Greening The Network

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Director of Network TELKOMSEL

Bali, 13 December 2012

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Greening The Network

Global and National Energy Issues

Telkomsel Contributions

Matters of Concern

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TODAY'S WORLD ENERGY ISSUES

1. Emission of Fossil Energy (Global Warming Issue)
2. Unbalanced Fossil Energy Supply and Demand
3. Scarcity and Limitation of Fossil Energy Reserves
4. Pros and Cons of Nuclear Power

WORLD ENERGY TIMELINE

Short term : (until 2020)

- Replace the nuclear energy with fossil energy step by step
- Demand of Coal, Oil, and Gas will increase
- Price of fossil fuel will increase
- Clean Technology becomes a necessity

Middle term : (until 2050)

- Starting 2020, Renewable Energy (RE) price will be more competitive to fossil energy
- Replace fossil energy with RE

Long term : (after 2050)

- RE will be the only source of energy to supply all energy demand
- Reduce the use of burned RE (such as biofuel, biomass, biogas)

Source : DEN

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Indonesia Fossil Energy Reserves

No	NON-RENEWABLE ENERGY SOURCES (FOSSIL ENERGY)	RESERVE	PRODUCTION PER YEAR	*RESERVE TO PRODUCTION RATIO*
1	Oil	4.0 *billion barrels*	347 million barrels	11 years
2	Gas	104.71 TSCF	3212 BSCF	32 years
3	Coal	28 billion tons	329 million tons	85 years

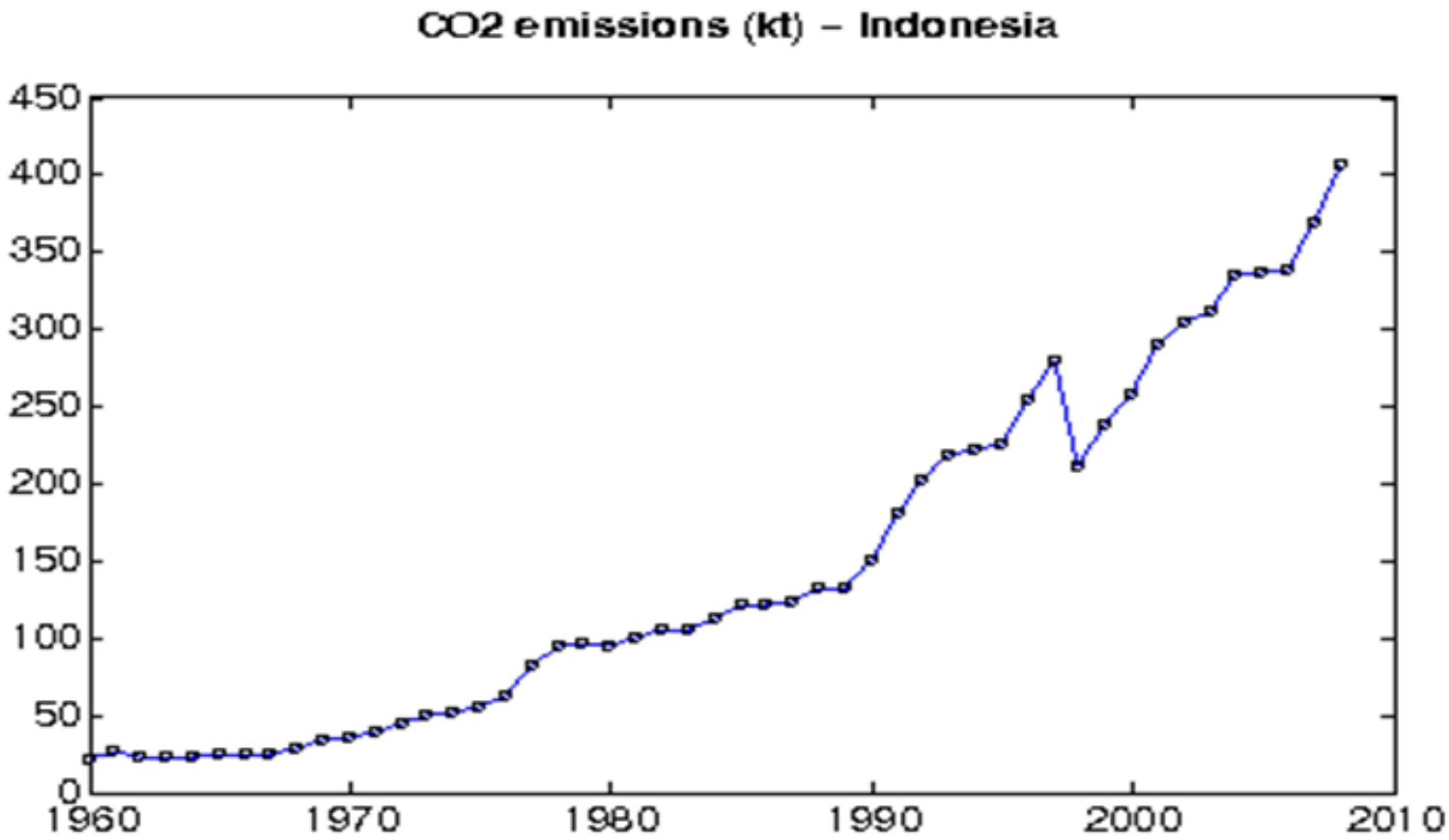
Note:

- The Reserves-to-production ratio (RPR or R/P) is the remaining amount of a non-renewable resource, expressed in years
- TSCF = Trillion Standard Cubic Feet
- BSCF = Billion Standard Cubic Feet

Source: KESDM (Indonesian Ministry of Energy and Mineral Resources)

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Indonesia Carbon Emission



Carbon dioxide emissions are those stemming from the burning of fossil fuels and the manufacture of cement. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring.

Source: Carbon Dioxide Information Analysis Center, Environmental Sciences Division, Oak Ridge National Laboratory, Tennessee, United States.

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NATIONAL COMMITMENT TO REDUCE GREENHOUSE GASSES

President Commitment in G-20 Pittsburgh and COP15 to reduce greenhouse gasses (GHG) emission by 2020
and
Presidential Regulation Number 61 Year 2011 concerning on National Action Plan for Reducing Greenhouse Gas Emissions

Domestic efforts

26%
(767 Mton)

41%

Domestic efforts and international support

Forestry, Agriculture	680 Mton
Energi	**30 Mton**
Waste	48 Mton
Industry &Transportation	9 Mton

Through new renewable energy development and energy conservation implementation in all sectors

Source: KESDM

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National Renewable Energy Sources

NO	RENEWABLE ENERGY SOURCES	RESOURCES (SD)	INSTALLED CAPACITY (KT)	RATIO KT/SD (%)
1	**2**	**3**	**4**	**5 = 4/3**
1	Hydro power	75,670 MW	5,705.29 MW	7.54
2	Geothermal	29,038 MW	1,189 MW	4.00
3	Mini/Micro Hydro	769.69 MW	217.89 MW	28.31
4	Biomass (al: Biogas)	49,810 MW	1,618.40 MW	3.25
5	Solar	4.80 kWh/m^2/day	13.5 MWp	-
6	Wind	3 – 6 m/s	1.87 MW	-

Source: KESDM (Indonesian Ministry of Energy and Mineral Resources)

Note: Telkomsel total solarcell BTS (Macro) installed capacity: 2.1 MWp

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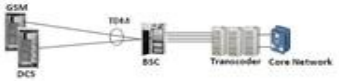
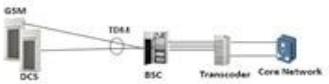
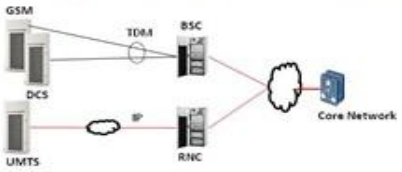
Global and National Energy Issues

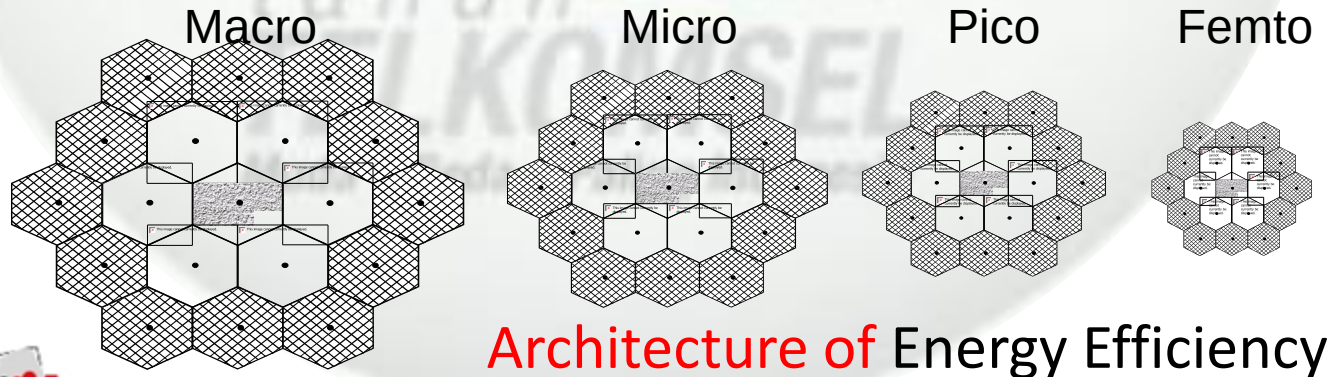
Telkomsel Contributions

Matters of Concern

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Reducing Energy Consumption by Adopting Green Technology

Description	1995 - 2000	2000 - 2005	2005 - 2010	2010 - future
Technology	Voice + GPRS	Voice + GPRS +EDGE	Voice + GPRS +HSDPA	Voice + GPRS +HSPA+ + LTE
BTS Evolution	 GSM 4/4/4 + DCS 8/8/8	 GSM 4/4/4 + DCS 8/8/8	 GSM 4/4/4 + DCS 8/8/8 + UMTS 2/2/2	 All Technology
RAN Configuration				
Capacity	6 TRX per cabinet	12 TRX per cabinet	12 TRX per cabinet	All technology inside a BTS
Transmission	Dedicated per technology using TDM-E1	Dedicated per technology using TDM-E1	Dedicated per technology : 2G using TDM-E1 3G Using IP	Common transport for 2G/3G/LTE Using native IP
BTS Power consumption (average)	1800 Watt/full cabinet GSM 4/4/4 : 3600 Watt DCS 8/8/8 : 7200 Watt	1500 Watt/full cabinet GSM 4/4/4 : 1250 Watt DCS 8/8/8 : 2500 Watt	1500 Watt/full cabinet GSM 4/4/4 : 1250 Watt DCS 8/8/8 : 2500 Watt UMTS 2/2/2 : 1250 Watt	GSM 4/4/4 : 600 Watt DCS 8/8/8 : 1200 Watt UMTS 2/2/2 : 600 Watt LTE : 940 Watt
Dimension (m)	1.8x0.6x0.5 (HxWxD) per rack	1.5x0.5x0.5 (HxWxD) per rack	1.5x0.5x0.5 (HxWxD) per rack	1.5x0.5x0.5 (HxWxD) per rack
Footprint (m2) for BTS configuration	1.8	0.75	1	0.25



Architecture of Energy Efficiency Analysis

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Telkomsel Energy Master Plan (2011 – 2015)

CORPORATE STRATEGIC PILLARS	LEADING TCO	RELIABLE NETWORK	GO-GREEN

Energy Master Plan

	SHORT TERM – 2011		MID TERM – 2013		LONG TERM – 2015	
CME Infrastructures	Temperature raising Conditioning re-design trial in a new TTC (hot/cold aisle strategy, displacement, hot spots)	Free cooling study and trial LED lamps: trial on 2/3 pilot sites Power safe illumination: trial	Conditioning re-design guidelines for all the new rooms and new TTCs sites Free-cooling: deployment first in the most suitable regions	LED lamps: deployment in all the sites Power safe illumination: deployment	Conditioning re-design guidelines implemented in all the TTCs sites Free-cooling deployment in all the suitable sites	Separation between civil and industrial systems Power safe illumination:deployment in all the sites
POWER SYSTEMS	Power systems fine tuning Batteries based on salt: study for possible replacement in the remote sites	Gensets fine tuning Copper bars SPD Raycap trial	Power systems replacement with higher efficiency plants Batteries based on salt: deployment in the remote sites	SPD deployment for most likely fulmination sites	Power systems: total replacement with higher efficiency plant	
GREEN POWER SOLUTIONS	Fuel Cell: trial Hybrid green RA site: low level design and trial Gas genset using bio-masses: feasibility study and trial	Solar cooling: feasibility study Geo-thermal: feasibility study	Solarcell: deployment Micohydro: deployment Fuelcell : deployment Genset biomass/biofuel : deployment	Solar cooling: design,trial & potential deployment Solarcell: deployment Microhydro: deployment Genset biomass/biofuel : deployment	Solarcell: deployment Microhydro: deployment Genset biomass/biofuel : deployment Energy storage: feasibility study Magnetic generator: feasibility study	Solarcell: deployment Microhydro: deployment Genset biomass/biofuel : deployment Solar cooling: potential deployment Magnetic generator: potential deployment Energy storage: potential deployment
MONITORING TOOLS	Improving monitoring and control as-is process Monitoring tool trial on 2/3 important TTCs Monitoring tool trial on 2/3 RA sites	**Weather station:** study and trial Equipment temperatures control tool: study and trial	Monitoring tool: deployment over all the TTC sites Monitoring tool: actuation features trial Monitoring tool: integration of RA sites	Weather station: deployment and remote reporting tool development Equipment temperatures control tool: development	Remote monitoring , control and actuation over all the sites, both TTCs and RA sites	Remote monitoring of the weather stations Remote monitoring and automatic alarming for equipment temperatures

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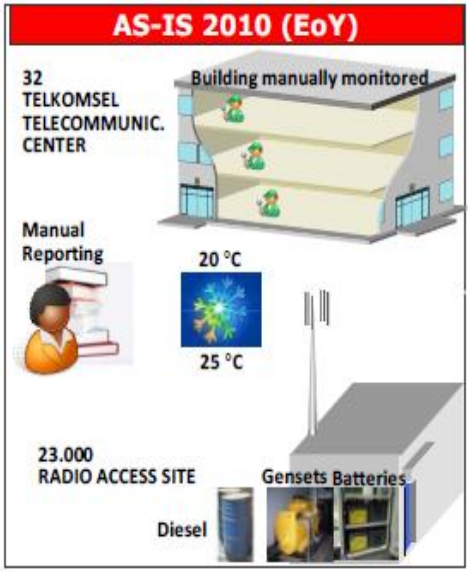
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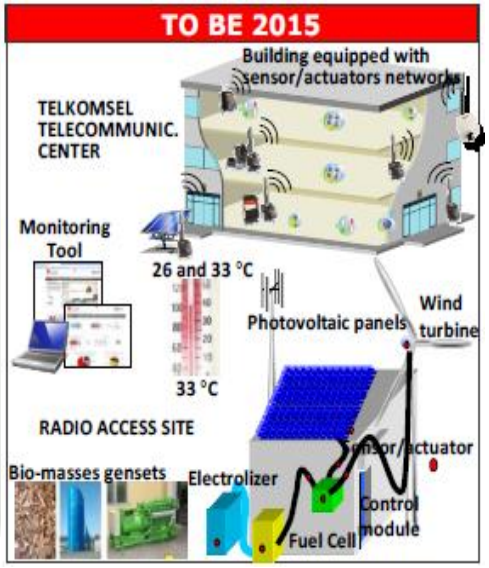
Target Architecture
Network Evolution & Transformation of Power Facilities

DRIVERS (from Strategic Plan, Assessment, Market Trend, Technology Plan)

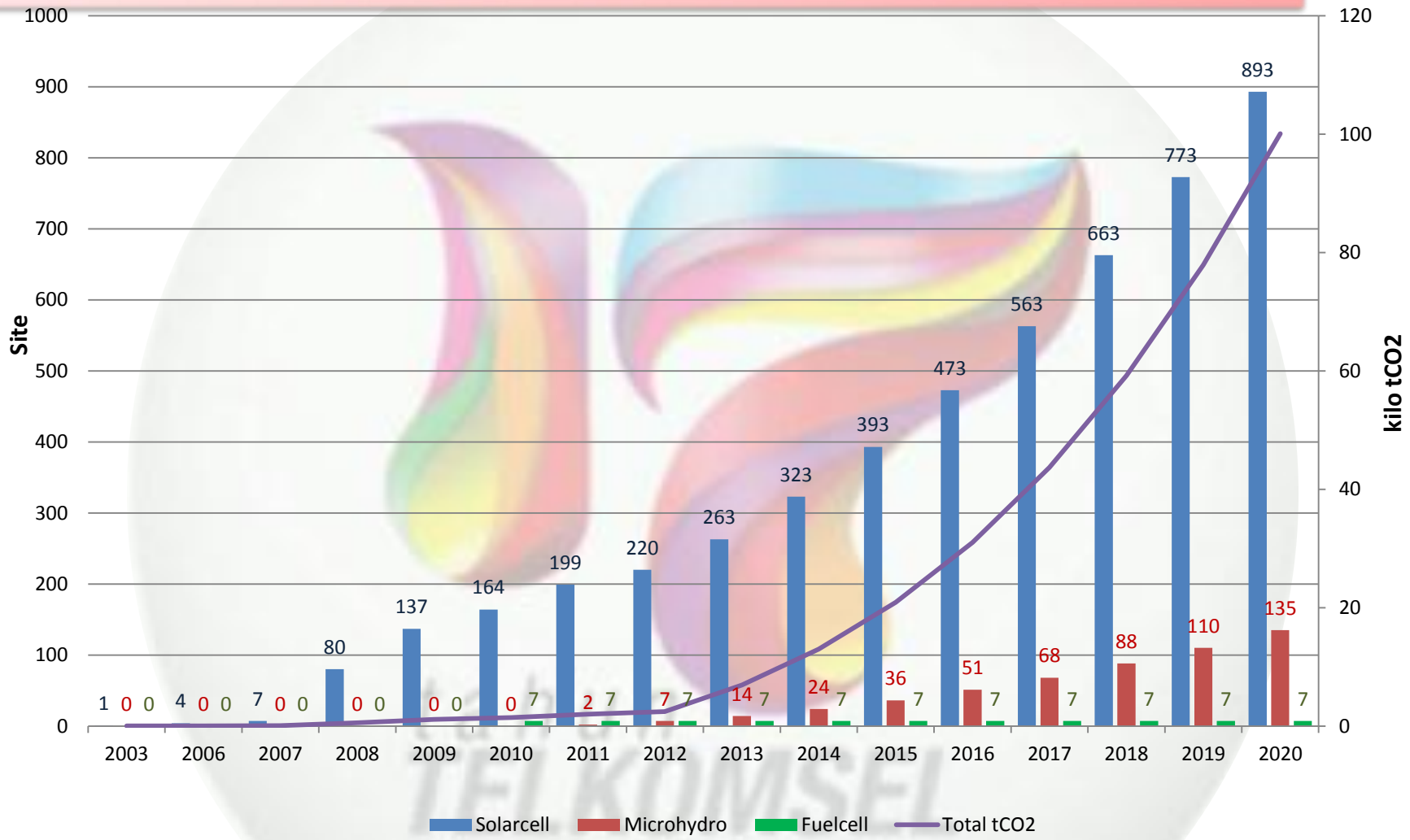
ENVIRONMENT	• High quantity off-grid sites and unrealiable PLN grid (Sumatera, Kalimantan, East Indonesia) • Primary energies costs increase and fuel delivery costs are expensive for remote sites • High potential New Renewable Energy (NRE) e.g Solar, hydro, geothermal, biofuel, and biomass
TELKOMSEL	Adopt new, more efficient technologies to reduce TCO Renewable energies developing & deployment: photovoltaic, wind, micro hydro & fuel cell system Reliable network and quality of service



- Monitoring and control tools for energy efficiency purposes
- Thermal/Cooling system management (hot/cold aisle, displacement, free cooling, hot spot management)
- Power systems optimization
- Implement hybrid renewable energy (solar/wind)
- Implement microhydro power plant
- Introducing Fuel Cell solution for offgrid site
- Feasibility study for Biofuel/Biomass to replace diesel.
- Feasibility study for energy storage, magnetic generator.



TELKOMSEL GREEN POWER FIGURES



- total installed solarcell (Macro BTS) : 2,1 MWp
- total installed microhydro : 82 kW
- total installed fuelcell : 22 kW
- total pico solar-powered BTS : 3688 sites

Reduce greenhouse gas : 3,000 ton CO2

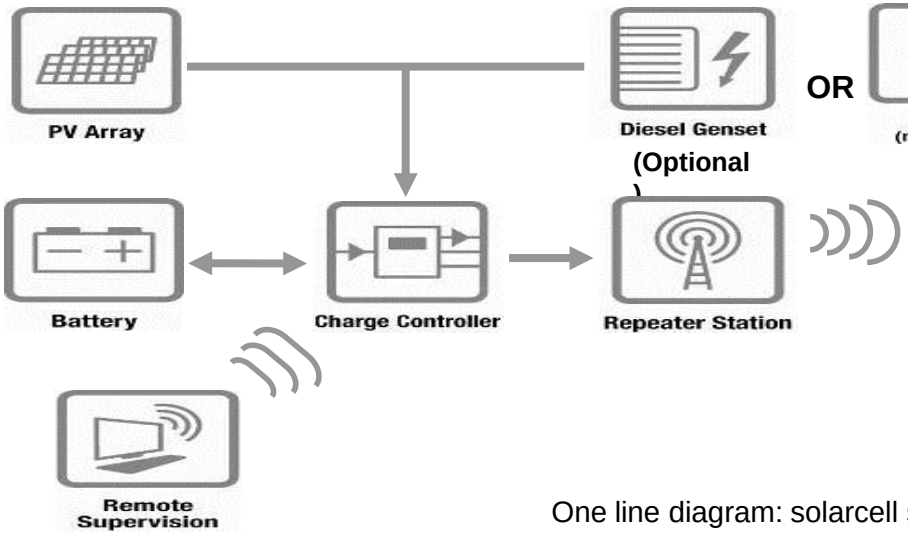
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One line diagram: solarcell system

SolarCell on the Network of Telkomsel.

Remote, Maintenance Free, Green

TELKOMSEL
By Telkom Indonesia

Site: Liukang Tupabiring-Sulsel







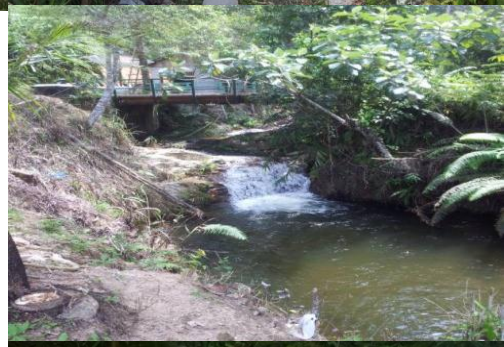






MICROHYDRO on Telkomsel Network
In West Sumatra

- Capacity : 10 kW
- Community : 0.9 kW
- Position : Sijunjung – Sumbar +/- 7.5hr from Padang
- Operated since : Aug'12









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MATTERS OF CONCERN

1. Need for National RET standardization.
2. Limited data and information about ready-to-be-implemented RES (Renewable Energy Source)
3. Need for fiscal incentives for using RET (Renewable Energy Technology).
4. CDM (Clean Development Mechanism) simplification procedures to attain CER (Certified Energy Reduction) credits.

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THANK YOU ☺

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