


# BE A POWER PIONEER



Lead your industry to new energy. Harness the power of sunlight and meet your operational goals efficiently and cost-effectively.



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# PROGRESSIVE SAVINGS WITH SOLAR

The more your operation utilises solar power instead of a traditional or grid-based power source, the greater your benefits. Mantrac works with your available budget and space to design a solar solution that meets your power needs and helps grow your business.

## LOWER ENERGY COST

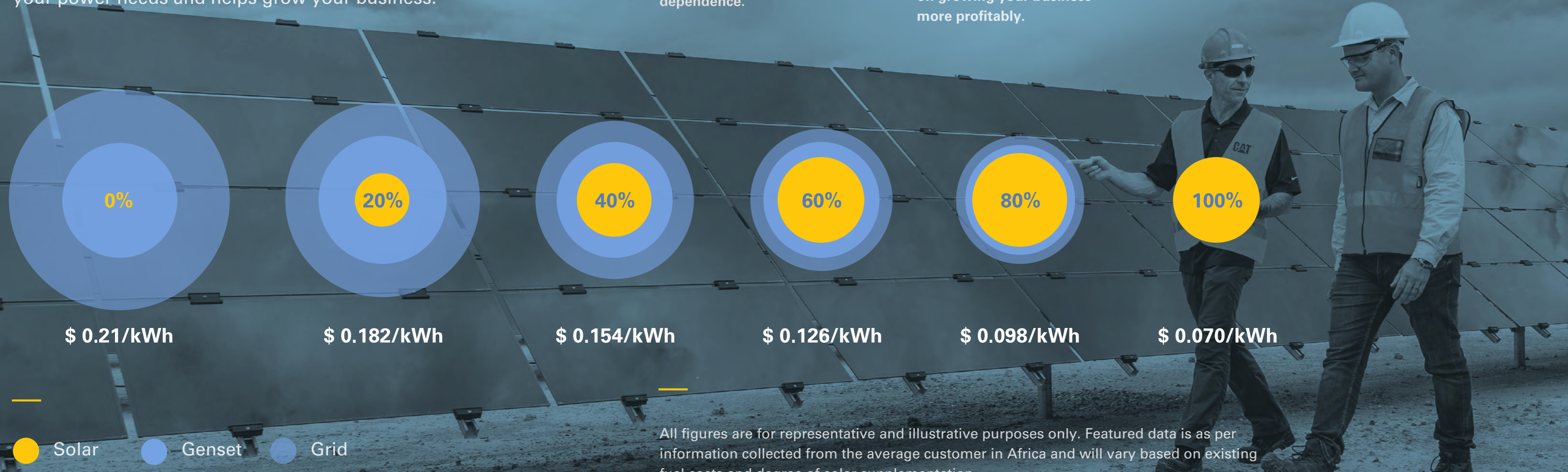
Adding solar to your energy mix reduces the cost of energy per kWh by lowering generator fuel and grid dependence.

## INCREASED PROFITABILITY

With very little maintenance involved with Solar installations, you can focus on growing your business more profitably.

## RETURN ON INVESTMENT

A solar solution pays for itself in about 3-4 years, depending on the cost of energy prior to installation.



All figures in \$ per kWh

All figures are for representative and illustrative purposes only. Featured data is as per information collected from the average customer in Africa and will vary based on existing fuel costs and degree of solar supplementation.

# DEMONSTRATING THE SUCCESS OF SOLAR IN A MANTRAC BASE

In 2019, we implemented a state-of-the-art solar power solution at our Component Rebuild Centre in Takoradi, Ghana. The system integrated existing grid and genset power sources with a CAT® Master Microgrid Controller (MMC) using CAT mono-crystalline PV modules. We successfully decreased annual operational costs by a staggering 73%, equating to a return on investment in as little as 3.5 years. At the same time, we eliminated nearly 250 metric tons of carbon dioxide emissions annually.

Through this data, you will see the significant savings and positive environmental impact our solar power solution had for our operations. This success drives us to recommend this eco-conscious solution to all our customers, so they can enjoy long-term savings, lower operational costs and sustainable growth.

## CARBON DIOXIDE EQUIVALENCIES

In one year we eliminated the equivalent of greenhouse gasses produced by:

**350,000**  
POUNDS OF COAL

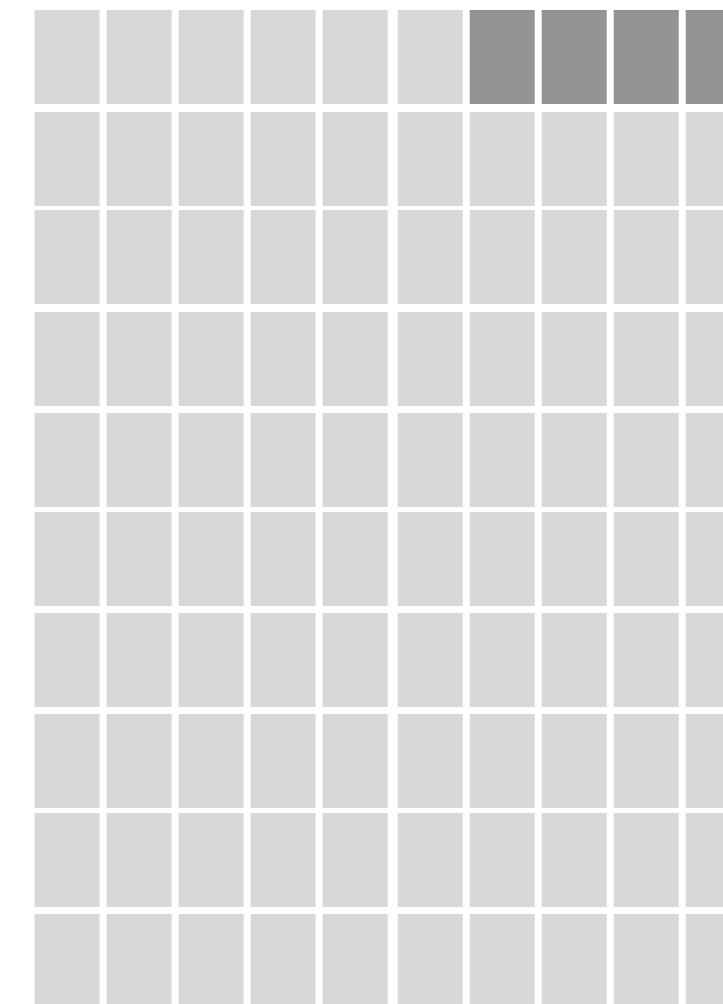
**750**  
BARRELS OF OIL

**4**  
TANKER TRUCKS  
OF GASOLINE

**800K**  
MILES DRIVEN BY AN AVERAGE  
PASSENGER VEHICLE

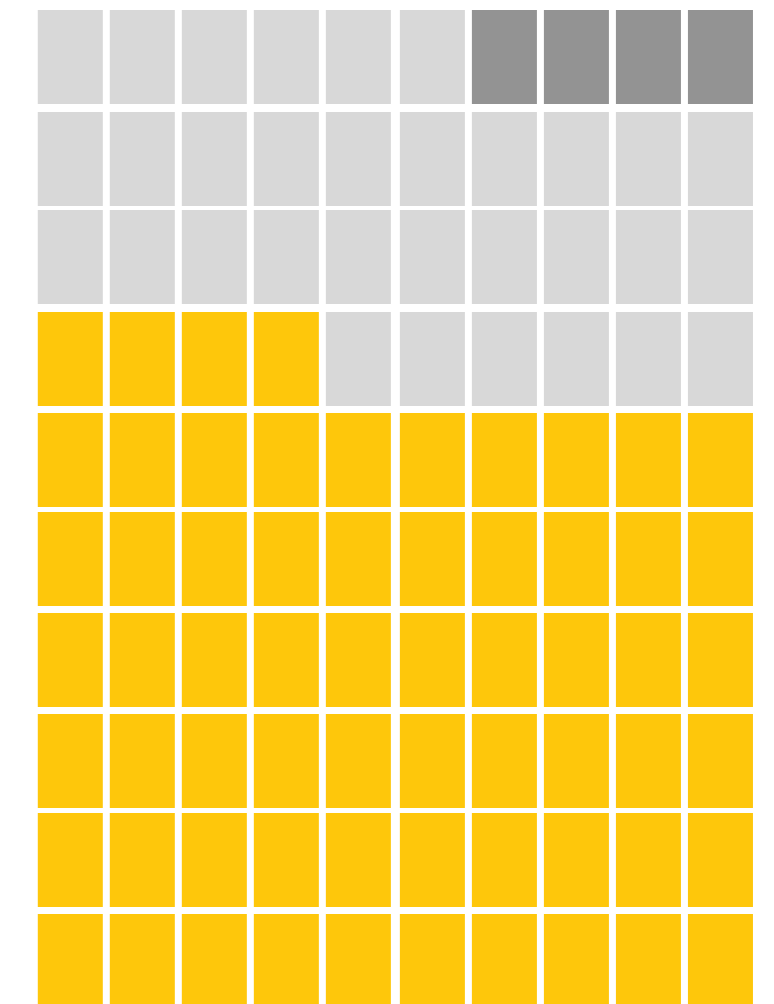
**96%**

GRID RELIANCE



**64%**

SOLAR RELIANCE

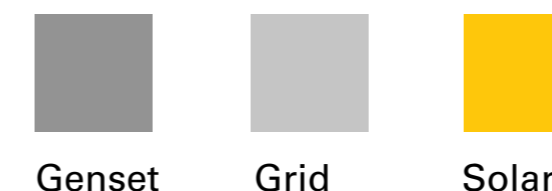


BEFORE  
AFTER

**\$130,000** REDUCTION  
in annual energy bills

**250** METRICS TONNES DECREASE  
in CO<sub>2</sub> emissions

Power distribution in kWh



\*All figures calculated from the official EPA website:  
<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

# BUILDING THE FRAMEWORK FOR A POWERFUL SOLUTION

Mantrac uses industry-leading CAT products to tailor solar power solutions. These components work together to meet power requirements across industries and applications. Solar microgrids are often used in conjunction with diesel generator sets, as seen in this diagram.

## MOUNTING SYSTEM

Durable structures of galvanised steel and aluminum, holding panels firmly in place.

### Features:

- 100% weatherproof
- Tilt range between 0 to 60°
- Withstands wind speeds up to 126 km/h

## PV MODULES

A combination of solar panels and transmission devices, converting sunlight into electricity.

### Features:

- Choice of thin-film panels for high temperatures and mono-crystalline for moderate temperatures
- Panels are 100% free of potential induced degradation (PID)
- Junction boxes with weather endurance
- Withstands wind pressure up to 2,400 Pa
- Bi-facial panels offers up to 20% more power output by using both sides of a solar panel
- CAT panels come with 25 year product and performance warranty as standard  
\*select models only

## DC/AC CABLES

Transmits photovoltaic current with minimal energy loss through the system.

### Features:

- Eliminates need for pre-cut or pre-terminated PV wire
- Compatible terminations with standard module connectors and string combiner whips

## INVERTERS

Converts high-voltage DC to appliance-friendly AC with a string of panels.

### Features:

- Operating temperatures between -25°C to +60°C
- Up to 98% efficiency
- Extendable five-year warranty

## CONTROLLERS

Hybrid controllers like the Master Microgrid Controller (MMC) synchronise power sources, including gensets, batteries, and the power grid.

### Features:

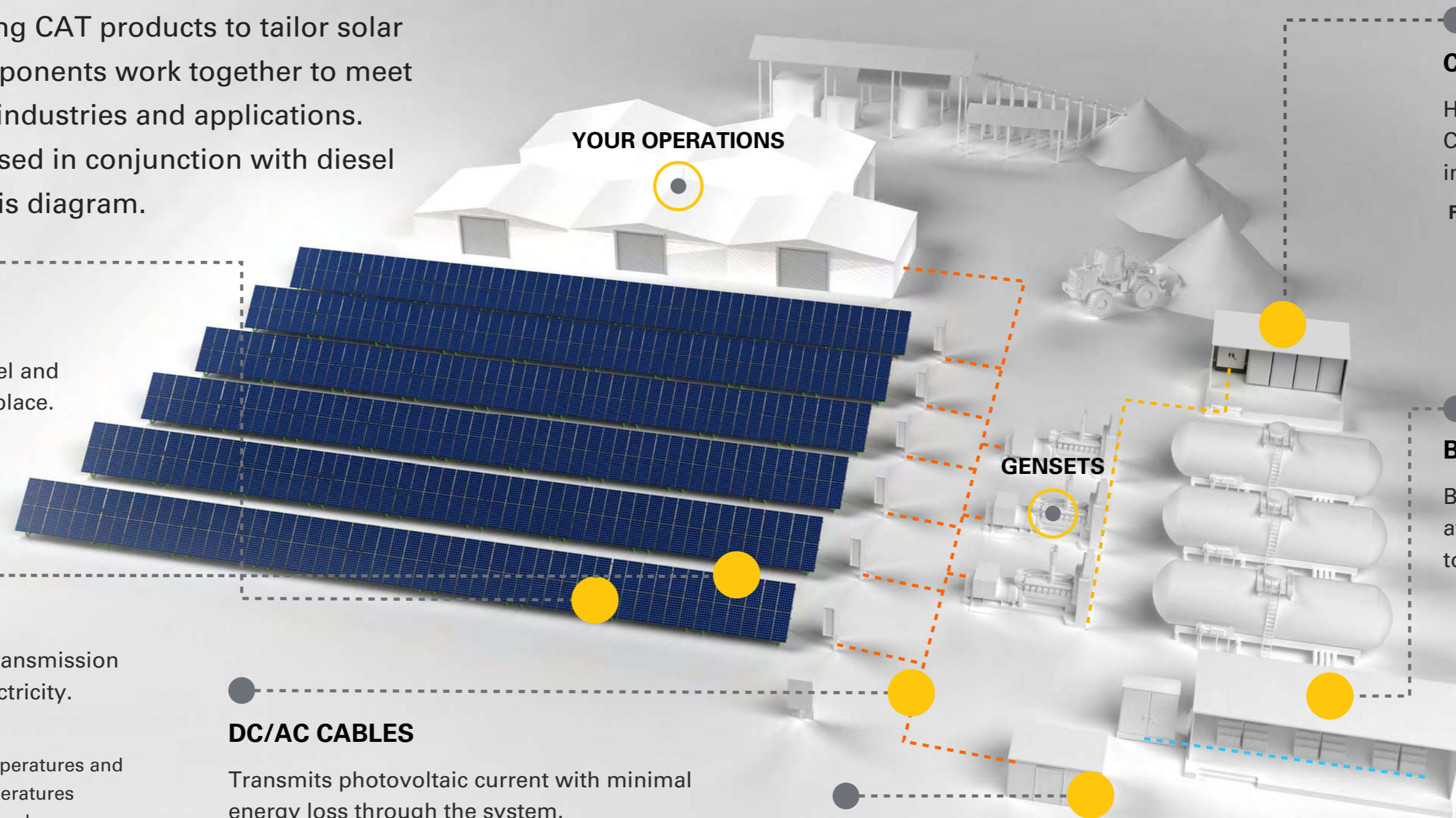
- Load shifting at the touch of a button
- In-built data analytics
- Remote monitoring

## BATTERY

Batteries store solar energy for later use, including at night time or in cloudy conditions. These can be topped up by any of your power sources.

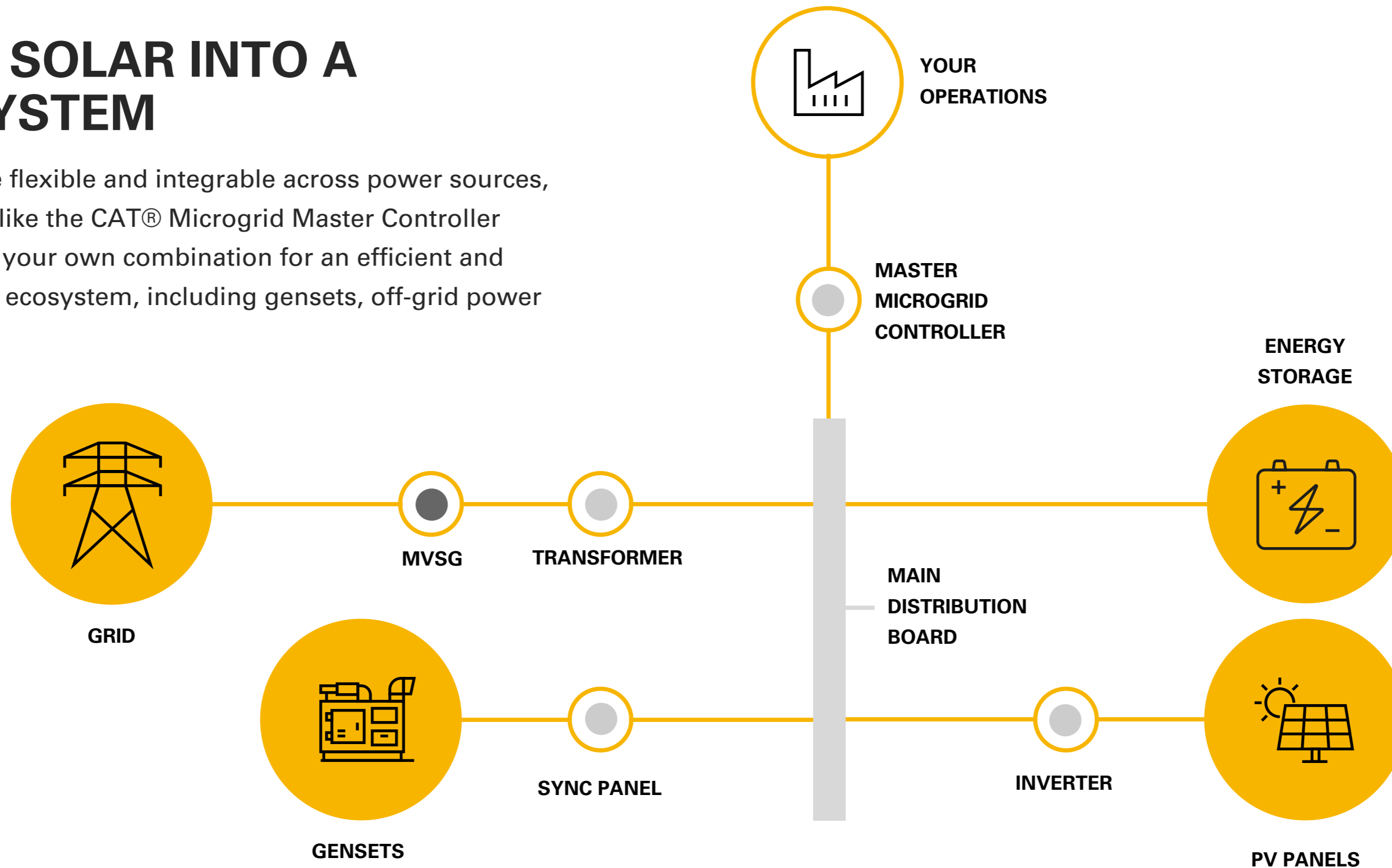
### Features:

- Application-optimized energy storage
- Types include Lithium-ion, lead acid batteries, zinc-air batteries, ultra-capacitors



# INTEGRATING SOLAR INTO A POWER ECOSYSTEM

Mantrac's solar solutions are flexible and integrable across power sources, particularly with technology like the CAT® Microgrid Master Controller (MMC). We help you choose your own combination for an efficient and integrated power generation ecosystem, including gensets, off-grid power sources and more.



Energy storage and MMC for remote operations are optional. These are recommended for hybrid solutions.

Depending on your output requirements, MVSG and SYNC panels may be required. This diagram is representative only.

MVSG = Medium Voltage Switch Gear

# IDENTIFYING YOUR SOLAR POWER SOLUTION

Depending on your existing power sources, budget availability, financial goals and environmental targets, you can choose from a variety of ways to integrate solar into your power system. Alternatively, you can go 100% solar, with required energy storage.

Mantrac consultants are experts at helping you explore your options and identifying the best solution for your business, utilising the best PV technology.

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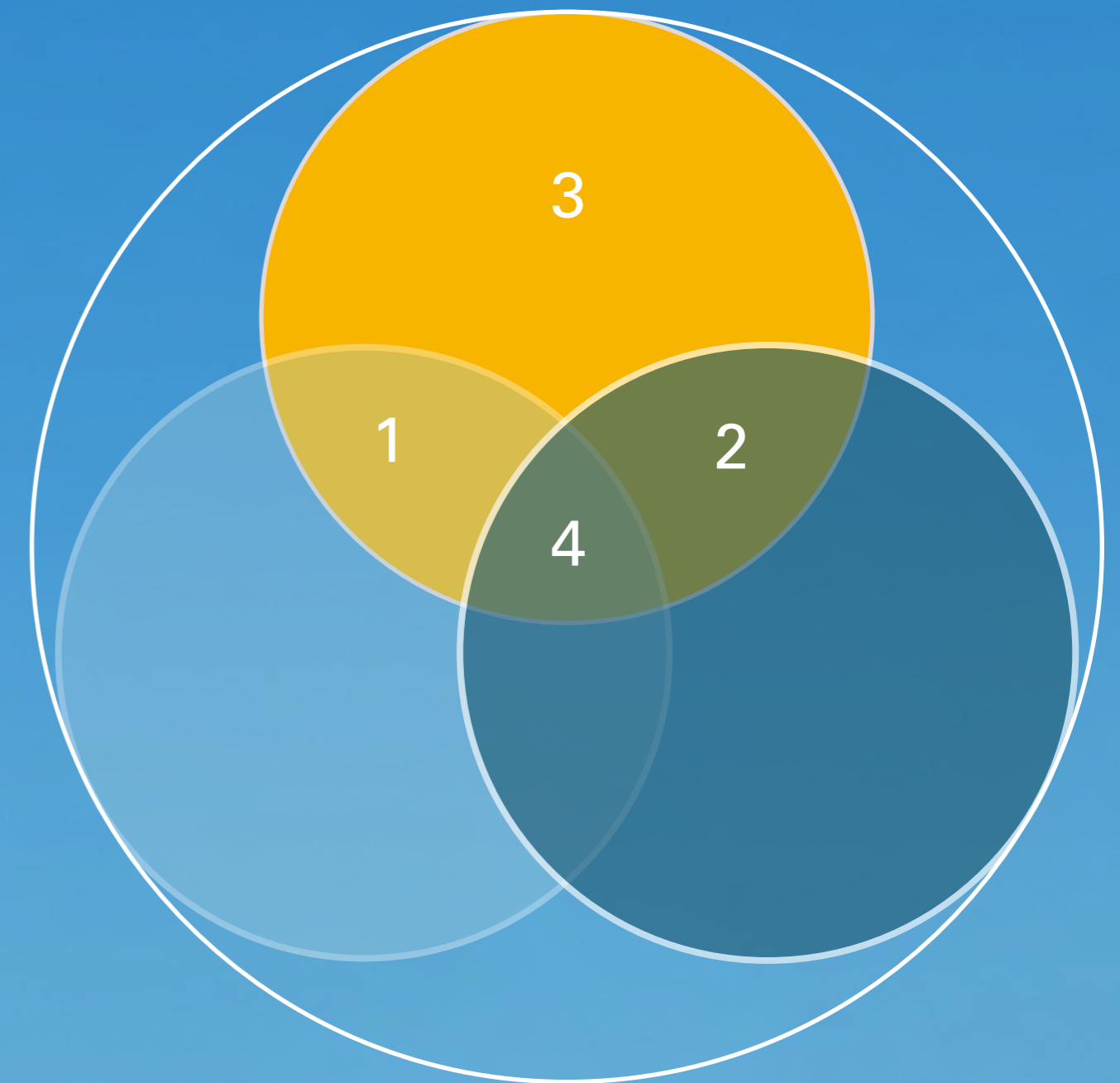
You have a variety of options to consider for solar-powered operations:

1. **SOLAR AND ELECTRIC GRID**
2. **SOLAR AND GENSET**
3. **100% SOLAR (REQUIRES ENERGY STORAGE)**
4. **SOLAR, ELECTRIC GRID AND GENSET**



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Energy storage is an optional component that can be added to any power solution, and may be required depending on power needs.



# IMPLEMENTING A SOLAR POWER SOLUTION

A solar solution should use your defined space optimally, meet your power requirements and integrate with any existing or new power sources. Combined with the expertise of a Mantrac specialist, you can own the perfect solar solution that delivers the power you need, when you need it, and at the lowest cost.

## ADAPT TO YOUR SPACE

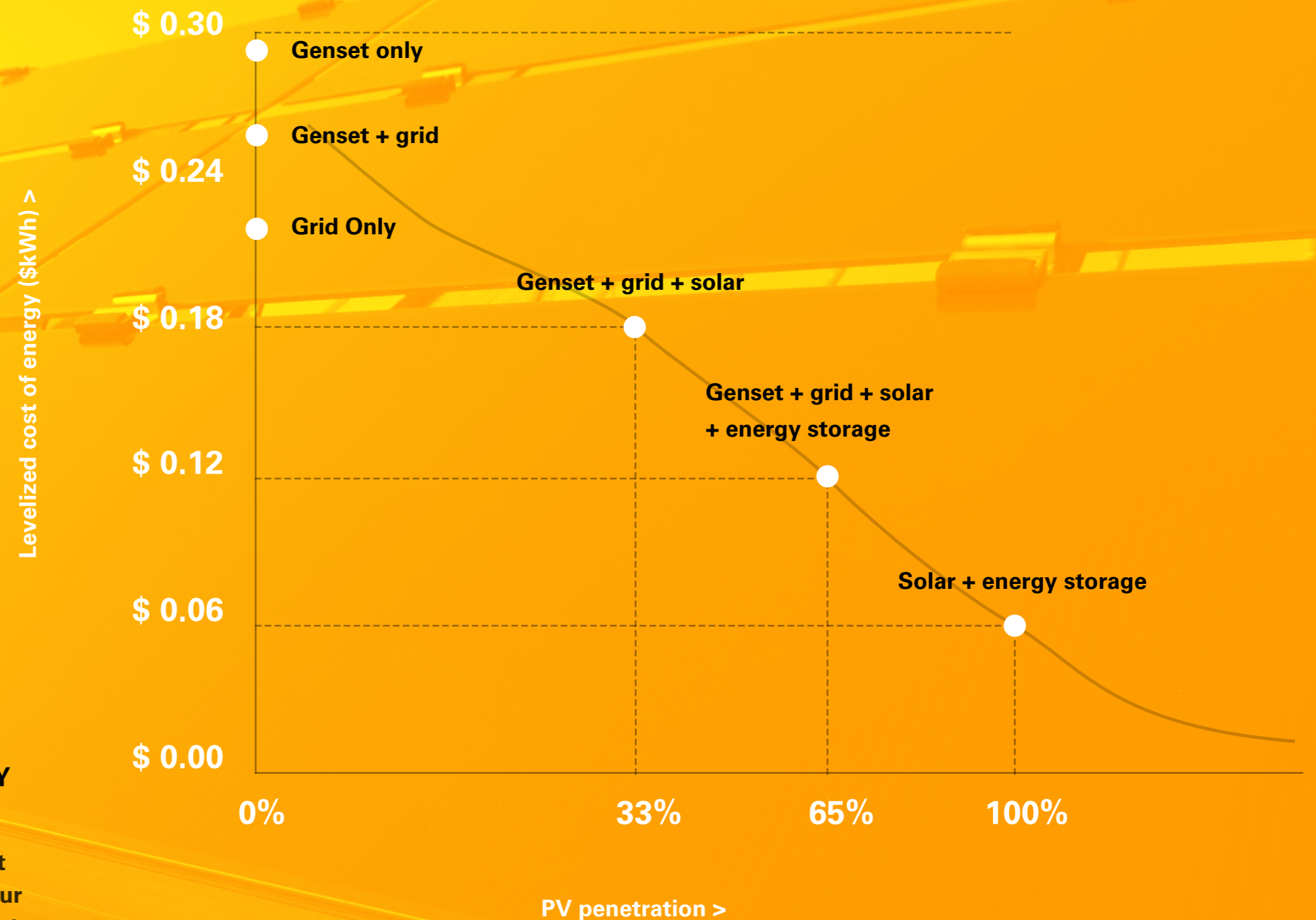
We can adapt our solar solutions to perform in challenging environments and ground conditions. Our building mounted PV panels are an example of how we maximize available space, from larger roofs to smaller sheds and carports.

## UTILIZE YOUR ASSETS

Leverage your existing power sources with our scalable and integrable solar solutions. Our used and rental department can even offer buyback for existing gensets from your fleet.

## OPTIMIZE TECHNOLOGY

We'll advise you on the best technology, customising your system from a range of panel types (mono-crystalline, thin film, bi-facial) and energy storage options (Lead Acid, Li-Ion).



This is an estimate for conceptual purposes, actual costs may vary pending local circumstance.

All figures are based on estimated diesel price of \$0.80 per litre.



# SOLUTIONS FOR A SUCCESSFUL PRESENT AND A BRIGHT FUTURE

Solar power systems enhance your entire operation, starting from efficient power generation to environmental compliance as a standard.



- **LOWER COST BASE**

The moment you implement one of our solar solutions, you'll see a lower cost of energy per kWh. This means you free up future costs to grow your business.

- **ENHANCED MARKET COMPETITIVENESS**

A lower cost base is your biggest advantage in the market. Additionally, your operations have a more positive public perception with environmentally conscious and energy aware operations.

- **LONG-TERM PERFORMANCE**

A solar power system from Mantrac carries successfully and sustainably into the future with robust design, installation and after sales support that you would expect from CAT. As a standard there is a 25 year warranty on product and performance on select panels.

- **FUTURE-READY AND SUSTAINABLE**

Our solar solutions are scalable, with the option to add more solar to current sites or new sites. Proprietary tools can also help you track and measure your "green footprint".

- **ENVIRONMENTAL BENEFITS AND EFFICIENCY**

Solar is an efficient and clean energy source, reducing costs and the need for emission compliance checks. A 1 MWP solution can eliminate between 500 and 2,000 metric tons of CO<sub>2</sub>.

# SUCCESSFUL OPERATIONS WITH MANTRAC

For every conceivable power need and challenge, Mantrac has the inventory and specialised workforce to deliver customized solar solutions. We bring the best in-class solar installations and technical expertise to every project, so customers have a hassle-free experience before and after installation.

## EXPERTISE IN POWER SOLUTIONS

- Serving industries since 1950
- Trusted partner for over 20 multinational corporations
- End-to-end power system solutions
- CAT-certified photovoltaic engineers and designers

## NETWORK PRESENCE

- 11 countries of operation, including across Africa
- Up to 80% in-territory spare-part availability
- 276+ dedicated service staff
- 45+ service vehicles for mobile assistance

## ENGINEERING AND CONSULTING

- Identification of solutions for your operations
- Cost-benefit analysis to weigh your options
- Return on investment reports for your finances
- Solution sizing and advisory
- Dedicated project manager for every project

## FINANCING

- Flexible and customisable payment plans
- Lease-to-buy plans
- Power Purchase Agreements (PPA)

## QUALITY AND RELIABILITY

- 20+ quality control points after-delivery
- High-grade electrical components
- Caterpillar standards on all solar installations
- Seamless integration across existing and new equipment

## AFTER-SALES SERVICE

- Maintenance and repair contracts
- Remote monitoring
- Complete warranty administration for performance and parts
- Operational training for your team members

## A TESTIMONIAL FROM A MANTRAC CUSTOMER

### HUSSEIN EL HAJJ

Operations Manager, Spaceplast  
Ghana Limited.

With Mantrac installing CAT PV systems on our rooftops, our company saves over 20% in electricity bills. Now, we are sure to succeed for years to come. We highly recommend using Mantrac's solar solutions for any business. You will definitely reap the rewards.

# MORE PROOF THAT SOLAR CAN HELP YOU OUTSHINE THE COMPETITION

Future Group Travel in Egypt, an experienced travel agency and tour operator and valued Mantrac customer, approached us with the need for a cost-effective, dependable and sustainable energy solution. After our proposal, we were awarded the entire project as a proven and trusted power solutions provider.

Our solution was a 1,500 kW solar power station to reduce fuel consumption from traditional generators.

We implemented:

- REMOTE CONTROL OPERATIONS
- DATA MONITORING
- OUTPUT POWER
- ENERGY
- ENGINE OPERATING HOURS
- POWER FACTORS
- GRAPH GENERATION
- WEATHER FORECASTING

## BENEFITS OF SOLAR



Operational efficiency



Bottom-line savings



Positive environmental impact



Positive public perception



Reduced operating costs

## IMPACT OF OUR SOLAR POWER SOLUTION

**2,985** MWH

POWER GENERATE IN ONE YEAR

**2,093** TONNES

CO2 EMISSION ELIMINATED

**805,000** LITRES

FUEL SAVED IN ONE YEAR



Mantrac's systems reduced our fuel consumption by 30 percent. It helped us lower our fuel costs to how much we previously used for a single generator. We also have the largest solar energy system in all of Marsa Alam, which makes us stand out from our competitors.



**Mohamed Raafat Rezk**

Senior Deputy CEO  
Future Group Travel



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## THANK YOU FOR READING

Make a statement about your business values while enhancing your operations. Let Mantrac help you secure a bright future.