MINISTRY OF PUBLIC UTILITIES
SARAWAK

State Generation Development and Small Clean Energy Resources

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Presentation Outline

- State Power Development Policy
- Power Sectors Development
- Small Renewable Energy Resources

State Power Development Policy

- Ensuring availability of adequate, reliable, efficient, affordable and safe supply of electricity in the State which is managed in a sustainable manner

..con't

- Optimal and sustainable development of the power requirements
  - generation mix will be less dependent on fossil fuels especially oil and gas.

- Utilize indigenous hydro and coal resources
  - to meet future electricity demand to ensure long term competitive pricing and energy security.

….con’t

- Development of hydro resources for trading of excess electricity beyond Sarawak

- Encourage small renewable energy development such as biomass, biogas, municipal wastes, wind, solar and mini-hydro as the fifth fuel resources under the nation’s Fuel Diversification Policy

Power Sectors Development

- Next two to three decades, rapid power demand growth due to
  - increased scale and pace of industrialization,
  - increased economic activities, and
  - higher living standards of population.

- Hydro and coal indigeneous resources will have an increasing role and opportunity as an energy provider.

…Con't

- Sarawak has huge geographical areas of rugged terrain and very low population density.

- Presently no transmission interconnection outside Sarawak.

- Electricity supply coverage has reached 82% of the total population of which rural population coverage is 64%.

POWER DEMAND SECTORS

- Power demands identified to grow rapidly are;
  - Normal (organic) load in Sarawak.
  - Energy-intensive industries in Sarawak (SCORE).
  - Power export to neighbouring countries.
- Major drivers of State's power system development plan .

Salient Features of Development Plan

The main elements of the plan:

- A 30-year strategic development plan
- Integrated and least-cost development of hydro as primary and coal as secondary energy resources for power generation
- Achieved a balanced generation mix of 70% hydro, 20% coal, 5% gas and 5% renewables.
- Coordinated development of transmission infrastructure in tandem with hydropower projects development.

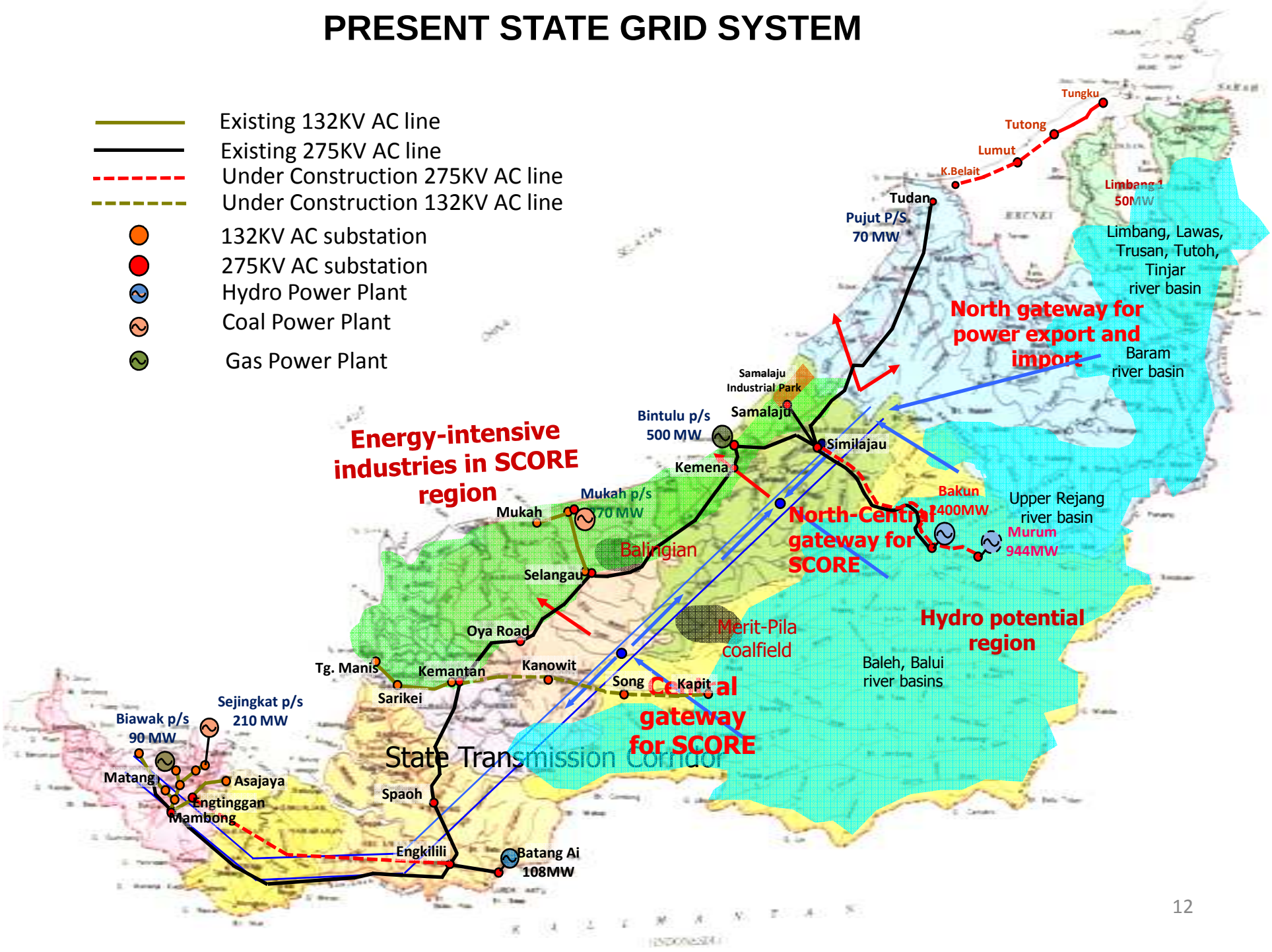
Projected Load Demand in Sarawak between 2010-2020

Demand in MW	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Organic loads	991	1050	1113	1180	1251	1326	1406	1490	1580	1674	1775
% contribution	92%	77%	58%	42%	36%	32%	33%	30%	32%	33%	34%
Energy Intensive & Export	**90**	**307**	**807**	**1637**	**2217**	**2817**	**2817**	**3417**	**3417**	**3417**	**3417**
% contribution	8%	23%	42%	58%	64%	68%	67%	70%	68%	67%	66%
Total load demand	**1081**	**1357.5**	**1920**	**2817**	**3468**	**4143**	**4223**	**4907**	**4997**	**5091**	**5192**
Installed Capacity in MW	**1250**	**1850**	**3752**	**4570**	**4570**	**5170**	**5170**	**5720**	**6024**	**7024**	**7294**
Reserve Margins (%)	14%	27%	49%	38%	24%	20%	18%	14%	17%	28%	29%

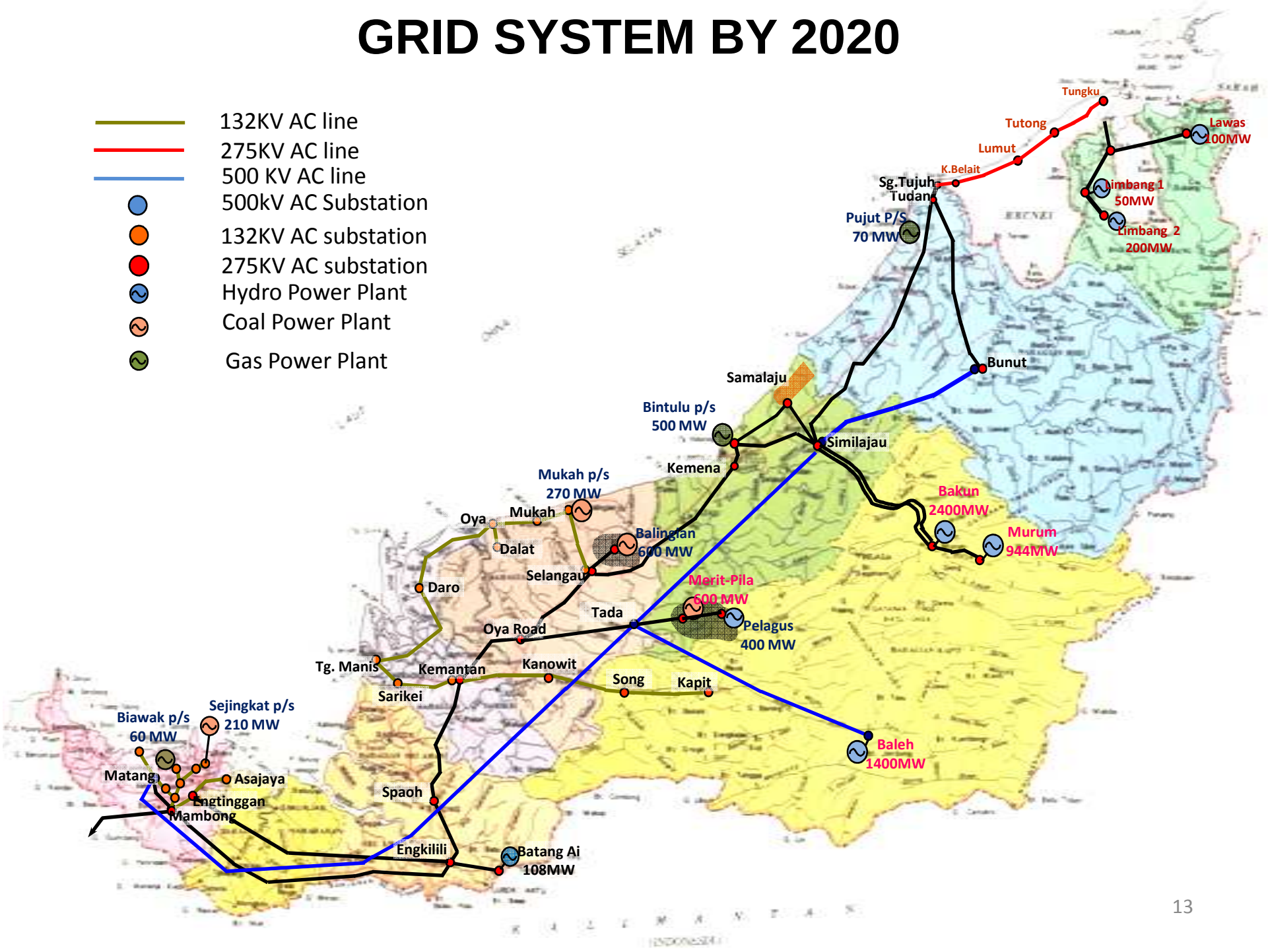
Installation Capacity by Fuel Source (% of total)

YEAR	2008	2010	2012	2015	2020
Coal	24%	38%	16%	21%	18%
Gas	54%	46%	19%	11%	5%
Hydro	12%	9%	62%	66%	74%
Diesel	10%	7%	3%	1%	0%
Small Renewable	0%	0%	0%	1%	3%

PRESENT STATE GRID SYSTEM



GRID SYSTEM BY 2020



D/S View of Murum Main Dam

Bakun HEP

Small Clean (Renewable) Energy Resources

MAIN SMALL RENEWABLE RESOURCES

- BIOMASS –
  - OIL PALM EFB (~800,000 HECTARE OF OIL-PALM)
  - WOODWASTES
- BIOGAS –
  - WASTES FROM INTEGRATED ANIMAL FARM
  - PALM OIL MILL EFFLUENCE (POME)
- SOLAR
- WIND
- MINI HIDROS

ENABLERS TO ENCOURAGE

- ENCOURAGED, NOT IMPOSED :
  - SMALL RENEWABLE vs LARGE RENEWABLE HYDROS
  - GENERATION MIX - SUBSIDIZED GAS AND DIESEL NOT PREDOMINANT
  - COMPARATIVELY SMALL INSTALLED SYSTEMS (1850 MW) –CANNOT DRIVE SMALL RENEWABLE RESOURCES.
  - PRICE STABILITY OF ENERGY.
  - COMMERCIAL –DRIVEN
  - LICENSEE WILLINGNESS TO PURCHASE

- ENABLERS IN THE FOLLOWING AREAS:
  - REGULATORY
  - TECHNICAL REQUIREMENTS
  - PROCEDURAL

ENABLERS - REGULATORY

- GENERATING LICENCE IF EXCEEDING 5kW.
  - FOR SOLAR OR WIND WITHOUT BATTERY STORAGE, NO LICENCE NEEDED IF NOT EXCEEDING 10 kW.
  - IN COMMERCIAL BUILDINGS OR ABOVE 10 kWp, LICENCING REQUIRED:
    - SUBMISSION OF MAINTENANCE RECORD.
    - REGULATE ON THE SAFETY OF THE INSTALLATION AFTER METER POINT.

ENABLER : TECHNICAL REQUIREMENTS

- LICENSEE POLICY ON SMALL RENEWABLE
  - 4% OF 2009 GRID CAPACITY (~1000MW)

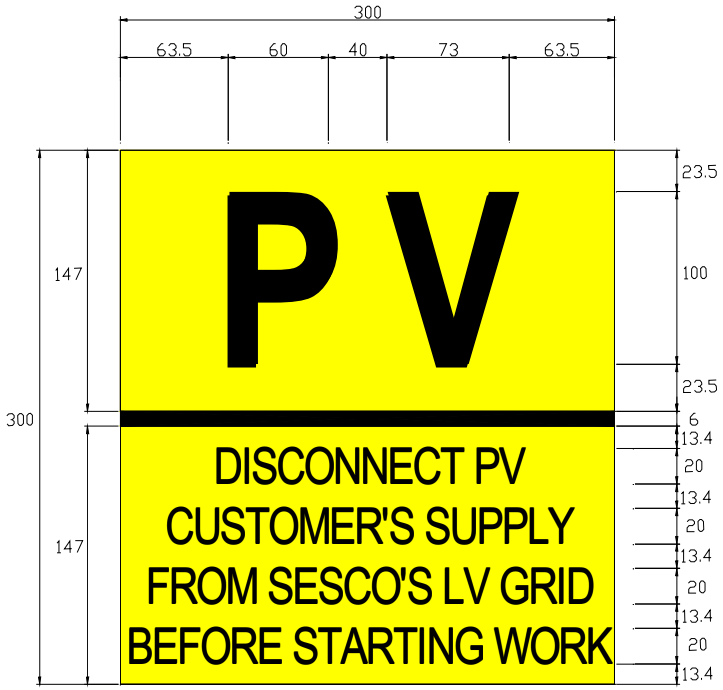
- INTRODUCED NET-METERING DESIGN STANDARD FOR BIPV
  - LICENCEE (SESCO) BILL ON NET ENERGY USED

- INTERCONNECTION REQUIREMENTS FOR BIOMASS PLANTS (>5 MW)

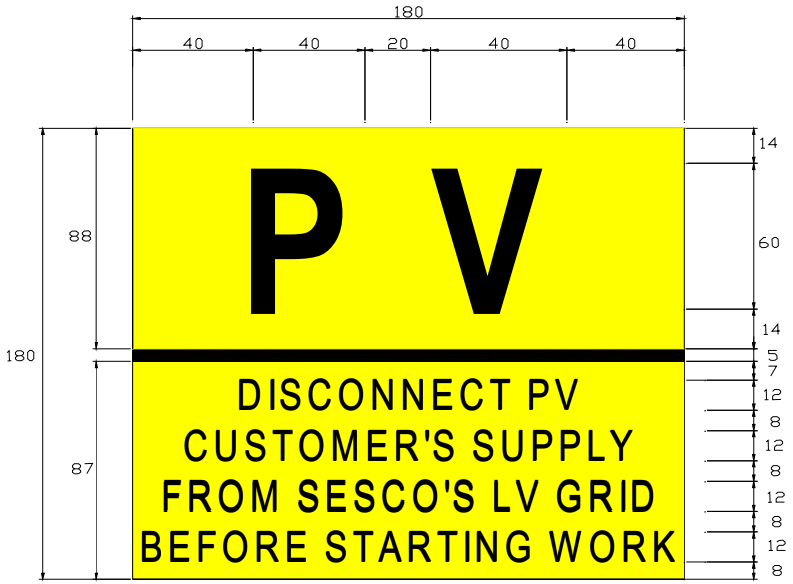
ENABLER : PROCEDURAL REQUIREMENTS

- MAINTENANCE ISSUES FOR SMALL GRID-CONNECTED PLANTS
  - ISOLATION POINTS
  - NOTICES
  - LIVE-LINE WORK
  - OPERATIONAL LIAISING

Caution Notice at Pillar Door

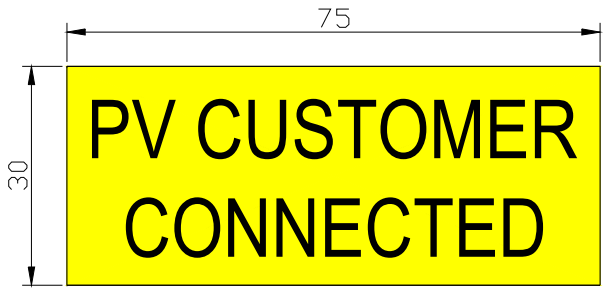


Caution Notice at Disconnector Switch (Isolator) Outside PV Customer's Premises



All Dimension in mm

Caution Notice Fixed at Feeder Inside Pillar



SELF-GENERATION vs GRID CONNECTED

- OIL-PALM MILLS AND TIMBER-BASED MILLS
  - GENERALLY GENERATION FOR OWN USE
    - NEAR GRID LINES, SESCO'S SUPPLY AS STANDBY
    - WIN-WIN SITUATION FOR ALL
      - SESCO DEFER PLANT-UP AND GENERATION MIX : NO NEW 30MW GAS PLANT-UP BUT 270 MW COAL PLANT-UP.
      - AVOID OPEN BURNING OR STORAGES OF SUCH WASTES (RESIDUES)
      - ENVIRONMENTAL FRIENDLY

SELF-GENERATION vs GRID CONNECTED

CURRENT SITUATION:

- NEW MILLS NEAR GRID
  - ENCOURAGED TO CONSIDER SUPPLYING SURPLUS TO SESCO
    - INCORPORATE INTERCONNECTION REQUIREMENT AT EARLY DESIGN STAGE

- BIOMASS / BIOGAS GRID-CONNECTED
  - SECURING FUEL SUPPLY
  - COMPETITVE USE OF FUEL SUPPLY
  - SYSTEM STUDIES UNDERTAKEN FOR INTERCONNECTION
  - PRICE AGREED WITH BUYER

SMALL-RENEWABLE GENERATIONS DATA

SOURCES	No.	CAPACITY	REMARKS
SOLAR-BIPV			
Commercial	1	15.5 kWp	Grid-connected with net-metering
School / Training Institution	2	8.4 kWp	
Domestic	4	16.6 kWp	
TOTAL:	**7**	**40.5 kWp**	
BIOMASS- OWN USE			
Non-Grid Woodwastes	3	26,000 kW	Non-grid connected due to remote location
Non-Grid Oil Palm EFB	3	14,000 kW	Non-grid connected due to remote location.
Grid-Connected Woodwastes	7	43,000 kW	Grid-connected but SESCO supply for standby or to meet excess demand
BIOMASS – POWER SALE			
Oil-Palm EFB	4	45,000 kW	Power sale to grid.
TOTAL:	**17**	**128,000 kW**	