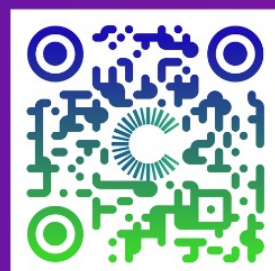


Clever solar devices by the Numbers



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PHOTOVOLTAICS 4.0



We digitize the Photovoltaic Industry for a sustainable and safer energy for all contributing to a better planet with a **MASSIVE COSTS REDUCTION up to 70%**



WHY A Total Cost of Ownership (TCO)?

The TCO is the cost to buy something plus the cost to operate it over its useful life.

Photovoltaics plants needs maintenance. **Monitoring platforms** at string or inverter level or **drone thermography** are **INDIRECT** measurements that gives only an ESTIMATION on where the problems might be always **requiring a manual check** to identify the issue incurring into **HIDDEN COSTS**.

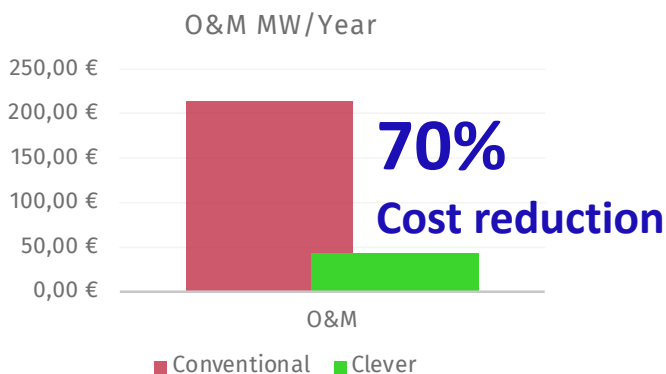
OUR SOLUTION: KNOW EXACTLY WHERE are the defective modules and WHAT is the problem automatically, in JUST 3-Clicks from your mobile device with **NO HIDDEN COSTS**.

WHAT HAPPENS AT THE END OF THE INSTALLATION'S LIFE?

Cumulative costs in 30 years for a 700.000 modules installation (280MW) :

CONVENTIONAL		CLEVER SOLAR DEVICES	
O&M Cost:		CLEVER power	€ 275.940
Energy cost (50€/MWh)	€ 4.235.986	CLEVER HW	€ 11.725.000
Total labor cost	€ 35.086.042	CLEVER SW	€ 3.600.000
Total Drone flights	€ 8.232.000	Non diagnosed panels cost	€ 0 (we diagnose 100% of the panels)
Opportunity Cost:		TOTAL Clever SD	€ 15.600.940
Energy not produced by strings	€ 132.650		
Energy not produced by modules	€ 268.333		
Non diagnosed panels cost	€ 24.741.394		
Total Conventional	€. 68.460.419		

Comparing the total costs of using a **conventional solution** and its **hidden costs** compared to use **Clever Dx**: Solar PV Plants can **save up to 70% costs** at the end of the PV installation life.



NOTE: This calculations have been made with 50€/KW cost, however **CONVENTIONAL** costs are **highly dependent** on **electricity cost** and **rises exponentially** when the **price/KW goes up** while **Clever Solar Devices solutions** remains **unaffected**.



BEHIND THE NUMBERS

The scenario is calculated for PV production plant that wants to **maximize their production capability** and **improve their service by reducing costs**.



The case study was done for 700.000 modules (280MW), if the number of modules is reduced or increased, the costs will change accordingly. (Note that this analysis doesn't include other extra maintenance tasks like grass cutting, mechanical inspections). **Contact us if you wish us to analyze your specific case.**

THE PARAMETERS:

We consider **3 different Failure Rate (FR) stages depending on the years of life of the installation**. The FR is the frequency with which an engineered system or component fails. It has relation with the manufacturing procedure. Environmental working conditions influence increasing the failure rate. It is divided into 3 different phases; installations requires more maintenances at the beginning and end of their life.

We consider:

- **Early years** – 2 maintenances/year (Infant mortality - 0 to 5 years)
- **Maturity of the installation** – 1 maintenance/year (constant random failures- 6 to 16 years)
- **End of Life** – 2 maintenances/year (wear out failures – 17 to 30 years).

Installation		Modules			Maintenance				
		Early years	Maturity	End of Life	Early years	Maturity	End of Life		
Number of Modules	700.000								
Hour Solar Pick (HSP)	1.752 hours								
Electricity Cost (€/MWh)	100								
Number of Modules/String	20								
		Failure rate	0,44%	0,25%	0,88%	String coverage	100%	50%	80%
		Power (W)							
		Modules Power in Watts	400		Modules Coverage	10%	5%	15%	

CONVENTIONAL Costs			
	Early years	Maturity	End of Life
Drone flight	600€/MW		
String coverage	100%	50%	80%
Module's coverage	10%	5%	15%
Troubleshooting Time (Operator's average time to access and measure):			
Per String	15 min		
Per PV Module	10 min		
Technician hourly cost			
Cost per Hour	35€		

CLEVER Dx Costs	
Hardware Investment (€/unit)	15€
Installation Time of the Hardware	2 min
Electricity Consumption of HW (mWh/unit)	300
Failure Rate (ppm)	100
Platform Fee	10.000€ /month
Technician hourly cost	
Cost per Hour	35€

The theoretical string coverage is much higher during the first operating years and last operating years due to the **greater possibility to incur in failures**. In the same way with individual PV module inspection.

The **Cost for conventional** maintenance is composed of the **energy lost due to troubleshooting, the troubleshooting time, and the required drone flights**.

Other costs impact the conventional linked to the early years are **not detecting in time manufacturing issues** and **losing component warranties**.

The cost estimated for Clever Dx platform is composed of **investment** in the Hardware (measurement devices), the **time needed for the installation**, the **power consumption** of different measurement devices, and the **platform subscription**.

No other costs are required with Clever as we don't need extra work other than just connect the cable and read the QR code.



GET RID OF THE HIDDEN COSTS WITH CLEVER Dx

Compared to **conventional processes**, Clever Solar Devices provides **HIGH EFFICIENCY** and **COST REDUCTION** to Photovoltaic plants.

PV Plants today do maintenance in a **conventional way : measuring some data points on the IV curve at string level** and **flying expensive drones** a couple of times a year to get **thermal and visual checks** on the status of their plants. Those processes thought stationaries today creates a lot of inefficiencies and extra costs.

We redefine the diagnosis of PV systems by remote AI-powered digitalization.

Clever Dx is a DIAGNOSTIC PLATFORM to support operational decisions knowing exactly what is happening to each module in real-time with **the most accurate data (automatically and remotely** measuring the **IV Curves of EACH and EVERY module in the installation)** and **AVODING MANUAL inspections to find the faulty modules.**

Simplified and comprehensive information, reports, alarms and maps for you know exactly **WHAT** is going on and the most important **WHERE EXACTLY** is the problem in the installation.

Save money by knowing from your desk without having to send operators to the field to find the **specific defective modules.**



3 simple click to find WHERE the problem is and WHAT is happening (shadows, oxide, broken cell string, etc.).

We ensure the **BEST EFFICIENCY** for your PV plants.
MEASURE IT TO IMPROVE IT

DO YOU WANT TO KNOW MORE?



You could see Pilot Power Plant performance using the **FREE** trial access <https://demo.cleversd.com/register.php>



Contact us for more details on our calculations and parameters and **get to know the numbers for your specific business!**

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