



**Report of the Eauxwell Prize for Innovations in Solar Energy  
Technology for Secondary Schools in Nigeria**

January, 2018

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## Executive Summary

The Solar Energy Society of Nigeria was established in 1980 to promote the research, education, adoption and dissemination of renewable energy technologies (RET) in Nigeria. At the 34<sup>th</sup> Annual General Meeting of the society held at the Obasanjo Space Centre, Abuja, in 2016, members agreed that the promotion of solar energy technologies (SET) in Nigeria can be enhanced by early education to students in secondary schools. Engr. Edwin Ewegbara, a Fellow of the society and CEO/MD of Eauxwell Nig. Ltd., Lagos, therefore, decided to sponsor a competition for innovation in SET among secondary schools in Nigeria. He donated four million Naira (N4,000,000) to the society to organize this competition. The society appointed zonal and state Coordinators for the competition. States and zonal competitions were held and zonal finalists competed for the prize at the grand finale held at the African University of Science and Technology, Abuja during the 35<sup>th</sup> National Solar Energy Forum (NASEF) of the society on October 12, 2017. A total of seventeen (17) schools participated in the competition with the North-west having the highest participants of nine (9) schools. The South-south and South-west zones did not participate, largely because of ineffective coordination. The scoring criteria used include local content, innovation, applicability of technology, socio-economic impact of the technology, environmental friendliness, potential for employment creation/generation and cost effectiveness of the technology. The team of assessors was chaired by Prof. A. S. Sambo, former Director General, Energy Commission of Nigeria and a past President of the society. Government College, Funtua, Katsina state won the overall prize of three hundred thousand Naira (N300,000). The Federal University of Technology, Owerri International School won the second prize of two hundred and fifty thousand Naira (N250,000). The Calvary Arrows College, Gboko won the third prize of two hundred thousand Naira (N200,000). Prizes were also given to the first, second and third place winners at the zones. The winners were also given a crystal plaque.

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## 1.0 Introduction

### 1.1 Profile of the sponsor



**Engr. Edwin Enwegbara**  
MD/CEO Eauxwell Nig. Ltd. Lagos

Edwin Enwegbara was born in Ihiala, Anambra State in 1953. He is the Managing Director and Chief Executive Officer of Eauxwell Nigeria Ltd, established in 1987 and recognised as Nigeria's

foremost Water & Renewable Energy companies with over 100 employees. Edwin's visionary leadership and hard work over the years has propelled Eauxwell to the forefront of Nigeria's water sector. He pioneered the use of solar energy for water pumping applications in Nigeria in 2002. Today in Nigeria, Eauxwell is known as an innovator in the fields of Water Pumping, Borehole Drilling and Renewable Energy, keeping up with global technological trends while providing cost-effective solutions to improve the lives of millions of Nigerians.

He began his career in France as a site engineer in Compagnie General Des Eaux. He then moved to Brosette Nigeria Limited where he worked as a Site Manager and Head of Dept. He rose through the ranks very quickly within Brosette as he helped the company during a period of rapid growth in the water sector in the early 90's.

Edwin Enwegbara earned his BSc degree in Mechanical Engineering in 1981 at the University of Reims, France. He also earned an Advanced Degree in Water Engineering from the University of Reims, France in 1982.

Edwin lives in Lagos, Nigeria where he and his wife of 30 years have raised their four children. He is an active philanthropist in his local community. In his personal time, Edwin enjoys reading and playing golf.

## 1.2 Background to the prize

The aims of the Solar Energy Society of Nigeria include to:

1. Encourage research and training activities in solar energy application;
2. Protect, promote and foster the establishment of high standards in the study and application of solar energy in Nigeria;
3. Provide a forum for scientists, engineers and other interested parties in Nigeria to meet from time to time to discuss problems relating to solar energy; and
4. Disseminate knowledge and information on research and development in solar energy applications.

At the 34<sup>th</sup> Annual General Meeting of the society held at the Obasanjo Space Centre on October 12, 2016, Engr. Edwin Enwegbara, CEO/MD, Eauxwell Nig. Ltd., Lagos, who had just been honoured with a Fellow of the society lamented poor innovation and the low role played by the society in promoting SET in Nigeira. He then donated four million Naira (N4,000,000) for the 'Eauxwell prize for outstanding innovation in SET' to be competed by secondary schools in Nigeria.

## 2.0 Modalities

### 2.1 Timelines for the competition

Table 1 is the timelines for the competition

**Table 1: Timelines for the competition**

Period	Activity
Dec, 2016 - Jan, 2017	Registration of participating secondary schools on state basis within the zones
Feb - March, 2017	Competition at the state level to select the best school in the state
April - May, 2017	Zonal competition among the winners in each of the states in the zones
July, 2017	Grand finale at Abuja during the 35 <sup>th</sup> NASEF to select winners for Nigeria



**Fig. 1: Poster of the North-West zonal competition**

## 2.2 Zonal and state Coordinators of the competition

Table 2 is the list of zonal and state Coordinators of the completion

**Table 2: Zonal and state Coordinators of the completion**

State	Name	Position	Telephone	e-mail	Address
<b>South-West Zone</b>					
Osun	Prof. A. T. Kuku	Chairman	08036798570	titilakuku@yahoo.com	OAU, Ile - lfe
Ondo	Dr. J. Diji	Member	08034742182	chuksdiji@gmail.com	Univ of Ibadan
Ekiti	Engr. T. Popoola	Member	08067174343	popoola.temidayo@gmail.com	Univ of Ibadan
Oyo	Dr. A. K. Aremu	Member	08023843272	ademolaomooraye@gmail.com	Univ of Ibadan
Lagos	M. O. Oba	Member	0803422840	obamichael@yahoo.com	Yaba College of Tech, Yaba
Ogun	Prof. A. A. Asere	Member	08035989056	aaasere77@yahoo.co.uk	OAU, Ile - lfe
<b>South-East Zone</b>					
Ebonyi	Prof P. Ugwuoke	Chairman	08065702570	peugwuoke@gmail.com	UNN, Nsukka
Enugu	Dr. C. Ibeto	Member	08039513896	cibeto@yahoo.com	UNN, Nsukka
Anambra	Prof AOC Nwokoye	Member	08033544136	aoc.nwokoye@unizik.edu.ng	Nnamdi Azikiwe Univ Awka
Imo	Prof. E. N. C. Okafor	Member	08033273974	encokafor2000@yahoo.com	MOU, Umudike
Abia	Prof I. Okoro	Member	08037751492	oiokoro@yahoo.co.uk	MOU, Umudike
<b>South-South Zone</b>					
Edo	Prof. L. Ezemonye	Chairman	08023353847	ezemslaw@yahoo.co.uk	Univ of Benin, Benin
Delta & Bayelsa	Prof. S. O. Azi	Member	08032395000	ogochukwuazi@uniben.edu.ng	Univ of Benin, Benin
Rivers	Dr. Mrs. Omosole Osafire	Member	07033243124	eromopower@yahoo.com	Fed Univ of Pet Res, Effurum
Akwa-Ibom & Cross River	Dr. F. Alonge	Member	08033603462	falonge6@yahoo.com	Univ of Uyo,

<b>North-West Zone</b>					
Zamfara	Prof. M. S. Dangogo	Chairman	08063432543	riskuwashehu@hotmail.com	UDUS, Sokoto
Kebbi	Dr. M. Argungu	Member	08036019468	garba.musa@udusok.edu.ng	UDUS, Sokoto
Sokoto	Prof B. Garba	Member	08036783215	bgarba2002@gmail.com	SSG, Sokoto
Kaduna	Engr. Balogun Muyideen	Member	08098826282	balo.muyi@gmail.com	ABU, Zaria
Katsina	Engr. I. Rikoto	Member	08038498566	rikoto2003@gmail.com	UDUS, Sokoto
Kano & Jigawa	Dr. Bala Abdullahi	Member	08033339805	balabdullahi@yahoo.com	KSUS & T, Wudil
<b>North-East Zone</b>					
Bauchi & Gombe	Prof. A. A. Bello	Chairman	08023835444	biieeyz@yahoo.com	ATBU, Bauchi
Borno & Yobe	Dr. I. Garba	Member	08065418536	isagar2051@yahoo.com	BUK, Kano
Adamawa & Taraba	Muhammad T. Baba	Member	08037259060	muhammادتankobaba@gmail.com	Fed Poly Mubi
<b>North-Central Zone</b>					
FCT	Eng. J. O. Ojosu	Chairman	08056181776	johnsonrains@yahoo.com	ECN, Abuja
Niger	Dr. J. Ezekwora	Member	08053331748	aghaegbunam@yahoo.com	FUT, Minna
Nassarawa	Engr. I. Zarma	Member	07084415597	ismailazarma@yahoo.com	ECN, Abuja
Kogi	Dr. J. S. Ibrahim	Member	08052958435	rovemmakurdi@yahoo.com	UAM, Makurdi
Benue	Dr. A. Edeoja	Member	08036993038	aoeadeoja@gmail.com	UAM, Makurdi
Kwara	Prof. J. A. Olorunmaiye	Member	08036000053	adeolorunmaiye@gmail.com	Univ of Ilorin
Plateau	Fred Attah	Member	0803588041	attahfred@gmail.com	SunCraft Energy Ltd, Abuja

### 2.3 Scoring Criteria

The scoring criteria used in assessing the innovations are contained in table 3

**Table 3: Scoring criteria used in assessing the innovations**

S/No	Criterion	Max Score (%)
1	Local content	15.0
2	Innovation	25.0
3	Applicability of technology	15.0
4	Socio-economic impact of technology	10.0
5	Environmental friendliness of technology	10.0



6	Potential for employment creation/generation	15.0
7	Cost effectiveness of technology	10.0
<b>Total</b>		<b>100.0</b>

### 3.0 The Competition

#### 3.1 Schools that participated in the competition

A total of seventeen (17) schools participated in the competition. The North-west had the highest number of participants of nine (9) schools. There were no schools from the South-west and South-south geo-political zones of the country. Table 4 is the schools that participated.

**Table 4: Schools that participated in the competition**

Zone	State	School
North-west	Katsina	Danmasani International Academy, Katsina
		Government College, Funtua
		Erudite Comprehensive School, Katsina
	Sokoto	Government Technical College, Farfaru
		Sultan Maccido Institute for General Studies, Sokoto
		Army Day Secondary School, Sokoto
	Kaduna	Sardauna Memorial College, Kaduna
		Alhudahuda College, Zaria
	North-central	Benue
ECWA Secondary School, Makurdi		
Baptist High School, Makurdi		
Calvary Arrows College, Gboko		
North-east	Adamawa	Atiku Abubakar Government Secondary School, Jada
South-east	Imo	Federal University of Technology, Owerri International School
	Abia	Michael Okpara University of Agriculture Demonstration Secondary School, Umudike
	Enugu	St. Theresa's Secondary School, Nsukka



**Fig. 2: Group photograph of Katsina state competitors**

### 3.2 The Assessors

The team of assessors that assessed the innovations at the grand finale comprised of the following:

1. Engr. Prof. A. S. Sambo, former Director General, Energy Commission of Nigeria, Abuja, Chairman
2. Engr. Prof. P. A. Onwualu, former Director General, Raw Materials Research and Development Council, Abuja, member
3. Prof. P. U. Ugwuoke, Director, Centre for Energy Research and Development, University of Nigeria, Nsukka, member
4. Engr. B. G. Danshehu, Past President, Solar Energy Society of Nigeria, member
5. Dr. M. M. Garba, Director, Sokoto Energy Research Centre, Usmanu Danfodio University, Sokoto, member
6. Engr. K. Ali, President of the Council for the Regulation of Engineering in Nigeria, Abuja, member



**Fig. 3: Prof. A. S. Sambo leading the project assessment and evaluation committee at the North-West zonal finals**



**Fig. 4: The assessors listening to the presentation of Sardauna Memorial College, Kaduna**

### 3.3 Winners, by zone

The zonal winners are contained in table 5

**Table 5: Zonal winners of the competition**

Zone	State/Project title	State Winners			Zonal Winners	
		1 <sup>st</sup> (score)	2 <sup>nd</sup> (score)	3 <sup>rd</sup> (score)	Position	Winners
NW	Katsina	Govt. College, Funtua (76%)	Erudite Comprehensive School, Katsina (62%)	Danmasani Int. Academy, Katsina (61%)	1 <sup>st</sup> (80.7%)	Govt. College, Funtua
	<b>Project title</b>	Multipurpose solar thermal collector	Biogas digester	Thermo-syphon solar heating system	<b>Project title</b>	Multipurpose solar thermal collector
	Sokoto	Govt. Technical College, Farfaru (74%)	Sultan Maccido Inst. for General Studies, Sokoto (70%)	Army Day Sec. School, Sokoto (64%)	2 <sup>nd</sup> (77.3%)	Govt. Technical College, Farfaru
	<b>Project title</b>	Household gasifier	Solar water pumping machine	Solar concentrator cooker	<b>Project title</b>	Household gasifier
	Kaduna	Sardauna Memorial College, Kaduna	Alhudahuda College, Zaria	Govt. Sec. School, Saminaka	3 <sup>rd</sup> (73.2%)	Sardauna Memorial College, Kaduna
	<b>Project title</b>	Solar boble green dryer,, hydrophonic and modern solar tractor	Solar heater	Telescope	<b>Project title</b>	Mixed mode solar dryer
NC	Benue	Calvary Arrows College, Gboko (69.7%)	Command Sec. School, Makurdi (67.7%)	ECWA Sec. School, Makurdi (59.0%)	1 <sup>st</sup> (69.7%)	Calvary Arrows College, Gboko
					<b>Project title</b>	Intelligent solar energy system
	<b>Project title</b>	Intelligent solar energy system	Solar cooker and oven	Solar-aided fuel cell technology	2 <sup>nd</sup> (67.7%)	Command Sec. School, Makurdi
					<b>Project title</b>	Solar cooker and oven
					3 <sup>rd</sup> (59.0%)	ECWA Sec. School, Makurdi
<b>Project title</b>	Solar-aided fuel cell technology					
NE	Adamawa	Atiku Abubakar Govt. Sec. School, Jada (79%)			1 <sup>st</sup> (79%)	Atiku Abubakar Govt. Sec. School, Jada

	<b>Project title</b>	Construction of solar powered motor			<b>Project title</b>	Construction of solar powered motor
SE	Imo	FUTO International Secondary School, Owerri			<b>1<sup>st</sup></b> (82%)	FUTO International Secondary School, Owerri
	<b>Project title</b>	Hybrid water-solar power generator (82%)			<b>Project title</b>	Hybrid water-solar power generator
	Abia	Michael Okpara University of Agriculture Demonstration Secondary School, Umudike			<b>2<sup>nd</sup></b> (81%)	Michael Okpara University of Agriculture Demonstration Secondary School, Umudike
	<b>Project title</b>	Solar egg incubator (81%)			<b>Project title</b>	Solar egg incubator
	Enugu	St. Theresa's Secondary School, Nsukka			<b>3<sup>rd</sup></b> (79%)	St. Theresa's Secondary School, Nsukka
	<b>Project title</b>	Solar chick brooder (79%)			<b>Project title</b>	Solar chick brooder

### 3.5 Winners of the competition

The winners of the competition are contained in table 6.

**Table 6: Winners of the competition**

Position	School
1 <sup>st</sup>	Government College, Funtua, Katsina state
2 <sup>nd</sup>	Federal University of Technology Owerri International Secondary School, Owerri, Imo state
3 <sup>rd</sup>	Calvary Arrows College, Gboko, Benue state

## 4.0 Finances

### 4.1 Cash award to the winners

The cash prizes awarded to the zonal and final winners are contained in table 7. Expenses were incurred in transporting and accommodating the teachers and pupils at the zones and at Abuja. The Coordinators were also mobilized to organize the competition in the states and the zones.

Table 7: Cash prizes awarded to the winners

Category	Position	Amount (N)	School
Final	1 <sup>st</sup>	300,000	Government College, Funtua
	2 <sup>nd</sup>	250,000	Federal University of Technology Owerri International Secondary School, Owerri

	3 <sup>rd</sup>	200,000	Calvary Arrows College, Gboko
North-west	2 <sup>nd</sup>	150,000	Government Technical College, Farfaru, Sokoto
	3 <sup>rd</sup>	100,000	Sardauna Memorial College, Kaduna
North-central	2 <sup>nd</sup>	150,000	Command Secondary School, Makurdi
	3 <sup>rd</sup>	100,000	ECWA Secondary School, Makurdi
South-east	2 <sup>nd</sup>	150,000	Michael Okpara University of Agriculture Demonstration Secondary School, Umudike
	3 <sup>rd</sup>	100,000	St. Theresa Secondary School, Nsukka
North-east	1 <sup>st</sup>	100,000	Atiku Abubakar Government Secondary School, Jada
<b>Total</b>		<b>1,600,000.00</b>	

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- Engr. Edwin Enwegbara, FESN
- Prof. P. Ugwuoke, Coordinator of South-east zone
- Engr. T. B. Muhammad, Coordinator of Adamawa state
- Engr. I. Rikoto, Coordinator, Sokoto and Katsina states
- Dr. G. Argungu, Coordinator, Kebbi state
- Engr. Dr. A. Edeaja, Coordinator, Benue state
- Dr. M. M. Garba, Director, SERC, Usmanu Danfodio University, Sokoto
- Teachers and pupils of the various participating schools
- Officials of State Ministries of Education
- Engr. Prof. A. S. Sambo and the team of assessors: Prof. P. A. Onwualu, Prof. B. G. Danshehu, Engr. K. Ali
- Prof. S. M. Dangoggo, Chairman, North-west Zone of the competition