

Economical & Environmentally friendly



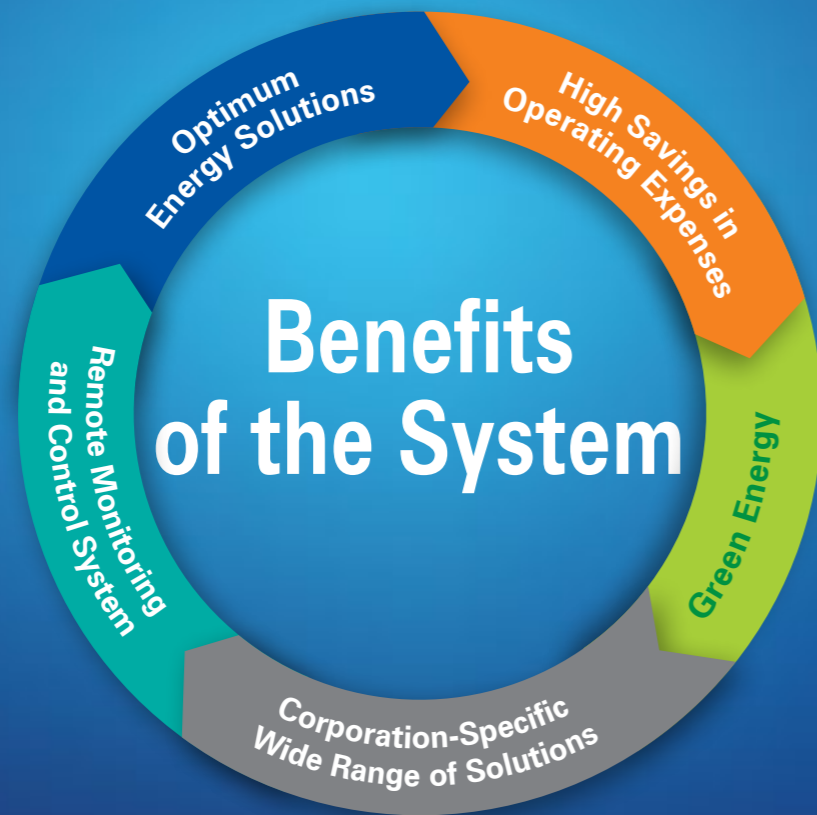
Hybrid
Power Systems

TEKSAN

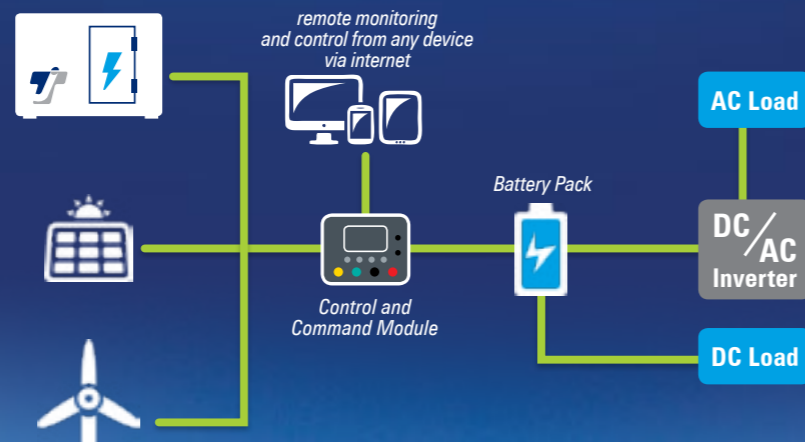


Hybrid Power Systems

Teksan Hybrid Power Systems is a clean energy system powered by nature, which is easily configurable to meet requirements in a wide range of power.



How does the system work?



Serious Savings in OPEX

- Up to 80% saving on generator running time,
- Service support at longer intervals and less technical staff requirement,
- Up to 65% saving in fuel consumption,
- Investment payback period down to 1.5 years,
- Longer system lifespan.



Green energy

- Low CO₂ emission,
- Up to 65% saving in fuel consumption,
- Low noise emission,
- Low heat emission.



1 SEMI STABLE GRID AREAS



FIELD OF APPLICATION

- Areas with Partial Power Outages
- Locations with daily scheduled power outages up to 4 hours or
- Locations having short-time power outages up to 8 hours in total on a daily basis

HOW IT WORKS

- The main power supply is the central grid.
- In case of any grid outage, the load is powered from batteries for up to 4 hours.
- If the grid outage lasts for more than 4 hours, the diesel generator starts up automatically and continues to supply the load. While the generator supplies the load, it charges the batteries at the same time.
- When the grid reactivates, the generator stops and automatically transfers the connection to the grid.
- Batteries are fully charged with the grid.
- Grid generator changeover is trouble-free and does not cause fluctuation.

THE OBJECTIVE OF THE SOLUTION

- Optimum solution for lower OPEX and CAPEX
- 100% facility utilization at lower costs
- Minimizing diesel engine running time and fuel consumption
- Emergency power supply meeting a 1-week period without refueling when there is no grid connection

ADVANTAGES AND DISADVANTAGES

- Compared to battery-only solutions;
 - + 100% facility utilization
 - + Longer battery life
 - + Longer discharge time
 - Wider carbon footprint
 - Maintenance cost of generator

Average Load	kW	2	4	6	8
Maximum Permanent Load	kW	3	5	8	10
Battery Capacity	Ah	300	500	800	1000
Generator Power	kVA	8	12	26	26
Rectifier Power	kW	6	9	18	18
Fuel Tank	lt	250		500	
Alternative Generator Configuration - for "fast" charge of battery					
Generator Power	kVA	12	26	26	41
Rectifier Power	kW	9	18	18	27
Optional Solar Energy System Configuration					
Total Solar Power	kWp	2	4	6	8

2 UNSTABLE GRID AREAS



FIELD OF APPLICATION

- Areas with power outages
- Locations with daily scheduled power outages up to 8 hours or
- Locations having short-time power outages up to 16 hours in total on a daily basis

HOW IT WORKS

- The main power supply is the central grid.
- In case of any grid outage, the load is powered from batteries for up to 8 hours.
- If the grid outage lasts for more than 8 hours, the diesel generator starts up automatically and continues to supply the load. While the generator supplies the load, it charges the storage batteries at the same time.
- When the grid reactivates, the generator stops and automatically transfers the connection to the grid.
- Batteries are fully charged with the grid.
- Grid generator changeover is trouble-free and does not cause fluctuation.

THE OBJECTIVE OF THE SOLUTION

- Optimum solution for lower OPEX and CAPEX
- 100% facility utilization at lower costs
- Minimizing diesel engine running time and fuel consumption
- Emergency power supply meeting a 1-week period without refueling when there is no grid connection

ADVANTAGES AND DISADVANTAGES

- Compared to battery-only solutions;
 - + 100% facility utilization
 - + Longer battery life
 - + Longer discharge time
 - Wider carbon footprint
 - Maintenance cost of generator

Average Load	kW	2	4	6	8
Maximum Permanent Load	kW	3	5	8	10
Battery Capacity	Ah	500	1000	1500	2000
Generator Power	kVA	12	26	26	41
Rectifier Power	kW	9	18	18	27
Fuel Tank	lt	250		500	
Alternative Generator Configuration - for "fast" charge of battery					
Generator Power	kVA	12	26	41	60
Rectifier Power	kW	9	18	27	36
Optional Solar Energy System Configuration					
Total Solar Power	kWp	4	6	10	16

3 OFF GRID AREAS



FIELD OF APPLICATION

- Off grid areas
- Locations where emission and fuel consumption should be minimized
- Optimized solution based on both OPEX and CAPEX for off grid areas

HOW IT WORKS

- The main power source is solar energy (if applicable)
- If solar energy is insufficient, the batteries balance the load.
- When the batteries are discharged, the generator will start and supply the load.
- The generator will stop after the batteries are charged.

THE OBJECTIVE OF THE SOLUTION

- Providing the most suitable solution for off grid Facilities
- Reducing engine running time and maintenance cost
- Lower fossil fuel consumption
- Fewer site visits due to reduced running time and fuel consumption

ADVANTAGES AND DISADVANTAGES

- Compared to a conventional diesel-only generator solution
 - + Lower fuel consumption
 - + Lower maintenance cost
 - + Less facility visits
 - Higher capital expense

Maximum Permanent Load	kW	3	6
Average Load	kW	2	4
Battery Capacity	Ah	500	1000
Generator Power	kVA	12	26
Rectifier Power	kW	9	18
Fuel Tank	lt	800	800
Optional Solar Energy System Configuration			
Total Solar Power	kWp	6	12

4 PURE SOLAR FOR OFF GRID AREAS



FIELD OF APPLICATION

- Off grid sites with extremely limited access
- Low power consumption facilities

HOW IT WORKS

- The main power source is solar energy
- Batteries are charged during daylight hours
- Power is supplied from the batteries at night and on cloudy days

THE OBJECTIVE OF THE SOLUTION

- Providing the best solution in off grid areas to reduce operating costs
- Eliminating generator maintenance and fuel expenses
- Cancel out field visits

ADVANTAGES AND DISADVANTAGES

- Compared to a hybrid generator solution
 - + Very low operating costs
 - + 100% green energy
 - + Zero field visit
 - Higher investment costs
 - Wider carbon footprint
 - 99,8% facility utilization

Average Load	kW	1,0 kW	1,5 kW	2,0 kW	2,5 kW
Number of Panels	pcs	20	35	40	45
Total Solar Power	kWp	8	14	16	18
Floor Space	m ²	40	70	80	90
Battery Capacity	Ah	1500	2000	3000	4000

5 TECHNICAL SPECIFICATIONS

CAPACITY INCREASE ON THE FIELD

- Increased rectifier power output by adding extra modules
- Adding an external fuel tank without any modifications
- Increasing the discharge time by adding an external battery group
- Power output increase with additional hybrid generator paralleling
- Increased Solar Panel Capacity for sites with low solar radiation

6 TECHNICAL SPECIFICATIONS

OPTIONS

- Dual generator setup
- Synchronization
- Increased maintenance interval
- Dust filters for the entire system
- Super silent cabinet solution
- Remote monitoring
- Anti-theft protection
- AC power output up to 10kVA
- Tailored solutions for different needs
- Air-conditioning for the battery pack (regions above + 45°C)
- Multiple user support
- Customer alarm contact outputs
- DC distribution board
- BLVD and LLVD
- Extra battery capacity
- Extra fuel tank capacity
- High rectifier power output

	TJ 3000 HD		TJ 6000 HD	
Maximum DC Load				
Average DC Load	3.000 W		6.000 W	
Optimized DC Load Range	1.000 - 2.000 W		2.000 - 4000 W	
Nominal Output Voltage	48 VDC		48 VDC	
AC Output Power (optional)	350 - 1250 VA		800 - 3000 VA	
ENGINE				
Make	Perkins	Deutz	Perkins	Deutz
Model	403D-11	F2M-2011	404D-22	F3M-2011
Output Power at 1800rpm	10,3 kW	15,0 kW	21,6 kW	23,3 kW
Cooling Type	Water	Oil	Water	Oil
Operating Speed	1200-2200 rpm		1200-2200 rpm	
Fuel	Diesel		Diesel	
Standard Maintenance Interval	500 hours		500 hours	
Increased Maintenance Interval (optional)	1.000 hours		1.000 hours	
ALTERNATOR				
Technology	Brushless Synchronous	Permanent-Magnet	Brushless Synchronous	Permanent-Magnet
Model	TAL040 D	PMG140K/18-90	TAL040 F	PMG140K/18-180
Output Power at 1800rpm	9 kW		18 kW	
DEEP CYCLE BATTERY				
Technology	Lead Acid	Li-Ion	Lead Acid	Li-Ion
Type	AGM Nano Carbon	LiFePO4	AGM Nano Carbon	LiFePO4
Nominal Capacity	500 Ah	500 Ah	1000 Ah	1000 Ah
Rated Voltage	48 V		48 V	
DoD (Depth of Discharge)	80%	80%	80%	80%
Cycle Life (25 °C @ %80 DoD)	3.200	4.000	3.200	4.000
Maintenance Requirement	No		No	
Running Temperature (°C)	-15 °C to 45 °C	0 °C to 45 °C	-15 °C to 45 °C	0 °C to 45 °C
SIZE				
Weight (including batteries)	TBA	TBA	TBA	TBA
Weight (excluding batteries)	TBA		TBA	
Dimensions (WxLxH)	TBA		TBA	
STANDARD FEATURES				
Ambient Conditions-Proof Cabinet	•	Auto Oil Supply	•	Fuel Theft Alarm
Power Cabinet and Protection Devices	•	Low Battery Voltage Protection	•	Internal Fuel Tank
Deep Cycle Batteries in the Air-Conditioned Cabinet	•	Short Circuit Protection	•	Communication Interface
Double Walled Fuel Tank	•	Double Locked Cabinet Protection	•	System Operating Temperature
				- 0 °C / + 45 °C

	TJ 3000 HD						TJ 6000 HD					
OPTIONAL FEATURES												
230V AC Output	350VA - 3000VA		Increased Maintenance Interval		1.000 hours		IP Protection Class		according to the project requirements			
Residual Current Protection	For 230V AC circuit		External Fuel Tank		1.000 - 2.000 liters		Super Silent Cabinet		according to the project requirements			
Auto-Transfer Switch	Auto-Transfer Board		External Battery Capacity		500 Ah - 1.000 Ah		Dust Filters		according to the project location			
DC Power Distribution	For critical loads: 2x125A, 2x64A, 4x32A, 2x16A For normal loads: 2x64A, 4x32A, 2x16A		Solar Energy Kit -1 (panel, charge regulator, fusebox)		Can be increased up to 4 x 3200W power		improved Security		according to the project location			
Free Contacts for External Signals	8 Inputs / Outputs		-		-		Remote monitoring / Control		2G/3G/4G/Ethernet			
Increased Operating Temperature Range	- 20 °C / + 55 °C		Solar Panel Construction		1 x From 3200W to 4 x 3200V power		Location Tracking		GPS			
Load Priority Selection	Normal / Critical Load		Multiple User Support		Power measurement per user							
500Ah Lead Carbon Battery												
1.000Ah Lead Carbon Battery												
EXPECTED PERFORMANCE VALUES												
	0,5kW load	1,0 kW load	1,5 kW load	2,0 kW load	2,5 kW load	3,0 kW load	1,0 kW load	2,0 kW load	3,0 kW load	4,0 kW load	5,0 kW load	6,0 kW load
Battery Discharge Time (hours)	28,8	14,4	9,6	7,2	5,8	4,8	28,8	14,4	9,6	7,2	5,8	4,8
Battery Charge Time (hours)	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5
Daily Cycle Amount	0,74	1,34	1,83	2,24	2,59	2,89	0,74	1,34	1,83	2,24	2,59	2,89
Gen. Daily Running Time (hour)	2,6	4,7	6,4	7,9	9,1	10,1	2,6	4,7	6,4	7,9	9,1	10,1
Gen. Maintenance Frequency (days)	192	107	78	64	55	49	192	107	78	64	55	49
Daily Fuel Consumption (liters)	5,1	10	14,9	19,6	24,2	28,8	9,0	17,7	26,2	34,5	42,7	50,8
Hourly Fuel Consumption (liters)	0,21	0,42	0,62	0,82	1,01	1,2	0,37	0,74	1,09	1,44	1,78	2,12
Fuel Consumption per kWh [liter/kWh]	0,43	0,42	0,41	0,41	0,40	0,40	0,37	0,37	0,36	0,36	0,36	0,35
Number of Annual Battery Cycle	271	489	669	819	946	1055	271	489	669	819	946	1055
Battery Service Life (years)	16,6	9	6,7	5,5	4,8	4,3	16,6	9	6,7	5,5	4,8	4,3
Battery Max. Discharge Time (hours)	48	24	16	12	9,6	8	48	24	16	12	9,6	8
Fuel Transfer Period (days)	156	80	53	40	33	27	88	45	30	23	23	20
Hybrid + Photovoltaic System												
Total Solar Energy Power (kWp)	1,96	1,96	3,27	6,54	6,54	6,54	1,96	3,27	6,54	9,81	13,08	13,08
Number of Solar Panels (pcs)	6	6	10	20	20	20	6	10	20	30	40	40
Panel Surface Area including 15° (m²)	9,4	9,4	15,7	31,5	31,5	31,5	9,4	15,7	31,5	47,2	62,9	62,9
Total Solar Charger Power (kWp)	2,0	2,0	3,4	6,9	6,9	6,9	2,0	3,4	6,9	10,3	13,8	13,8
Gen. Daily Running Time (hour)	0,8	3,0	3,9	3,3	4,8	6,1	1,7	3,3	3,9	4,4	4,8	6,1
Gen. Maintenance Period (days)	180	164	129	154	104	81	297	151	129	113	104	81
Daily Fuel Consumption (liters)	1,5	6,5	9,1	8,1	12,8	17,5	5,8	12,5	15,9	19,3	22,6	30,9
Fuel Transfer Period (days)	533	123	87	98	62	45	137	64	50	41	35	25
Solar Energy Rate (%)	71%	35%	39%	59%	47%	39%	35%	29%	39%	44%	47%	39%

7 TOTAL E&P / THE NETHERLANDS

8 TURK TELEKOM / TURKEY



PROJECT REQUIREMENTS

TOTAL E&P is an oil platform located 100 km off the Netherlands, in the North Sea. Since there is no electricity supply network in the oil platform, the energy requirement is provided thanks to generators. Periodic maintenance and refueling of generators are carried out thanks to helicopters. This is over-costing and non-sustainable.

THE SOLUTION WE OFFER

For the project, a 2x82 kVA synchronous Hybrid Power system, which provides 40% saving in fuel consumption and 80% saving in generator maintenance period, has been proposed. The hybrid system has been also designed to be supported by solar energy up to 30 kWp. When the system is supported by 30 kWp solar energy, the generator daily operating time is reduced to 1.4 hours, resulting in 85% saving in fuel consumption and 94% in generator maintenance frequency.

SOME OF THE OPTIONAL FEATURES OF OUR PRODUCT:

- Solar system compatible Hybrid UPS,
- Tailor-made product design,
- Remote monitoring (GSM based),
- 800 VDC High quality battery group,
- Cabinet design specially insulated to prevent external effects.



PROJECT REQUIREMENTS

Türk Telekom, the leading telecom operator and internet service provider in Turkey, needed a generator set to be designated as an off-grid power source for a telecom tower in a remote area. The main objectives of this project were to reduce operating costs while reducing the risk of financial loss resulting from power outages.

THE SOLUTION WE OFFER

Teksan designed a specially-designed hybrid generator set that provides 65% savings in fuel consumption and 80% reduction in generator operating time, that can work integrated with solar energy. Thanks to its generator with increased periodic maintenance interval, and remote monitoring and high capacity fuel tank features, the system requires less technical personnel during its operation, provides longer maintenance cycles, thus reduces operating costs significantly.



Solar Panel Integration

SOME OF THE OPTIONAL FEATURES OF OUR PRODUCT:

- Solar energy integration,
- Anti-theft full protection,
- Cabinet design specially insulated to prevent external effects.
- Tailor-made product design,
- Remote monitoring (GSM and Internet Based),
- High quality battery pack that provides power for longer.





Some of our references in the telecommunications industry



- | | | | |
|---------------------------|---------------------|-------------------|-----------------------|
| ■ Airtel | KONGO | ■ Ooredoo Telecom | ALGERIA |
| ■ Allai Newroz Telecom | IRAQ | ■ Saudi Telecom | SAUDI ARABIA |
| ■ Alkan Telecom | EGYPT | ■ Turkcell | TURKEY |
| ■ Alsys Telecommunication | ROMANIA | ■ Turk Telekom | TURKEY |
| ■ Brt Media | CYPRUS | ■ Tigo | D.R. CONGO |
| ■ Camusat | TANZANIA | ■ Ucell | UZBEKISTAN |
| ■ Helios Tower | KONGO | ■ Uganda Telecom | UGANDA |
| ■ Iceland Telecom Ltd. | ICELAND | ■ Ums | UZBEKISTAN |
| ■ JV Coscom | UZBEKISTAN | ■ Vodacom | D.R. CONGO , TANZANIA |
| ■ Kazakh Telecom | KAZAKHISTAN | ■ Vodafone | THE NETHERLANDS |
| ■ Magticom Ltd. | GEORGIA | ■ Xpress Telecom | JORDAN |
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