Group Power Savings Initiatives

23rd Mac 2010

Green Power for Mobile Working Group

Egypt

company confidential

INTRODUCTION TO AXIATA



AXIATA GROUP IS UNIQUELY ASIAN WITH THE BROADER PURPOSE OF ADVANCING ASIA



10
countries

25,000
employees

>120
million customers

•Our Purpose - Advancing Asia by:

–bridging relationships through affordable connectivity.

–accelerating progress through technology.

–developing talent throughout Asia.

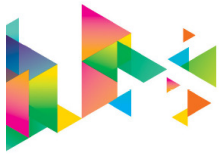
OBJECTIVE/EXPECTATIONS

1. END IN MIND
   - REDUCE NETWORK TCO (OPEX & CAPEX) IMPROVE EBITDA
   - CREATING GREEN ENVIRONMENT/CR OBLIGATION

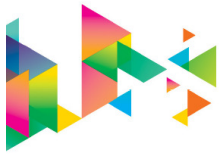
2. HOW and WHERE
   - LOW HANGING FRUITS
   - TRIAL HOSTED BY COUNTRY MARKETS

3. MOVING FORWARD/WISH LISTS FROM GSMA DEVELOPMENT FUND GROUP
   - INFO SHARING
     - Solution Dimensioning and TCO Analysis
     - Pricing for Benchmarking
     - List of Approved Vendor
   - FINANCIAL AID
     - Grant
     - Carbon Credit

4. Fuel - less
   Air Conditioner - less
   Shelter - less



HOW



INITIATIVE DEVELOPMENT – FROM THEORY to IMPLEMENTATION

- Theory

  Develop the Theory (TCO) -Seminars, paper, Vendors

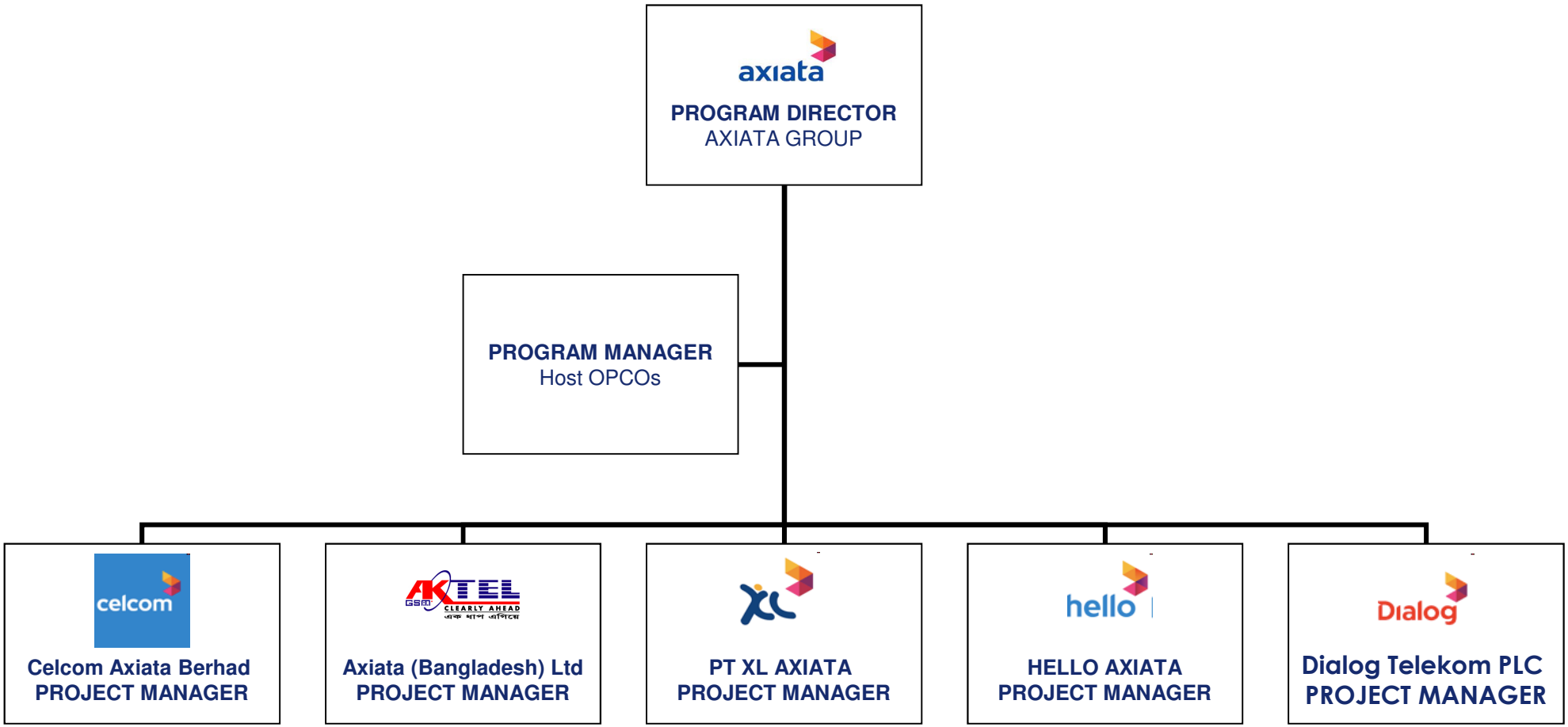
- Trial/PoC

  Do Trial and Proof of Concept – Participants from selected country markets. Info shared during AXIATA CTO Forum.

- Implementation

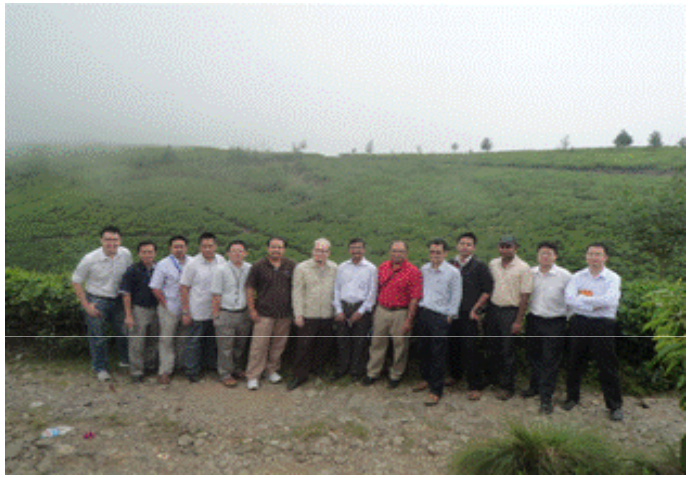
  - Site Classification/Profiling , risk, traffic load, site configuration etc – based on country markets own analysis
  - Implementation – Observation and presentation of annual cost savings on all initiatives (% of savings given back to staff as part of savings effort)

Axiata wide Working Group
-POWER SAVINGS COMMITTEE



Axiata wide Working Group -Group Meetings

- The objectives of the meeting is to :
  - disseminate CEOs cost savings KPI,
  - understand Country Markets initiatives,
  - track initiatives progress,
  - develop mechanism and format for adoption and monitoring,
  - identify ways forward in discovering new initiatives solutions.



Bandung, INDONESIA



Randenigala, SRI LANKA

Initiatives Deployment Schedule

- Total number of base stations deployed at Group Level 27,000
  - Introduction of Green Energy Solutions - 23 sites (End 2009), 100 (End 2010), 400 (End 2011)
  - Modernization to green base stations - 1064 (4%) (by April 2010)
  - Increase in working temperature - 5406 (End 2009), 11,000 (End 2010)
  - Genset reduction from 1+1 to 1+0 - 689 (End 2009), 1,000 (End 2010)
  - Genset capacity reduction from 27KVA to 8-13KVA - 72 (End 2009), 200 (End 2010)



COST SAVINGS INITIATIVES
– TCO REDUCTION & MAINTAINING NETWORK QoS

- ENERGYSAVINGS (Reduction in no. of KWh/Diesel usage while maintaining Quality of Service (QoS))
- Use of Outdoor New Generation BTS, low power consumption, high capacity & high coverage
- Reduction in the following elements;
  1. Civil Mechanical Electrical
     - Site Rental – smaller space size
     - Power/Air Conditioner – low power consumption
     - Building/Site Maintenance
     - Civil and Mechanical Infrastructure
     - Security/Water/Insurance
     - Site Fee
     - Transportation fuel
  2. MANPOWER COST (Overtime/Spares/Patching/O&M)

TARGET REDUCTION IN NETWORK POWER CONSUMPTION 40-50%
(ABOUT 2.25% of TOTAL REVENUE)

INITIATIVES SO FAR….



NETWORK MODERNIZATION – SITE BKK1, Phnom Penh CAMBODIA

		Feb-09	Mar-09	Apr-09	May-09	Jun-09
Item	Description	KW (4/4/4)	Swap	Swap	KW (8/8/8)	KW (8/8/8)
1	Rectifier	1833	2161	2161	1555	1555
2	Lighting	0	0	0	0	0
3	Transmission	167	167	167	167	72
4	BTS	1584	1771	1771	1509	1509
5	Air Conditions	1138	1138	1138	1138	190
6	Actual Kw (Bill)	2836	2972	3052	2570	1718
					Variance KW May & June	852
					Variance KW Feb & June	1118

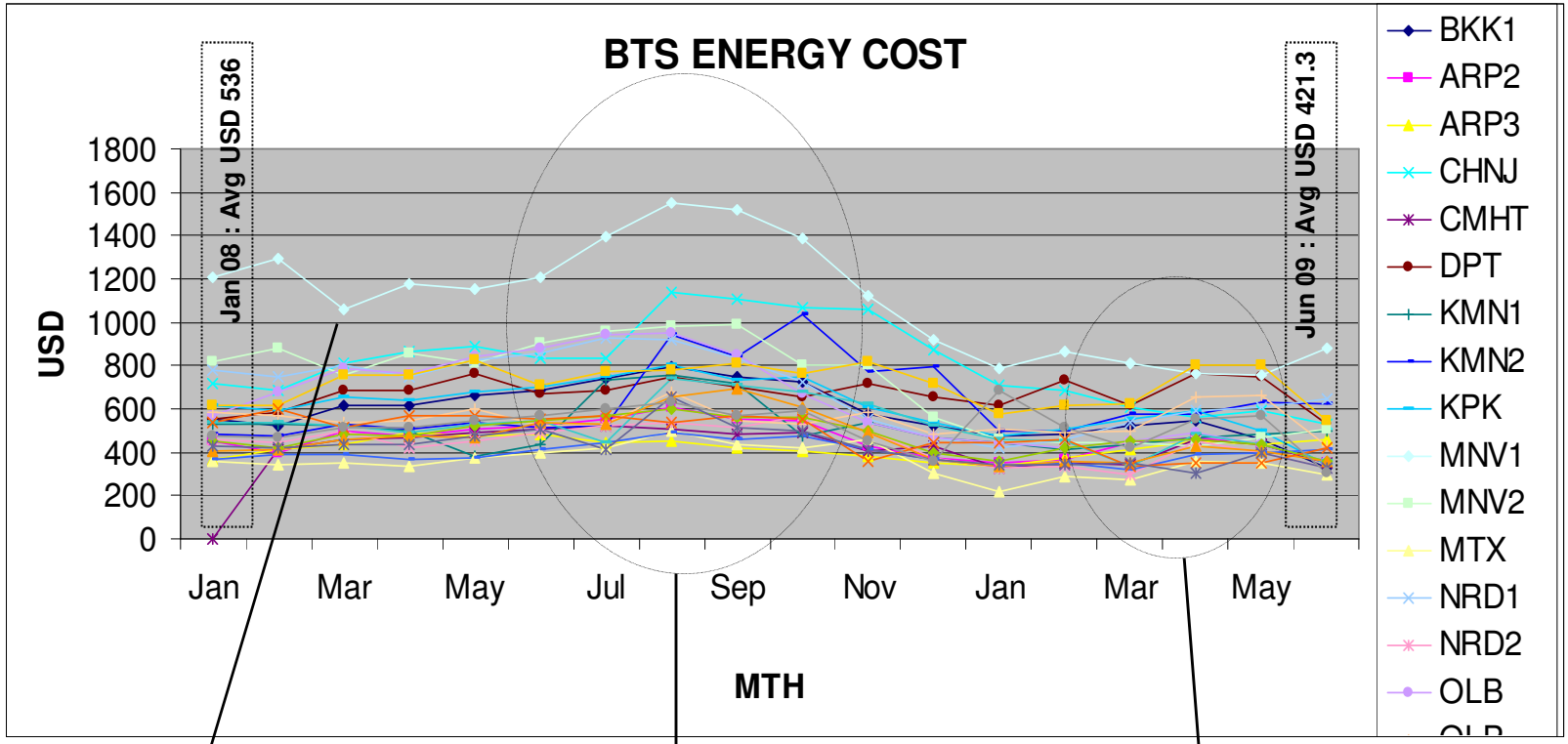
Turn off air conditions

Theoretical Max Power Consumption

Vendor B, BTS 8/8/8 Dual Band : 2280 KW

Vendor A, BTS 4/4/4 : 2240 KW

Analysis For 25 Rooftop Sites In Phnom Penh



The electric bill charge by Building owner – MNV2

Fuel price increase from June 08 – Oct 08

Swap period. Vendor B & Vendor A BTS co lo Mar-My09

System : Vendor A Jan 08 – Mar 09
Config : 4/4/4
Cooling : 16-24Hrs

System : Vendor B
Dual Band &3G
Config : 6/6/6, 7/7/7 & 8/88
Cooling : 0 – 4 Hrs

ALTERNATIVE & GREEN POWER – FOR NON GRID NON RELIABLE GRID SITE

1. TOTAL SOLAR, PULAU BESAR MELAKA, MALAYSIA
2. TOTAL SOLAR, LAHAD DATU SABAH, MALAYSIA
3. TOTAL SOLAR, CLUB TEREH JOHOR, MALAYSIA
4. TOTAL SOLAR, LADANG TAWING, JOHOR, MALAYSIA
5. HYBRID SOLAR HATIYA ISLAND BANGLADESH
6. HYBRID SOLAR KALIBARI BAZAR, SATKHIRA, BANGLADESH
7. HYBRID SOLAR & WIND RANDENIGALA, SRI LANKA
8. HYBRID SOLAR & WIND WEERAWILLA, SRI LANKA
9. HYBRID SOLAR, WELIMUWAPOTHA, SRI LANKA

GREEN SOLUTION DEPLOYMENTS IN AXIATA NETWORKS



LAHAD DATU, SABAH, MALAYSIA



PULAU BESAR, MELAKA, MALAYSIA



CLUB TEREH, JOHOR, MALAYSIA



LDG TAWING, JOHOR, MALAYSIA



SANGORIA HATIYA ISLAND BANGLADESH



KALIBARI BAZAR BANGLADESH



WEERAWILA, SRI LANKA

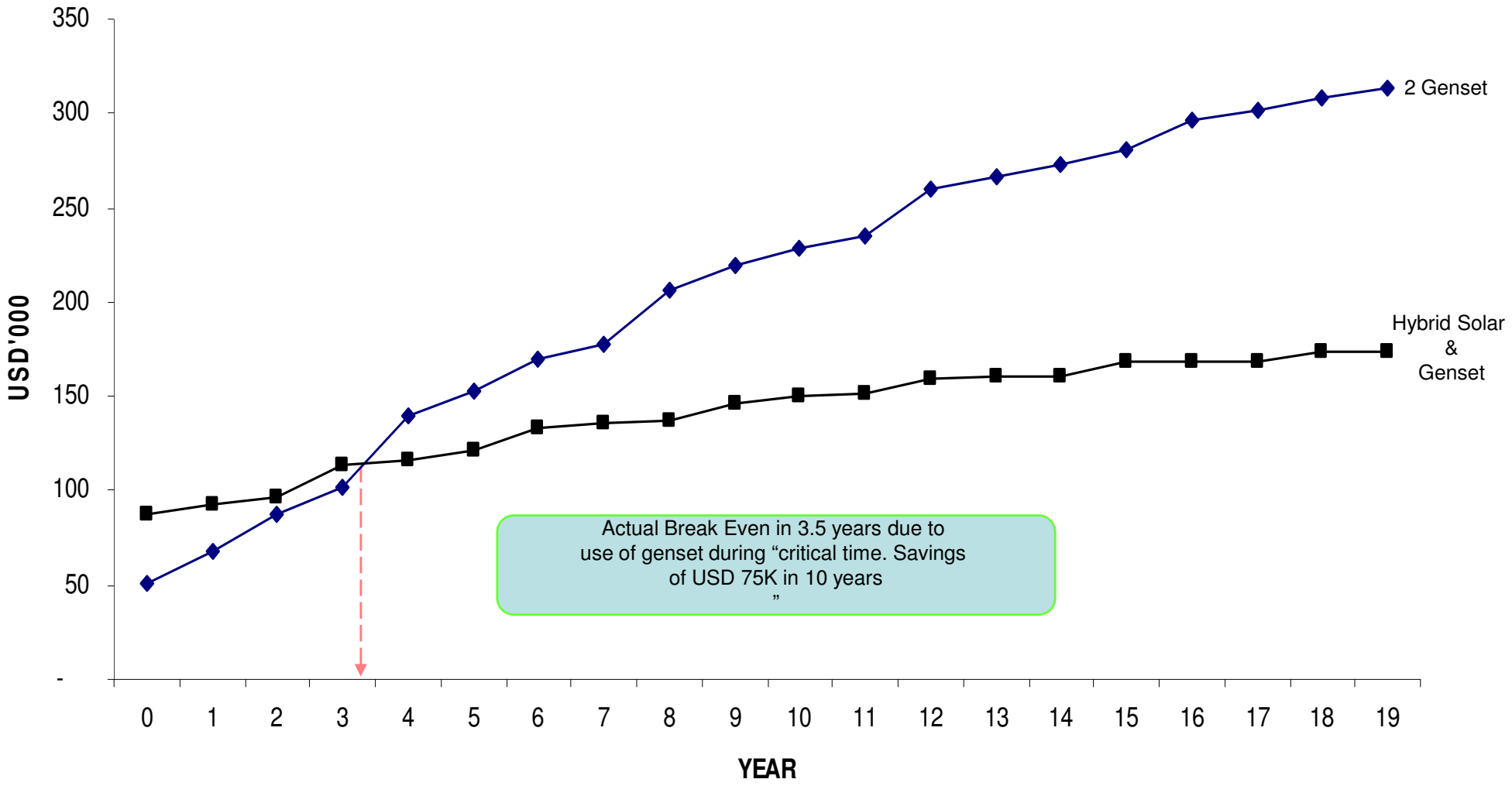


RANDENIGALA, SRI LANKA

IMPLEMENTATION ISSUES

- Need bigger land size to install solar panel/site rental/reduce site foot print
- Go for outdoor Distributed BBU/RRU BTS solution/vandalism on feeder
- Modernize with less than 1KW BTS at 4/4/4 configuration lowest implementation capex

SANGORIA HYBRID SOLAR – TCO ANALYSIS

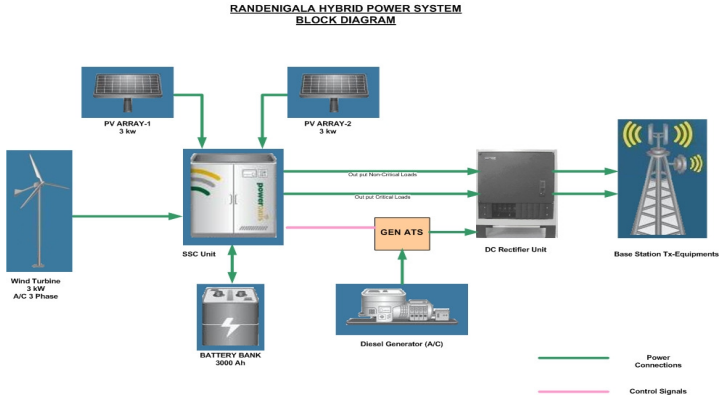


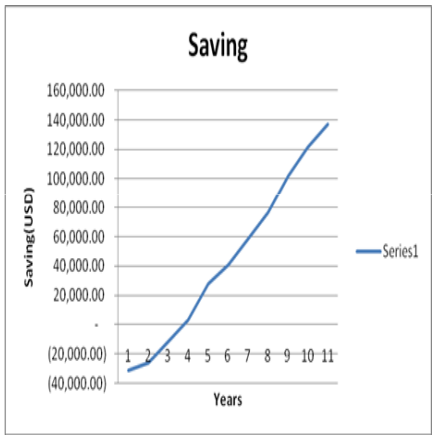
RANDENIGALA HYBRID SOLAR & WIND – TCO ANALYSIS

Randenigala site configuration

1	Kestrel	E400i	3kW wind turbine – 48V version
36	BP Solar	BP3170	170W solar panel
1	PowerOasis	SSC	Power controller
16	Exide	3-100A29	6V Absolyte IIP 1400Ah batteries (Total 2800 AH)

Proposed configuration =>Full time on renewable power.
There is a significant saving when total cost is compared with full time gen option.
Presently site is powered only from gen power.





SITE NAME: RANDENIGALA

TCO Savings Compared to BAU

Year	Renewablwe
5	USD 55,000
10	USD 257,000

FUEL CELL TRIAL at CELCOM – SOLUTION FOR COLLECTOR SITE



Methanol system successfully
tested during one month at Celcom facilities

Advantages

- **Improved reliability and availability**
  - Fewer moving parts than a generator
  - No degradation in standby mode like a battery
  - Low maintenance (annual visit)
- **Long autonomy /backup time:** hours and days
- **More Robust than generators or batteries**
  - Wide temperature operating range (No degradation with temperature)
  - Do not require a/c air-con to operate
- **High Flexibility**
  - Indoor or outdoor installations
  - systems can be installed in parallel
  - 48VDC or 230VAC (with UPS or Inverter) options
- **Environment friendly solution**
  - Extremely low noise
  - **No harmful emissions**
  - No hazardous wastes (excluding batteries)

Why Fuel Cell

•Batteries have a short lifespan (tropical weather). They need to be replaced on a regular basis or be kept in a air-conditioned cabin

• Diesel generators are maintenance intensive, more or less reliable and subjected to thefts

•Theft : Battery, Genset, Diesel (Hot Item)

Way Forward

•Creating new supply chain/business model on OAM

Fuel Cell – TCO and Fuel Availability Analysis

	H2 gas	Methanol
Malaysia		
Indonesia		
Cambodia		
Bangladesh		

ROI < 2 years

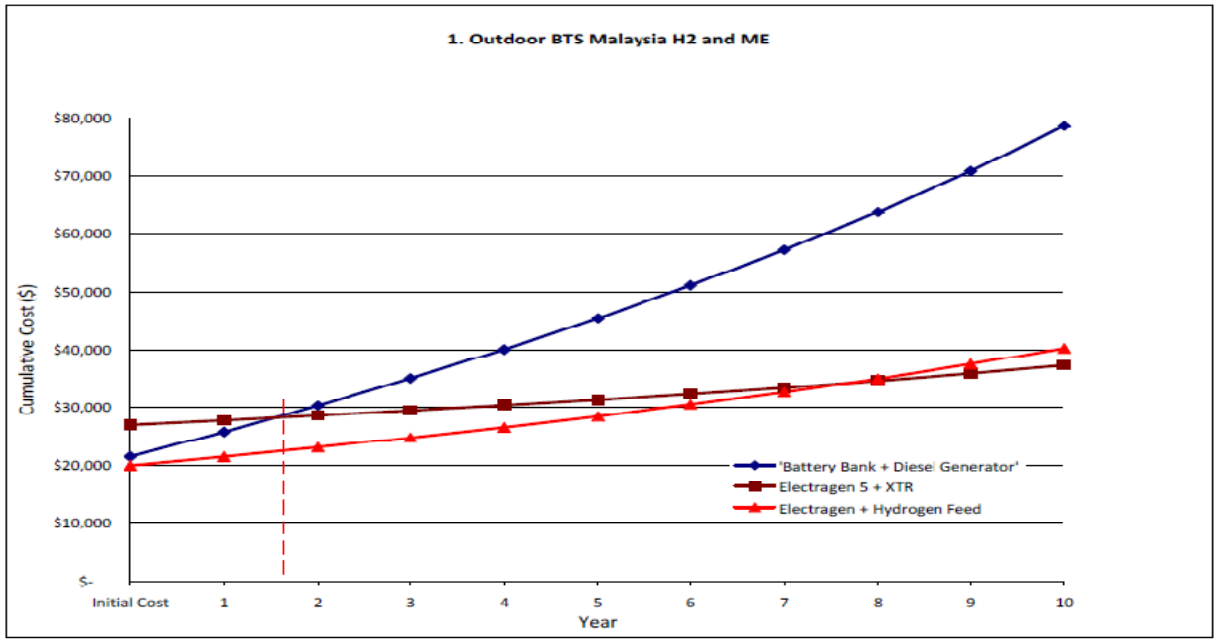
ROI < 4 years but limited cost saving

ROI >5 years (no business case at this stage)

Malaysia:

1. Battery+Genset replaced by fuel cell system (2.5kW)

1.1 with fuel cell operating with H2 gas
1.2 with fuel cell operating with methanol/water fuel



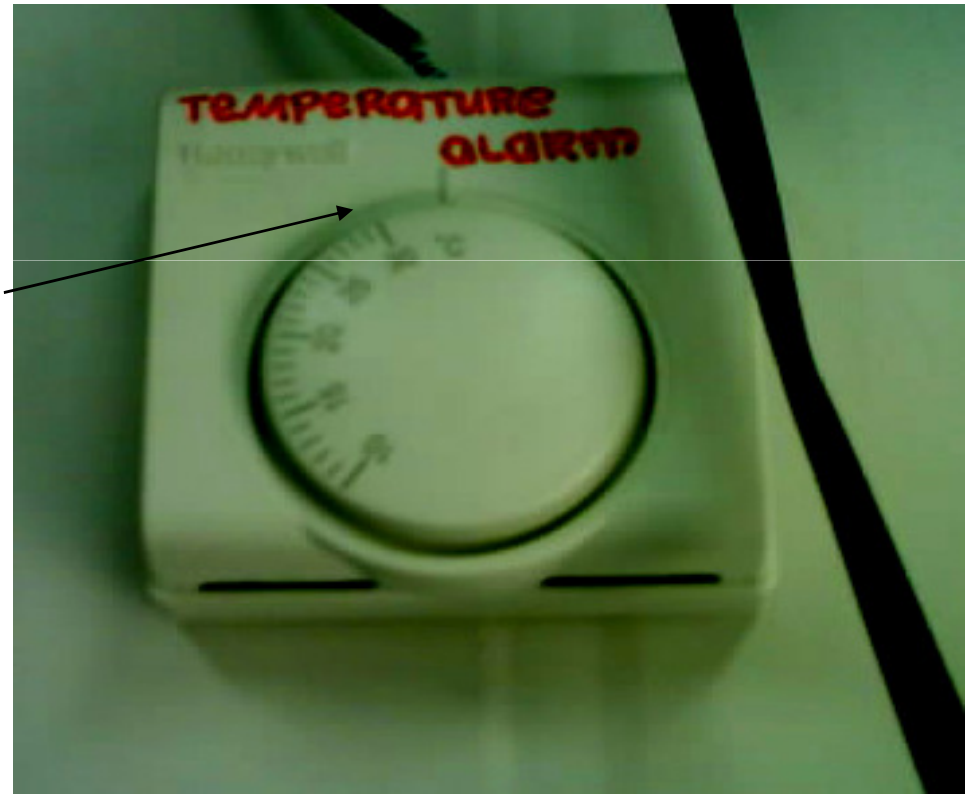
The CAPEX of the hydrogen fuel cell solution is similar to Genset+battery.

Air Conditioner Temperature Increment Setting

Theory

- Increase in Air conditioner temperature setting is expected to reduce site power consumption by reducing the running time of the air conditioner system.

TEMPERATURE SETTING 30°C



Temperature Increment Setting

Result

NO	SITE NAME	SITE ID	EQUIPMENT	kWh CONSUMPTION in 10 days		
				25°C	30°C	35°C
1	BKT INDAH 2	G4801	Rectifier, 3G Huawei, 2G ALU, Nokia microwave	114	104.8	69.4
3	TMN SERI ORKID	G4811	Rectifier, 3G Huawei, 2G ALU, Nokia microwave	99.4	95.9	74.2
5	TMN JAYA MAS 2	G4794	Rectifier, 3G Huawei, 2G ALU, Ericsson & Huawei microwave	105.7	99.3	72.6
6	TUTA 7	G4805	Rectifier, 3G Huawei, 2G ALU, Ericsson microwave	91.8	84.1	79.2

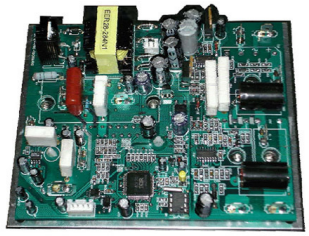
	Reduction of Power Consumption (%)	
	25°C to 30°C	25°C to 35°C
BKT INDAH 2	8.07	39.12
TMN SERI ORKID	3.52	25.35
TMN JAYA MAS 2	6.05	31.32
TUTA 7	8.39	13.73

A/C Temperature Setting	% Savings on Power Consumption	
	Theoretical Savings	Actual Savings
25°C to 30°C	5%-10%	6.50%
25°C to 35°C	10% - 20%	27.30%

Inverter Type Air Conditioning System







Theory

Aircond Inverter System

- Continuously regulate the thermal power flow by making the compressor fan running at variable speed according to the ambient air temperature

Aircond Non-Inverter system

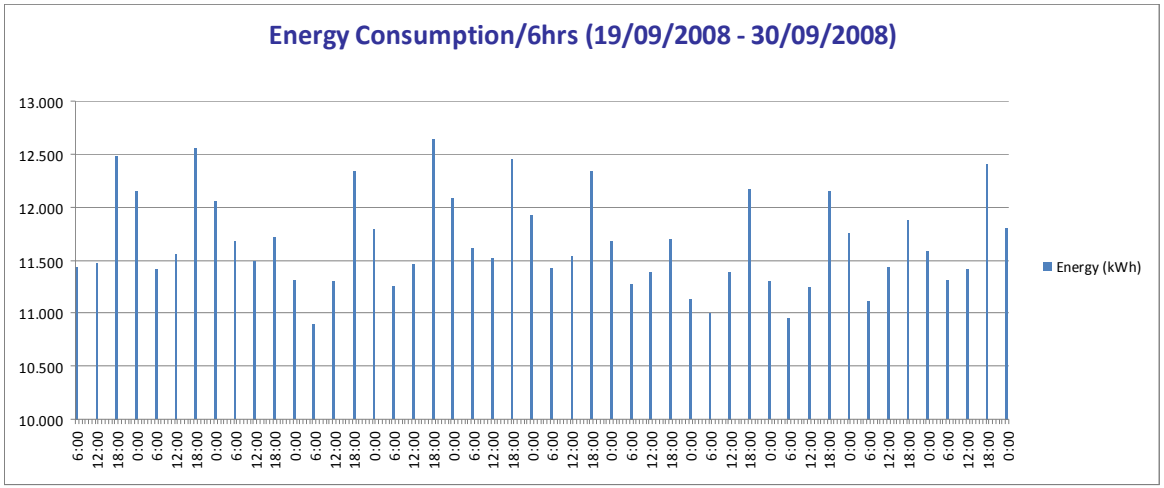
- Compressor is working at maximum and constant speed throughout the cooling process.

Temperature Setting (°C)	Average Daily kWh Usage (Normal A/C)	Average Daily kWHh Usage (Inverter A/C)	Daily Savings on kWh Usage	Percentage on saving (%)	5 Years Savings (USD'000)	10 Years Savings (USD'000)
25	**35.7**	**30.75**	**4.95**	**13.8%**	**0.5**	**1.5**
30	**36.6**	**28.6**	**8.00**	**21.9%**	**0.95**	**2.4**

Free Cooling Box (FCB)

What Is Free Cooling System (FCB)

- A ventilation system that brings in outside air when its temperature is sufficiently low to provide ventilation (free-cooling) inside the cabin.
- It shall supplement existing air-conditioning units with a potential 10% - 30% annual energy saving depending on temperature setting and local climate.

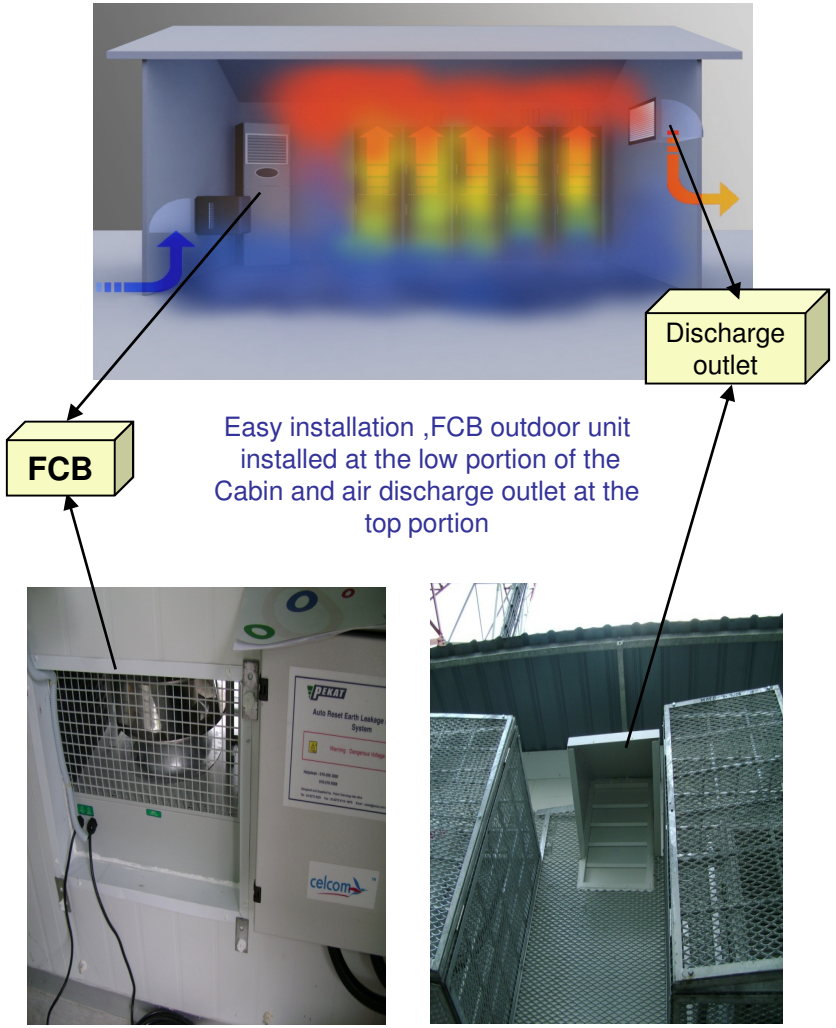


At 25°C setting

- **Total usage before FCB at 25C : 302.4KW / week**
- **Total usage after installing FCB : 263.06KW / week**
- **% KW saving : 13%**
- **39KW x 0.38 = RM 14.82 / week ; RM63.51 per month; RM 762.00/ year**

At 30°C setting

- Total usage before FCB at 30C :292.9KW / week
- Total usage after installing FCB :233KW / week
- % KW saving : 23% (vs aircond at 25C)
- 69.4KW x 0.38 = RM 26.37 / week ; RM113.00 per month; RM 1356.00/ year

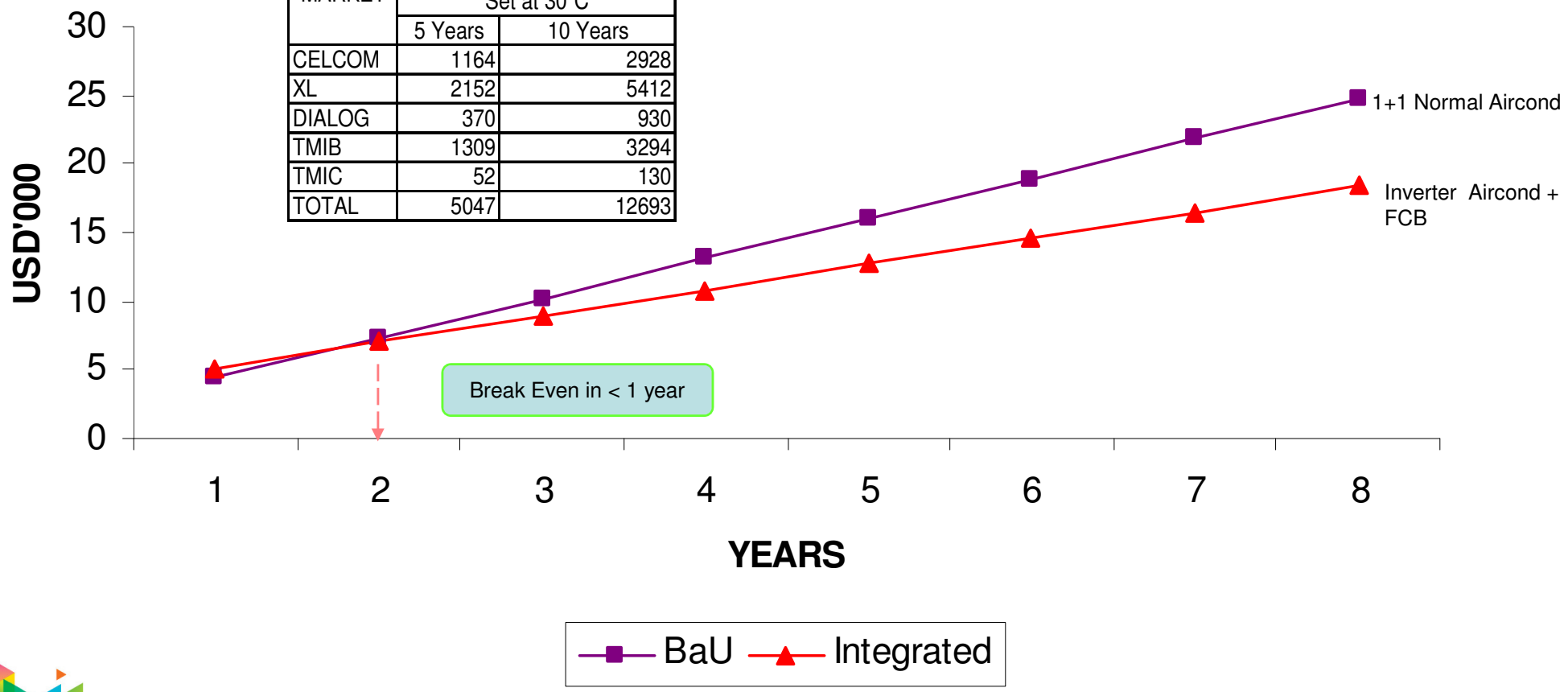


Site Location: TPM Bukit Jalil

INTEGRATED IMPLEMENTATION – INVERTER AIRCOND and FCB (SET at 30°C (NEW SITE)

Based on new sites

COUNTRY MARKET	Total Potential Savings in USD'000	
	Set at 30°C	
	5 Years	10 Years
CELCOM	1164	2928
XL	2152	5412
DIALOG	370	930
TMIB	1309	3294
TMIC	52	130
TOTAL	5047	12693



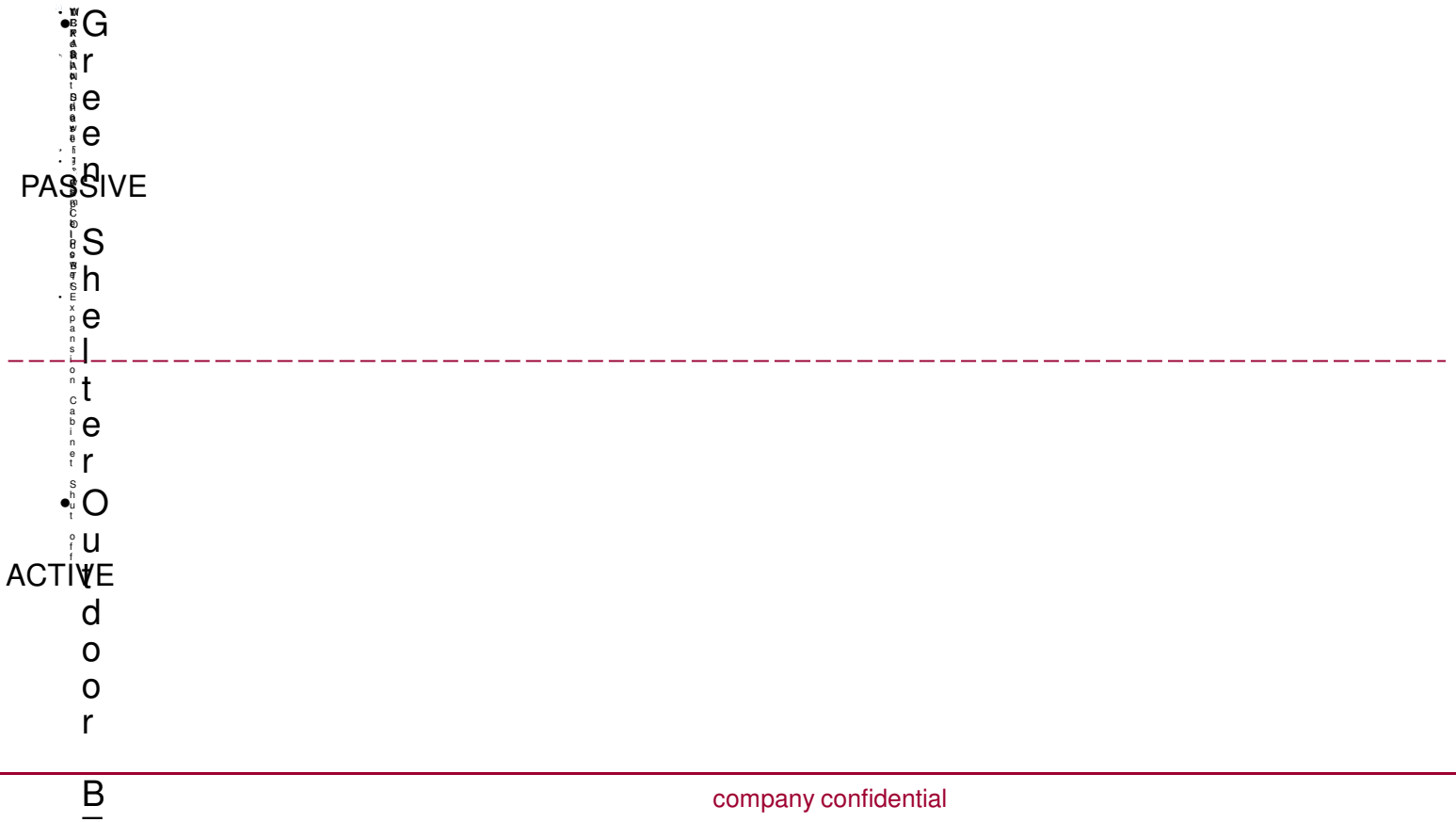
IMPLEMENTATION ISSUES

- Legacy equipment/classification/prioritizations/sensitivity
- Book value/Re-deployment
- Human Factor/Automization
- Operational Process/Outsourcing

WAY FORWARD

- Active implementation on passive power savings
- Trial on active elements power savings

Areas of Energy Efficiency in Mobile Operations



THANK YOU