

Energy access: feeding of isolated areas with no local energy resources”

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In the present socio-economic environment it is quite clear that energy assumes a fundamental role for both the life of industrialized countries and for the development of LDC's.

In particular, electricity is becoming the most important form of energy for final consumers with ever increasing penetration rate. The link between electricity consumption and GDP is well recognized and therefore the correlation between poverty and access to electricity.

Around 1.4 billion people (about one third of mankind) are not yet connected to commercial electricity supply, and 80% of them live in rural areas; therefore feeding of these areas is assuming a key importance for the eradication of poverty.

The alternatives to feed these areas, apart from local diesel generation could be:

- use of possible local energy resources if / when available (biomasses, mini hydro, etc.);
- use of photovoltaic (PV).

The last alternative, even if of interest for some initial small consumptions is still expensive, and would require energy storage and / or conventional generation spare capacity. Wind is not convenient in many internal areas.

A study has been performed to check the possible cost competitiveness to transport the electricity produced by “convenient sources” to isolated areas distant some hundreds of km. And this even considering areas with possible initial load of few MW but with a large load growth potential as soon as electricity is available to start both domestic / handy craft / small industry / commercial

- Transport of electricity from a single generating plant feeding different load centers can be cost competitive due to the economy of scale on investment cost and O&M costs and due to the higher efficiency of larger units. In addition such power plant can be developed in steps larger than the single load center demand with economic advantage. The same applies for feeding isolated areas far from an interconnected system
- Beside the economy of scale one has to carefully consider the leveling of the load diagram and reduction of the peak load, resulting from load diversity when the different demand areas are connected to the single source.

The main hypotheses and results of the studies are reported in the paper. In summary, with initial small loads of 5-15 MW an energy transmission from 350-500 km is more convenient

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than local diesel generation; this even with the minimum Load Growth (LG) considered and equal to 5%.

Clearly higher values of oil price and of load growth rates increase the advantage of transmission versus local generation.

A 230 kV voltage level becomes competitive versus the 138 kV one, for larger initial loads (above around 10 MW) and larger distances.