven mechanism like PowerView™ could, if soiling is reported, suggest to the operators not to clean the panels right now because the forecast predicts rain which will most likely solve the problem. This reduces maintenance costs and frees up ressources. As a result, workers can devote themselves to other tasks which increases overall productivity. Aggregating asset-immanent and contextual data such as weather forecasts, Power-View™ generates such high-level suggestions.

# LARGE SCALE
## PHOTOVOLTAIC
## PLANTSLAR ENERGY

Kalkbult, South Africa: grid connected in 2013, 141 GWh per annum.

Benban, Egypt: Grid connected in 2019, 930 GWh per annum.

Quantum Solar Park, Malaysia: 3 solar plants, grid connected in 2019, 284 GWh per annum.

Boguslav, Ukraine: Grid connected in 2020, 61 GWh per annum.

# SCATEC
## IMPROVES THE FUTURE
## WITH SOLAR ENERGY

**SOLAR ENERGY IN EMERGING MARKETS**
Scatec owns, operates or constructs 40 assets all over the world predominantly in emerging markets. The majority of the company's assets are solar energy plants. The beauty of solar is that the resource is already there, you just have to capture it, says Terje Melaa, Senior Vice President Engineering and Technology of Scatec. Aggregating data about all the equipment involved and analyzing it for asset control and maintenance purposes is more complicated, however.

**SCATEC PROVIDES SOLAR POWER IN AFRICA**
Scatec is the largest provider of solar power in South Africa. The first solar project in the African continent was the Kalkbult solar plant in South Africa. Under the Renewable Energy Independent Power Producer Program which was launched by the South African Government in 2011, Scatec set out to build it in 2011. It was connected to the grid in 2013. Kalkbult has a nominal capacity of 75 MW. Two solar plants followed in 2014, Linde with 40 MW and Dreunberg with 75 MW. The Upington solar plants which were connected to the grid in 2020 produce 650 GWh per year and provide energy for 120.000 households.
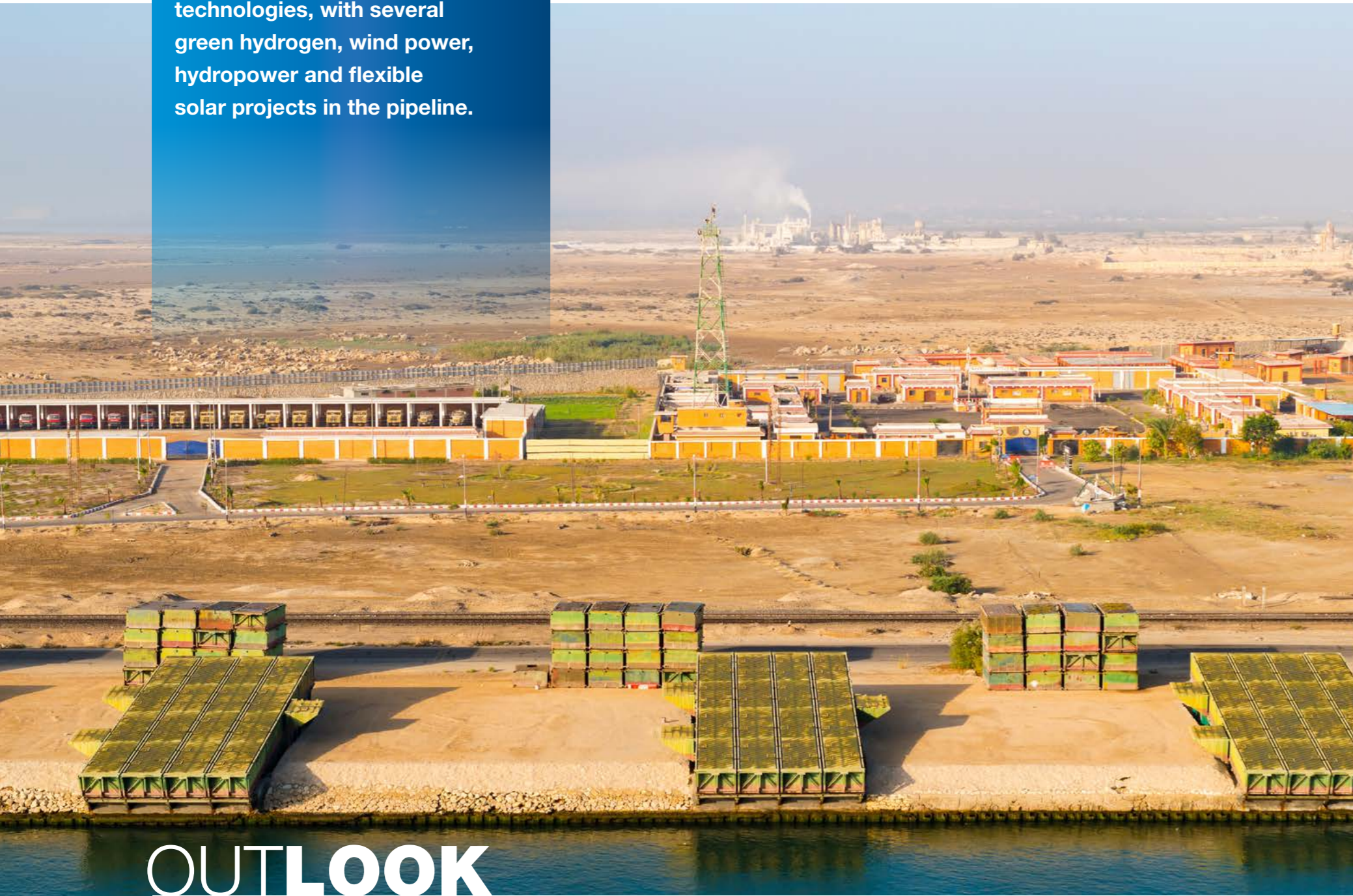
Benban Solar Park in Egypt is by far the largest solar asset in Scatec's portfolio. Situated near the Aswan Dam, it is the world's fifth-largest solar power park (in 2022) and produces approximately 930GWh of power per year. This equals the energy consumption of 420.000 households. The park covers an area of 37 km² and is visible from space. Benban uses bifacial solar modules, which produce energy from both sides of the solar panel (both the energy from direct sunlight and sunlight reflected off the ground), increasing the amount of energy produced.

**SOLAR FIELDS IN DESERT REGIONS**
Setting up solar plants in the desert actually poses some challenges. The extremely high temperatures can damage the inverters, for example. Problems with soiling, shadowing and keeping an overview of general maintenance put great demands on the need for surveillance, data collection, and reporting. As in 2011, when Scatec began building at the Kalkbult site, neither SCADA nor intelligent asset management systems existed, they turned to Prediktor for help. Through this collaboration, PowerView™ came into existence. Using OPC UA, PowerView™ provides a standardized, unified, reliable and secure means of accessing operational data and using it for operational decision support.

> Scatec has become a global player in renewable energy solutions across different technologies, with several green hydrogen, wind power, hydropower and flexible solar projects in the pipeline.

Scatec is the largest solar player in the Sub-Saharan African region.

# OUT**LOOK**

Release offers unique flexible solutions for small scale utility projects and the mining industry.

### GREEN AMMONIA FACILITY IN EGYPT

In March 2022, Scatec has reached an understanding with the Egyptian government and Egyptian organizations to jointly develop a green ammonia facility with a production capacity of one million tonnes annually and with a potential for an expansion to three million tonnes. The green hydrogen and ammonia facility will be located in the Ain Sokhna Industrial Zone near the Suez Canal and will be powered by renewable energy plants to be built in close proximity. In this type of project, renewable energy is used as the energy source for other types of productions, for instance for ammonia production which is then used as the basis for fertilizer production.

### SOLAR FIELD IN LESOTHO

In December 2021, Scatec entered an agreement with the Lesotho Electricity Company and the Government of Lesotho to build the first solar project in Lesotho of 20 MW. In this cooperation, Scatec is an independent power producer. Scatec will build, operate and majority-own the facility under a 25-year power purchase agreement.

### RELEASE BY SCATEC IN CAMEROON AND CHAD

Release by Scatec is a pre-assembled, modular and redeployable solar power and storage system, allowing for fast and easy power generation. The electricity company ENEO in Cameroon will lease two hybrid solar and storage plants totalling 36 MW solar and 20 MW/19 MWh storage. The plants will supply low cost, clean and reliable electricity from mid-2022. In Chad, Release by Scatec is installing 7.7 MWp of solar plant capacity across the country, which will support clean energy access to 300,000 people across 5 provincial cities. The plants will be operational in the course of 2022.