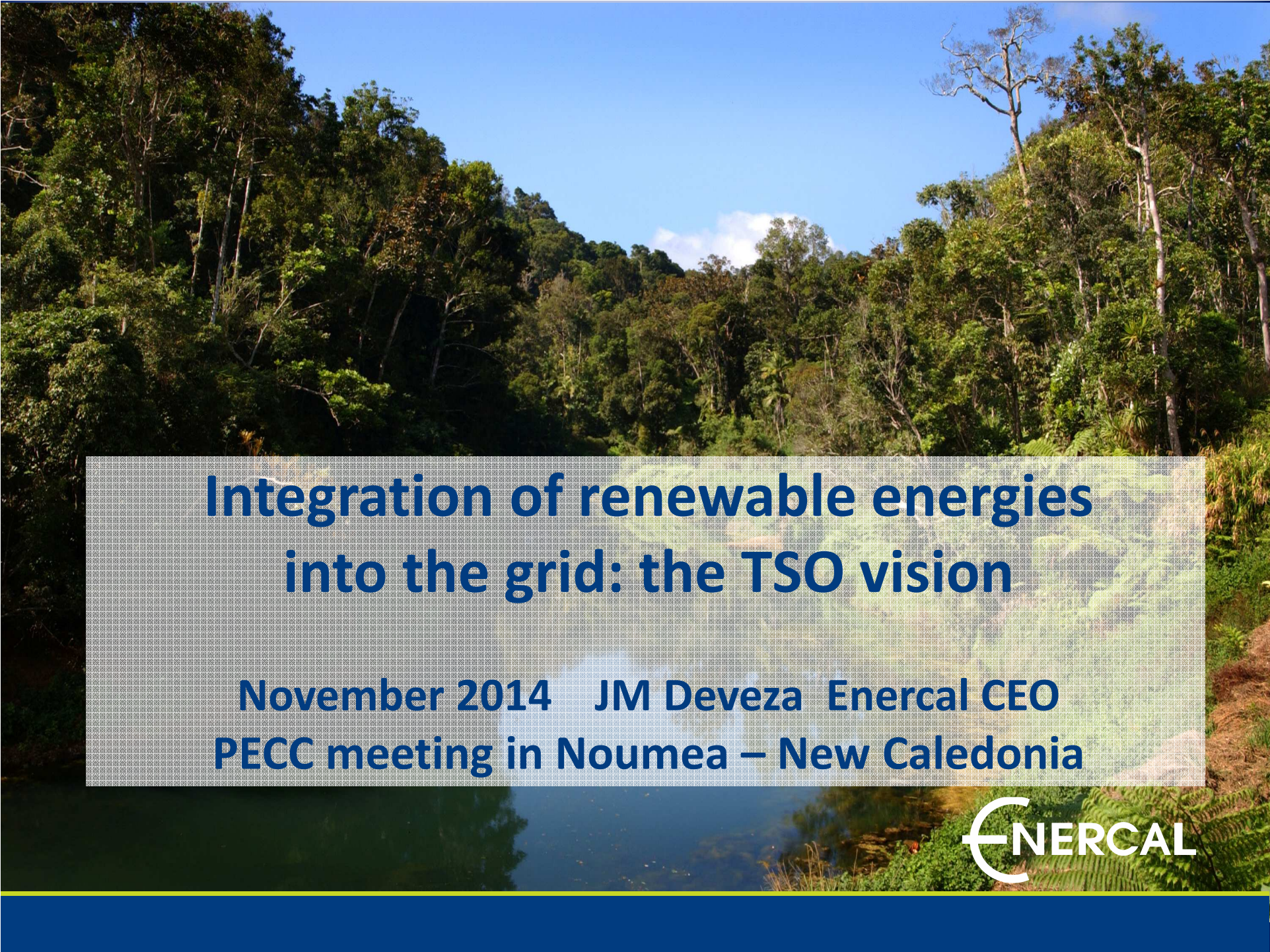
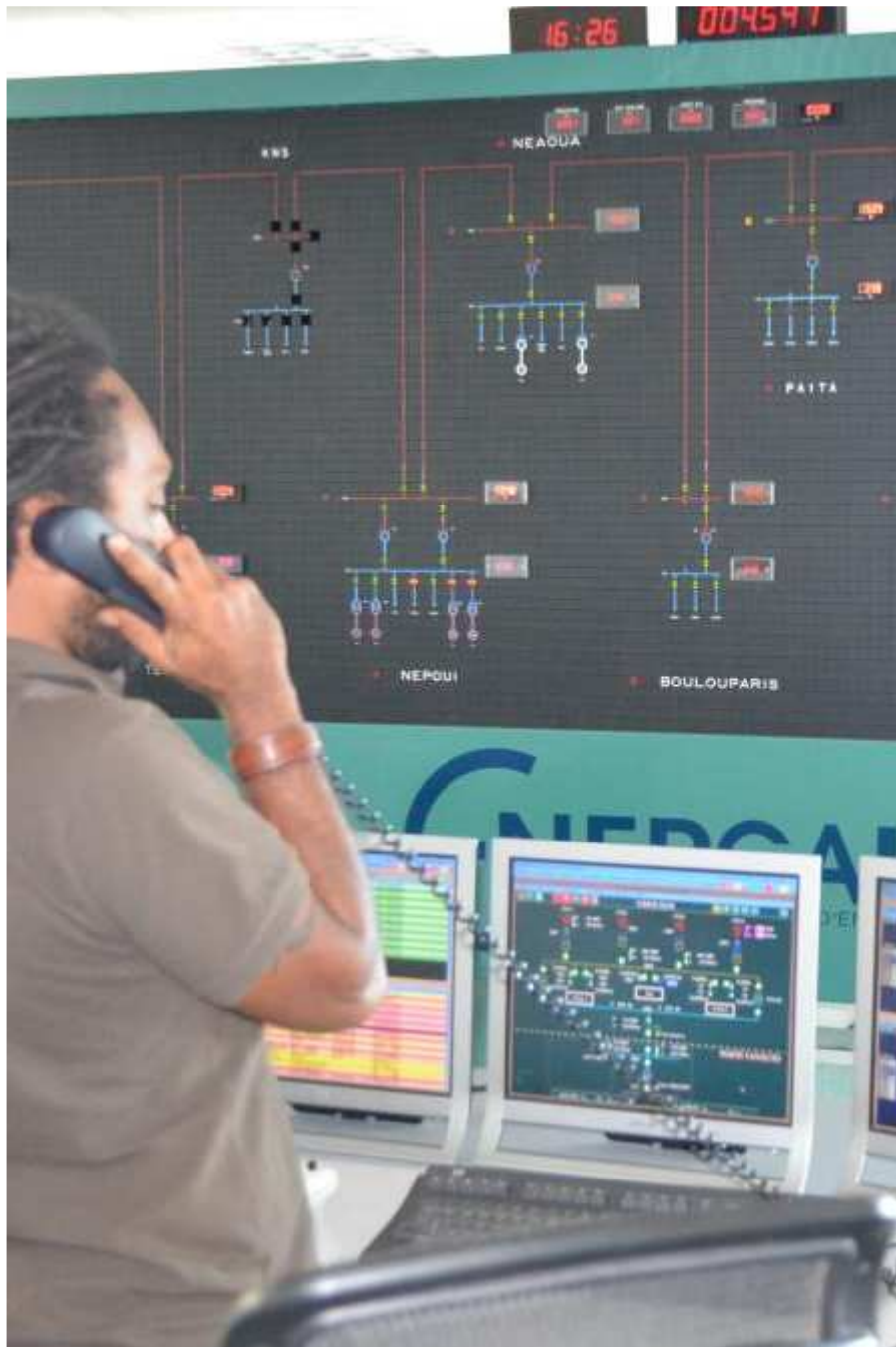




Integration of renewable energies into the grid: the TSO vision

November 2014 JM Deveza Enercal CEO
PECC meeting in Noumea – New Caledonia





PECC New Caledonia

Integration of renewable energies
into the grid: TSO vision
November 2014

- ENERCAL : Who are we?
- The New Caledonian Grid & the Energy Mix
- Development of Renewable
- Fixing Intermittency

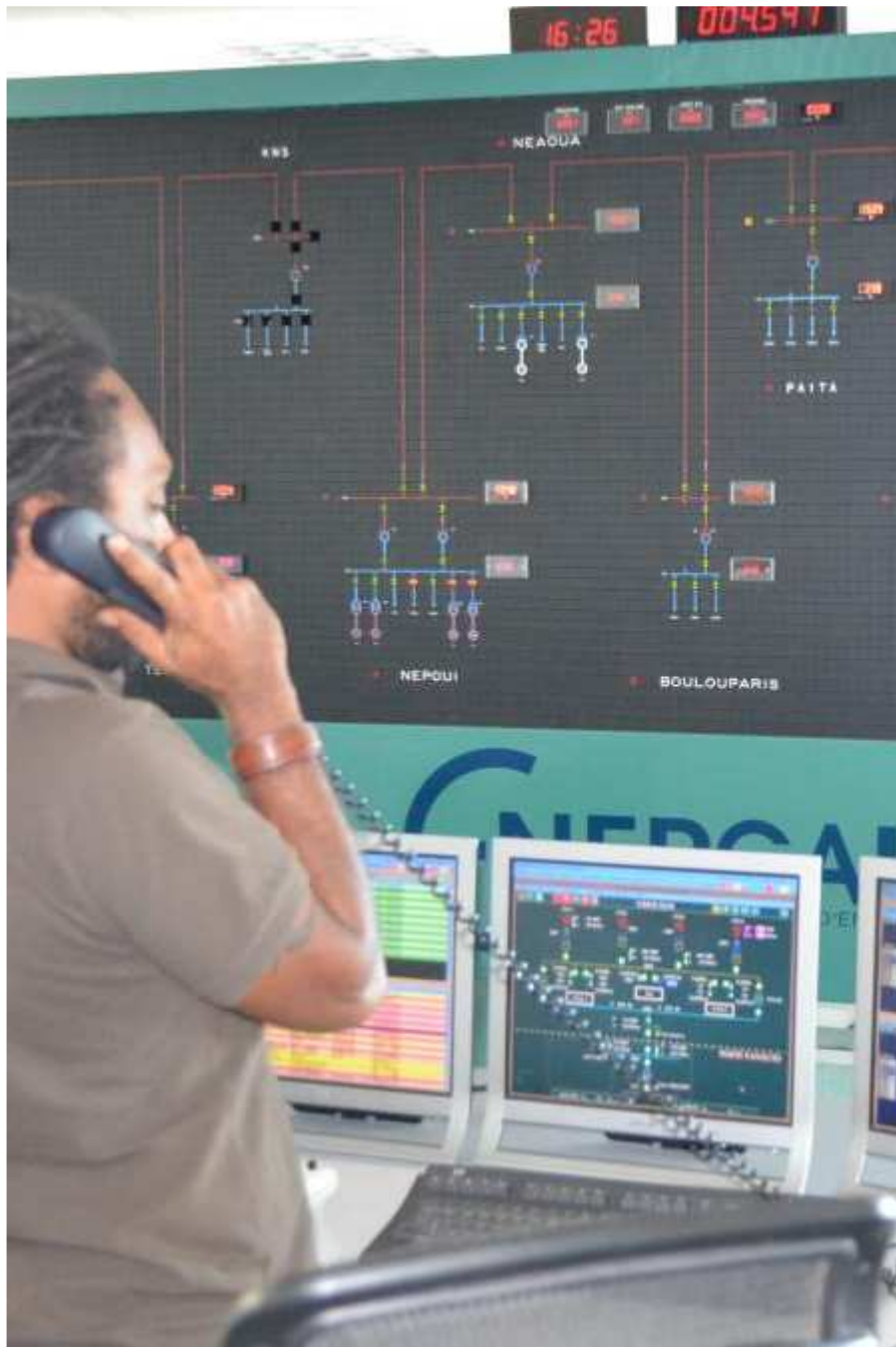
Who are we?

- ENERCAL is a mixed equity company, shares being distributed as follows:
 - 54 % for New Caledonia
 - 3 % for local authorities and Provinces
 - 43 % for private shareholders (ERAMET – EDF – SUEZ)

- We carry out the following missions of the energy sector:
 - Generation
 - Transmission (TSO)
 - Distribution (DSO)

- Our staff is about 400 distributed on the whole territory.



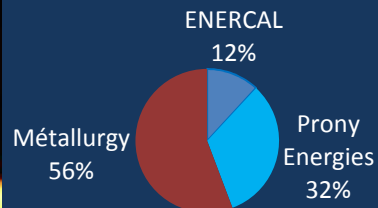
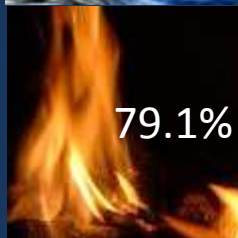
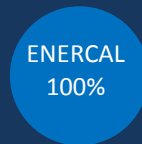
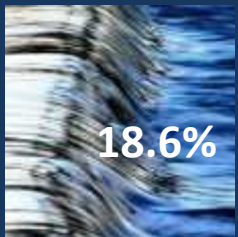
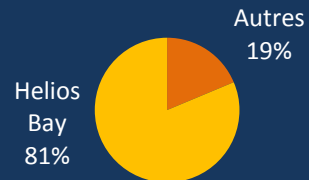


PECC New Caledonia

Integration of renewable energies
into the grid: TSO vision
November 2014

- The New Caledonian Grid & the energy mix

Generation : 2.5 GWh



Transmission



ENERCAL
100%

96% - Interconnected Grid
⇒ **Main Island**

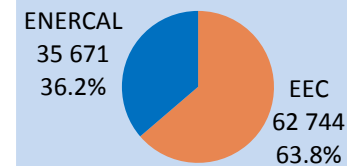
4% - Remote Areas
⇒ In Main Island
⇒ Bélep, Isle of Pines, Loyauté Islands

Distribution

Public Distribution (DP)

31.6%

Nb de clients



Metallurgy

68.4%

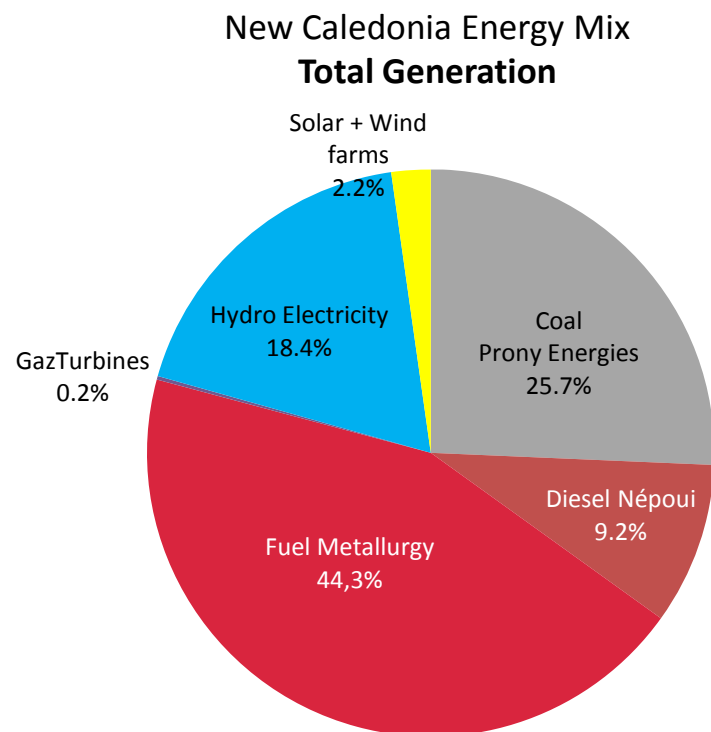
SLN
KNS
Vale NC



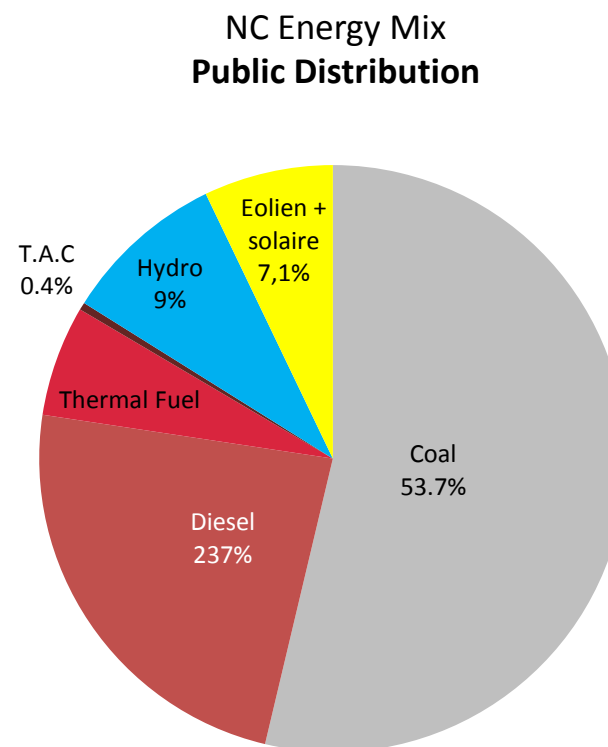
ENERCAL

GENERATION

Energy Mix

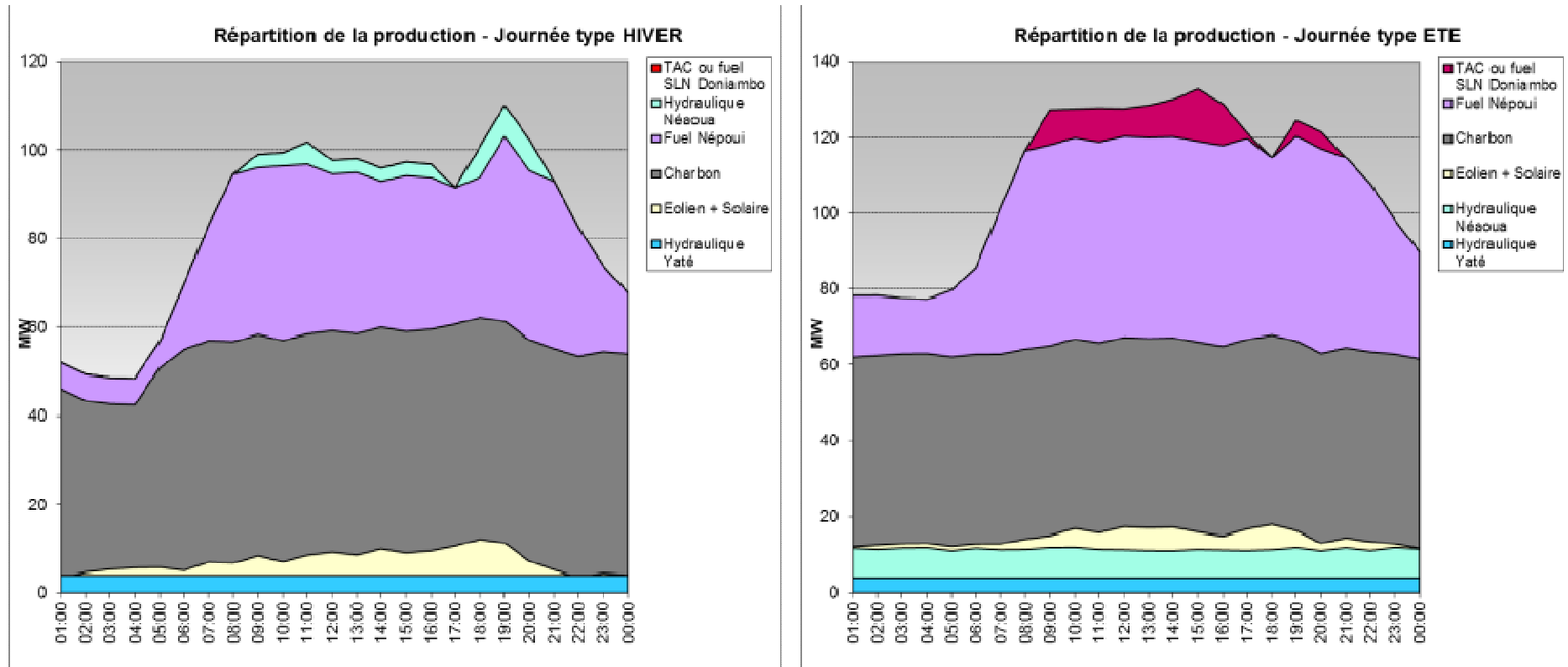


Renewable: **20.6%**



Renewable : **16.1%**

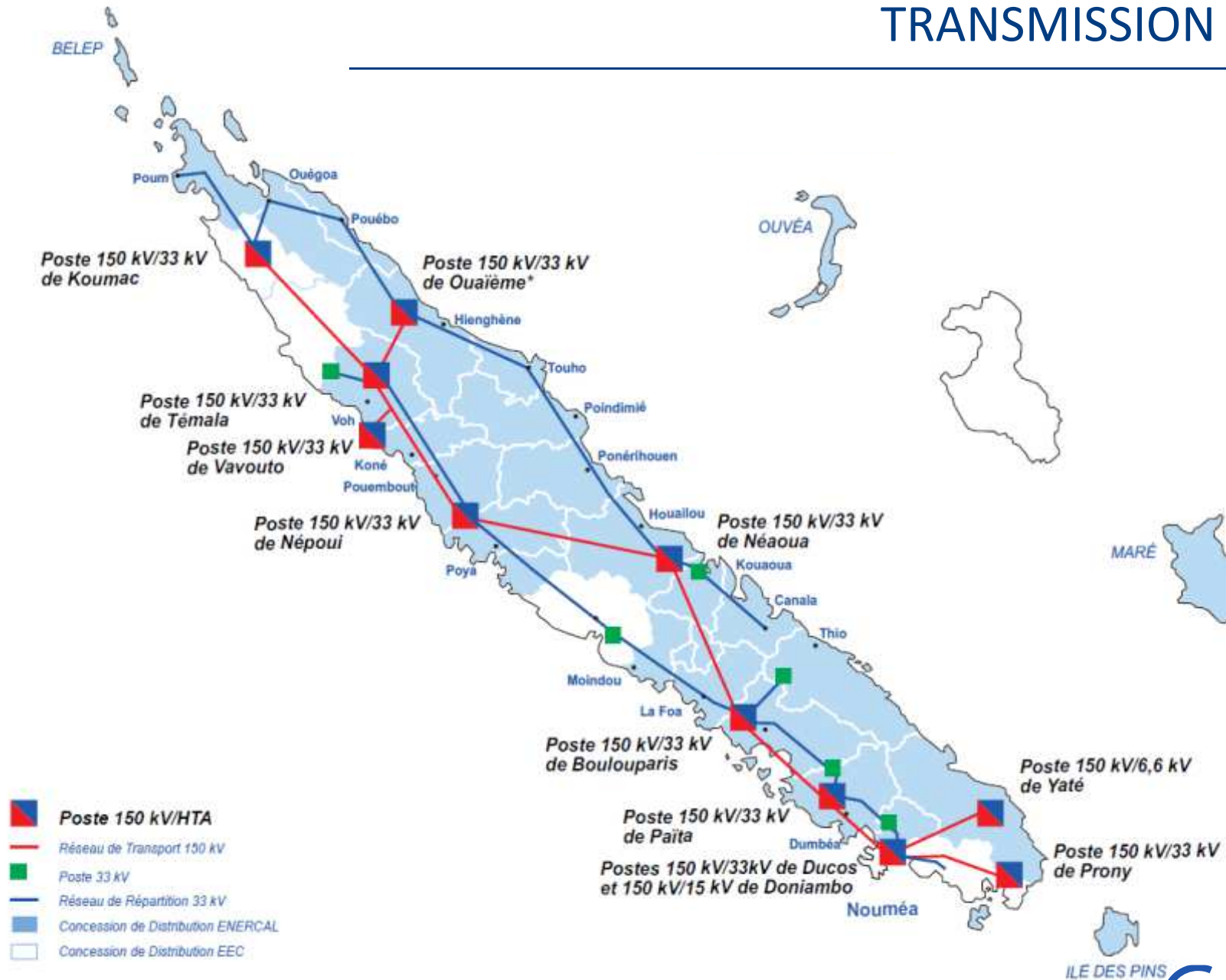
Piling up various production: typical winter and summer day



In order to balance in real time production vs consumption, Enercal TSO calls (single buyer) various type of production. The TSO piles them up according to « calling rules » (merit order) validated by the Government :

1. hydro: cheap and stable renewable
2. intermittent renewable: solar and wind farms without energy storage
3. other productions: from the cheapest (coal thermal plants) to the more expensive (gas turbines)

TRANSMISSION GRID



*actuellement exploité en 33kV



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Integration of renewable energies
into the grid: TSO vision
november 2014

- Renewable Development

Developing Renewable

Les différentes énergies renouvelables

STABLE renewable energies

- > Guaranteed and slightly fluctuating generation
- > Easily predictable generation

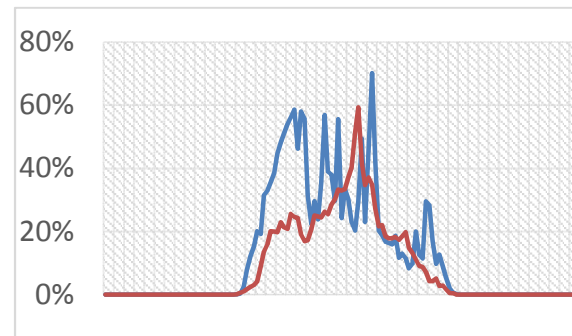
- . Hydro electricity
- . Biomass generation
- . Geo thermal generation
- . Marine energies

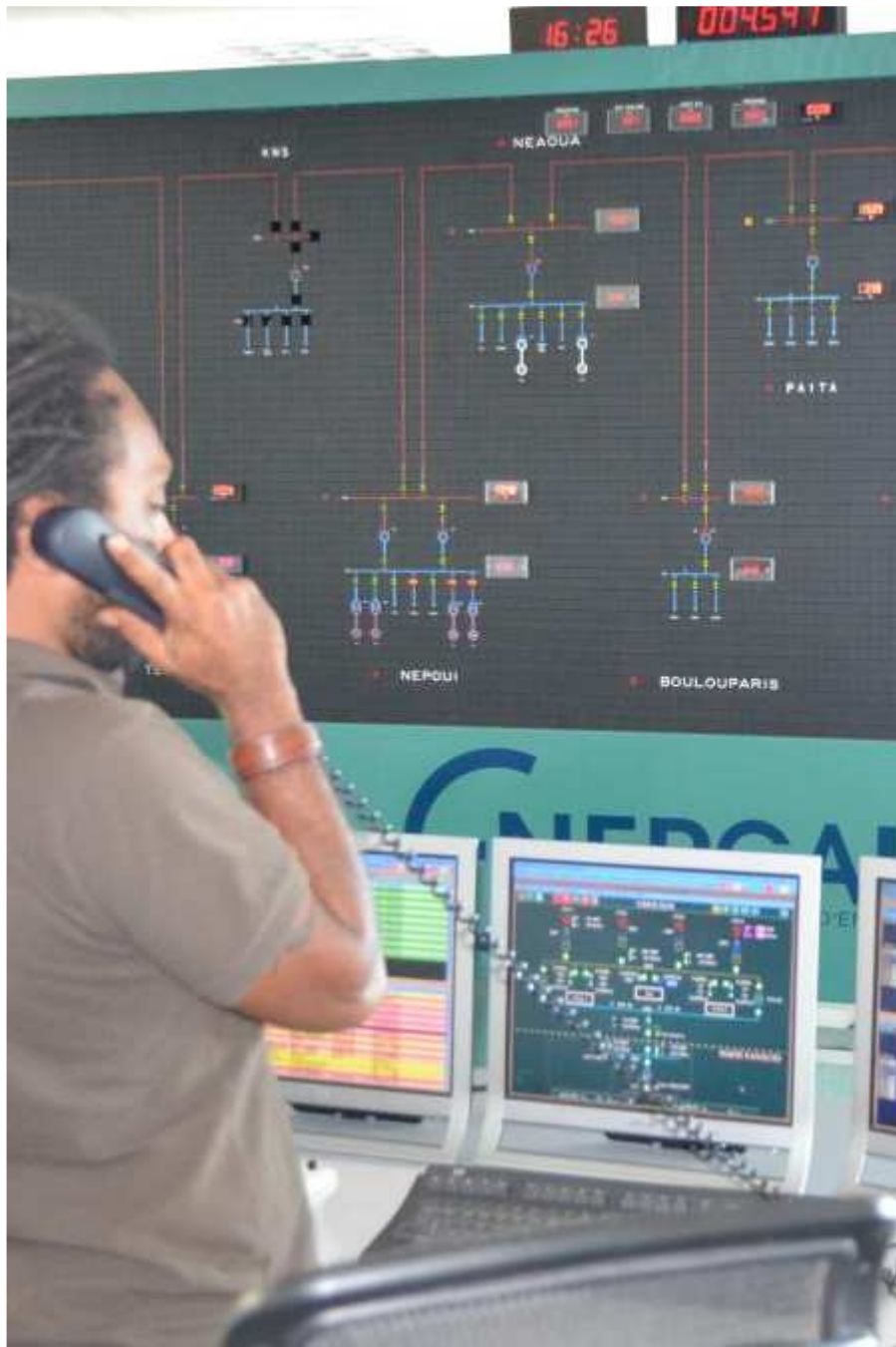


INTERMITTENT renewable energies

- > Fluctuating and unavoidable generation
In great quantity in the energy mix, they can cause a problem of electric stability into the grid

- . Wind farms
- . Solar farms





PECC New Caledonia

Integration of renewable energies
into the grid: TSO vision
november 2014

- Managing intermittency & increasing renewable penetration into the grid

Renewable integration into the grid

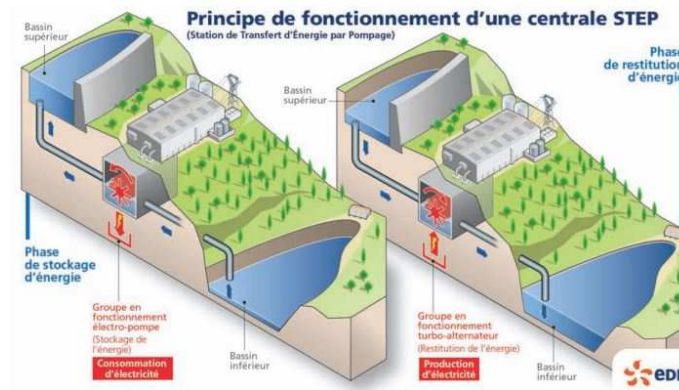
- > **Developping Hydro Electricity**, one of the best renewable, the « shortest way » to energy autonomy:
 - Stable, predictable and available on the whole territory
 - Economical interest: high capex but low opex

- > Encouraging **hybrid systems** in remote areas → Fuel Saving

- > Encouraging and developing storage solutions for wind and PV farms:
 - Smoothing intermittent generation
 - Optimizing inavoidable generation
 - Increasing renewable penetration

Enercal plan for hydro electricity

- Survey on Potential Sites in hydro electricity: « Enercal NC Atlas »
 - 80 potential sites for the equivalent to the Yaté Dam
- ENERCAL studying:
 - A mid size hydro electric project (Ouinné) half equivalent to Yaté Dam
 - Several small size projects ready to be launched
- ENERCAL studying potential sites for Pumped Storage Hydro Power Plants



CONCLUSIONS: Solutions for sustainable energy on Islands

- Energy Saving:
 - Fostering Demand Side Management and Demand Response
- Managing more flexible and high performance thermal plants (economical interest)
- Increasing Renewable Energies
 - Developing Hydro Electricity Projects
 - Developing hybrid Systems on remote areas
 - Integrating intermittent renewable energy sources
 - Battery Storage and Pumped Storage Hydro power plants as a key technology