Access to Energy at Schneider Electric

Life is on for everyone, everywhere, at every moment

Presented by: Gareth Smit
Schneider Electric is leading the digital transformation of energy management and automation

Key figures for 2018

5% of revenues devoted to R&D

€25.7 billion
2018 revenues

42% of revenues in new economies

137,000+
Employees in over 100 countries

A well-balanced global presence
2018 Revenues breakdown

North America 28%
Western Europe 27%
Asia Pacific 29%
Rest of the World 16%

Four End Markets:

39% Commercial & Industrial & Residential Buildings
14% Data Center & Networks
29% Industry
10% Energy & Utilities
8% Infrastructures

*Based on non-GAAP FY 2017 orders
3 challenges leading our sustainable strategy

The energy equation

The facts vs The need

Energy demand vs CO₂ emissions

× 1.5 vs ÷ 2

Energy efficiency and resources efficiency are a must for the planet ... and the bottom-line

The energy paradox

1: Billion people has no access to electricity
63: Million people live in fuel poverty in Europe

Find business solutions for long-term development collaborating with public and private actors

The rise of awareness

Culture and values Customer & public Regulation & ratings

Build a culture and a comprehensive disclosure on environmental, social, and governance data not only to comply but make it a competitive advantage and a transformation driver
We believe Access to Energy is a basic human right

Our challenge: we want everyone on our planet to have access to reliable, safe, efficient, and sustainable energy

Universal access to energy at the heart of sustainable growth

1. **No Poverty**
   - Reduced poverty

2. **Zero Hunger**
   - Improved agriculture productivity

3. **Good Health and Well-being**
   - Safe lighting, medicine storage & health services

4. **Quality Education**
   - Improved conditions at school and at home & better education in electricity trades

5. **Gender Equality**
   - Women integration & entrepreneurship

6. **Clean Water and Sanitation**
   - Access to drinking water & irrigation

7. **Affordable and Clean Energy**
   - Universal access to energy at the heart of sustainable growth

8. **Economic Growth**
   - Job opportunities and economic development

9. **Decent Work and Economic Growth**
   - Decreased rural exodus

10. **Sustainable Cities and Communities**
    - No impact on climate change

11. **Climate Action**
    - Life Is On

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Energy creates social and economic development, it creates a better life

**Health**
- safe lighting,
- medicine storage,
- health services

**Economical development**
- agriculture,
- entrepreneur development

**Security**
- public and private lighting

**Education**
- improved working conditions at school and at home

**Access to water**
- provision of drinking water and irrigation
Access to electricity

Perspectives in Africa
How do you provide energy access to people deprived of it?

Progress on electricity access rate is being made in all parts of the world, but to a lesser extent in Sub-Saharan Africa (mainly due to population increase)

- **In 2000-2017**, over 1.3 billion people have gained access globally - Most progress has been made in developing Asia with 870 million
- **600 million** people are expected to gain access to electricity in the next decade – Most progress is expected in Africa
- **By 2030**, there will be 674 million people without access (on business as usual)

Scenarios point out the need for developing minigrids to reach electricity access targets

- Between 2010 and 2017, over 400 million people globally gained access to electricity from off-grid solar solutions
- And by 2030, an estimated 71% of new electricity connections will be provided via off-grid or minigrid solutions
- Investment gap: Total financing needed to reach universal electricity access by 2030 is at least $52 billion USD per year, more than twice the level mobilized under current and planned policies
- In Sub-Saharan Africa, industry actors, public institutions and national governments are developing frameworks to help maturate the minigrid market

At the current trajectory, in 2040 95% of the remaining global unelectrified population will be in Sub-Saharan Africa

Contrasted situation + opportunities for electrification:

• **Kenya electrification rate**: up from 8% in 2000 to 73% in 2018
  + the Last Mile Connectivity Project targets **universal access by 2022**

• **Ethiopia electrification rate**: up from 5% in 2000 to 45% in 2018
  + the National Electrification Program targets **universal access by 2025**

• **Burkina Faso electrification rate**: currently at 20% (with 60% of the urban and only 3% of the rural population) and targeting **80% by 2020**
  The Government has taken steps to introduce legislation encouraging private-sector investment and liberalizing electricity generation and distribution

• **Total population in sub-Saharan Africa** without access to electricity remains at **600 million** (57% of population) and 15 countries have access rates below 25%

Source: World Energy Outlook 2018
Schneider Electric
Access to Energy program

Enabling the ecosystem
In 2009, we set up an ambitious Access to Energy program with 3 pillars:

**Offers & business models**
For the design and deployment of adequate electrical distribution offers.

**Investments**
Investment funds for innovative energy entrepreneurship locally.

**Training & Entrepreneurship**
Train disadvantaged people and sustain entrepreneurship in the energy field.

### Achievements as of end of 2018

- Energy access solutions provided to 24+ M people
- Investments in 20 energy access ventures
- 190,000+ people trained in electricity trades

### Targets by 2025

- Energy access solutions to 50 M people
- 3 Investment funds focusing on Sub-Saharan Africa, Europe & Asia
- 1,000,000+ people trained in electricity trades
Investment

Investing in energy access
Impact investing: a strong and long-lasting commitment from Schneider Electric

**LAUNCHING OF SCHNEIDER ELECTRIC ENERGY ACCESS ASIA**
+20M€ fundraising
Giving access to electricity in South-East Asia & India

**LAUNCHING OF ENERGY ACCESS VENTURES**
€75M impact fund, co-funded with DFI’s
Giving access to electricity in Africa

**INVESTMENT IN LIVELIHOODS**
€38M Carbon fund (€5M participation from Schneider Electric)
Backing reforestation, agroforestry and improved cookstoves

**LAUNCHING OF SCHNEIDER ELECTRIC ENERGY ACCESS**
€7M Solidarity-driven fund
Bridging the energy gap worldwide, 13 investments
Schneider Electric Energy Access – Portfolio overview

Amped Innovation, which designs and produces radically affordable solar systems for off-grid communities

Kayer Energie Rurale, a rural social enterprise that builds solar irrigation systems in Senegal

Simpa Networks (exited), which makes modern energy simple, affordable, and accessible for everyone.

SunFunder, a financing company that specializes in companies seeking to increase energy access in emerging markets.

Okra, which designs step by step modular picogrids, thanks to a network of plug & play Solar Home Systems, they connect, manage and control.

Nova Lumos (exited), which designs remote solar electricity production systems large enough to replace small diesel generators

Fenix International (exited), a social enterprise that develops access to energy solutions in partnership with mobile operators.
Energy Access Ventures – Portfolio overview

Off-Grid Electric (OGE)
- OGE designs, manufactures, deploys, finances and serves solar home systems in Tanzania and Rwanda using a Pay As You Go (PAYG) model.
- The company operates as a vertically integrated distributed utility, leasing solar home systems to rural and peri-urban households with no access to the national grid.
- To date the company has installed over 110,000 systems.

Persistent Energy Ghana (PEG)
- PEG focuses on distribution and finance of PAYG Solar Home Systems technology.
- The company is currently active in Ghana and is planning on expanding to Côte d'Ivoire.
- PEG has >6,000 customers.

d.light
- The largest distributed solar lighting brand in the world, with revenues of $44m in 2015-16.
- Originally focused on selling solar lanterns, then moved in to the PAYG Solar Home System space.
- Has sold over 14m solar lanterns and 250,000 Solar Home Systems in 62 countries.
- Fully vertically integrated; designs, manufactures, distributes and finances its products.
## Energy Access Ventures – Portfolio overview

<table>
<thead>
<tr>
<th>Company</th>
<th>Description</th>
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| **!nspiraFarms** | • !nspiraFarms produces and sells modular, pre-certified renewable-powered processing and cold chain solutions for value addition and loss reduction in small scale agribusiness, enhancing the sustainability of domestic and global supply chains  
• The company offers attractive financing to low-income customers as well as offering cash sales  
• All !nspiraFarms products are off-grid capable and can be powered by renewable energy |}

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| **SunCulture** | • SunCulture designs and sells solar powered irrigation systems in Kenya and will expand to other Sub-Saharan geographies  
• The company currently sells irrigation solutions on a cash basis. Going forward, the Company will also offer their products also on a PAYG basis  
• SunCulture has partnered with Fargo, who delivers its products in Kenya via their 135 drop-off points in Kenya and with a lead-time of 24h |}

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| **PayGo Energy** | • PayGo has developed a smart metering system with mobile integration for the distribution of LPG to BOP residential customers for clean cooking.  
• Improved service system and innovative smart metering technology that eliminates upfront costs and enables customers to access clean-burning LPG on a pay-as-you-go basis |
Solarise Africa

- Solarise Africa provides commercial and industrial (C&I) companies with customised financing solutions that enable them to take advantage of solar technologies with limited upfront investment and manageable periodical payments.
- Focusing on captive rooftop and ground mounted solar projects ranging from 100kW to 3MW
- Currently active in Kenya, looking to open in South Africa and has plans to expand into East, Southern and West Africa

Port It Global

- Port It Global is a mobile phone data-driven financial platform providing behavioral scoring and pay-over-time services to the unbanked at the point of sale (PoS)
- Business-to-Business-to-Consumer (B2B2C) model, enabling credit poor individuals to build a repayment history and to gain access to low-margin, short-term PoS installment management

Zonful Energy

- Zonful Energy is a provider of clean energy solutions, especially PAYG Solar Home Systems, to off-grid households
- Became the country leader in Zimbabwe, and currently expands in the Region
Training & Entrepreneurship

Provide underprivileged people with the knowledge and skills that have long-term impacts.
Build a career path in an energy related job

Adapted to local needs
• Free and accessible
• A few months of basic training
• Or full-time or evening and week-end courses
• Or multi-year training leading to qualifications

Transfer of competencies
Facilitate the training of trainers to support effective and quality roll-out of training to a wider audience

Empowerment of people
• Enable entrepreneurship for people who have been trained, connecting them with the retail plans of the countries.
• Give trainees the ability, should they wish, to sell and maintain energy access offerings and to create their own small business.
The program worldwide

190,000+ people trained in energy trades, across 150+ projects in 40+ countries with 250+ partners (local NGO’s, local authorities, national ministries of education…)

- Our presence
- Our new geographical presence
Our objectives for 2025
Inclusive Training & Entrepreneurship

- 10,000 entrepreneurs
- 1,000,000 people trained
#PoweringJobs
Advocacy Campaign
Led by POWER4ALL
How to close the skill gap in decentralized renewable energy (DRE) sector?

• **Up to 20,000 decentralized renewable energy companies** are needed to ensure access to affordable, reliable, sustainable and modern energy for all by 2030.

• **4.5 million jobs globally by 2030** could be created by decentralized renewable energy value chain – including sales, installation, service, appliances.

• **Today there is a paradox:**
   The majority of renewable energy jobs are in mature countries (less than 1% in Africa).
   There is a dearth of workforce with the technical, financial and managerial skills in low energy access countries.
#PoweringJobs Advocacy Campaign led by A Power for All branded campaign

**Objective:**

Promote job creation opportunities in the energy access sector thanks to training and education.

**Steps:**

1. **Awareness:** Prove that DRE markets can be created and grown with a positive social impact on energy access, employment (and related SDGs).

2. **Advocacy:** Grow support within target institutions for financial, policy and programmatic support for DRE training and education.

3. **Activation:** Demonstrate new opportunities for youth and women (connect the skills set need for DRE to energy sector more broadly).

Access to Energy = Access to Jobs
1 Awareness: prove Decentralized Renewable Energy = positive social impact on energy access and employment

- Design & conduct first Decentralized Renewable Energy job survey:
  - In Kenya, Nigeria, and India: ~150 companies in each country
  - Including baseline for sector, job creation potential, and training.
- Conduct a gap analysis between current trajectories v. actual numbers needed to ensure access to affordable, reliable, sustainable and modern energy for all by 2030
- Identify reforms needed in Technical and Vocational Education and Training in low energy access countries and ministries/agencies needed to create transformation (global and national).
- Develop thought leadership platform and campaign plan to pursue reforms
Advocacy: grow support within target institutions for financial, policy and programmatic support for DRE training and education with a coalition of partners
Offers and Success stories

Solutions for village electrification and domestic solutions for energy-related needs
We develop products and solutions that meet a wide range of both individual and community needs across the energy chain.

- For homes and micro-businesses
- For fundamental public services: education, healthcare,..
- For Micro-entreprises: agriculture, services
- For villages and communities
- For emergencies
- For energy skill development
Our Access to Energy portfolio of **Products and Solutions**

**Mobiya**
- Access to light, and phone charging

**Homaya**
- Access to light, fans, TV,....

**Villaya**
- Electricity for schools, health center, and other public buildings
- Battery charging
- Lights for public areas & roads
- Easier access to water

**Education**
- Didactical benches, courses contents

**Training**

**New products and solutions launch in 2018-2019**
MOBIYA

Portable solutions: solar lanterns including or not a solar panel and a USB port to charge mobile phones
MOBIYA range

Portable solutions: solar lanterns including or not a solar panel and a USB port to charge mobile phones

NEW – Q3 2019

Mobiya
Solar powered portable LED Lamp with mobile charger
#Mobiya

Mobiya Lite
Solar LED Lamp with mobile charger
#MobiyaLite

Mobiya Read
Solar reading lamp
#MobiyaRead

Mobiya Front
Frontal lamp
#MobiyaFront
Mobiya
Portable solar LED lighting system

KEY FEATURES

- **Water resistant**
  Up to 0.5m depth for one hour

- **Up to 48 hours of autonomy**
  With one day of charge

- **Integrated Mobile phone charger**
  USB Cable with 4 adapters, charge all kind of phones

- **Shock Resistant**
  User friendly - Plug & Play product

- **Energy Efficient Lighting**
  Thanks to electronic design, LED technology & Lithium Ferro Phosphate battery
HOMAYA

Solutions for domestic electrification: solar home systems for rural or peri-urban areas
Homaya range

Solutions for domestic electrification: solar home systems for rural or peri-urban areas

Homaya Family
Solar Home System including a solar panel and lamps
#HomayaFamily

Homaya Hybrid
AC and DC, Solar and Grid Home System
#HomayaHybrid
Find out more about this product in this video

Homaya PayG
Solar Home System Pay as you go, including a solar panel and lamps
#HomayaPayG

NEW – Q3 2019
Homaya Solar Home System
Individual solar home electrification system

**KEY FEATURES**

- **Reliable, long life & safe battery**
  Inbuilt with the latest, clean and green Lithium Ferro Phosphate technology with 5 years battery life

- **Portable solution**
  Portable lamps with lithium battery and power box with inbuilt torch

- **Charges 3 mobiles or a radio at the same time**
  3 USB charging ports provided to charge standard or smart phones or radio

- **Additional Solar panel compatibility**
  Can connect higher Wp Solar panel for quick charging during cloudy days

- **Globally certified**
  Lighting Global, SONCAP, SABS (IEC), LM79, LM80
VILLAYA

Solutions for collective electrification: microgrids, solar street lights, water pumping solution
Focus on Villaya Containerized Microgrids
Focus on Villaya Containerized Microgrids: two product lines

- Villaya Emergency
- Villaya Community
Main market players overview

Access to Energy

- Refugee camps
- Disaster relief
- Rural electrification
- Schools
- Small businesses
- Hospitals

Other segments

- Mining industry and telecoms
- Oil & Gas
- Islands
- Defense

Mobile PV panels: **Villaya Emergency**

Fixed PV panels: **Villaya Community**

Mobile & fixed PV panels
Villaya Emergency

A game changer, containerized technology, including pre-mounted and retractable solar modules
## Technical Specifications

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container</td>
<td>10 feet or 20 feet</td>
</tr>
<tr>
<td>PV power</td>
<td>From 7kWp to 65kWp (24 to 240 modules)</td>
</tr>
<tr>
<td>Power Conversion system</td>
<td>From 7kVA to 63kVA (48V)</td>
</tr>
<tr>
<td>Battery storage</td>
<td>From 10 kWh to 120 kWh</td>
</tr>
</tbody>
</table>
## Villaya Emergency’s advantages

### Robust
- Designed by Schneider Electric
- 20 year life span
- Fully tested in house
- Up to 5 years warranty

### Cost Effective
- 3 year ROI compared to genset
- No maintenance
- Fast installation

### Clean
- Solar energy
- Environmentally friendly batteries specifically designed for high temperature environments

### Mobile
- Fast installation: 30min with no expert required
- Transportable by lorry, helicopter (10 feet only) or boat
- Plug & Play

### Remote monitoring
- Ecostruxure for energy access
  - Monitoring
  - Control
  - Efficiency

### Scalable
- Modular solution
- 10ft or 20ft containers
- Additional containers of PV arrays available
- Hybrid with grid or genset if required
Technological innovations:

1. Sodium batteries, adapted to high temperatures and extreme environments, no need of air cooling systems. 80% DoD (deep of discharge) Environment free and 100% recyclable
Villaya Emergency

Technological innovations:

3. Remote monitoring

• A system monitor enables users to check **battery status**, along with energy production and consumption levels, at any time.

• **The data can be captured and sent by GSM, 4G or satellite**, and analyzed thanks to EcoStruxure for Energy Access.
Villaya Emergency

https://www.youtube.com/watch?v=4_xgUYjfqWc
Success stories
Provide a "multi-energy" plant supplying electricity, hot and very hot water production without CO2 emissions for:

- Fish farming: pool heating for fish growing, refrigerators power supply, fishing food machine
- Rice steaming
- Market gardening: pasteurization, food storage in refrigerators, fruit drying
- Irrigation: pumps power supply

**Solution:**

- Electrical production: 50 kWp PV arrays / 36 kVA
- Thermal production: 50 KW thermic power with CSP or flat panels

2016-2017: two first sites inaugurated in Togo & Senegal
2018 and onward: up to ~100,000 people in 8 sites of UEMOA countries with also drinking water, lighting and internet access provision.
Global Supplier Framework Agreement

• Schneider Electric selected as a preferred supplier for solar lanterns

CHAD

• Equip a camp in Chad with Mobiya solar lanterns in order to give access to the light at night and recharge mobile phones
• 2016: 20,000 Mobiya solar lanterns

Rohingya Refugee camp BANGLADESH

• 2018: 36,000 Mobiya solar lanterns delivered within 45 days after receiving order
Schneider Electric is committed to providing:

- an efficient and sustainable energy access solution
- and the equipment needed to process agricultural products

Schneider Electric and IECD:

- will train women in the cooperative to help them find sustainable economic opportunities
Asia - Rural electrifications and entrepreneurs’ retail shops

HCL Foundation project

- 47 Solar Microgrids
- 13 commissioned
- Installation work in progress in 7 microgrid sites

Retail shop with trained electricians

- 22 retail outlets opened by Schneider Electric trained entrepreneur’s – India & Myanmar

Cambodia Tender for rural electrification

- Received order for 3000 SHS in govt. tender

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Partnership with Green Village Electricity (GVE)

Schneider Electric as Technology Partner,

- Provides support to design the overall Mini-grid system.
- 24 - 38 kWp solar Microgrids installed combining:
  - Conext XW+ power conversion package with remote monitoring
  - A pay-as-you-go prepaid metering solution

Uninterrupted renewable power supply to:

- 200 to 300 households per villages
- 25 small to medium scale enterprises per villages
- Schools, mosques and churches, and public buildings

GVE benefited from a unique concessional funding scheme (debt + equity) provided by a commercial bank (Bank of Industry) backed by the UNDP
Our objective for 2025:
50 million people
with access to safe, reliable, efficient and sustainable energy
JOIN THE COMMUNITY

Access to energy program
@SchneiderA2E
www.linkedin.com/groups/2830580
WANT TO KNOW MORE?


Schneider Electric White Papers

Providing Sustainable Access to Energy:

Microgrids for Access to Energy:

Developing the Skills in Energy for Emerging Economies through TVET

Micro and Social Entrepreneurs in the Energy Field: