

PowerOasis

GPM

Accra

John O'Donohue

Nov 2012

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Making it Happen



"I am 'hurrying-up'...
Rome wasn't built in a day, you know!"

- Making GPM Happen
- Standard Configurations & Tools to enable full network rollout
- Two Hundred Diesel Hybrid & Solar Site Deployment
- Lessons Learned, ROI achieved
- Checklist to Take Away
- Conclusion

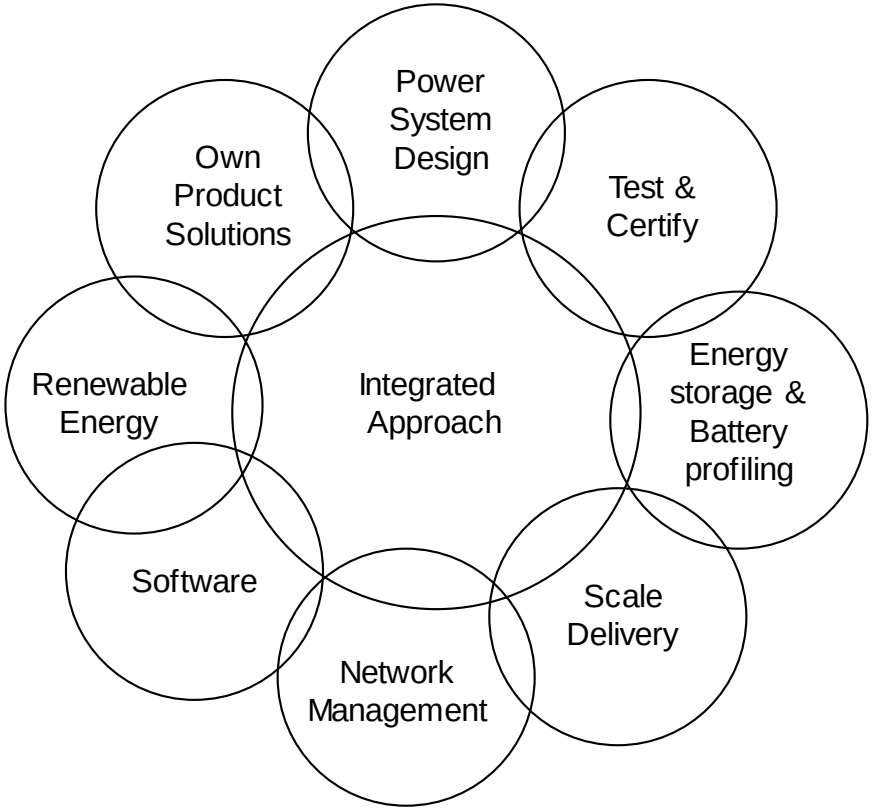
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Telecoms Power Solutions

PowerOasis Profile

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Telecoms Power Solutions

- UK based company with operations in Asia Pacific , Africa & Middle East
- Founded in 2007, ex Motorola engineers
- Total Focus on Telco Power Solutions, Agnostic to sub components
- Founding members of the GSMAGPM
- GPM Early Trials



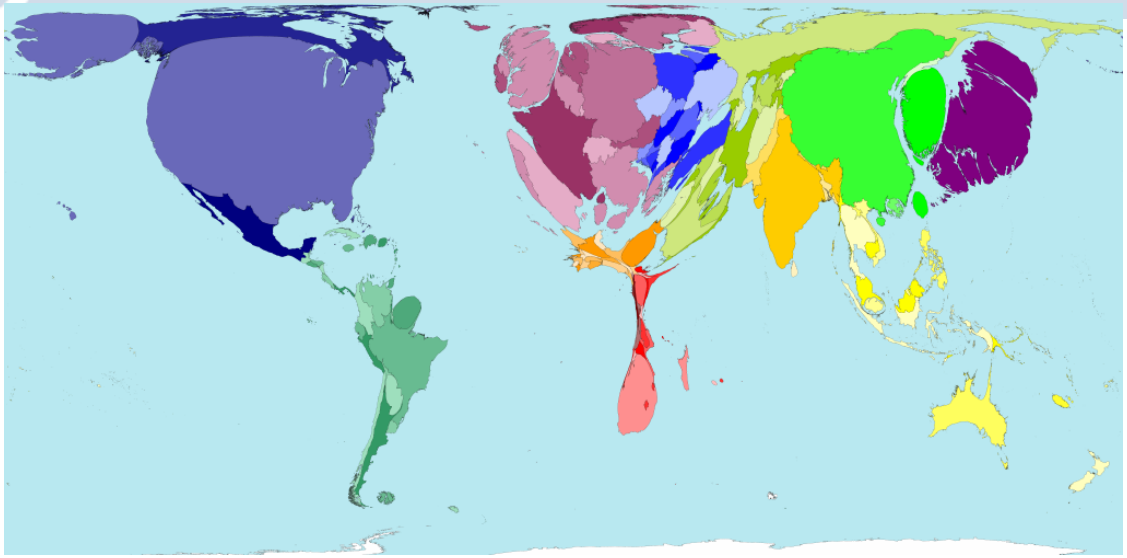
Want the Industry to Succeed

Deployed over 1000 Systems including 300 Diesel Hybrid Sites & 100 Diesel Hybrid Solar sites

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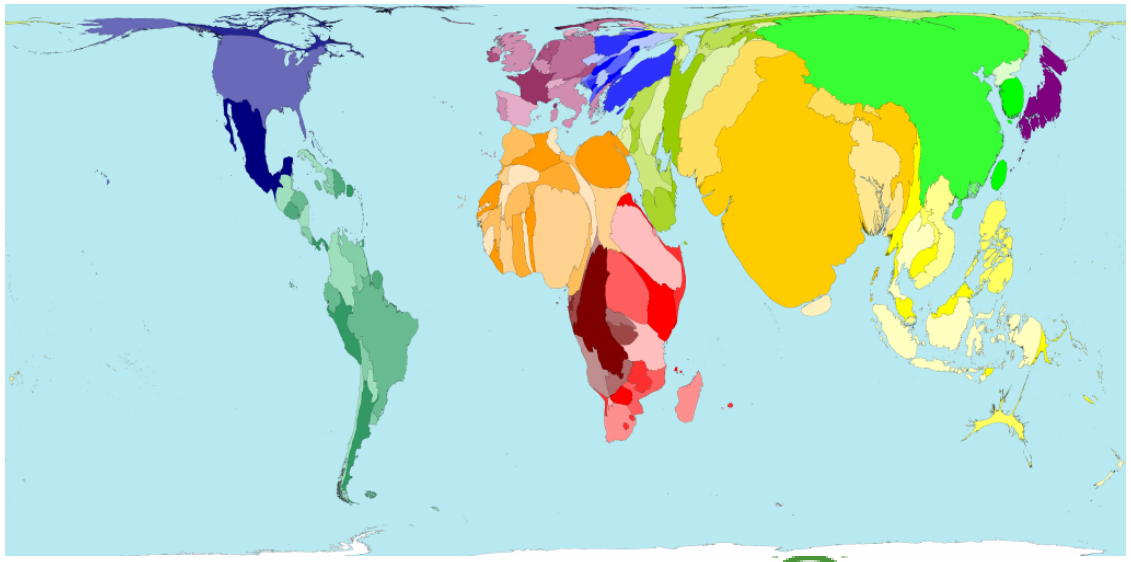
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“Its the world but not as we know it Jim”



Electricity
Coverage 2010

Population 2050

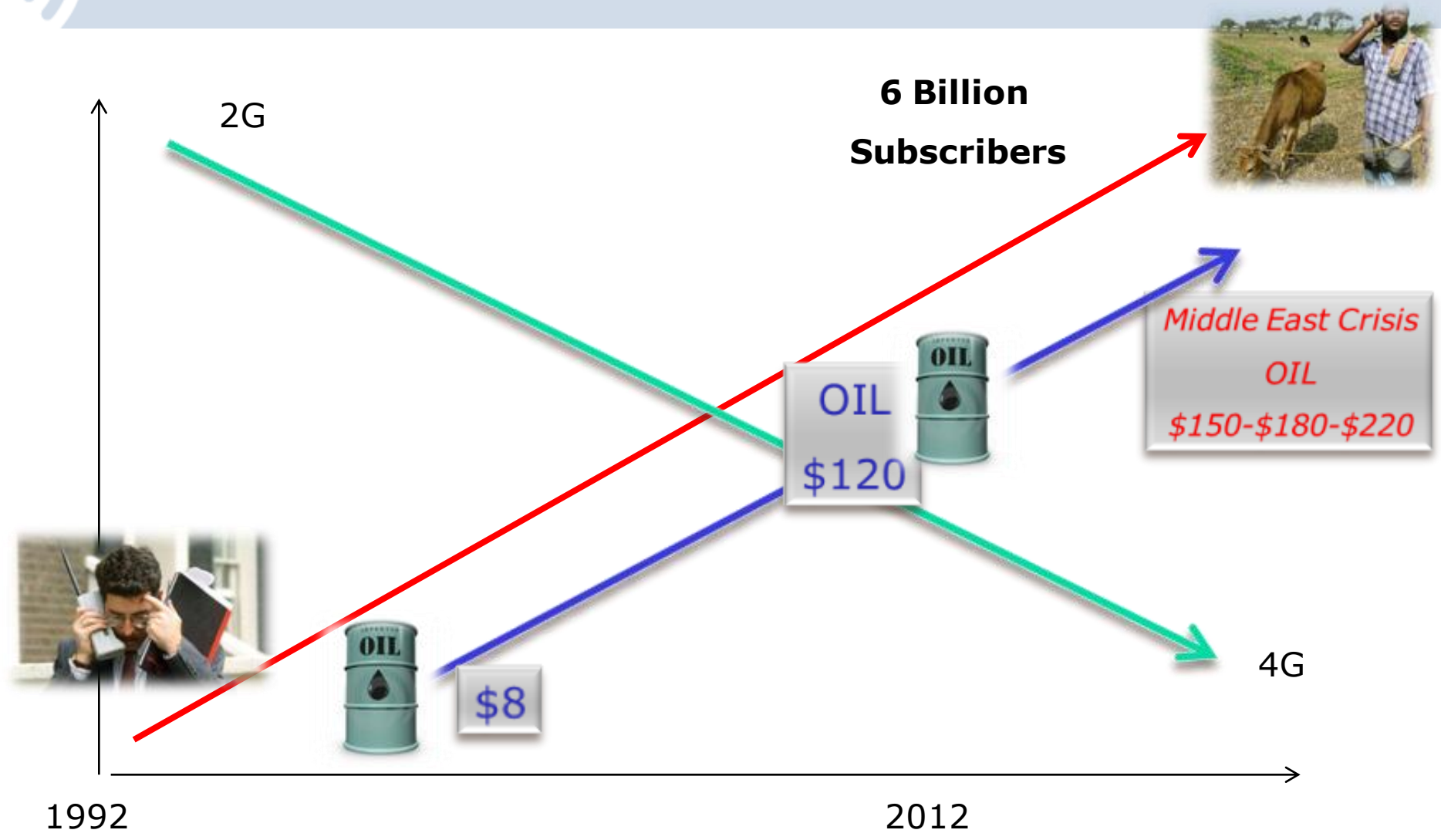


Source: worldmapper

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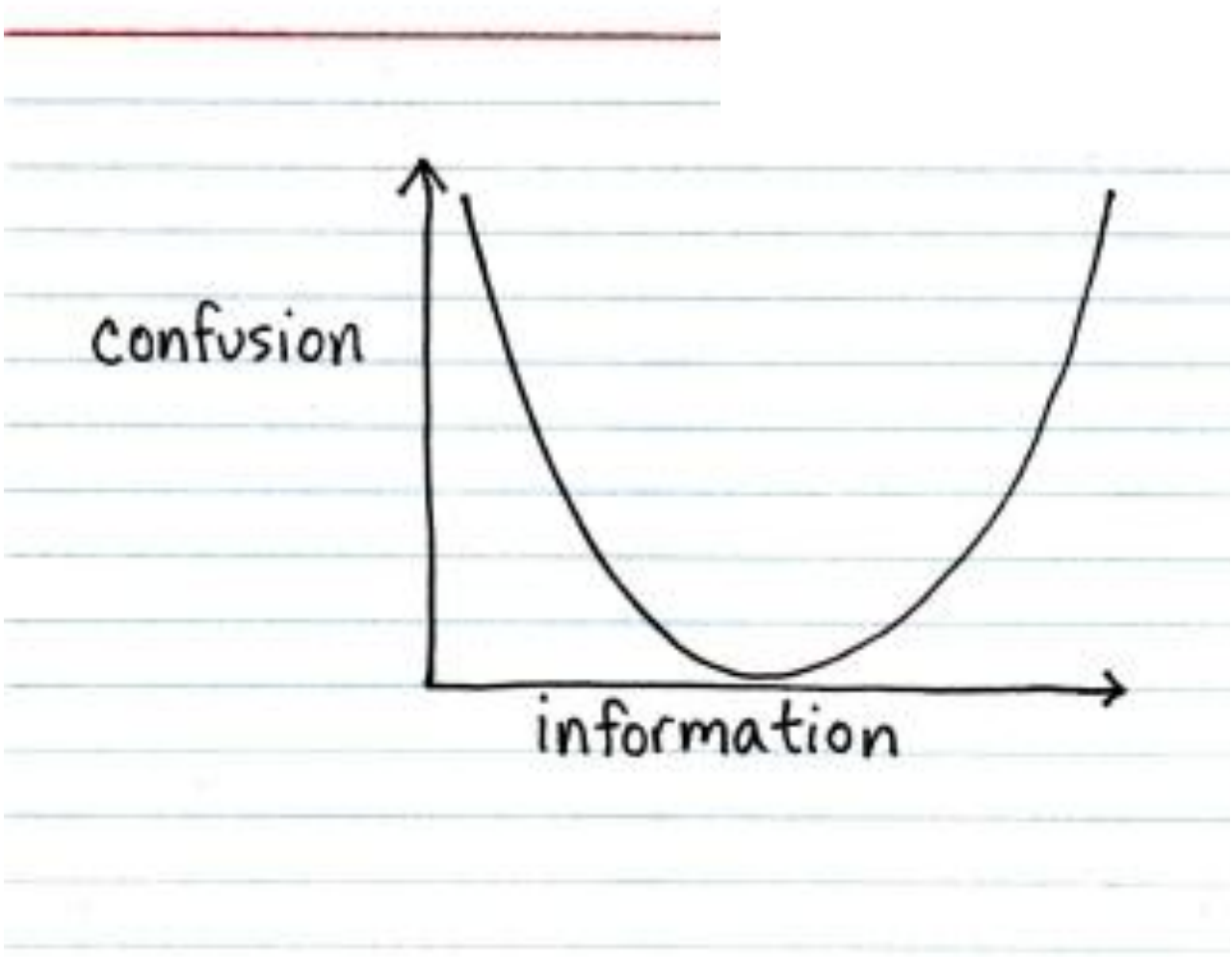
What Happens ?



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The Trouble with Trials



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Suggestions

Challenges

Understanding Complexity

Goal of trial

Key Performance Indicators

Repeating what is done before

Commitment to follow-up

Budget to follow-up

Suggestions for GPM & GSMA

Industry Standards

Standard Configurations

Access to Results

Trial Criteria & KPIs

Benchmarking & Compliance of Vendors

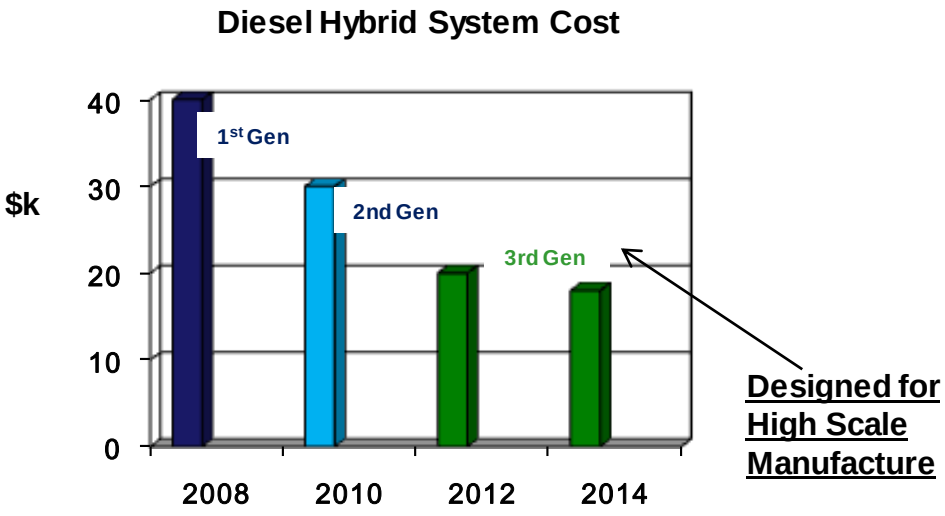
Approved Vendor List

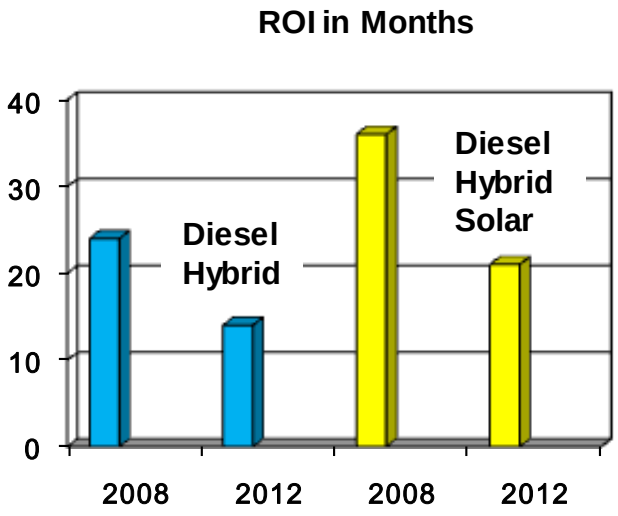
Financing

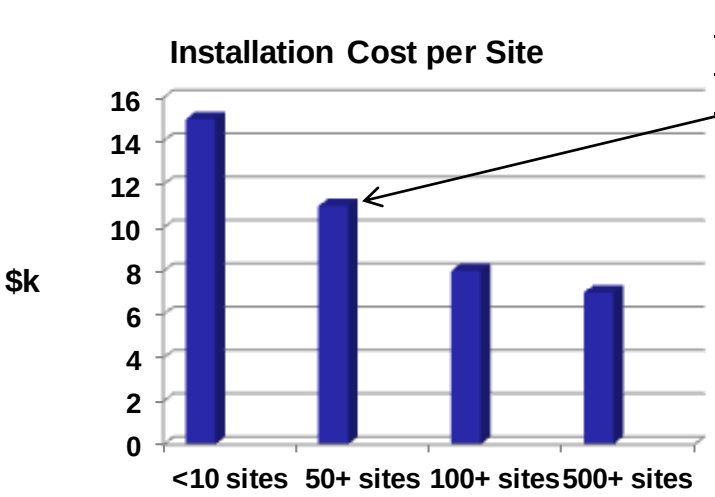
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The Advantage of Scale









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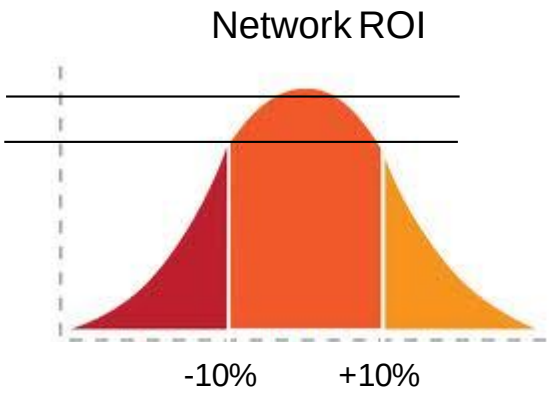
Key Enablers to Scale Deployment



Cluster Sites into 5/6 categories aligned to standard configurations

Flexible, modular technology. Agnostic to sub-systems

Standard external interfaces to Generators, Batteries, PV.



Power Design Expertise & Power budget tool kit
ROI & TCO model
Warranted performance
Deploy categorised designs that deliver ROI within the target range.

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Standard Configurations

Load	New GSM <1KW	Old GSM 1-2KW	GSM + 3G 2-3KW	Shared Site 3-5KW
Grid				
Generators				
Batteries Site Autonomy				
PV				

Specific Sites

Wind – applicable to less than 10% of sites

Large Solar – footprint implications

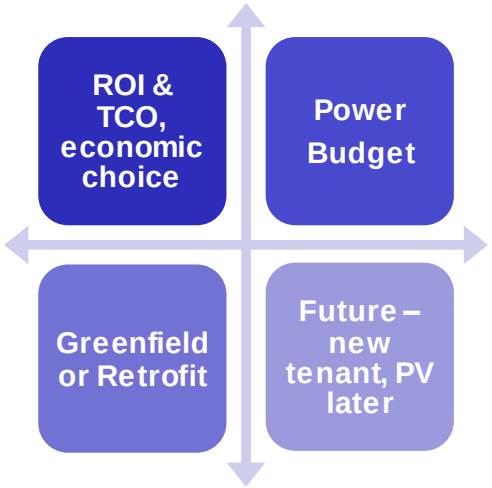
Fuel cell – specific drivers

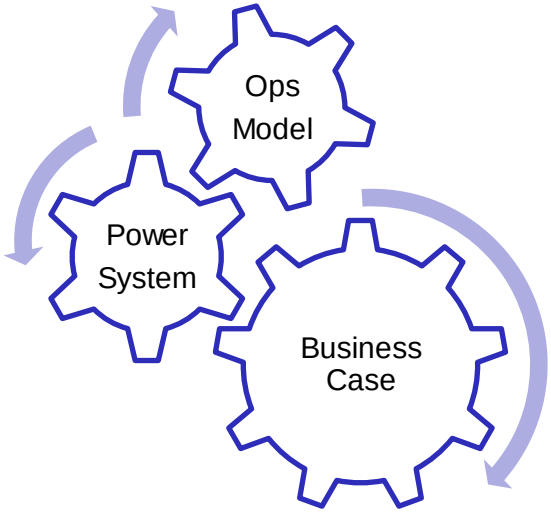
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Standard Configurations

Load	New GSM <1KW	Old GSM 1-2KW	GSM + 3G 2-3KW	Shared Site 3-5KW
Grid				
Generators				
Batteries Site Autonomy				
PV				

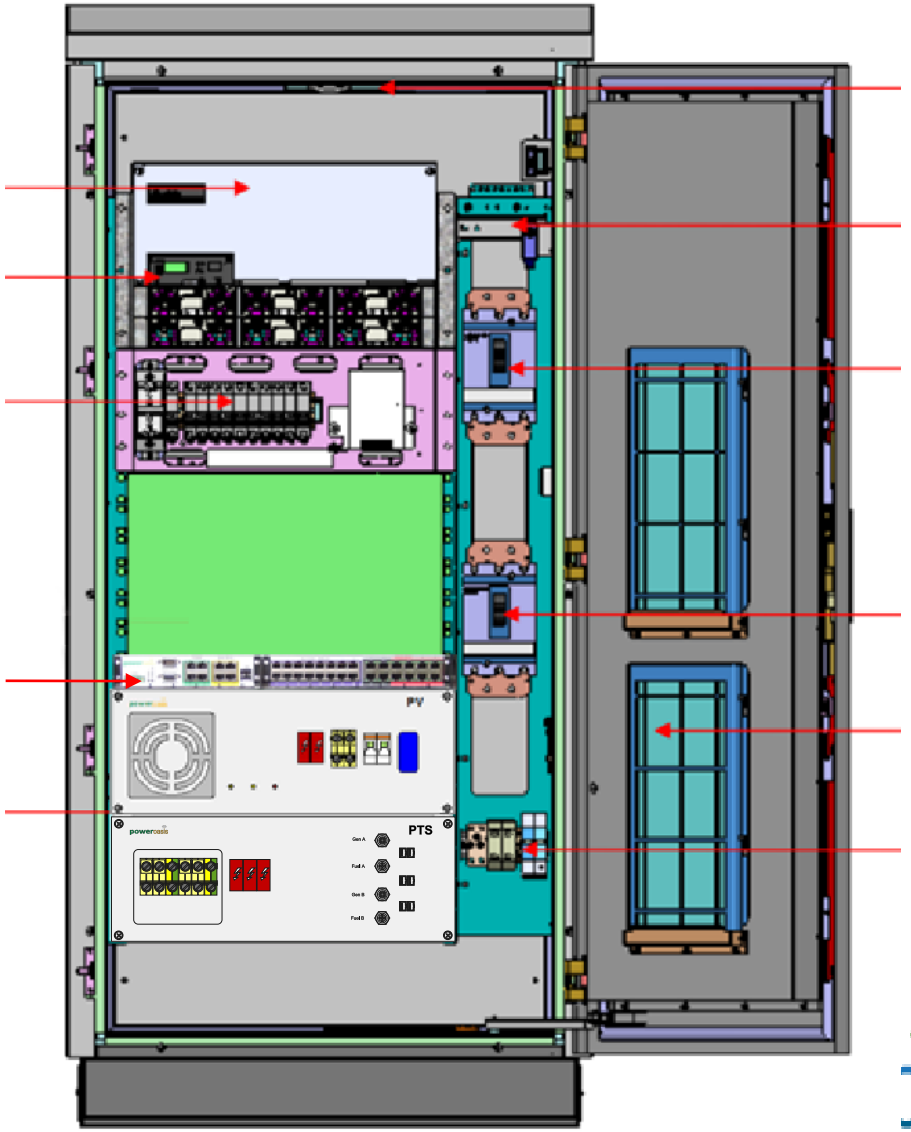




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PowerOasis 19 Inch Outdoor Modular Hybrid Power System

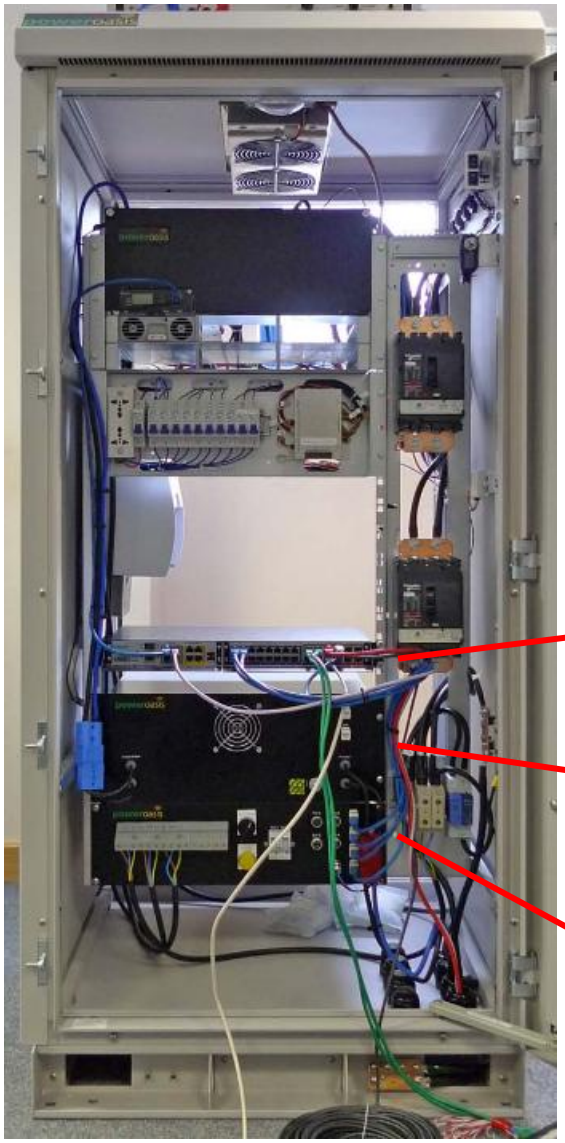


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PowerOasis 19 Inch Hybrid Power System

The HPS is a complete factory configured and tested system with everything need to build site power system except generators and batteries



SmartHub Controller – The system controller:

Optional Modules specific to site type:

PV Controller (Dual iSolar 6kW) - takes inputs from two PV arrays up to 6 kW

PTS (Dual TCU) – takes inputs from two generators and switches AC.

Rectifier (configurable 2.5- 17.5kw) - converts AC from grid or generators to DC



SmartHub

iSolar

iPTS

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Base power cabinet

Type C
2 bay cabinet
– batteries plus power



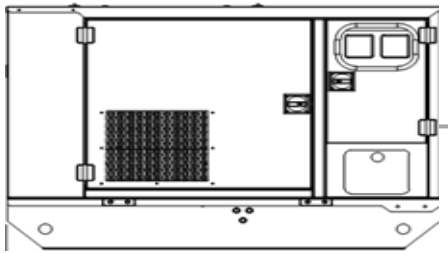
2 x 12 module PV arrays
Total 5.76 kW

Class 1 surge protection and isolation

SPD

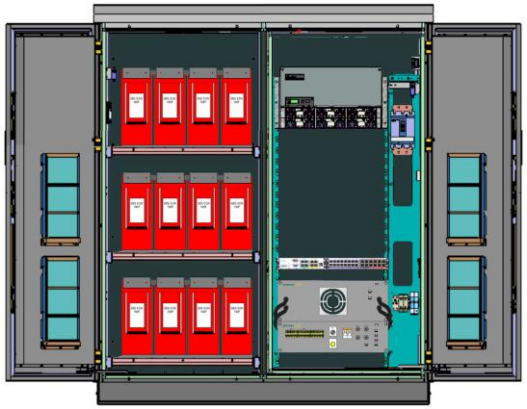


SPD

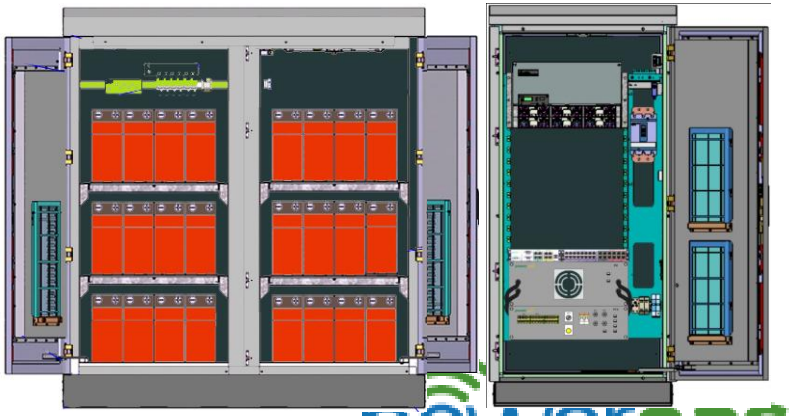


Generator





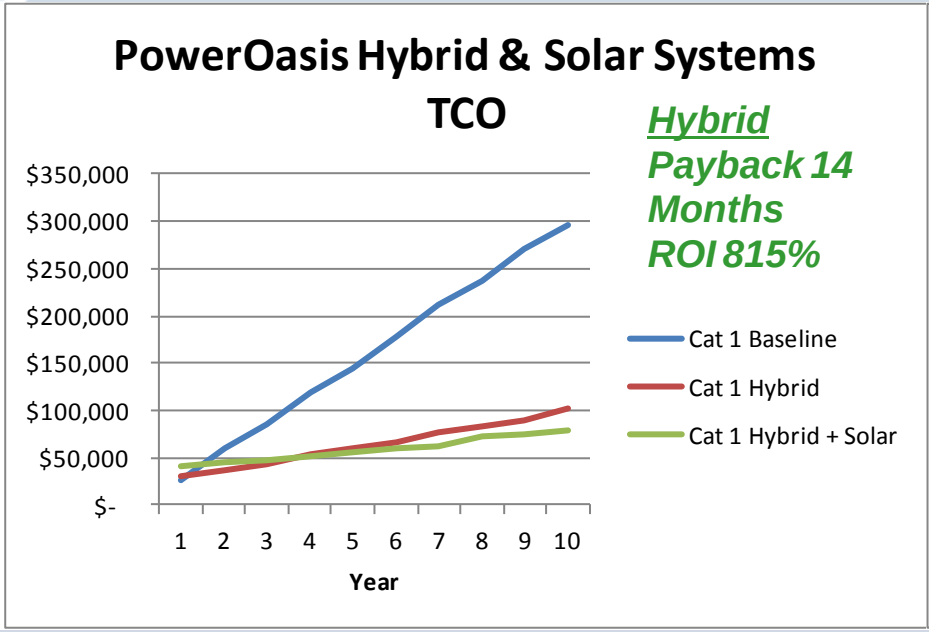
Type A: Base power cabinet plus 2 bay battery cabinet

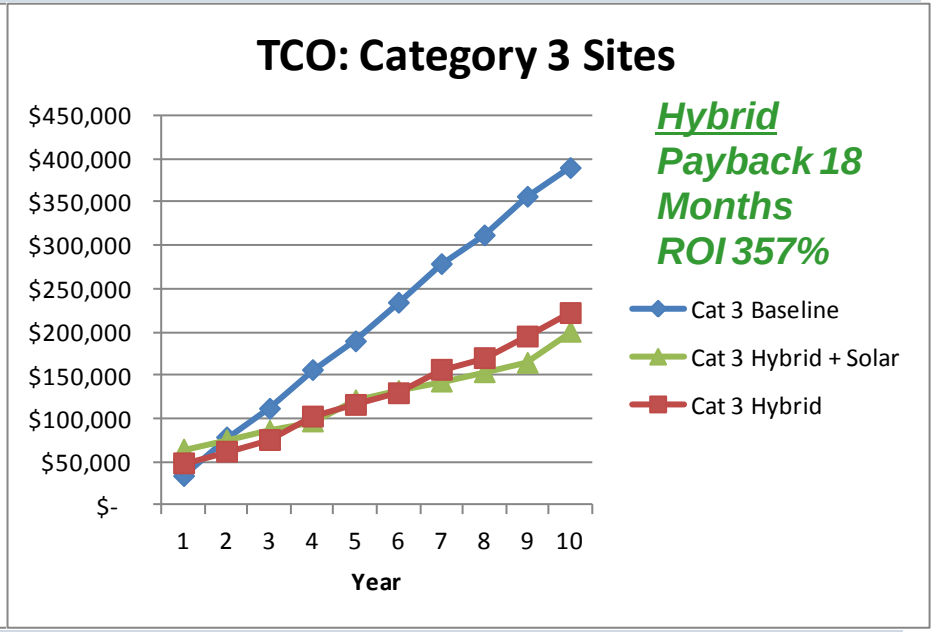


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Business Case



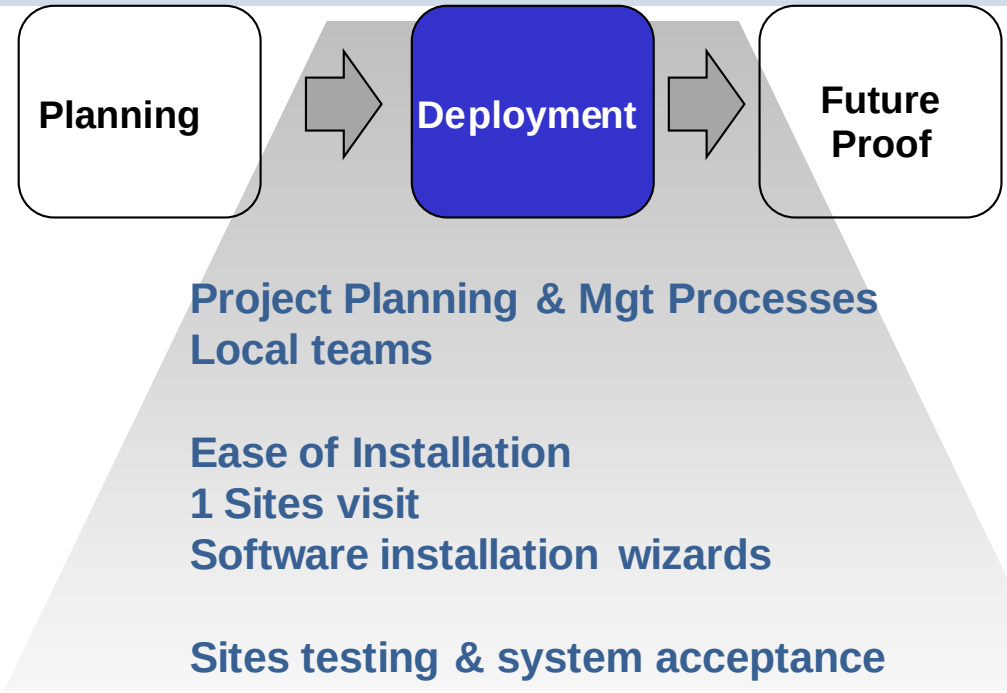


ASSUMPTIONS	1		2		3		4	
	Hybrid	Solar	Hybrid	Solar	Hybrid	Solar	Hybrid	Solar
Load (kW)	0.8	0.8	1.6	1.6	2.4	2.4	3.8	3.8
Generator capacity (kVA, Prime power rating)	16.5	16.5	16.5	16.5	24.0	24.0	24.0	24.0
PV capacity (kWp)	0.0	2.88	0.0	3.60	0.0	4.32	0.0	5.76
Fuel cost (USD/L)	$ 1.50							
Generator service cost (250 hrs)	$ 140							
Generator replacement cost	$ 8,500		$ 8,500		$ 11,500		$ 11,500	
Generator lifetime running hours	15000							
Battery replacement cost	$ 5,850	$ 5,850	$ 9,750	$ 9,750	$ 13,650	$ 13,650	$ 19,500	$ 19,500
Battery lifespan (yrs)	3.0	7.1	3.5	6.1	3.2	4.9	3.1	4.3
Autonomy - battery only (hrs)	26.5	26.5	27.8	27.8	26.0	26.0	23.5	23.5

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Key Enablers to Scale Deployment



Pre-configured, pre-built, minimise site wiring

Test cycle is multivariable, automated test via NMS and on-line sign off by operator

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System Configuration & Test

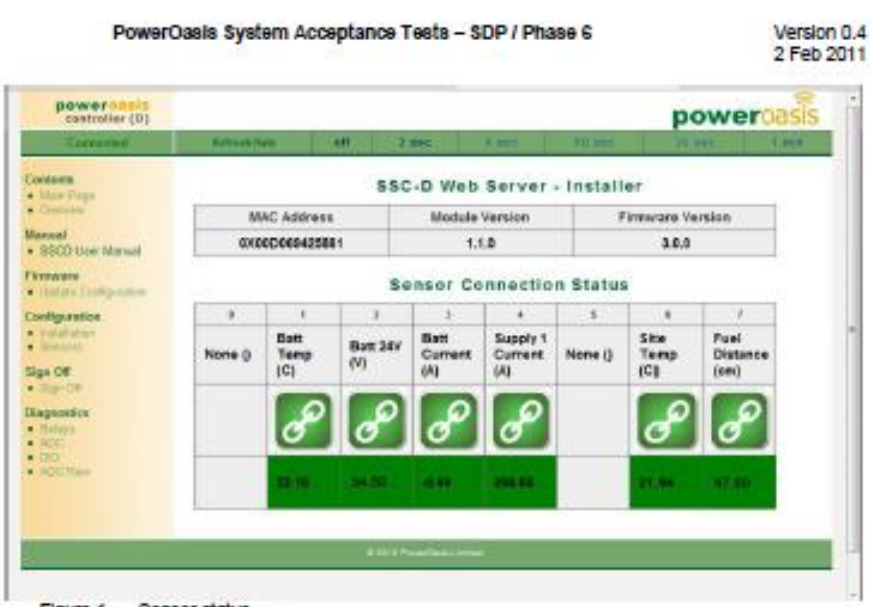


Figure 1. Sensor status

HARDWARE CONFIGURATION SIGN-OFF

1. From the Controller (D) web page select **Sign off** – as shown in figure 3.
2. Verify that all sensor are reported as connected (Green link)
3. Verify that all sensor data fields are valid (Green)
4. Check configuration settings are as detailed in Appendix B
5. Enter name in **Sign off** web page and open issues as appropriate
6. Press **Submit** to record data

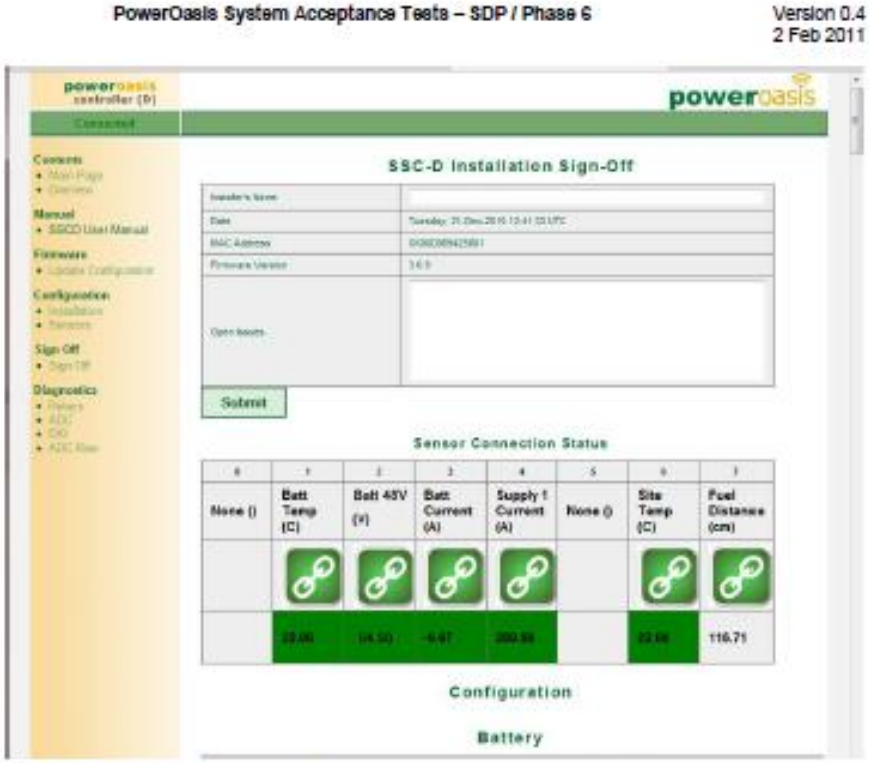


Figure 2. Controller (D) sign off page

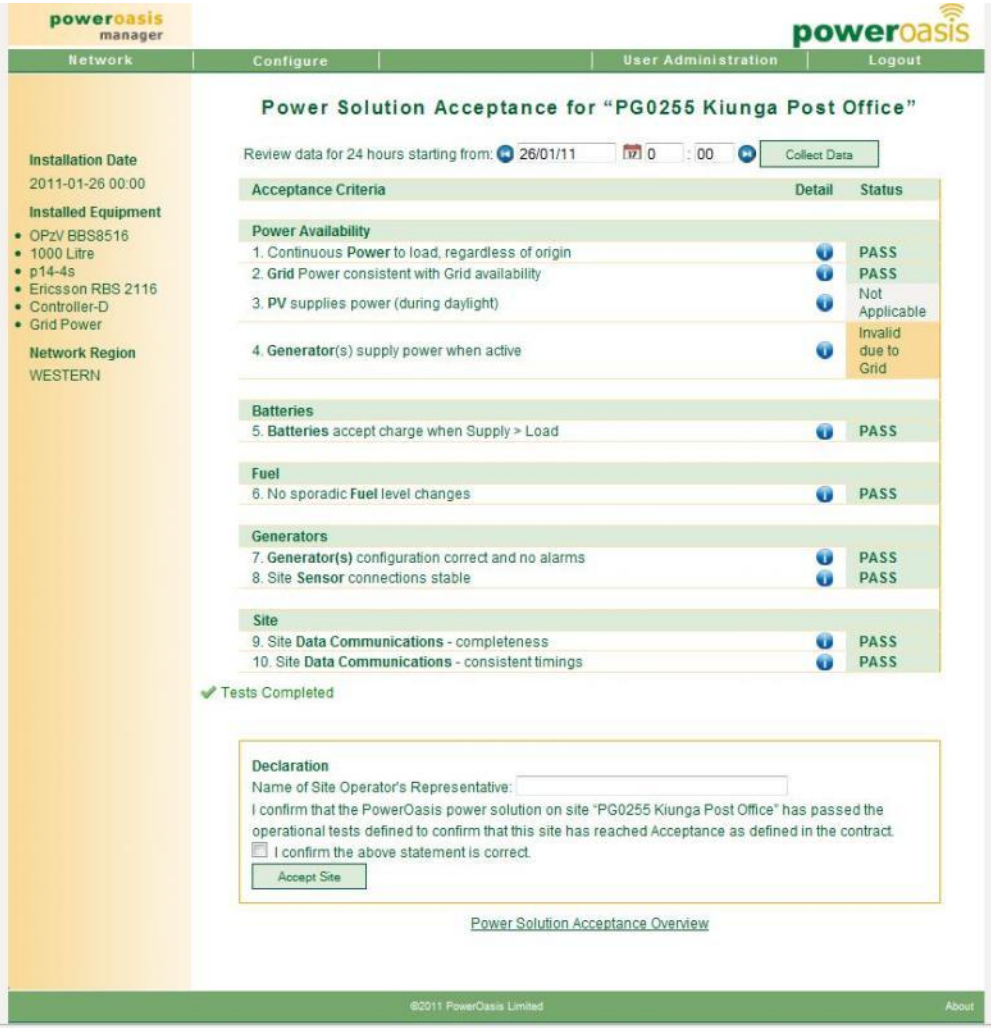
The Configuration test is now complete and all the Sensor status have been recorded.

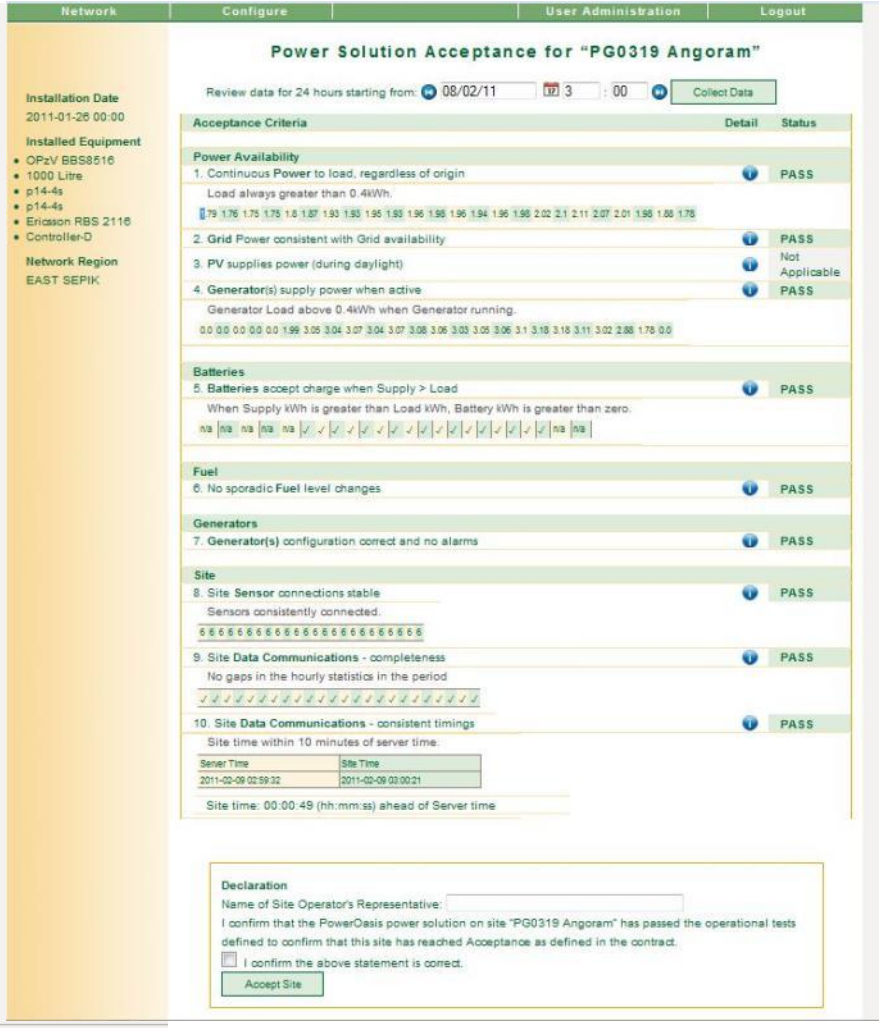


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Solution Acceptance Screen







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Key Enablers to Scale Deployment

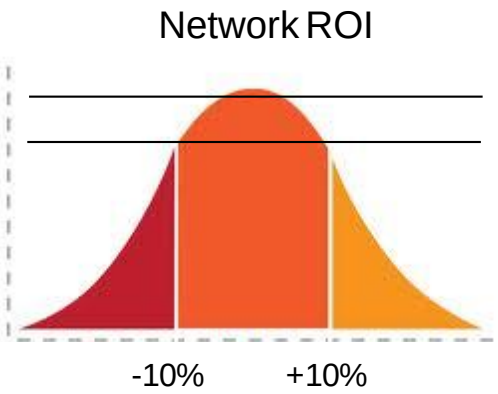
Planning → Deployment → Future Proof

Technology Reliability

Remote configuration & control

Ability to upgrade, modular, new tenant or PV investment later

Change Battery charging profile to compensate for aging to optimise the TCO



Network wide reporting – delivery of business case

Optimize performance by customising configuration remotely – enhance the ROI, 80% of the sites are within 10% of optimum ROI

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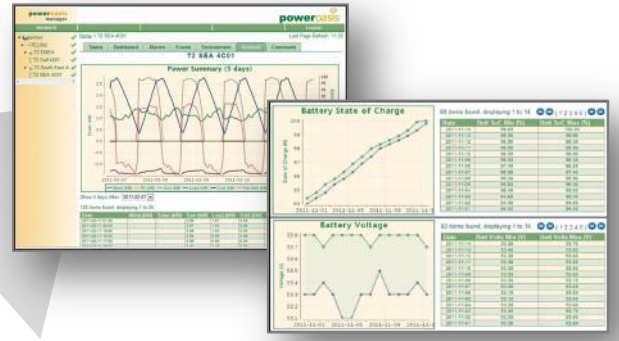
Power Monitoring, Management & Control



NMC Integration

PowerOasis Manager™





Site Monitoring & Control

Remote Management & Configuration



CxO Reporting

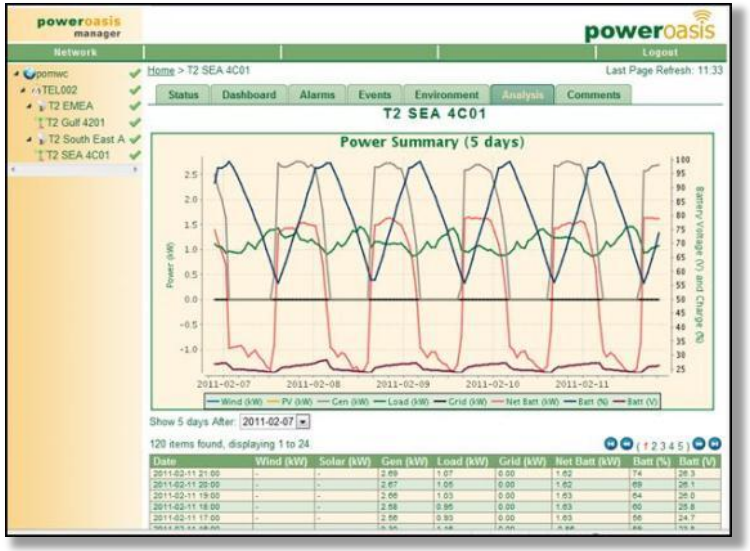


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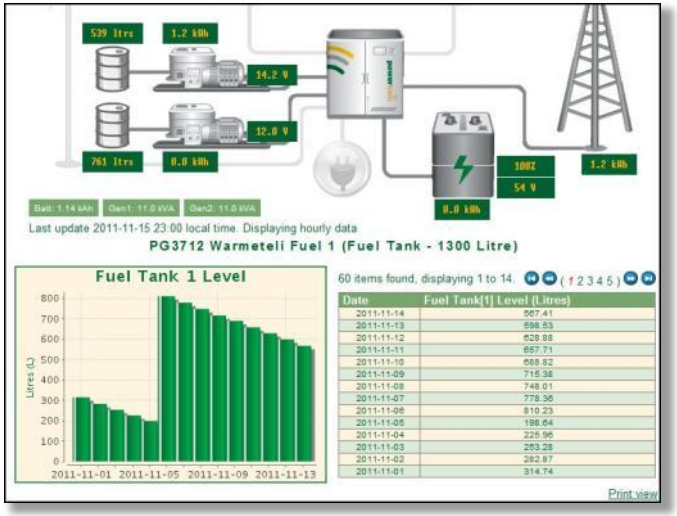
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Site Control, Alarms & Reporting

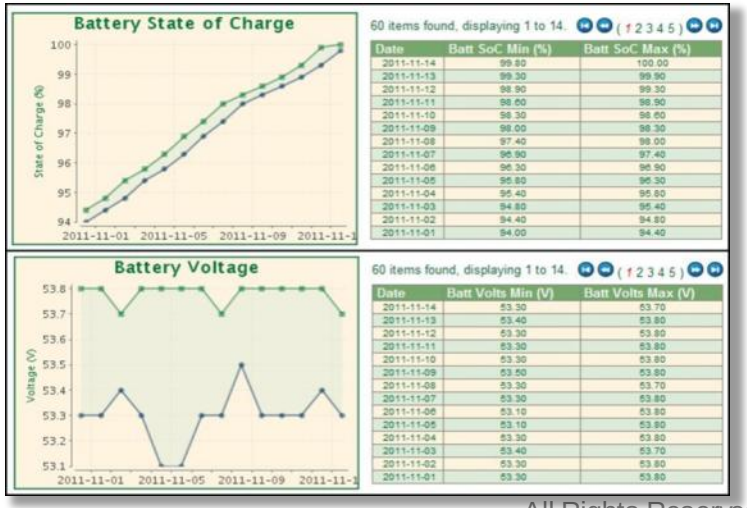
Summary Power Cycles



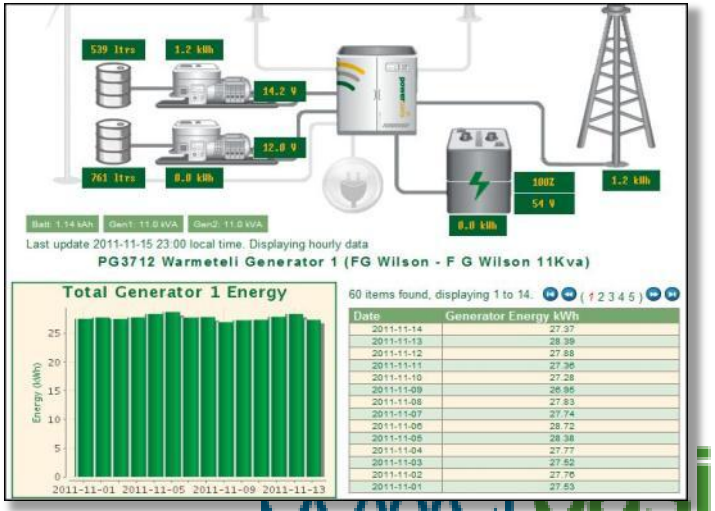
Fuel Management



Battery Management



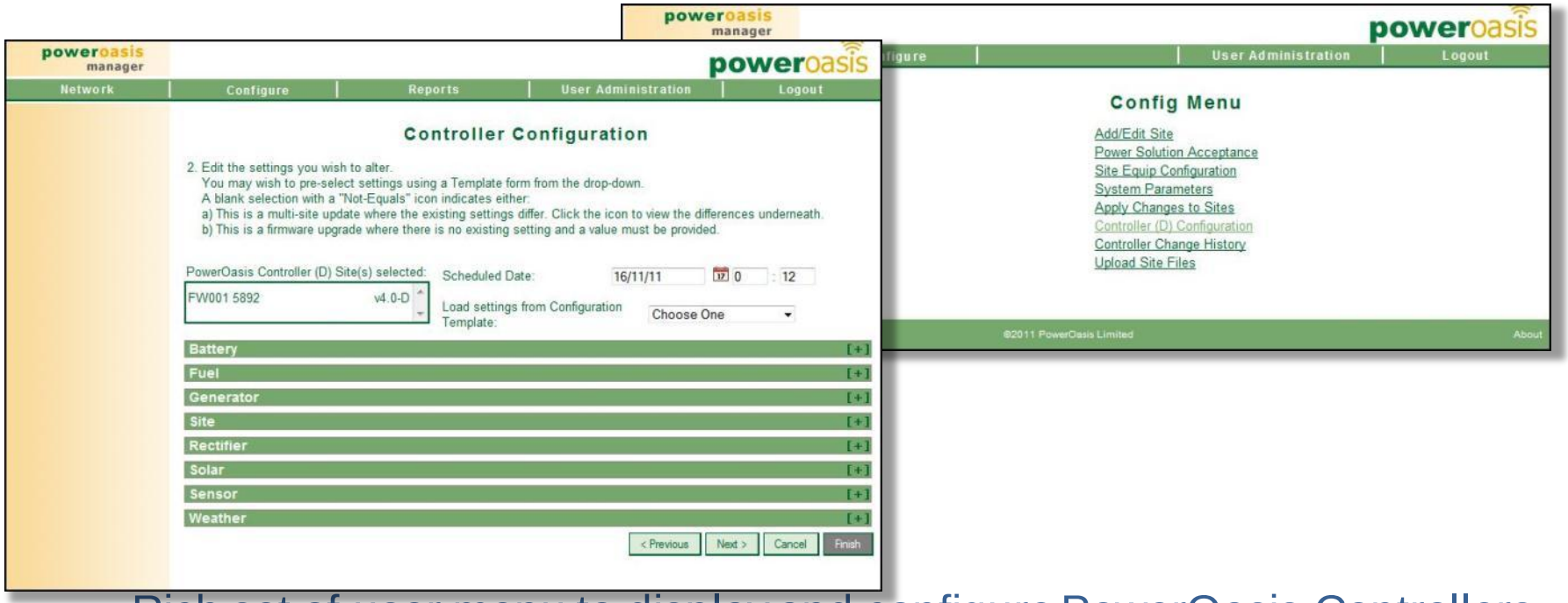
Generator Management



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Remote Site Configuration



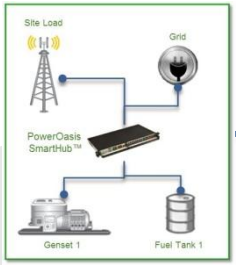
- Rich set of user menu to display and configure PowerOasis Controllers remotely from the NOC.
  - Remotely update site power controller configuration
    - All power system components, alarm & event settings, charge mgnt algorithms, gen test; start / stop etc.
  - Remotely update site power controller software
    - Firmware updates & new versions

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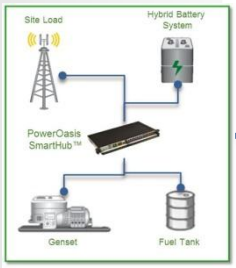
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Case Study: Asia Pacific

- 800+ Sites
- C. $40M OPEX p.a.
- Mix of Greenfield and Retrofit
- Segment Sites
- Power Budget & Business Case



Grid Sites



Off Grid Modular Hybrid, + Solar



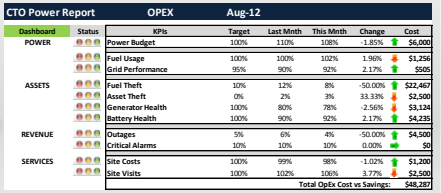
Off Grid Integrated Hybrid, + Solar

PowerOasis Manager™



Integrated Network Mgnt System

Diesel Saving



CTO Power Report		OPEX		Aug-12				
Dashboard	Status	KPIs	Target	Last Mnth	This Mnth	Change	Cost	
POWER		Power Budget	100%	110%	108%	-1.85%	↑	$6,000
		Fuel Usage	100%	100%	102%	1.96%	↓	$1,256
		Grid Performance	95%	90%	92%	2.17%	↑	$505
ASSETS		Fuel Theft	10%	12%	8%	-50.00%	↑	$22,467
		Asset Theft	0%	2%	3%	33.33%	↓	$2,500
		Generator Health	100%	80%	78%	-2.56%	↓	$3,124
		Battery Health	100%	90%	92%	2.17%	↑	$4,235
REVENUE		Outages	5%	6%	4%	-50.00%	↑	$4,500
		Critical Alarms	10%	10%	10%	0.00%	→	$0
SERVICES		Site Costs	100%	99%	98%	-1.02%	↑	$1,200
		Site Visits	100%	102%	106%	3.77%	↓	$2,500
						Total OpEx Cost vs Savings:		$48,287

Network Performance Management

SLA Mgnt

Cost Drivers



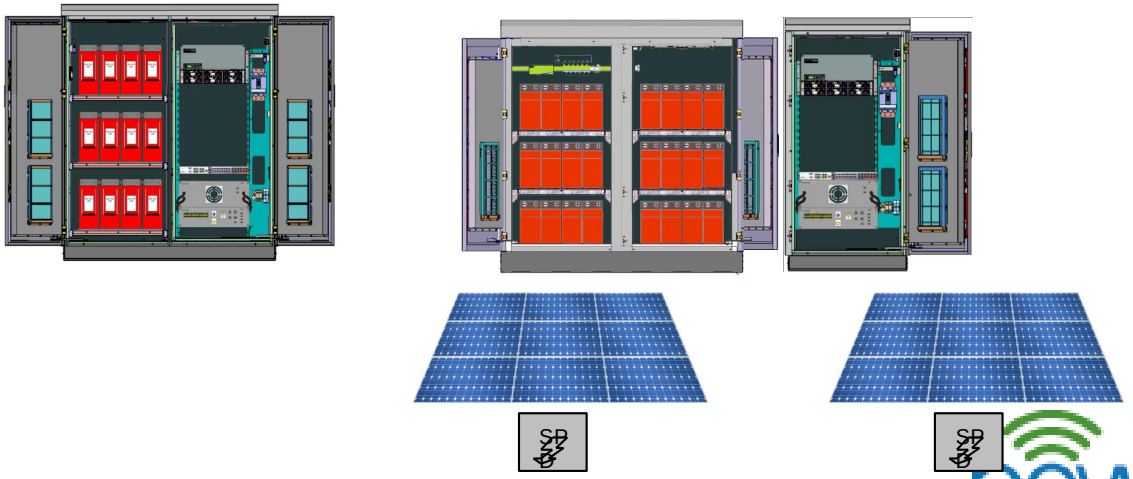
Operational Management

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Case Study: 210 Sites - Standard Configurations

Load	<1KW	<1KW	1-2KW	2-3KW
Number Sites	56	62	38	54
Load	820W	820W	1620W	2330W
Grid	On grid	No grid	No grid	No grid
Generators	1	2	2	2
Batteries Site Autonomy	12 hours	26 hours	27 hours	26 hours
PV			2.88kW	5.6kW



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On Grid – Sites - New GSM



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New GSM Hybrid



PowerOasis Dual Bay CRS



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GSM + 3G Diesel Hybrid



PowerOasis Dual Solar Array, installed as "tower-to-fence"

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GSM + 3G Site *(Ad144)*



PowerOasis Dual Solar Array

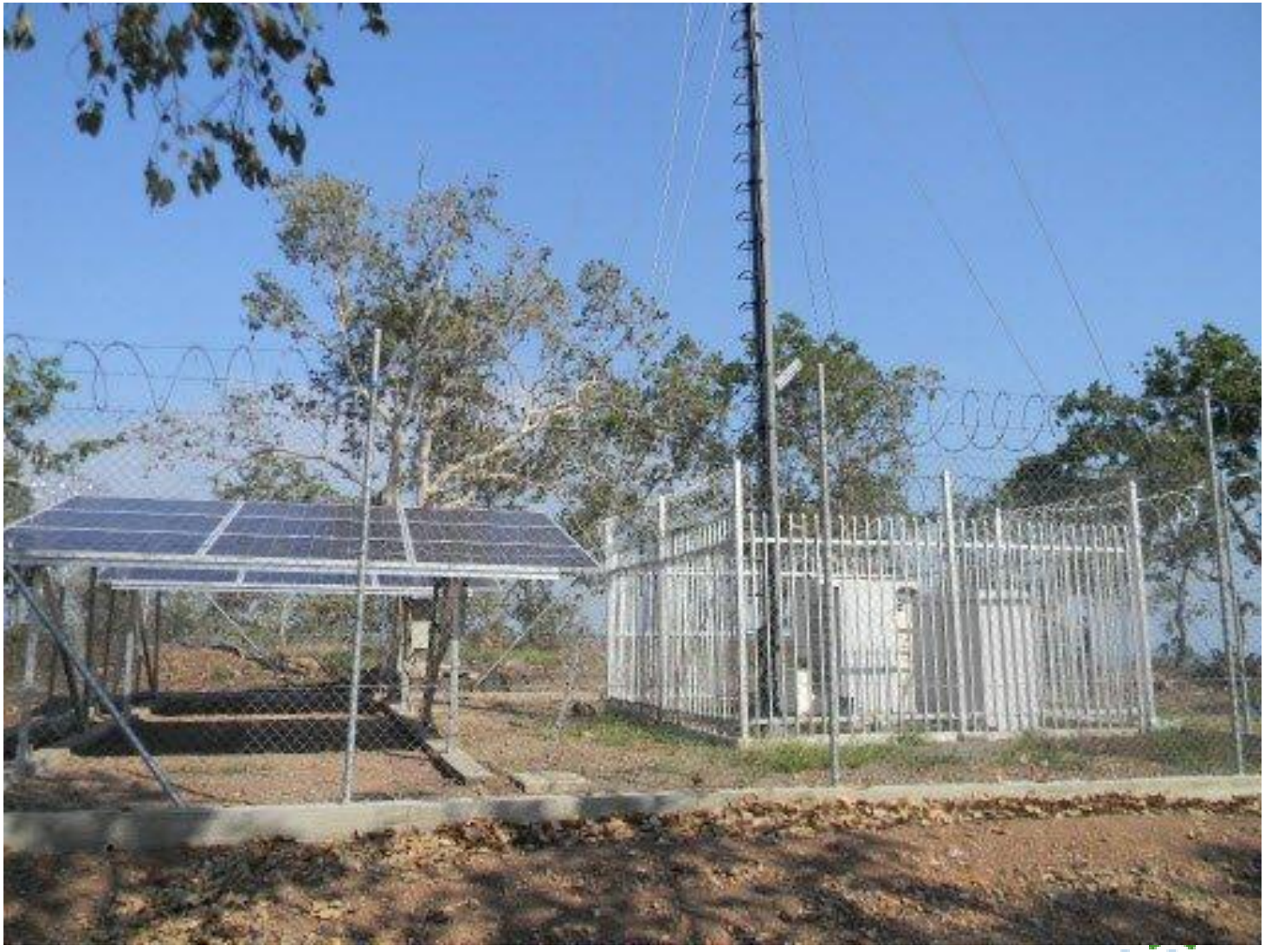


PowerOasis Solar Combiner

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Completed GSM + 3G Site *(Ad144)*



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Solution ROI

Reduced generator run-time by average 72% (target 45%)

Reduced fuel used / under-filled / stolen by approx. 78,000 ltr/mth

Improved site up-time by reporting critical alarms (all sites – eg, low fuel)

REDUCED OPEX by $3M
Planning Upgrade to next 400 sites to take OPEX down to $30M from $40M

Business Benefit	Operational Benefits
Reduced diesel fuel consumption	Reduce site visits
Reduce fuel theft	Preventive & Corrective maintenance
Reduce under-filling	Manage truck rolls
Maximise air time revenue	Reduce off-air time

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Conclusion

Scale Deployments drive business returns

Structure Approach is key

Cluster Sites, Standard Configurations

Avoid Systems Integration on Sites



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