Aema

STRONGEST IN FINLAND GOLD
AEMA Oy
FI24261635 | 2024

Aema OY offers:

Green Transition processing:

- Connecting the latest innovations within the renewable energy inventions to the real sector of economy with maximum efficiency
- control of the assets energy consumption (EMS)
- complementary profits from NordPool (FCR, aFRR, mFRR)

- Tier-1 hardware partnering provides long live stable energy solutions
- Virtual Power Plants (VPP) & Smart Grid systems
- Physical and financial PPAs implementation
- Guarantees of Origin (GO) as pure proof of green generation

European Parliament Initiative

Key Points from the Proposed Law (as of 2024):

The updated Energy Performance of Buildings Directive (EPBD) includes mandatory solar rooftop installations on certain types of buildings, progressively:

- By 2026: All new public and commercial buildings must install solar panels (where technically and economically feasible).
- By 2027: All existing public and commercial buildings undergoing major renovation.
- By 2029: All new residential buildings must include rooftop solar (again, where technically and economically feasible).

PHONE:
+358-44-237-6666

WEBSITE:
www.aema.fi

Good to know - Main Problems Caused by the Grid

Power Outages

A direct interruption in electricity supply can lead to operational downtime. Stores cannot transact sales, and security systems might be compromised. This not only affects the day's revenue but can also damage customer trust and loyalty.

Data Loss

For stores heavily reliant on digital systems for inventory, sales tracking, and customer data, power outages or fluctuations can result in data loss. Even with backups and cloud storage, the immediate impact can disrupt operations and require time-consuming data recovery efforts.

Equipment Damage

Sudden power surges or fluctuations can damage sensitive electronic equipment used in the stores, from cash registers to computer systems. Replacing or repairing these can be costly and disrupt service.

Increased Operating Costs

To mitigate the risks of grid instability, stores may need to invest in backup power solutions like generators or UPS (Uninterruptible Power Supply) systems. This increases the operating costs, affecting profitability.

Impact on Digital Infrastructure

For a business that relies on online sales and digital marketing, power issues can affect servers, potentially taking the online store offline and affecting sales and customer engagement.

Supply Chain Disruptions

Power problems can extend beyond the store to affect the wider supply chain. Distribution centres or logistical operations impacted by power issues can delay product restocking, affecting inventory levels and sales.

Green Transition

Grouping Energy Consumers:

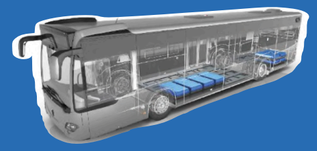
- Operations: Administrative buildings, lighting, security & control systems
- Logistics Hubs: Warehouses, cranes, material handling equipment
- EV Charging: EV charging stations for zero- emission

Retrofitting Equipment to EV Engines:

- Retrofit cranes
- forklifts
- Company heavy machinery

Energy Storage and Smart Grid Integration:

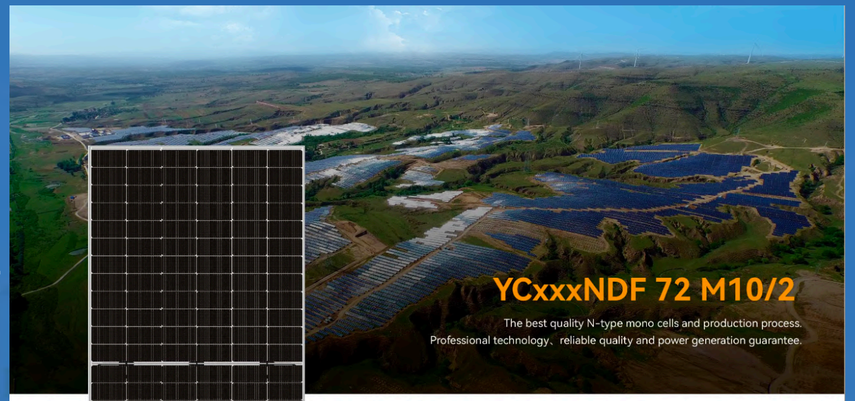
- Implement Solar and ESS capacity
- Implement a full smart grid with real-time analytics, predictive maintenance, and load forecasting under Provider’s control



Hardware: Solar Panels 560 W

- **Yingli Solar** is the world's leading manufacturer of smart solar energy solutions.
- energy solutions in the field of solar energy.
- One of the first companies in China to enter the solar industry.
- An integrated solution provider covering R&D, smart manufacturing and power plant construction business.
- In 2023, the volume of solar panel tenders and shipments ranked among the top 10 in the global industry.
- The production facilities are located in Baoding, Tianjin, Hengshui and other locations.
- With advanced technology, the company is constantly developing in the solar energy industry.

- The solar panels are guaranteed for 30 years, which means uninterrupted service life for 30 years
- The degradation of the generated power is only 10% in 30 years
- Aema OY as an EPC contractor and an authorised representative of Yingli Solar provides the customer a guarantee of free replacement of any solar module during the first 5 years of service



22.5%
Module Efficiency

15YEAR
Product Warranty

0~+5W
Power tolerance

QUALIFICATIONS & CERTIFICATES
IEC 61215, IEC 61730, IEC 62941: 2019, CE,
ISO 9001:2015, ISO 14001:2015,
ISO 45001:2018

Higher Durability
The multi-busbar design can decrease the risk of the cell micro-cracks and fingers broken.

High Power Density
High conversion efficiency and more power output per square meter, by lower series resistance and improved light harvesting.

Half-cell Design
Less energy loss cased by shading due to new cell string layout and split J-box, and lower cell connection power loss due to half-cell design.

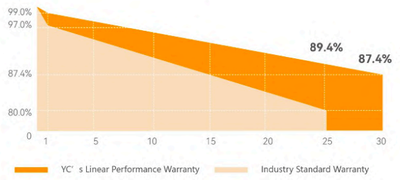
Bifacial Power
Bifacial panel,High generation revenue

Large size cell
The large cell design effectively increases module peak power and effectively reduces BOS costs, thereby reducing system costs.

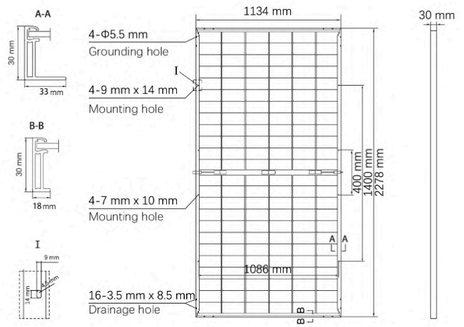
Linear Warranty

First year attenuation≦1%, 2-30 year anual attenuation≦0.4%

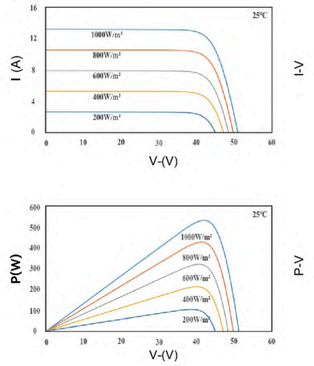
Linear Performance Warranty of YC Solar



unit:mm



Characteristic curve



ELECTRICAL PERFORMANCE

Electrical parameters at Standard Test Conditions (STC)

Module type			YC xxx NDF 72 M10/2 (xxx=Pmax)				
Power output	P_{max}	W	560	565	570	575	580
Power output tolerances	ΔP_{max}	W	0/+5				
Module efficiency	η_m	%	21.7	21.9	22.1	22.3	22.5
Voltage at Pmax	V_{mpp}	V	41.96	42.15	42.34	42.53	42.72
Current at Pmax	I_{mpp}	A	13.35	13.41	13.47	13.53	13.59
Open-circuit voltage	V_{oc}	V	50.67	50.87	51.07	51.27	51.47
Short-circuit current	I_{sc}	A	14.13	14.19	14.25	14.31	14.37

STC: 1000W/m2 irradiance, 25°C module temperature, AM1.5g spectrum according to EN 60904-3.
Average relative efficiency reduction of 3.3% at 200W/m2 according to EN 60904-1.
Max test power tolerance ± 3%

Electrical parameters at Nominal Operating Cell Temperature (NOCT)

Power output	P_{max}	W	418.1	421.9	425.7	429.5	433.3
Voltage at Pmax	V_{mpp}	V	39.60	39.80	40.00	40.16	40.34
Current at Pmax	I_{mpp}	A	10.55	10.60	10.65	10.70	10.74
Open-circuit voltage	V_{oc}	V	47.80	48.00	48.20	48.40	48.60
Short-circuit current	I_{sc}	A	11.39	11.44	11.49	11.54	11.59

NOCT: open-circuit module operation temperature at 800W/m2 irradiance, 20°C ambient temperature, 1m/s wind speed.

OTHER INFORMATIONS

Cell Orientation	144 (24×6)
J-Box	IP68, three diodes
Cable	4mm², positive 300mm/negative 300mm,length can be customized
Glass	Dual Glass,2.0mm coated tempered glass
Frame	Anodized aluminum alloy
Weight	31.9kg
Dimensions	2278×1134×30mm
Packaging	36 modules per pallet/20 pallets per 40HQ

THERMAL CHARACTERISTICS

Temperature coefficient of Pmax	γ	%/℃	-0.300
Temperature coefficient of Voc	β_{Voc}	%/℃	-0.250
Temperature coefficient of Isc	α_{Isc}	%/℃	+0.045

OPERATING CONDITIONS

Operating temperature range	-40℃ to 85℃
Power tolerance	0 ~ +5W
Voc & Isc tolerance	±3%
Max. system voltage	1500V_{DC}
Max. series fuse rating	30A
Nominal operating cell temperature	45±2℃
Protection Class	Class II
Bifacial Rate	80±5%

DO NOT connect Fuse in Combiner Box with two or more strings in parallel connection

MECHANICAL LOADING

Max. static load, front (e.g., snow)	5400Pa
Max. static load, back (e.g., wind)	2400Pa
Max. hailstone impact (diameter / velocity)	25mm/23m/s

Warning: Read the Installation and User Manual in its entirety before handling, installing and operating YC Solar modules.

Yingchen New Energy Technology Co., LTD.
Address: No. 88, Hengyuan West Road,
National High-tech Zone, Baoding City, China
Tel: 400-666-7111

Hardware - ZOE Energy Storage - ESS Partner

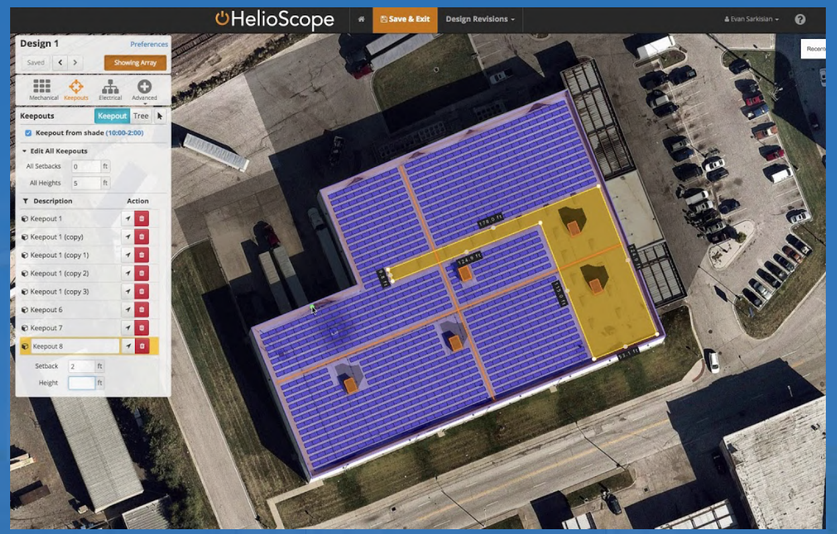
Certification & Standards

- UN38.3
- IEC62619, IEC62477, IEC63056
- IEC61000
- NRS 097-21-1:2017
- EN 50549-1, C10/C11:2019, G99 typeA, CSN 50549-1, PPDS 2022, CEI 0-16, CEI 0-21
- Grid connection for Netherlands, Belguim, Greece, UK, Poland, Czeck Republik, Italy and Sweden etc.

Aema OY acts as a leader of the Consortium established with ZOE Energy Storage

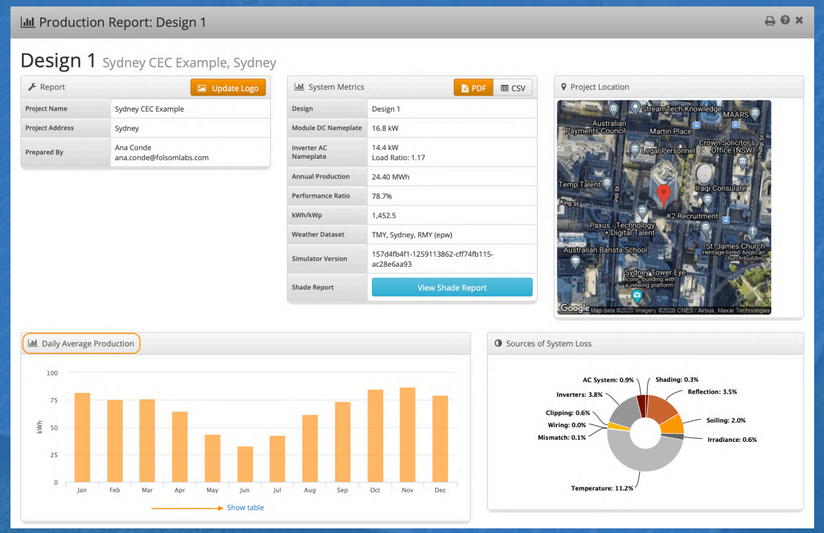
Software Simulation HelioScope/Aurora

HelioScope is a powerful cloud-based software designed for photovoltaic (PV) system design, analysis, and optimisation. It simplifies the solar design process by integrating energy modelling, system layout, and performance simulations into one intuitive platform.



Key features include:

1. System Layout Tools: creating precise PV system layouts, including module placement and electrical configurations, on real-world site imagery.
2. Performance Modelling: utilises advanced algorithms to simulate energy production while accounting for shading, weather, and equipment specifications.
3. Compatibility: Supports integration with various industry-standard tools and databases, ensuring accuracy in equipment specifications and project estimates.
4. HelioScope is ideal for solar professionals seeking to streamline project workflows, enhance accuracy, and improve communication with clients through detailed reports and visuals.

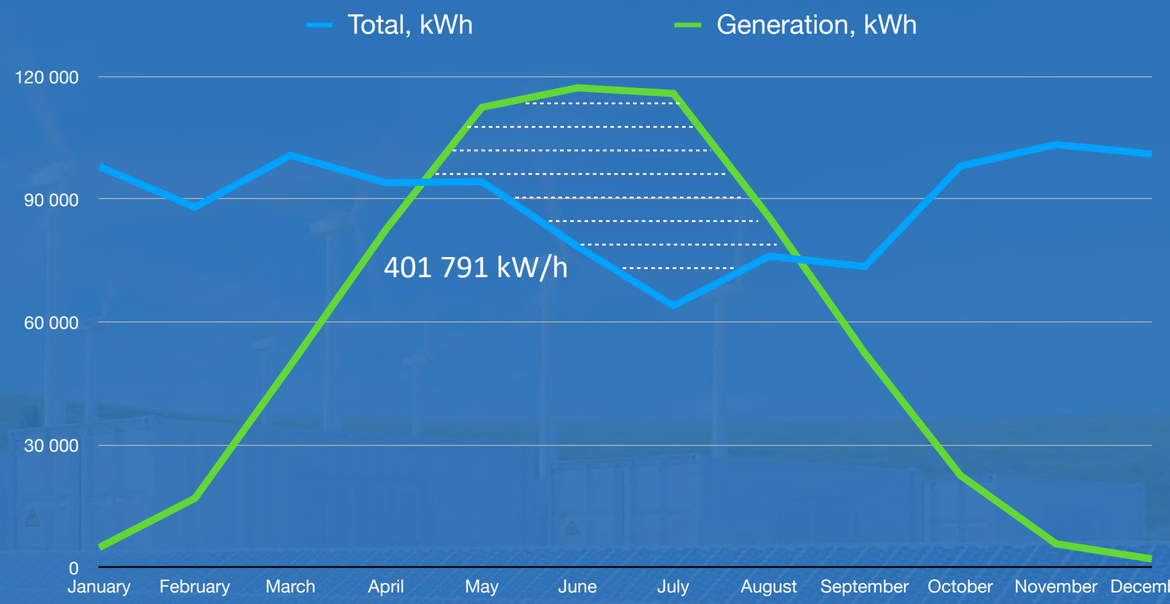


Aema OY is certified user of HelioScope

Example of the Calculation (real project case)

Average consumption

Month (average)	Day, kWh	Day, €	Night, kWh	Night, €	Total, kWh	Generation, kWh
January	68 987		28 986		97 973	4862,4
February	60 777		27 238		88 015	16871,7
March	71 258		29 479		100 736	49422
April	64 732		29 268		94 001	82676,1
May	67 313		26 959		94 272	112434,2
June	55 659		22 759		78 418	117189,3
July	47 180		16 744		63 923	115819,5
August	55 429		20 604		76 033	85631,2
September	51 134		22 402		73 537	52353,7
October	64 543		33 526		98 069	22474,6
November	75 928		27 402		103 330	5750,7
December	66 698		34 334		101 032	2061,7
TOTAL, kWh:	**749 638**		**319 700**		**1 069 338**	**667547,1**
TOTAL, €	0		0		0	



- Installation of solar panels on shop roofs is the most economically feasible, least costly and optimal in operation
- To ensure high efficiency of the solar panels, monthly visual inspection and, if necessary, cleaning of the surfaces is required
- All generated e/energy will be used for the company's own needs by storing the surplus (shaded area on the graph: 401 MWh in total) in e/energy storage systems: an average of 2.68 MWh per day or 111.6 kWh.
- The choice of the energy storage model is based on the surplus of own generation per hour, i.e. 120 kWh.

After the system integration the electricity cost have decreased by 60%

Green Transition implementation schedule

Stage 1, experimental - Standalone ESS Deployment

Objective: deploy a standalone Energy Storage System (ESS) with a capacity of 1-5 MW to test energy storage feasibility, reliability, and revenue potential apart of co-located solar plant

Scope:

- Installation, testing, and commissioning of the ESS by using idle grid connection
- Conduct measurements and research on energy demand, storage efficiency, and grid interaction
- Analyse revenue streams, including excess energy sales to TSO and landlord´s customers (tenants)
- **Deliverables:** baseline data report for scalability, demand response testing results, and initial smart grid integration plan
- **Timeline:** completion within 12 months from the Effective Date

Stage 2: Rooftop Solar Park Design and Implementation

- **Objective:** Install a PV system on rooftop space, integrating it with the Stage 1 ESS.
- **Scope:** Design, procurement, supply, installation, testing, and commissioning of the PV system
- Pilot smart grid integration to manage solar energy distribution across landlord operations.
- Ensure Guaranteed Generation targets are met
- **Deliverables:** Fully operational hybrid solar-ESS system, initial smart grid analytics platform, and energy production report.
- **Timeline:** Completion within 12 months from Stage 1 completion, subject to parallel implementation

Stage 3: comprehensive Green Transition and PPA Development

Objective: Achieve full green energy transition with smart grid management and finalise a PPA for energy supply either physical or virtual

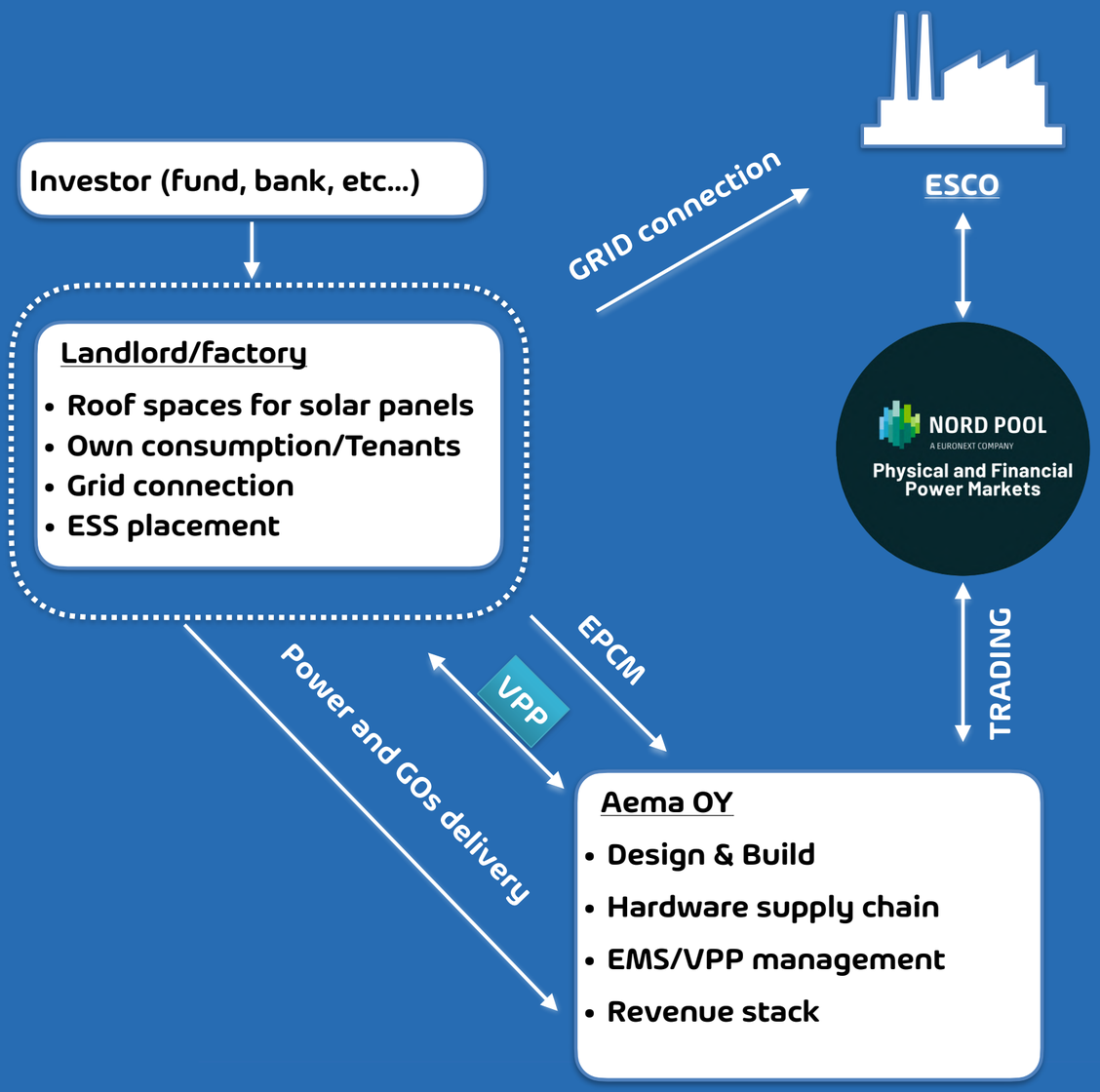
Scope: Grouping Energy Consumers: categorize consumption into:

- **Tenant Operators:** Administrative buildings, lighting, security&control systems.
- **Logistics Hubs:** Warehouses, cranes, material handling equipment.
- **Fleet Charging:** EVs, trucks, EVs charging stations for zero-emission shipping.
- **equipment retrofitting to EV Engines:** cranes, forklifts, trucks, delivery fleet transport, etc. to EV power, with fast-charging infrastructure powered by the System.
- **Energy Storage and Smart Grid Integration:** expand ESS capacity based on Stage 1 findings, implement a full smart grid with real-time analytics, predictive maintenance, and load forecasting under Provider’s control.



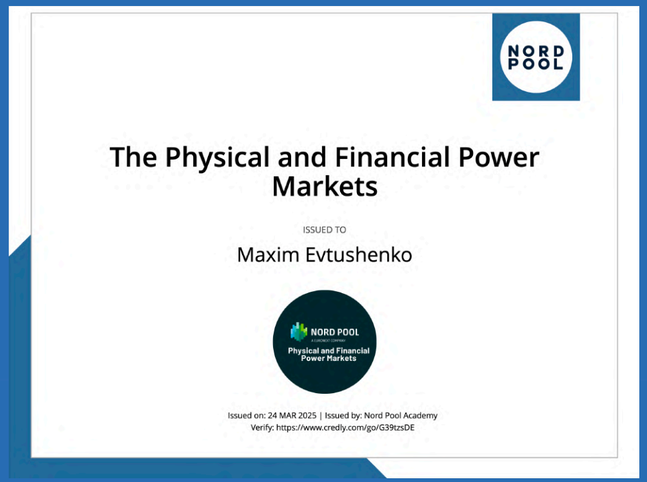



PPA Structure



Green Transition in Action

- SPV as counter part
- Contract structure, fit to needs
- Tenor - flexible, upon request
- Volume - 100% GOs, up to 100% power
- Stable AC supply
- Outage backup
- Full protection of business (data lost, security, etc.)
- Economies and savings on electricity bills



PPA pricing structure

1. Fixed Price

Buyer will offtake at constant price per MWh, regardless of how much it would have cost to source, e.g., on spot: electricity price risk belongs to the consumer

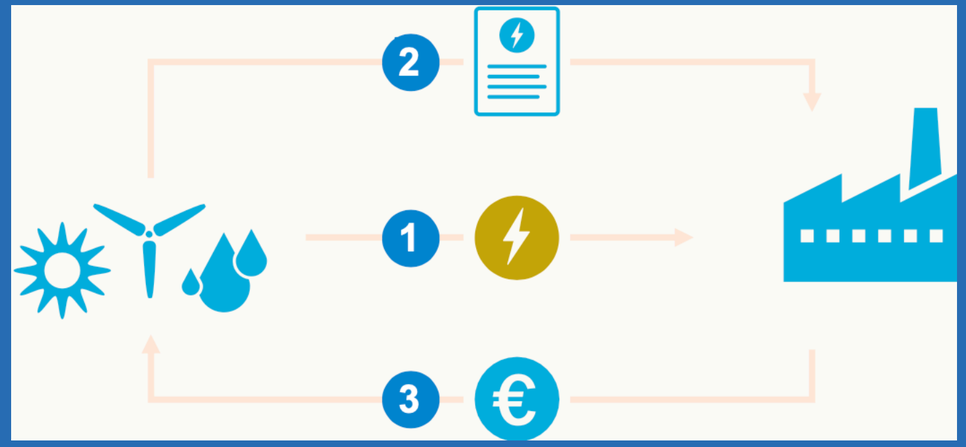
2. Floating Price

Buyer will offtake at reference market price – typically with discount: electricity price risk belongs to the manufacturer (PV Farm)

3. Collar Price

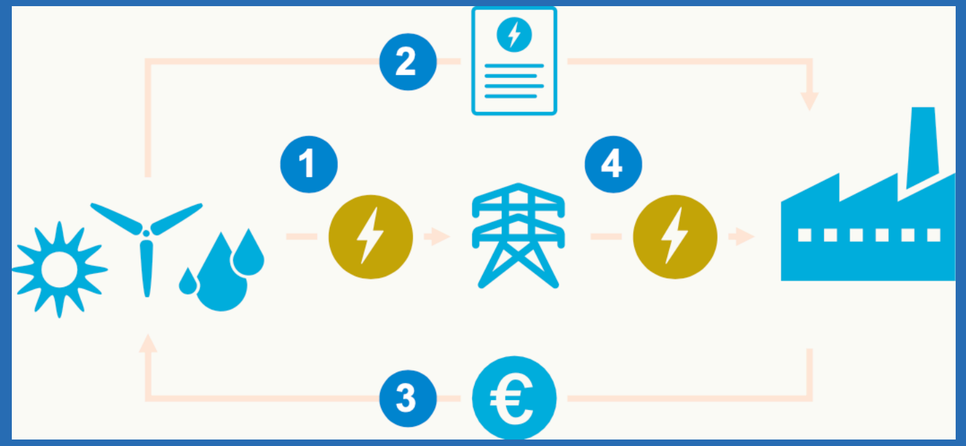
Buyer will offtake at reference market price, but if price drops below floor, seller gets floor/if price jumps above ceiling, buyer will only pay the ceiling: electricity price risk equally belongs both to the consumer and the manufacture

Physical PPA



1. VPP delivers power to the customer
2. VPP delivers Guarantees of Origin to the customer
3. Customer pays PPA price to VPP

Virtual PPA



1. VPP sells output into the grid
2. VPP delivers Guarantees of Origin to the customer
3. Customer pays CFD to VPP
4. Customer buys physical power from the wholesale market






Let’s grow together

Let's make inevitable things beneficial to our business:

- Green Transition design&build
- Clean tech innovations implementation to every process
- Carbon-neutral, industrial solutions lead to green behaviour - “get what you need and enjoy what you get”
- Enjoy the opportunities of the smart grid, make a move to energy markets with trustworthy partner and get a passive income

The intersection of clean energy, applied science and industrial innovations is where the business should be

Email

epc@aema.fi

Website

www.aema.fi

Phone

+358 - 44 - 237 - 6666