

ADF TRUEWAY LTD

RENEWABLE ENERGY

SOLAR & WIND ENERGY

ADF The Energy Company



ENERGY

RENEWABLE ENERGY

The movement of wind and water, the heat and light of the sun, and plant, all are energy sources that can supply our needs in a sustainable way. A variety of methods are used to convert these renewable resources into electricity. Each comes with its own unique set of technologies, benefits, and challenges.

SOLAR AND WIND POWER

Solar energy—power from the sun—is a vast and inexhaustible resource. Just 20 days of sunshine contains more energy than the world's entire supply of coal, oil, and natural gas. A range of technologies is used to convert the sun's energy into electricity, including solar collectors and photovoltaic panels.

Wind turbines harness air currents and convert them to emissions-free power. Plentiful and inexhaustible in Nigeria and around the world, wind power is one of the fastest growing renewable technologies and has the potential to provide a significant portion of our electricity needs.

The sun and wind provides a tremendous resource for generating clean and sustainable electricity without toxic pollution or global warming emissions. Imagine a future powered by wind and sun. ADF believes in a future where clean, sustainable energy from the sun and wind is harnessed for commercial, civil and consumer applications

VALUES

ADF Trueway Ltd is a Private company, led by active, experienced management and driven by values that underpin everything we do.

We are committed to delivering technically challenging mega-projects safely, on time, in renewable energy production, to a high standard of quality.

We truly embrace green, environmentally conscious culture that encourages openness, innovation and change. Our aims will be accomplished through a performance based on environment that encourages, trust, individual accountability, good communication and empowerment.

STRATEGIC RELATION WITH OUR CUSTOMERS

The foundation of ADF social and environmental strategy is the creation of sustainable value for our employees, the environment and the economy of the community. To accomplish this strategy, ADF has created a better strategic communication relationship with the customers. This is focused on a mutual beneficial relationship that will keep our customers in good services. The project has expected employment of 375 to 450 workers in 25 States.

CLIMATE CHANGE

The need to slow or reverse global warming is now widely accepted. This requires reduction of greenhouse gas (GHG) emissions, especially reduction of carbon dioxide emissions using Solar and Wind for energy needs instead of fossilized plant such as Mineral Oil and Coal reduces the net addition of CO2 to the atmosphere that are harmful to human health.

SOCIAL IMPACT

Humanitarian aids

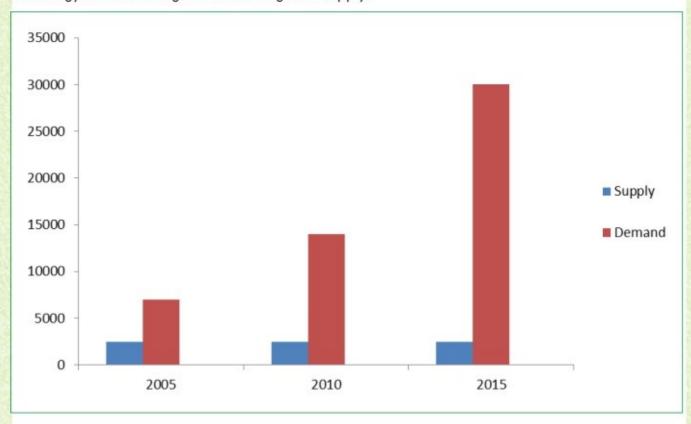
Finally 0.5% to 1% of the profit shares will be reserved for humanitarian's aids for rural development such for building schools, clean water and medical clinic

FEASIBILITY ON SOLAR ENERGY IN NIGERIA

SUPPLY AND DEMAND

Despite all the local available resources, still 70 % of the Nigerian population lives in rural areas and only 47 % of the population has access to electricity.

The energy demand in Nigeria far outweighs the supply.



F: Electricity demand and supply (MW), (Sambo, 2008)

The energy sector in Nigeria is monopolized by the Power Holding Company of Nigeria (PHCN), formerly called National Electric Power Authority (NEPA). At present the electricity demand is about 18,000MW. The total installed capacity is 6,500MW (Ibitoye and Adenikinju, 2006). PHCN generated 69.3 % of electricity from gas; 0.5 % from coal and 30.2 % from hydro plants located across the country Amobi (2006). However, due

to poor infrastructure and loses, only 3,500MW was in operation in 2010. This means there is a huge gap between supply and demand. As a consequence of this gap Nigerians have to suffer constant power cuts.

The climatic conditions prevailing in Nigeria are conducive for good solar energy on commercial scale over various regions in the country.

ENVIRONMENTAL EFFECTS

Land Use

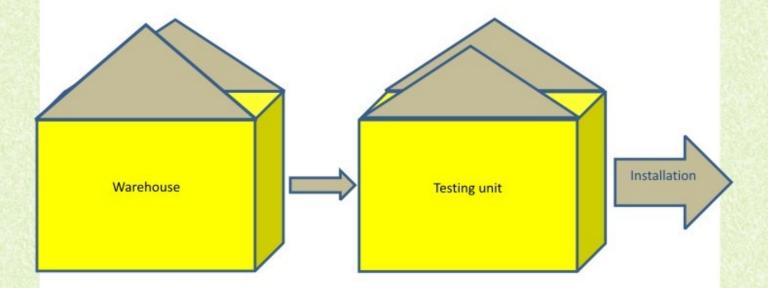
Depending on their location, larger utility-scale solar facilities can raise concerns about land degradation and habitat loss. Total land area requirements varies depending on the technology, the topography of the site, and the intensity of the solar resource. Estimates for utility-scale PV systems range from 3.5 to 10 acres per megawatt, while estimates for CSP facilities are between 4 and 16.5 acres per megawatt. ADF have the technology of saving enough land to get the same required megawatt.

BENEFITS AND IMPACTS OF RENEWABLE ENERGY

Renewable energy has the potential to reduce pollution, slow global warming, create new industries and jobs, and move Nigeria toward a cleaner, healthier energy future.

Plan of an ADF TruewayLtd Facility

As outlined, the facility consists of the warehouse and the testing unit before taking to the place for installation. All installations is monitored digitally and controlled via a central controlling room and Office at the front.



We will engage the technology that has the capacity to solve the customers' energy and maintenance problems, simultaneously. Generate income for individuals or communities, create employment, with constant of electricity, will improve standard of living.

ADF TRUEWAY LTD ENERGY ASSESSMENT,

Energy consumption / Energy Source

Company Name:		
Address:		
State:		
Country:		
Phone Number:		
E-mail:		
Website:		
Name:		Title:
Address:		
Website:		
E-mail:		
Phone number:		
Fax number:		
State:		
Country:		
Director	Manager	Business Owner

QUESTIONAIRE

Opinions On Alternative Energy Source / Consumption

Your reviews, options and suggestions of other source of energy are basis for the improvement and further development of such alternative energy source.

The information you provide will be gathered and analysed and will remain completely anonymous. There are no right or wrong answers to these questions; it is your opinion that counts for us.

If anything is unclear please ask the ADFTrueway officers or E-mail us info@adftruewayltd.com

Please answer the following questions by crossing the response which best applies to you or your company.

Home	Apartment	Shop	Bank	School	Church	Hospital	Filling Station	Restaurant	Hotel	Community	Business park	Government office
					\times							

SECTION A (ENERGY CONSUMPTION)

Appliance	Rating	Daily time use	Quantity	Daily use
	(in watts)	(numbers of hours)		(wh/day
Refrigerator	300w	24hrs	1	7,200
Air condition				
Tv / lcd standby				
Fluorescent light		10		
Cordless phone				
Microwave Oven				
Water boiler				
Ceiling fan				
Computer / Laptop		M 52		
Printer				
Standing fan				
E-Herd				
Washing Machine				
Vacuum cleaner				
Total				
Total in kwh		75		

SECTION B WHAT ARE YOUR SOURCE OF ENERGY?

Wind turbine system	Diesel / Fuel Generator	Solar pv system	Other source

Questions About The Cost Of Your Energy Source

Capital and installation cost	
Hours of operation	
How many kwh/m²/day	
How many kwh/m²/year	
Daily cost consumption	
Yearly cost consumption	
Cost of maintenance per year	
Other electrical bills in a year	

SECTION C

Questions on general conditions of your energy source	Yes	No
Is Your Source Of Energy, Pollution Free?		
Too Expensive To Manage?		
Too Nosing?		
Not Stable?		
Is There Any Security In Place?		
Any Insurance For Your Generator Plant?		
Too Difficult To Maintain?		
What Is The Life Duration Of Your Generator Plant?		

BECOME INDEPENDENT POWER PRODUCER

ADF Trueway Ltd has a stable, reliable and high efficiency source of generating self-sufficient stable energy. The installation and technical service is provided by ADF trained highly qualified personal and engineers. And many other benefits as follows:

Your benefits from ADFTureway Ltd

- Free installation of solar plant by ADFTrueway Ltd Train personnel and Engineers (for the first 6 months)
- 2. Free services for One year (for the first One year)
- 3. Three to Five years Guarantee
- 4. 25 Years Life span
- 5. Low cost of Maintenance
- Energy storage
- 7. Stable sources of energy
- High Efficiency
- 9. Follow up and communication
- 10. 24 hours round
- Saving money from electric bills, Diesel or fuel cost by thermal generators and high cost of maintenance
- 12. Earn income from your solar plant
- 13. Zero fuel consumption
- 14. Zero Co₂ pollution
- 15. Free consultation

FINANCING

ADFTrueway Ltd. plans and consult Bank for financial Services, with a made financing mix for your solar plant needs. We are happy to advise you on grants that you receive for your new home, so that you can continue to remain financially flexible. We offer financing options that fit your energy needs - whether it be deferred payment, loan amount, maturity or repayment. Looking forward to seeing you soon!

ADF Trueway Ltd is your partner for the realization of your self-sufficient solar energy plant!

ESTIMATION OF DAILY AVAILABLE SOLAR ENERGY

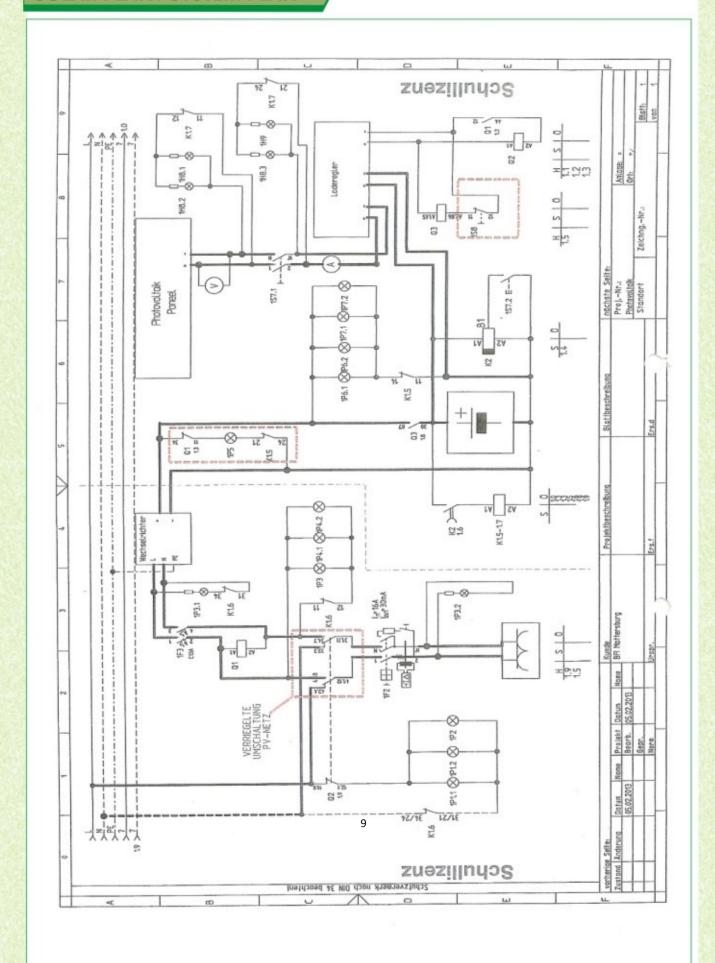
Solar radiation varies with time and season. For estimation of available useful solar energy, worst month solar radiation was considered to ensure that the designed system can operate year-round. In Nigeria yearly average sunlight hours varies from 8 to 10 hours/day and maximum area is over 10 hours/day. From estimation solar radiation is over 5.8kWh/m²/d varies from 07:30AM to 18:00PM i.e. sun hour is more than 10hrs/day. Lowest monthly average solar radiation is 4kWh/m2/day. PV system designed to supply entire load considering the worst month solar radiation, which will deliver sufficient energy during rest months of the year

CHOOSING THE RIGHT SOURCE OF ENERGY

Request / Order

Please answer the following questions by crossing the response which best applies to you or your company.

Resident						
Home Apartment Shop Bank	k School Church Ho	Station Res	staurant Hotel	GovernmentCommunity Office	Business Park	
	Place of in	stallation				
On Roof	Open Spa	ce	Buildi	ng Integrated		
Who	at is the Amour	nt of energ	y you ne	ed?		
Peak power day light /kWh (d	luring day with sun)	Peak power aft	ter sun /kWh	(after sun until mo	rning)	
What is you	or choice of ene	ergy Type f	or instal	lation?		
Solar + Grid So	lar + Diesel Generator	Solar + Wind	Energy	Solar + Any Other Source Energy		
One Face	Two Face	Three Face				
Who is	to install the so	lar plant s	ystem?			
Do it alone By ADFTrueway engineers By other compo						
Method Of Payment						
Cash	Bank Loan Credit Card					
Date:						





Thanks for your co-operation!

CHOOSING THE RIGHT SYSTEM

. Storage Significantly Adds Flexibility In Renewable Energy (re) And Improves Energy Management

To explained the estimation procedures of required storage with grid connected RE to support for a residential load. We will consider storage integrated RE may support the entire steady load and grid will support transient high loads. This will maximize the use of RE. Proper sized RE resources with proper sized storage is essential for best utilization of RE in a cost effective way.

Most of the presently installed Solar PV or Wind turbines are without storage while connected to the grid. The intermittent nature of solar radiation and wind speed limits the capacity of RE to follow the load demand. The available standards described sizing and requirements of storage in stand alone systems. However, standards available for distributed energy resources (DER) or distributed resources (DR) to connect to the grid while considering solar photovoltaic (PV), wind turbine and storage as DR. Bearing this limitation.

Solar PV is unable to provide electricity during night and cloudy days; similarly wind energy also unable to follow load demand. Moreover, PV and/or wind application is not able to follow the load demand; when these RE generators are just in the stage to start generating energy and when these RE are in highest mode of generating stage while load demand falls to the lowest level. Therefore it can be said that RE is unable to generate energy by following the load demand which is a major limitation in energy management. Storage can play this critical role of proper energy management. Moreover storage helps in reducing the intermittent nature of RE and improve the Power Quality (PQ). Storage needs to be integrated to overcome this situation

Background

Solar and Wind are the two major sources of renewable energy. Nigeria is one of best places for solar sources. In most places Nigeria, roof top Solar PV can be installed in many residential houses either in off-grid or grid connected configurations and for residential wind turbine will be specific applications in off-grid configuration. In grid connected solar PV systems where storage is not integrated, the energy output from this system does not satisfy to the desired level. To install most of the residential PV systems will be design for an unplanned way that even with battery integrated system will not be able to support the load in reliable way. This will be a typical situation when whole system will be jeopardizing as the estimation of storage system was not done correctly.

TYPICAL CONDITION IN STORAGE INTEGRATED RE SYSTEM

The adoption of storage with the PV system certainly incurs additional cost to the system but the benefits of adding storage has not been fully assessed. Therefore we aim to achieve two objectives. One is to estimate the required storage for the grid connected PV system or grid connected wind turbine or combination of grid connected PV and wind turbine system to achieve the maximum daily use of renewable energy (RE). Second objective is to identify the effects of storage on the designed system in terms of environment and economic by comparing the same system with and without storage. The feasibility of the designed system is expressed as the Cost of Energy (COE) is closer to the present system while providing environmental benefits by reducing Greenhouse Gas (GHG) emission and improving the Renewable Fraction (RF).

BACKUP FACILITIES

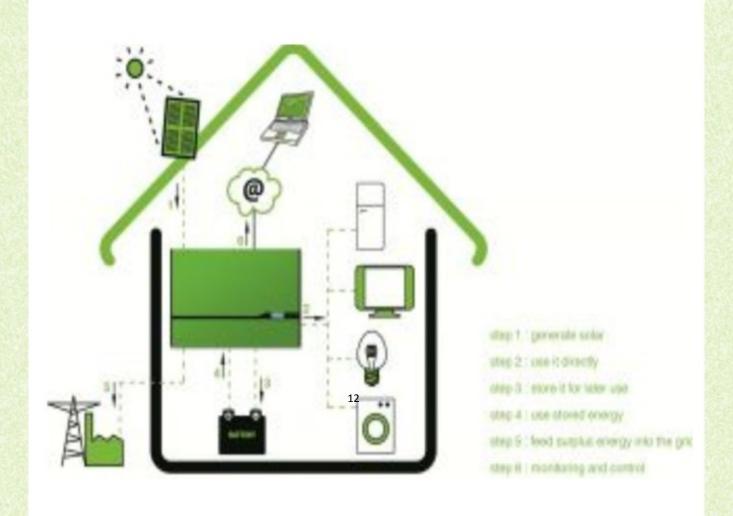
- Diesel Generator
- Wind turbine system

Estimation of daily available solar energy

Solar radiation varies with time and season. For estimation of available useful solar energy, worst month solar radiation was considered to ensure that the designed system can operate year-round. In Nigeria yearly average sunlight hours varies from 8 to 10 hours/day and maximum area is over 10 hours/day. From estimation solar radiation is over $5.8 \text{kWh/m}^2/\text{d}$ varies from 07:30AM to 18:00PM i.e. sun hour is 10hrs/day. Lowest monthly average solar radiation was $4 \text{kWh/m}^2/\text{d}$ ay. PV system designed to supply entire load considering the worst month solar radiation, which will deliver sufficient energy during rest of the year.

Annual Average Solar Radiation (5.8kwh/m²/day)

Month	Daily Time period	Time window (hrs)
lan	06:00 - 18:00	12
Feb	06:00 - 18:00	12
Mar	06:00 - 18:00	12
Apr	06:00 - 19:00	13
May	06:00 - 19:00	13
Jun	06:00 - 19:00	13
Jul	06:00 - 19:00	13
Aug	06:00 - 19:00	13
Sep	06:00 - 19:00	13
Oct	06:00 - 18:00	12
Nov	06:00 - 18:00	12
Dec	06:00 - 18:00	12



IMPORTANCE OF STORAGE

The ability to store large amounts of energy would allow electrical utilities to have greater flexibility in their operation, because with this option the supply demand do not have to be matched instantaneously.

Type Of Storage

Storage		Advantage	Limitations	
	Efficiency (%)	Life time (years)	Response time (S)	
Pumped hydro	80	50	10	Location specific Expensive to build.
Compressed Air Energy Storage (CAES)	°f _{cef} =1.3 bf _{fir} =4300kJ/k	Wh 25	360	Location specific Expensive to build.
Flywheel	85	20	0.1	Low energy density. Large standby loss
Thermal Energy Storage(TES)	75	30	Tens of minutes	Storage tank is Expensive
Batteries	80	10	0.01	Early stage technology. Expensive
Superconducting Magnetic Energy Storage (SMES)	90	30	0.01	Low energy density. Expensive.
Capacitor	80	10	0.01	Low energy density. Expensive.
Hydrogen	50	25	360	Highly flammable

ESTIMATION OF STORAGE SIZING

PV panel size and the storage size have different impacts on the indices of performance and proper balance between the two is necessary. A proper match between the installed capacities with the load demand is essential to optimize such installation.

The following steps we take to summarize the estimation.

We find out the determined daily load of a residential house

Finding of (determined required PV rating for the load)

We find out the determined daily energy output from the PV array.

We estimate PV array size

We compare the daily energy output (from PV) with the daily load, finding the required load that storage needs to support.

For the load on storage we estimate the required Storage size in Ah

Required Storage For The Residential Load In Different Configurations

Designed system	Required system capacity	Required Storage (at 24V DC system voltage)		
		Minimum (Ah)	Maximum (Ah)	
Solar PV system	2.541kW PV with 20.328m² PV array	665.90Ah	1409.64Ah	
Wind turbine system	1.92kW wind turbine with 5.58m rotor diameter	582.356Ah	1010.143AF	
Hybrid system	1.27kW PV with 10.16m ² PV array and 0.9592kW wind turbine with 3.95m rotor diameter	543.62Ah	1067.544Ah	

Emission:

Emission is widely accepted and understood environmental index. Greenhouse gases (CO₂, CH₄, N₂O, HFCs, PFCs, SF6) are the main concern for global warming. In addition SO₂ is another pollutant gas released by coal fired energy system. Emission is measured as yearly emission of the emitted gases in kg/year and emissions per capita in kg/kWh. Model used it as input when calculating the other O&M cost.

How to be your own, of independent power producer:

- Monthly loan instalment: -----naira
- Estimated savings from independent power production per month ------Naira
- Total load per month: -----naira

The savings ** refers to a system with approximately 5.50 kWp, depends on the particular circumstances and is therefore not binding.

ADF is your partner for the realization of your Solar Plant System!

We offer:

- Complete solar plant and mounting system
- Installation and all electrical work
- Carrying out all official duties
- Night-time consumption optimization

For more information about our Bank package please contact D.O Aihebhoria under request @ adftruewayltd.com or Tel; +43 6649761216

Solar Plant system Insurance - ADFTruewaycare, the Carefree Package

No matter what type of solar plant system you are planning or have the **adf trueway** solar plant carefree package protects your investment from damage and extensive downtime.

- Comprehensive, safe and cheap
- Rapid settlement of claims
- Protection against damage
- From -----naira (incl. 10% Tax.) per year!

Protected is everything that belongs directly to the functionality of a solar plant system. Rapid and bureaucratic repair in case of damage by ADFTrueway Technicians. For more information about our free package, please contact Michael Evbuoman at request@adftruewayltd.com or Phone: +234 7084449604

Energy Management And Energy Storage

Adfrueway are supported with step by step to ensure the vision of energy independence. Each step converts the ADFTrueway with customers, is designed and planned to take the next step together and subsequently.

With all manufacturers

Night-time consumption optimization

Take advantage of the opportunity of an independent counselling or consulting session with a specialist at

AdFTrueway Ltd.

WHY ADFTRUEWAY SOLAR PLANT SYSTEM?

- Free price power of the sun
- We test what we sell
- We have the experience

All information on ADFTrueway solar plant system at a glance:

Solar plant system – solar plant product lines

Solar plant Insurance – ADFTruewaycare the Carefree Package

Solar plant prices – fixed price no extra

Solar plant system Consulting – solar plant our certified planner advise

Order Solar plant System

- Tel +234,7084449604, +43 664 9761216
- ask@adftruewayltd.com
- For online inquiry

Services - our experience takes you further

As the only solar company in Nigeria, we rely on individual, vendor-independent consulting and planning. It requires the highest level of expertise, years of experience and continuous training at all levels in our company.

Trust is the most important link between us and our customers.

- Solar plant system Consulting
- Solar plant system planning
- Energy Consulting

We offer an optimum solution adapted to your needs and the existing conditions. The best components are carefully selected by our experienced team comes together on your roof or your building to a whole. Here, a more energy-efficient and resource-efficient use of materials and the environment is important. The key to a successful sustainable functioning solar plant system is the individual view of your situation. We consider not only your current consumption behaviour, visual-aesthetic desires, roof orientation and inclination, but also each valid funding situation.

Solar plant systems: We test what we sell!

When selecting our products we attach great importance to quality and sustainability. Security for our customers resulting from the experience and vision **ADFTrueway Ltd**, will establish the leading company in the field of solar plant in Nigeria.

- Experience
- Foresight
- Trust
- Control
- Security

In our product portfolio are only renowned manufacturers. Before ADFTrueway receives products in their range, they are meticulously tested in-house test facility and released only after a thorough examination.

Individual Advice

Requires the highest level of expertise.

- Network or stand-alone operation, for your solar plant system is in our experienced hands.
- Building integrated, open space or on the roof.
- Agricultural or industrial, we sick suitable found for all individual energy solution.
- Community or Business Park.

ADFTrueway will assist our customers with all the official channels and wrap the entire administration, including all funding needs for your solar energy system.

Ask For A Free Consultation

Fields marked with * are mandatory.
First name / last name: *
E-mail: *
Phone: *
Zip code: *
What Type (solar plant system)?

MAINTENANCE AND WARRANTY -

We'll Be More

- AdftruewayCheck online
- Annual Inspection
- Service package with Response Guarantee

The maintenance and monitoring of a solar plant system are long-term yield stability.

The easiest way is to regularly best to control the yield of the PV system always first of the month.

For plant operators who want to monitor and evaluate their solar yields exact offers adftrueway maintenance and monitoring packages in various shades of. A brief overview is the listing below.

Data guards on the inverter

Manufacturer-specific monitoring data on the inverter.

ADFtruewayCheck

ADFtruewayCheck is a monitoring unit which monitors the function of Photovoltaic system automatically around the clock.

ADFtruewayCheck basic data logger for monitoring suburb by the customer

ADFtruewayCheck online data logger for online monitoring; access to online monitoring software with password and user acquisition, monitoring and control of the system by virtue of the solar adftrueway. Notification for error message.

AdftruewayCheck comfort logger for online monitoring; access to online monitoring software with password and user acquisition, monitoring and control of the system by virtue of the solar adftrueway, Notification for error message. Annual inspection of the system, response time guarantee:

Annual Inspection

The maintenance of the solar plant system is once a year, if possible, before the most profitable months.

Service package with 10 Response Guarantee

The service package 10 can only be purchased together with adftruewayCheck package (basic equipment for system monitoring). It is a service contract for a period of 10 years. After adftruewayCheck reported an error by the customer of the solar plant system power of the sun to adftrueway, which has led to the failure of the system, correcting the error made as soon as possible.

Professional handling

- With authorities
- Supply
- Mounting
- Operation

On request, all solar plant systems are delivered ready assembled and prepared or as DIY packages for pickup or delivered to the construction site. Course, is also the home builder one of our staff for information. After payment of a deposit, the system will be delivered to the construction site. Will be install by our engineers team professionals (built facilities to acquired trust of our customers)..

Humanitarian Aids

Finally 1.2% to 1.5% of the profit shares will be reserved for humanitarian's aids for rural development such for building schools and clean water (borehole).

RESULTS AND FINDING

GENERATOR

Capital cost 350,000 naira

Replacement cost 320,000 naira

Operation & Maintenance cost 7.95 naira/hr.

 Life time
 15000hrs

 Fuel cost
 97 naira/ltr

10kw diesel generator 5730 kwh /year

consumption of fuel 8,440 L/year

cost of one litre = 97.00 naira/litre

Total cost/year =8,440 multiply by 97 = 818.680 naira/year

 Maintenance cost
 = 069,642 naira/year

 Electric bill
 = 084,000 naira/year

 Capital cost
 = 350,00 naira0/year

 Replacement cost
 = 320,000 naira/year

Total/year 1,642 322



You can saved all this money (#1,642 322/year) by investing in solar plant system with Adftrueway Ltd

Gain better value for money over a long period of time!

Actions price with price guarantee from -----to-----

Proper maintenance of solar power installations, whether small- or large-scale, particularly the photovoltaic panels, is critical to maintain maximum optical efficiency. To ensure that solar panels absorb as much solar energy as possible, they not only need to be properly positioned so that the maximum amount of sunlight hits them directly; their surfaces need to be kept clean at all times, as well



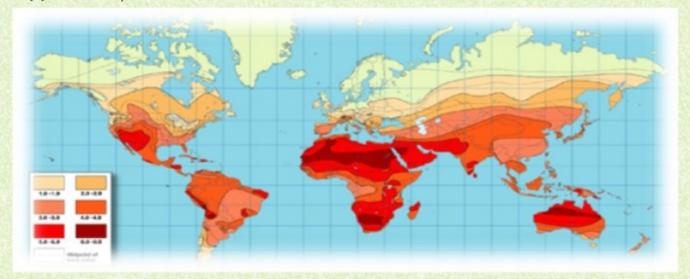








Applications / financial and environmental benefits





Enjoy free energy from the sun

OPERATING COST

Office Supplies	
Utilities	
Legal and Accounting	
Maintenance and Cleaning	
Advertising	
Insurance	
Transportation	
Telephone	
Rent (Office & Warehouse)	
Salaries	
Training	是是有自己的。 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1
Website	

COST OF SAMPLES

Energy Storage	FB 10 – 40 kw	110,000 €	
Complete System	PR 2 - 3.5 kw	7,000 €	
Complete System	RG 2 – 3 kw	4,000 €	
Complete System	P I 3 – 3.5 kw	10,000 €	
Complete System PI 14 – 15 kw		47,000 €	
Complete Mobile System	RG 1 – 1.5 kw	3,000 €	

ADF MANAGEMENT TEAM

D.O. Aihebhoria	President	
Dr. Ejeh Celestine	Vice president / Communication	
Michael Evuoman	Vice President / Technical Manager	
Rev. Peter Sunday Aluko	Vice President / Finance	
Mr Zifa Edward	Marketing and Business Development	
Eng. Ejeh Joseph .O.	Chief Operation Officer	
Eng. Alex Osayande	Technologist / Technical Director	
Electrical Engine	ering Department	
1. Aihebhoria Emanuel	(HND, BSc Electrical Electronics)	
2. Itepu Angela	(HND Electrical Engineering)	
Dr. Godwin Aihassan	Director	

Globally

All ADF's activities including sola, wind and other projects will be carried out under the ADF, ensuring all operations have been carried out using the highest standards of environmental and social responsibility.

All funding will be routed through ADF and partners.

For more information
Contact info@adftruewayltd.com
Tel: +43 664 9761216 Austria, +234 7084449604,
+2348083948135 +2348034934775 Nigeria
Website: www.adftruewayltd.com



Enjoy free energy from the sun

ADFTrueway Ltd D.O.Aihebhoria President

ADF MANAGEMENT STRUCTURE

