Energy Efficiency Initiatives
Indosat Case

GSMA Green Power for Mobile
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Azwani Dadeh
Div. Head Power & Utility Indosat

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Topics

1. Energy Management Issues
2. Pain-points of Energy Management in Indosat Network
3. Energy Efficiency Initiatives to Mitigate Energy Management & Opex Chalenge
4. Indosat's Stakeholders Expectation to Promote Green Power and Energy Efficiency

MOTIVATION





Energy Management Issues

Energy Source	# Sites
PLN	9500
PLN + DG	2500
PV + DG	20
2 DG	650

Rp 600 Bilion/Year
(USD 60 mil/year)

Rp250 Bilion/Year
(USD 25 mil/year)

only 5 % of total sites, but cost is 40% of total energy cost

3800 units DG: 1200 units located in off grid sites

Energy Efficiency Initiatives

Off Grid

1. Connect 2DG (Off Grid) Sites to PLN
2. Convert 2DG to CDC

Bad Grid

3. Install long hour backup battery
4. Delay DG Start (run battery first when PLN off)

Good/Bad Grid

5. Modernize RAN with low power consumption
6. Reduce PLN capacity to 10.6 kVA or lower

Renewable Bad/Off Grid

7. Standalone PV for remote solution BTS (200 – 300 Watt)
8. Fuel Cell (FC) and Hybrid PV & FC/DG

Off Grid Solution

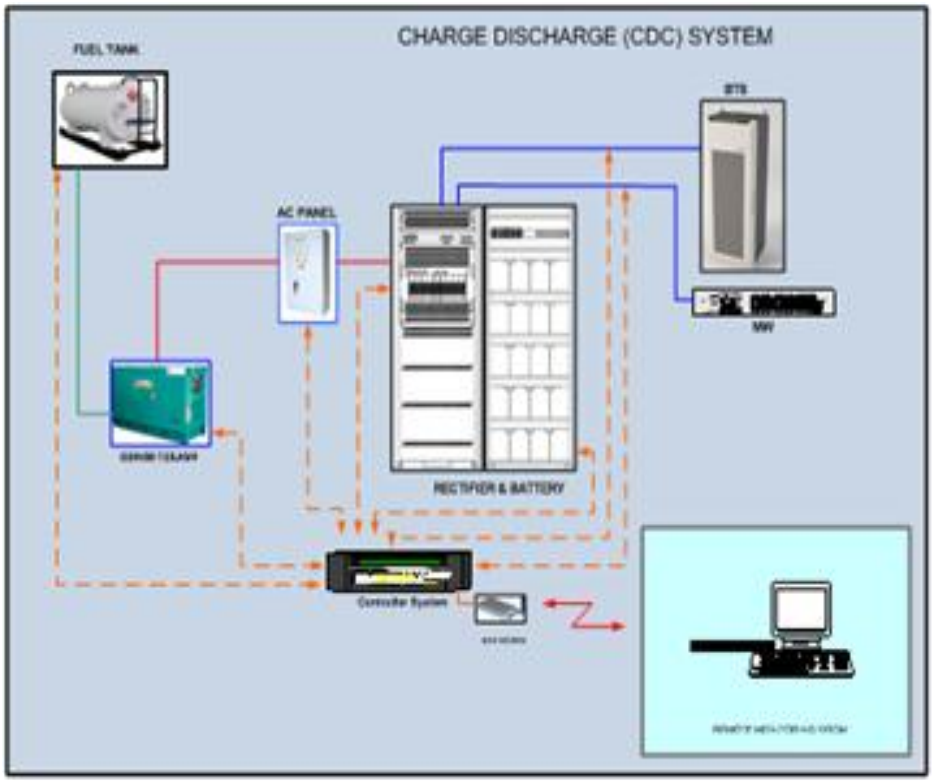
1. **Connect Off Grid Site (2DG) to PLN (state owned utility company)**
   - Opex cost of 2DG per month: Rp 25 - 30 milion
   - PLN Cost per kWh: Rp 1200 (ATSI), the cheapest energy cost
   - Average PLN cost per month: Rp 2.5 milion
   - Connection cost (Capex) : Rp 50 – 250 milion (depend on distance from pole)

2. **Convert 2DG to CDC**
   - 2 cycles/day (3hr charge – 9hr discharge), 2 kW load, 20 kVA DG (existing)
   - Capex persite (battery+rect+cabinet+controller): Rp 170 milion,
   - Opex persite (fuel & maintenance) per month: Rp 7.5 milion

Comparison 2DG, CDC and PLN:

	2DG	CDC	PLN
Capex (4 years)	Rp 400 mio	Rp 420 mio	Rp 290 mio
Opex per year	Rp 360 mio	Rp 90 mio	Rp 30 mio
Opex 4 years	Rp 1.400 mio	Rp 360 mio	Rp 120 mio
TCO 4 years	Rp 1.800 mio	Rp 780 mio	Rp 410 mio
Opex saving/site toward 2 DG	-	75% (Rp 270 mio/yr)	90% (Rp 320 mio/yr)
Opex saving/site toward CDC	-	-	67% (Rp 60 mio/yr)

Off Grid Solution – Implementation



Convert 2DG to CDC

- Nbr of sites: 573 sites
- Location: Sumatera & Kalimantan, Sulawesi, Papua
- Status: on progres
- Calculated net saving: Rp 400 bilion (USD 40 milion) in 4 years.
- Opex saving target: 75%
- Actual Saving: ~ Rp 20 bilion.

PLN Connection:

- 70 sites in 2011: ~ Rp 8 bilion
- 80 sites in 2012 : ~ Rp 10 bilion

Note:
Convert Multiguna to Regular tariff: 130 sites, saving ~ Rp 10 bilion in 2011.

Bad Grid Solution (1)

- **Reduce DG run time ~ 8 hours per day**
- **Outage Classification**

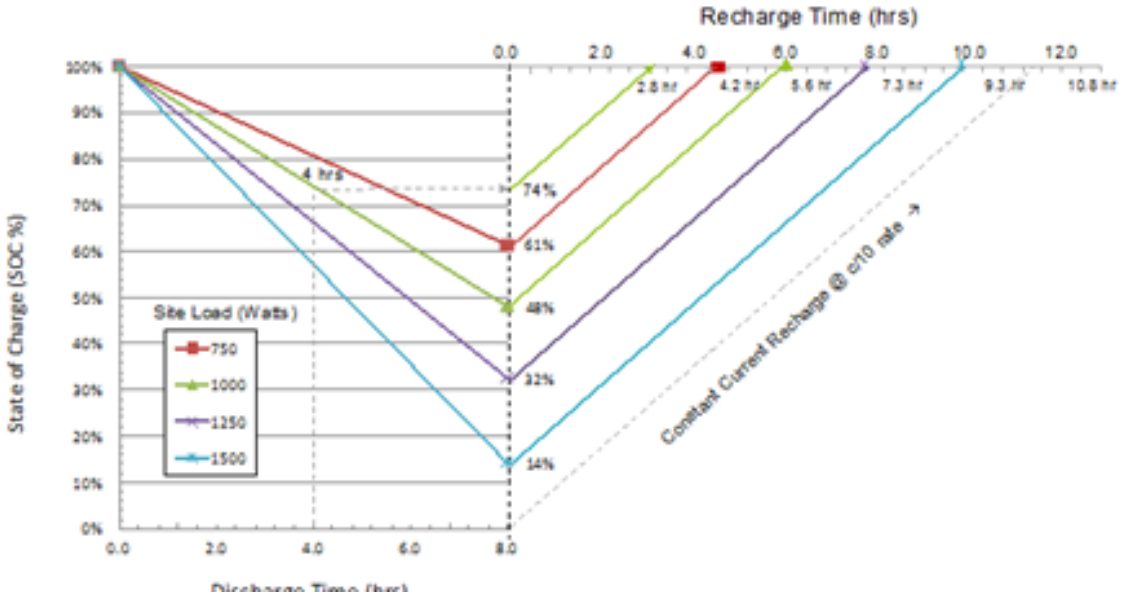
CLASS-1	CLASS-2	CLASS-3	CLASS-4
<10hr/Month	<10hr/Week	2-8 hr/day	>10hr/day

REGION	GRID OUTAGE CLASSIFICATION				
	CLASS-1 <10hr/Month	CLASS-2 <10hr/Week	CLASS-3A 2-4 hr/day	CLASS-3B 4-8hr/day	CLASS-4 >8hr/day
NORTHERN SUMATERA	-	502	312	**353**	159
SOUTHERN SUMATERA	-	399	144	**422**	83
JABOTABEK & BANTEN	1,804	1,328	-		-
WEST JAVA	838	342	-		-
CENTRAL JAVA	952	445	-		-
EAST JAVA BALI NUSRA	1,430	406	-		-
KALIMANTAN	-	388	284	**110**	290
SULAMPAPUA	-	344	232	**112**	41
TOTAL	**5,024**	**4,154**	**972**	**997**	**573**
PERCENTAGE	**43%**	**35%**	**8%**	**9%**	**5%**

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Bad Grid Solution

- **Opex saving (fuel & DG maint) per site/per month: upto ~ Rp 10 milion (USD 1000) [$4/hr*8hrs/day*30days]**
- **Load 1.5 - 2 kW, outage 4 – 8 hours a day → ~ 300 Ah battery.**
- **Battery Specification:**
  - Fast charge
  - Operating temp ~ 50 C
  - Anti theft (no lead)
  - PSOC/Cycle free



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Bad Grid Solution - Implementation



- **Technology:**
  - Metal air battery (Zinc-air)
  - Lithium phosphate & Lithium Ion
  - Sodium battery
- **Implemented:**
  - Zinc-Air (Fluidic Energy)

  green, made in Indonesia.

  Location: Sumatera
- **Result:** Longest bakcup time 16 hours.

Load & PLN Capacity Downgrade

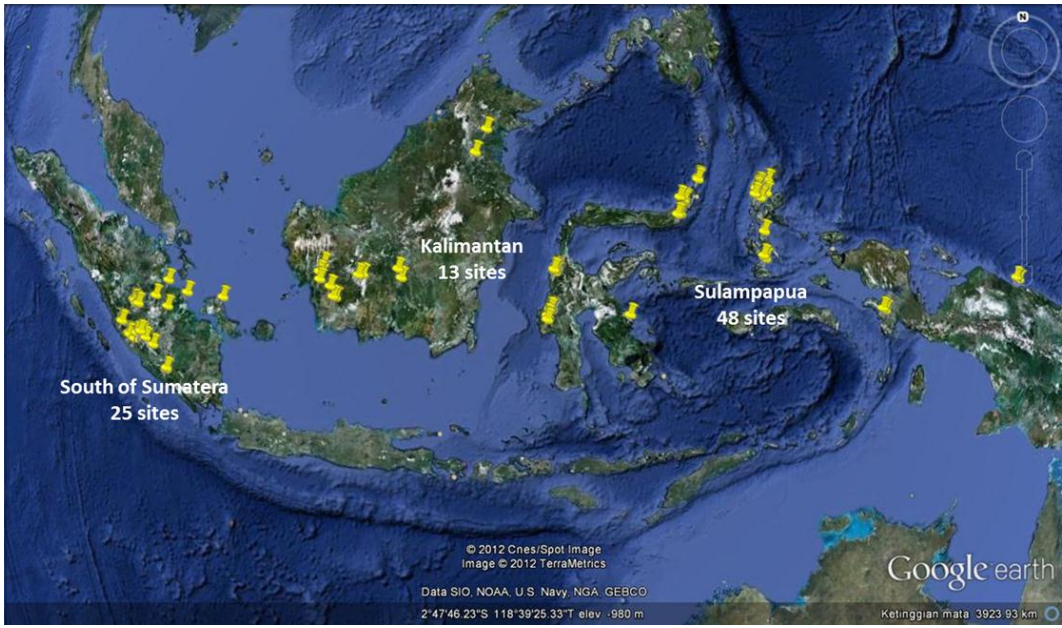
- **RAN Modernization,** new technology → 700W (3 RRU)–3300W (12 RRU)
  It's outdoor, no need aircond !
  Capacity 6000 Watt or 6.6 kVA is sufficient.
- **Existing PLN Capacity PLN:** 10,6 – 23 kVA in 8000 sites.
- **Why we should downgrade the PLN capacity?**

  E-min 110

  If energy utilization divided by capacity < 110, then we have to pay flat rate. → will be no effect even we reduce load

Energy Efficiency Intitiatives
Renewable (Green) Solution

- **PV: 86 Sites** (standalone) 200W ~ 2kW load.
- **Hybrid PV+DG:**
  10 sites in Sumatera

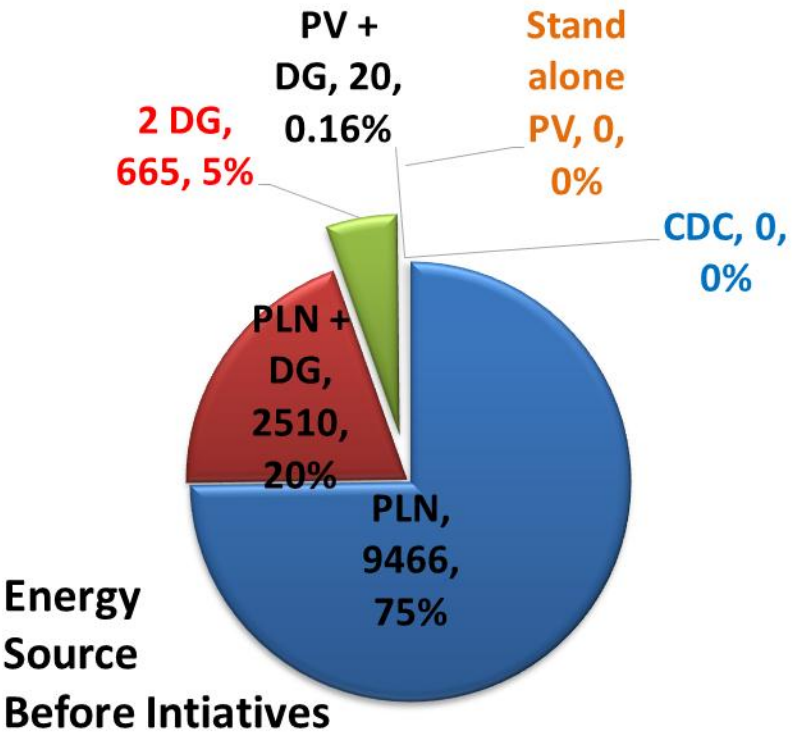


Next Step:

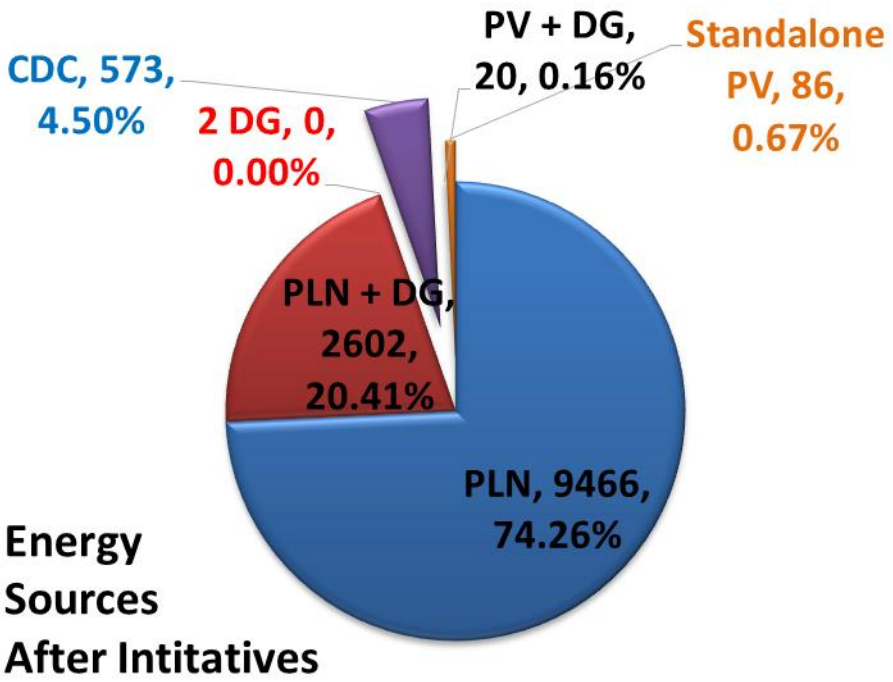
- **Hybrid PV+ MFC (Methanol Fuel Cells)** in off grid site wich has community case
- **PLN+MFC**
  In bad grid with high load (3 - 5kW)

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Energy Efficiency Initiatives
SUMMARY



Energy Source Before Intiatives



Energy Sources After Intitatives

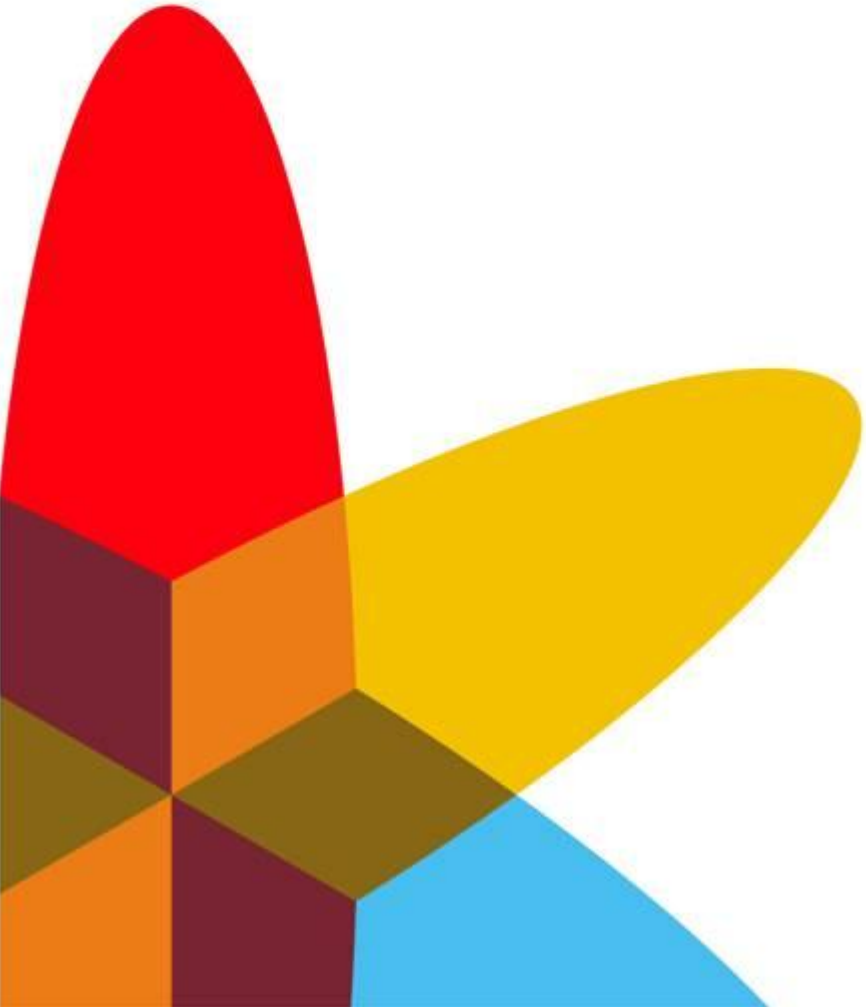
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Challenges & Expectation in Implementing
Renewable Energy & Energy Efficiency Initiatve

- **Indosat have strong commitment on enegry efficiency initiatives and promote green energy and at the same time increase the network availability**
- **Green or renewable energy is not always cheap. We, innovatively apply the various technologies to generate and storage energy to lowering the cost.**
- **We're expecting there will be incentives (such as tax holiday/reduction) from government.**

Thank You

Q & A



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