SunPower™

Who is SunPower?

SUNPOWER™

MORE ENERGY. FOR LIFE.™

Well capitalised company backed by Total

- World's fifth-largest publicly-traded oil & gas company
- 2012 revenue: €200B
- First largest capitalisation on the Euronext Paris and the Euro zone

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- World-leading solar conversion efficiency
- We only do solar, more than 200 patents
- 1 GWp total production capacity at end of 2012
- 5,000+ employees
- 2012 revenue: $2.4B



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Proven leader in innovation

World-record-breaking cell efficiency[1]

PlanetSolar
World's largest solar boat



Solar Impulse
The first manned solar airplane



Partnership with car manufacturers



[1] Green, M. A., et. al. "Solar Cell Efficiency Tables (version 39)," Progress in Photovoltaics, 2013, vol. 21, p1-11

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World Leader in Solar for Telecom

- Global leader since more than **20 years**: first installation in Togo,1989
- More than **3,000 installations** worldwide, approx. **18 MWp** (90% in Africa)
- Chosen by **Orange**, one of the leading telecom operator, as their **PV preferred partner since**: **1,500 sites over 14 countries.**
- **Applications**: fixed mobile, radio operated networks, transmitting base stations, peripheral infrastructures



Reduce energy OPEX & carbon footprint.
Green branding advantage

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A partner, not only a supplier

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Optimize the sizing of systems to ensure sufficient power generation while avoiding excess CAPEX.

- **Rationalized** CAPEX (no oversizing)
- Guaranteed system **efficiency** :
  - with a comprising understanding of local constraints
  - avoiding underestimation
  - using time-tested components



→ *Over **3 000 telecom sites worldwide** experience in **pragmatic** sizing*

→ *Tenesol **support** worldwide, to check input parameters on field*

→ *> 30-persons project / **technical team** for multiple-energy-generators*

→ ***Efficiency-driven** recommendations : **open architecture** including any possible source of energy*

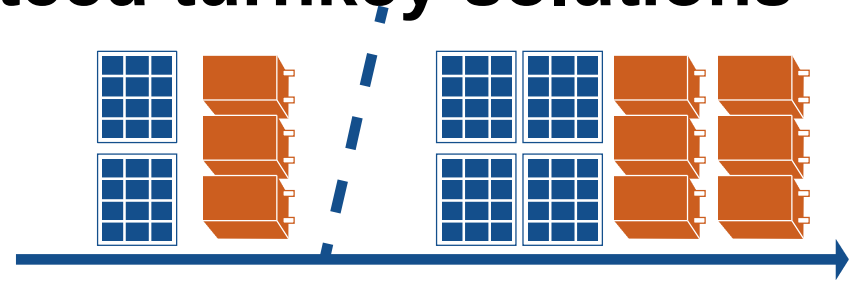


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SunPower approach to solar alternative systems: Full adjustment to BTS lifecycle… We propose result guaranteed turnkey solutions

NEW SITES, LOW POWER → 100% Solar

- Start to the need with PV
- Scale-up progressively according to the evolution of power need



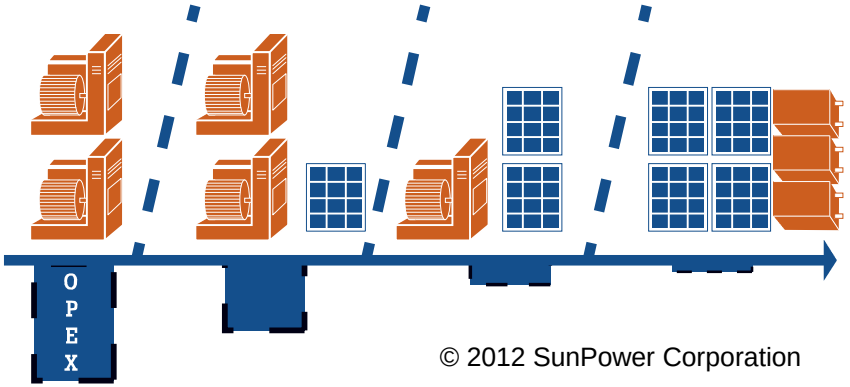
HIGH POWER & BACKBONE SITES → Go Hybrid

- Go for PV / GE hybrid solution
- Always secure backbones with 2 different sources of energy



EXISTING SITE WITH GE → Revamp step by step

- Progressively revamp BTS power generation
- Go for hybridation with a little PV to start cutting OPEX
- Self finance additional PV field with OPEX savings, to finally substitute GE instead of replacing



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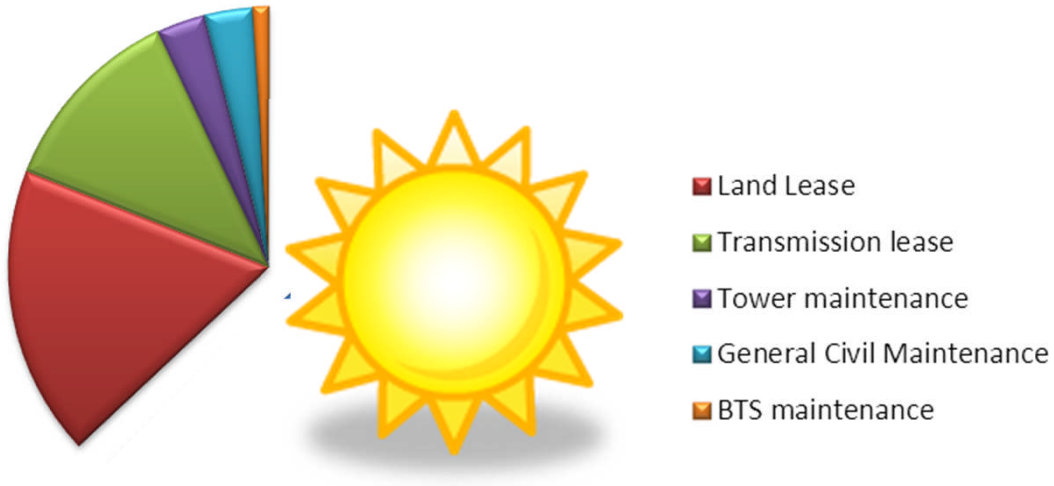
Energy cost reduction as a key leverage to stabilize your operating margins

Off-grid site OPEX breakdown, example of an operator in Africa (100% diesel- GE site, 1 000W power)

The more PV, the less fuel OPEX (sun is for free !)

Per site:

- 13 500l of fuel / year
- Maintenance visit every 12 days
- > 20K€ OPEX / year directly linked to fuel consumption and GE maintenance



> Average 20K€ /year / site OPEX Savings for our Telecom customers

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TCO approach, or the importance of Sunpower 360° analysis before making a decision

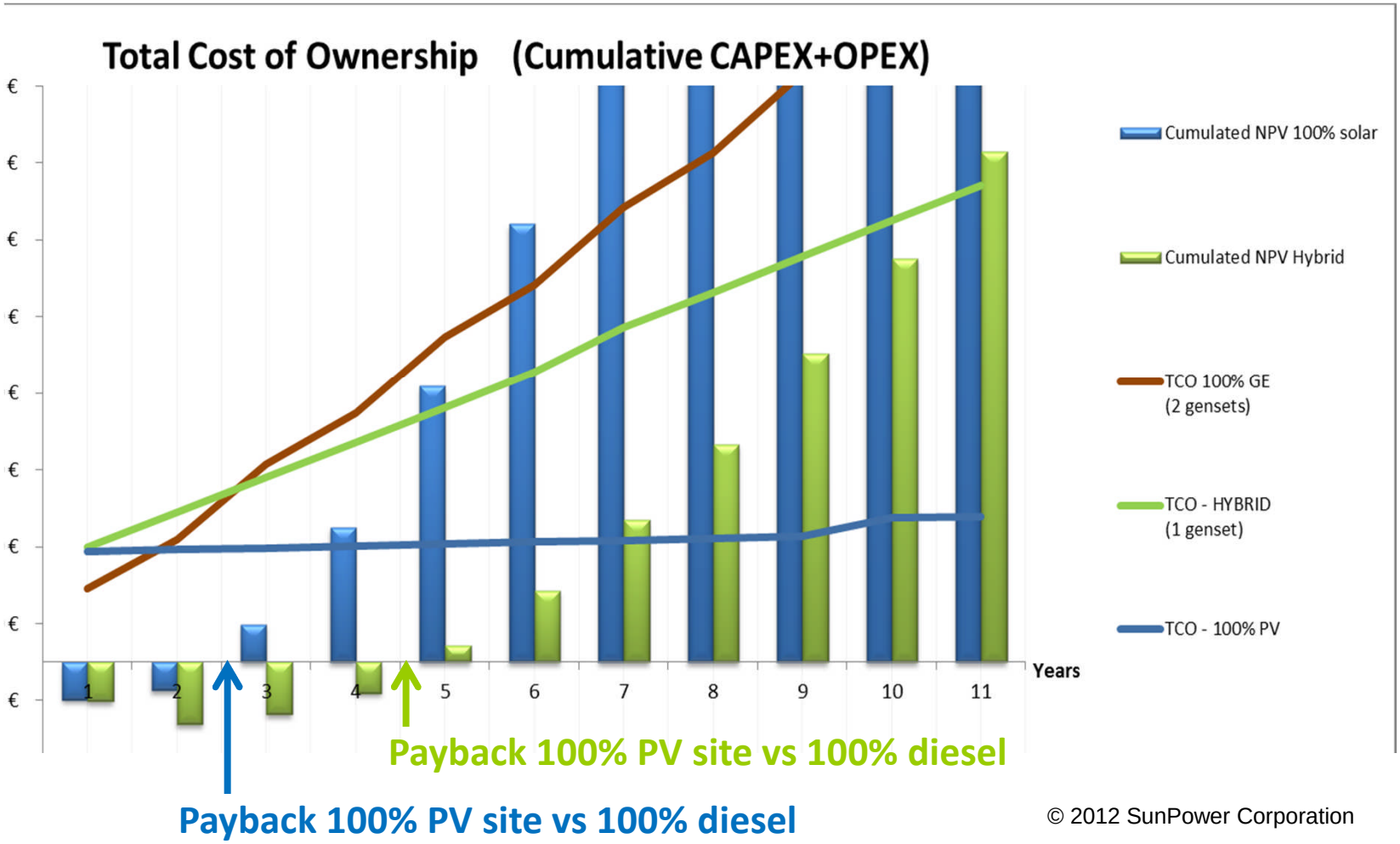
Basic fuel retail price: $0,9/l

Remoteness: 1h fuel transport

24/7 BTS operation

BTS power 1000W

Sun power 4kW/m²



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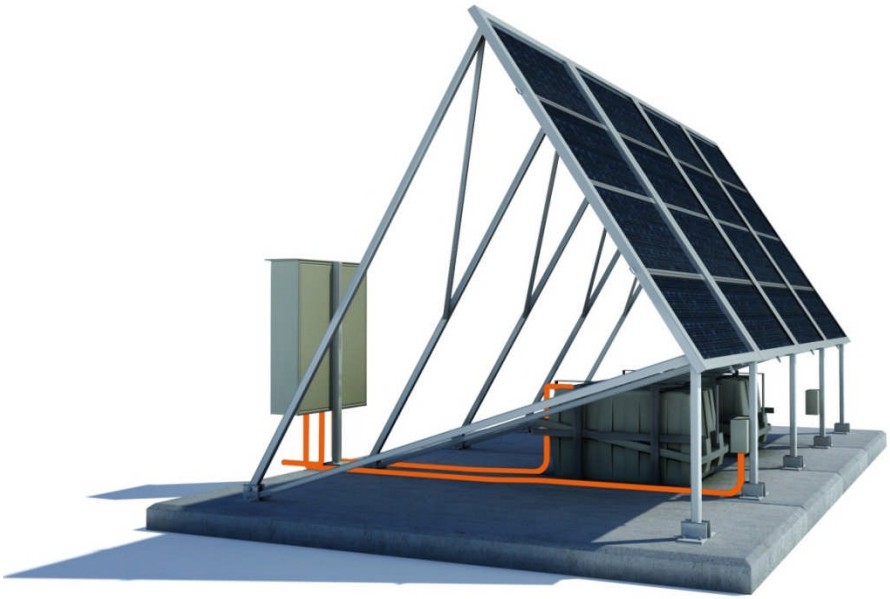
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More than 20 years of Customer Focus

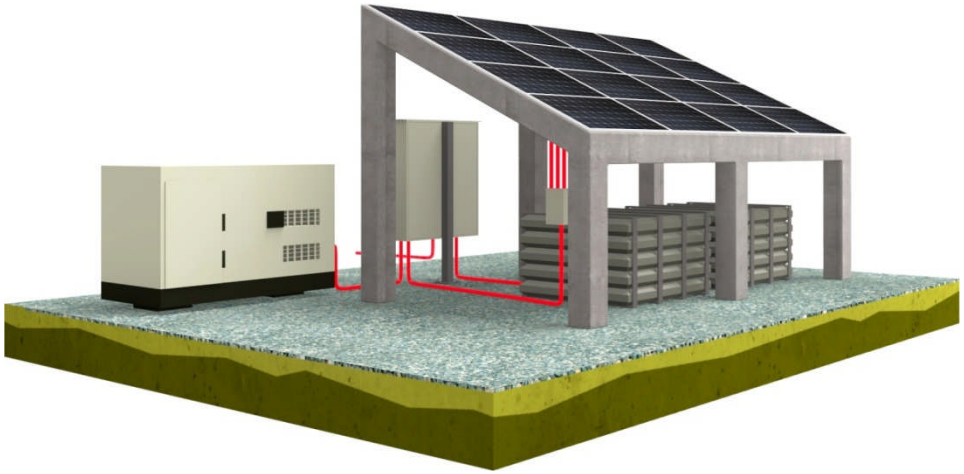
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Reliable turn key solution – Cost effectiveness



PV solution



Diesel Hybrid solution

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Differentiated Solution for Telecom

E20 327Wp Module



SMS Web portal



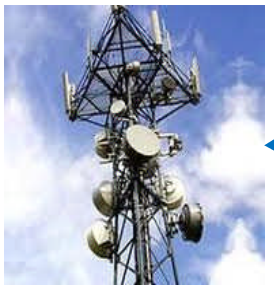
GPRS, TCP/IP

TSX logger



Modbus

O&M Contract (Provided by SPW or subcontracted)

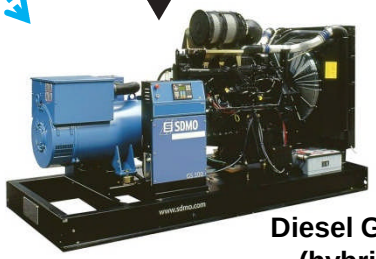




MPPT Charge Controller



Battery Bank

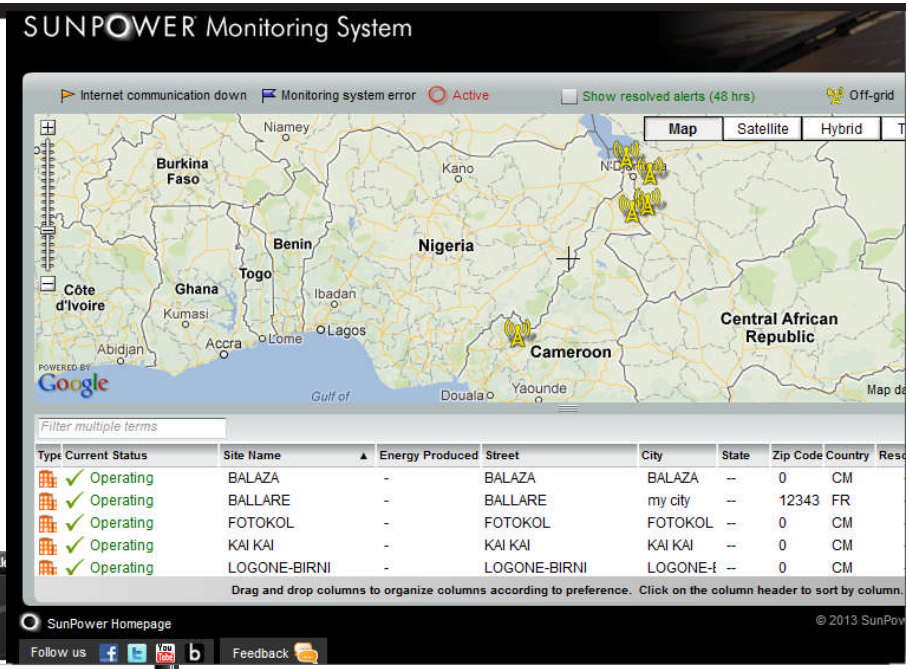


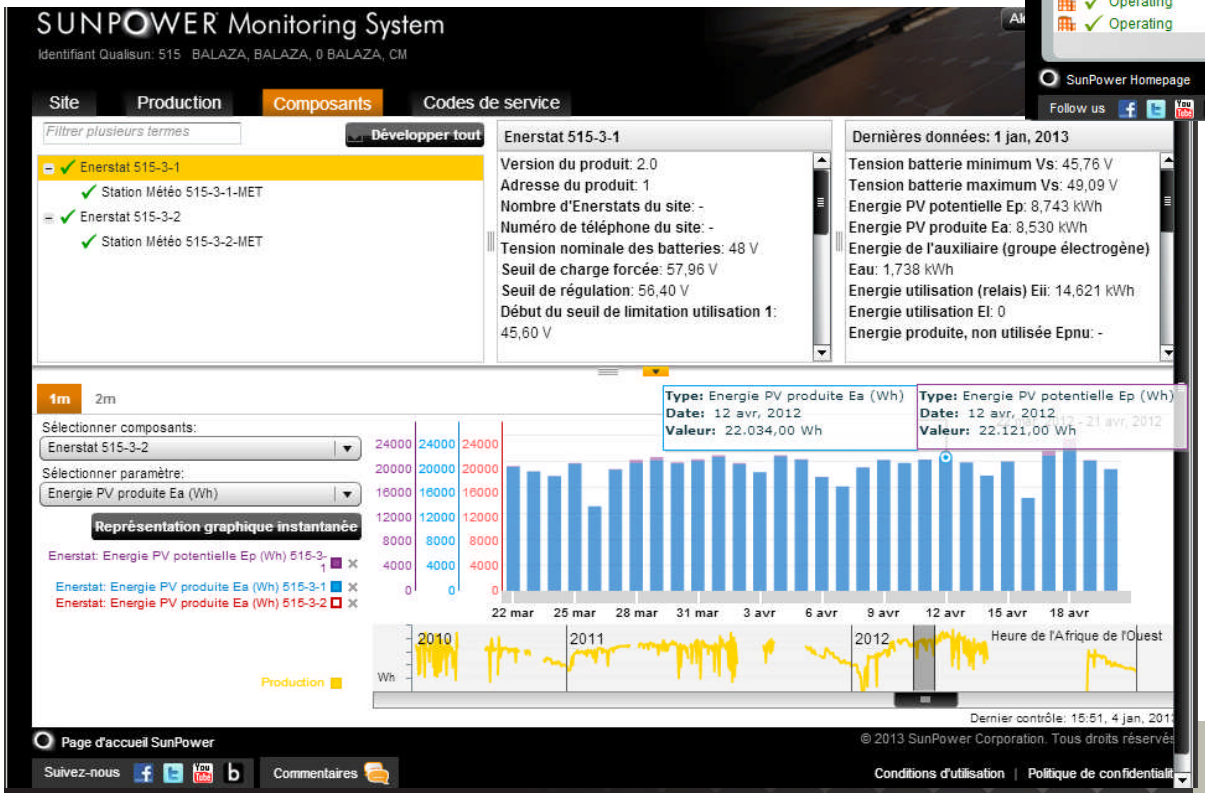
Diesel Generator (hybrid sites)

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Control, everywhere

- Local and remote monitoring
- Detailed and Consolidated Fleet supervision
- Remote site management





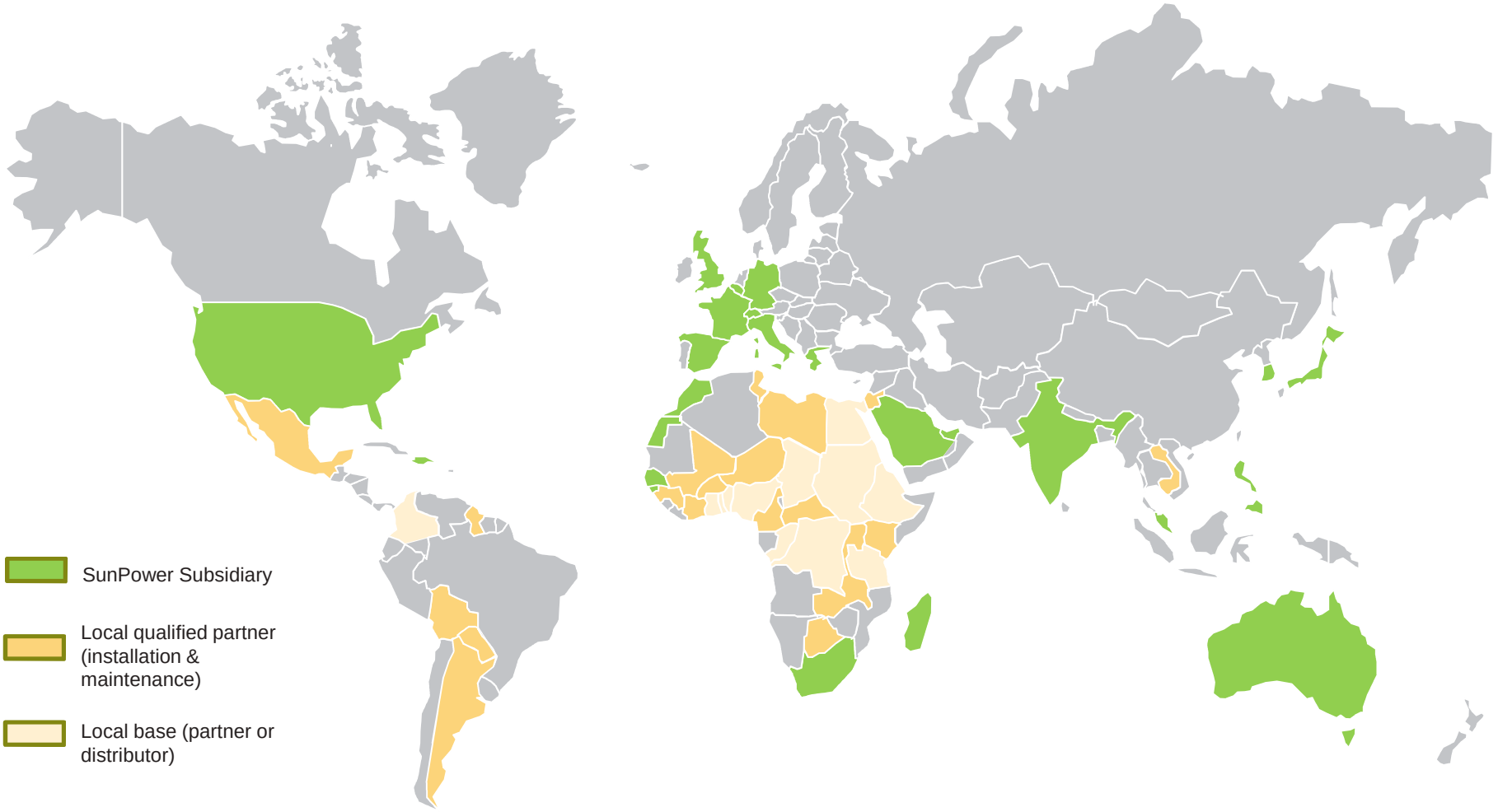
SMS* local and remote monitoring

**Sunpower Monitoring System*

XXX

SUNPOWER™

World wide deployment Capability



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Worldwide deployed solutions since 1989



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Haiti







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Cambodia



3.6 kWp

Hybrid

?

?



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Dominican Republic



9 kWp

Hybrid

30

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Lybia



13 kWp

Hybrid

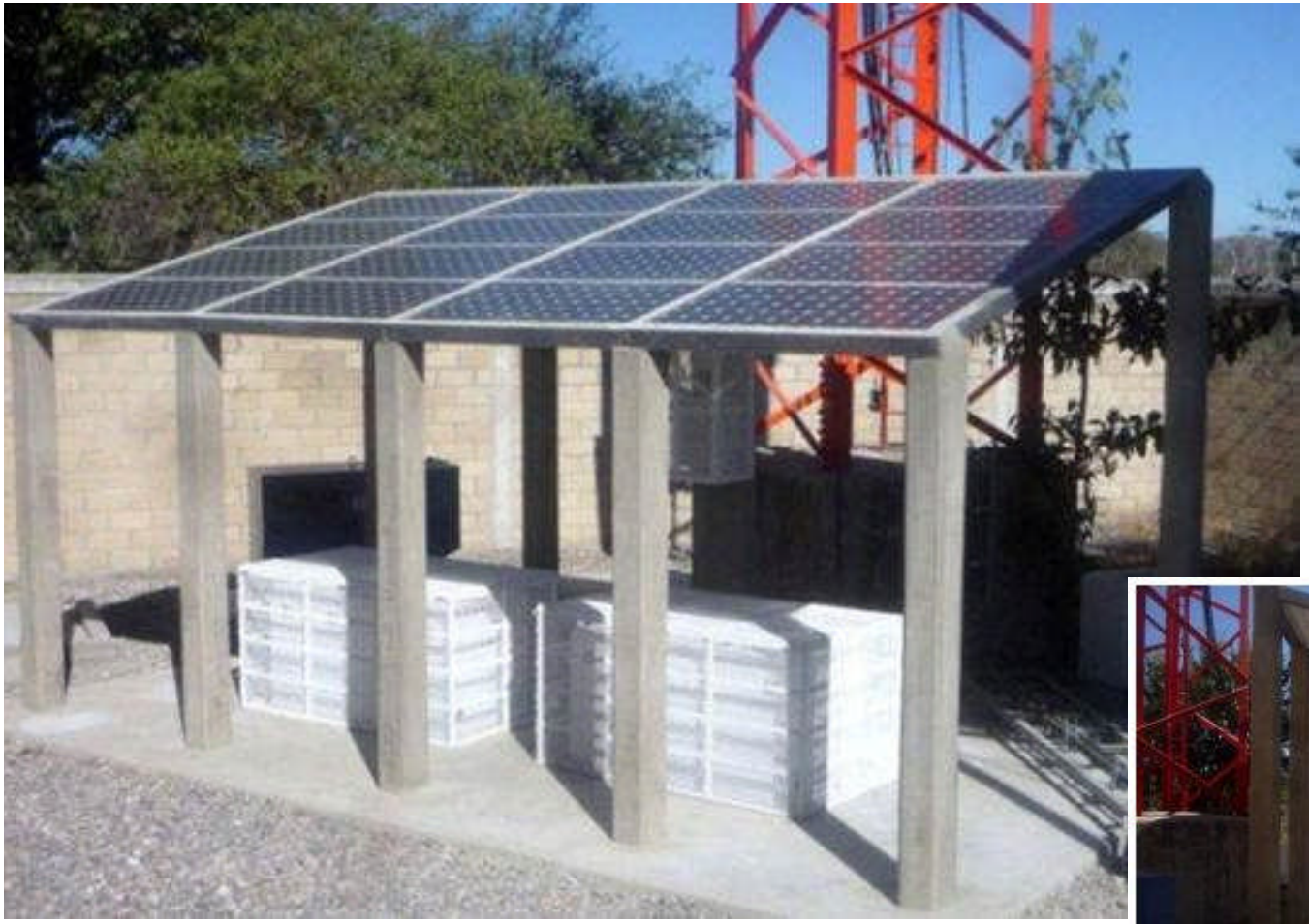
96



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Mexico





2.9 kWp

Hybrid

16

1864

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Morocco



10 kWp

Hybrid

72

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Senegal



7.8 kWp

Hybrid

60



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Madagascar



9.9 kWp

Hybrid

72

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Trend & Challenges

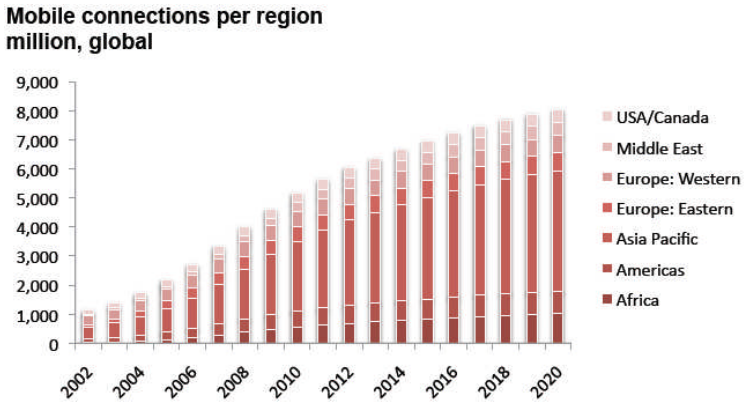
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Trends

1

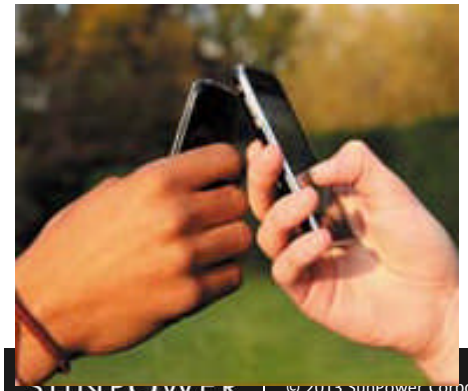
- Stress on **ARPU** (developing countries + rural areas)
- Search for **margins stabilization or growth**

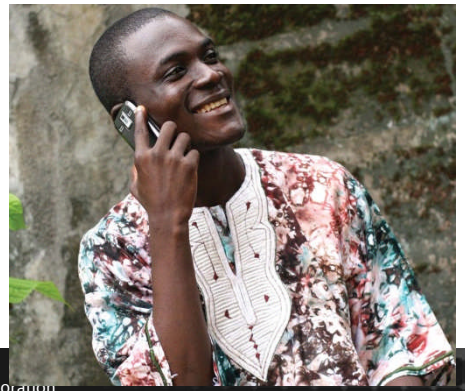


GSMA, *Mobile's Green Manifesto,* November 2009

2

- Thighter directives from **governments &consumers concerns**
- 20% of green BTS in 2020







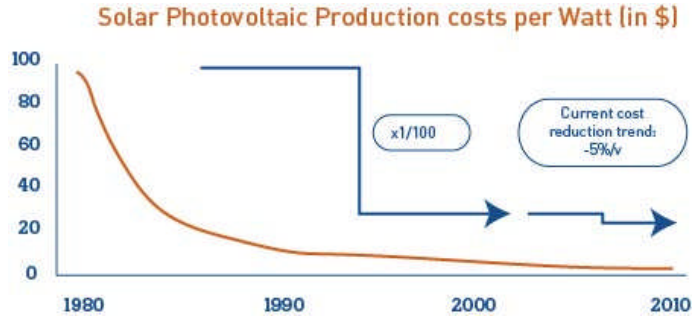


3

- For a small van transporting 300 litres of fuel, each additional hour adds roughly 3% to the price / l.
- 80% of the service interruptions are **due to a power supply cut**
- 10% of BTS fuel replaced by water

4

- **Solar power** expected to **achieve competitiveness** with the power grid retail price in many regions of the world ("grid parity")



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Challenges

- Payment over time, leasing, PPA…
- Specific Offer to be built, depending on:
  - Final Destination
  - Project Size
  - Customer profile
- Main Challenges to overcome:
  - Volatile Economy
  - Geography
  - Regulatory Frameworks





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Expectations

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What can speed the solar deployment

- Think Energy not power (more Planning)
- Assess the TCCO
- Cost the CO2
- Financing (Bankers)
- Regulation (Selling energy)





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Thank You!

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