Green Power for Mobile
Base Station Energy Efficiency Workshop
Dubai Working Group Meeting (March, 2009)

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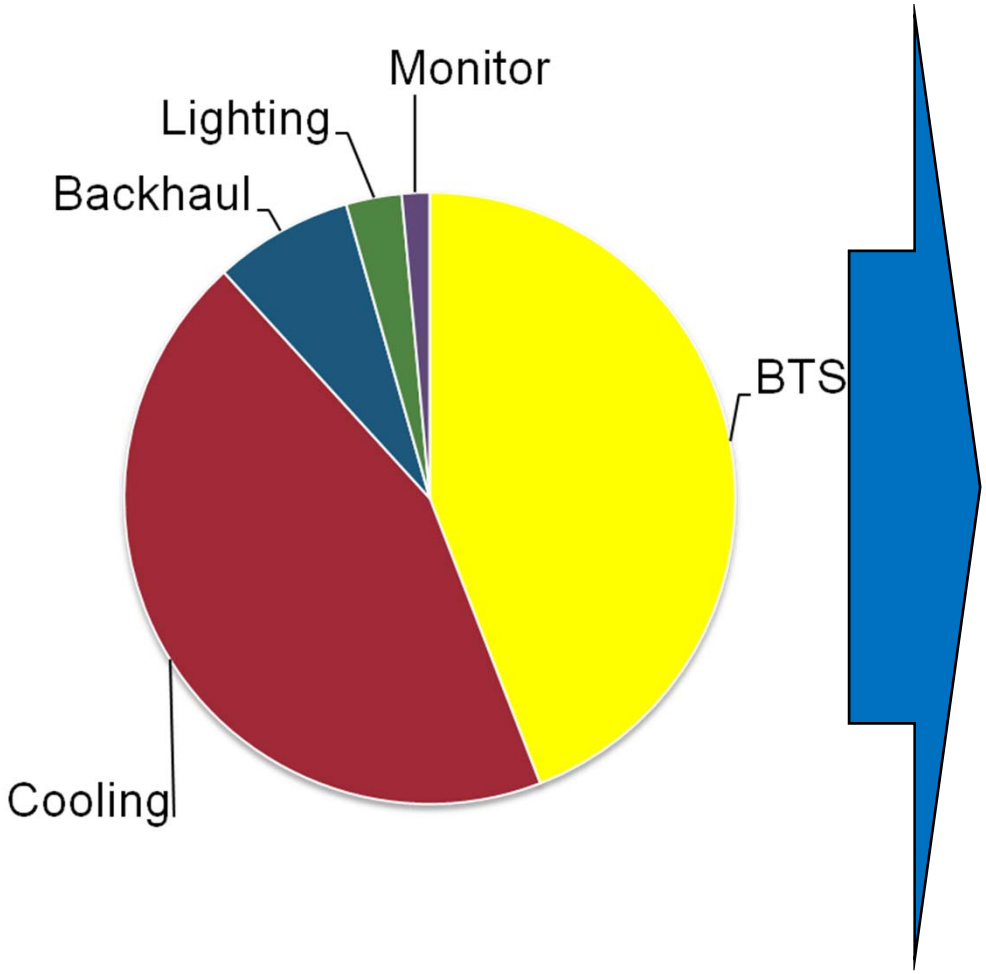
Presentation Objectives

- Highlight the importance of base station energy efficiency for operator OPEX
- Highlight that energy efficiency is critical for renewable energy base station financial/technical viability
- Discuss solutions for energy efficient base stations
- Initial brainstorming for ‘best practice’ energy efficient base station
  - Dubai is starting point
  - Continued work between Dubai and next Working Group

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A Typical BTS Site has a Number of Contributors to its Total Power Consumption



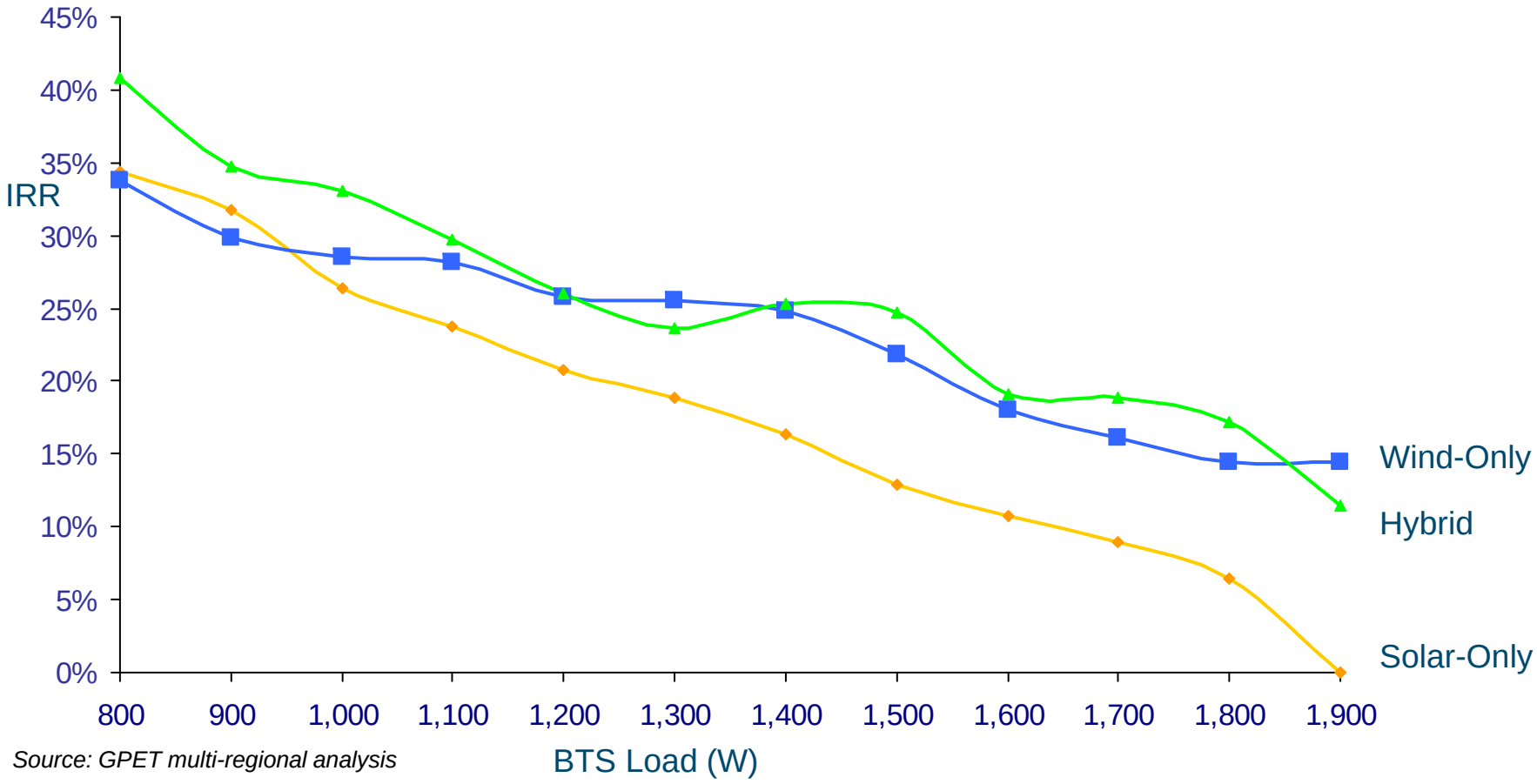
- BTS equipment is a minority factor in total site power requirements
- Inefficient sites have high electricity utility rates and high diesel consumption
- High power, inefficient sites are financially and technically unfavourable for renewable energy

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Financial Models Forecast Deteriorating Financial Viability at High Load

LOAD EFFECT ON IRR BY TECHNOLOGY

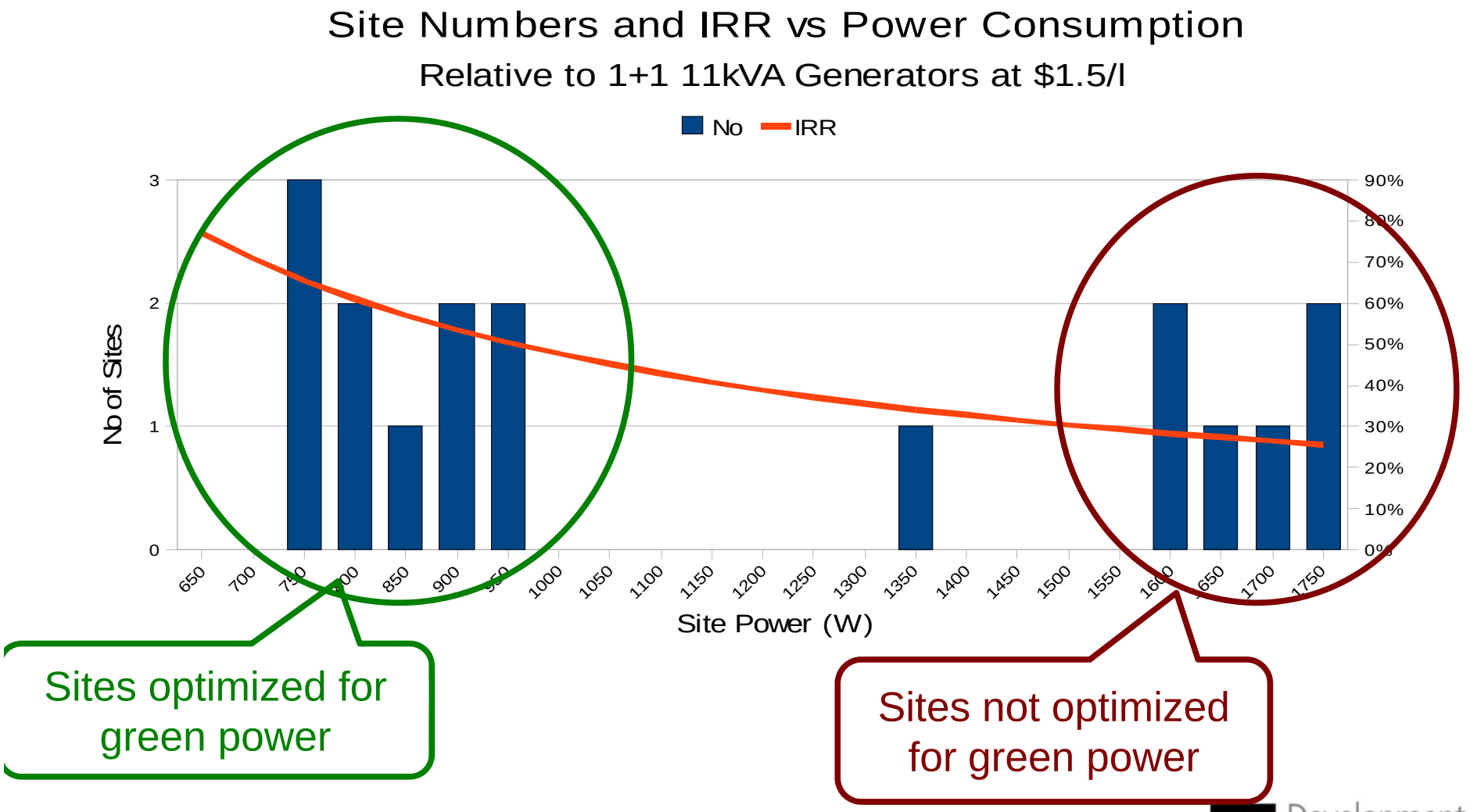


Source: GPET multi-regional analysis

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Real Life Trial Data Supports this Forecast



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Topic Summary

- Calculating Energy Consumption for Base Stations
- Principle Factors Leading to Poor Energy Efficiency
- Schematic of Energy Consumption and Wastage in Base Stations
- KPIs for energy efficiency of base stations
- Increasing the Energy Efficiency of Transmission Infrastructures
- Reducing the Energy Demand of Environmental Control Systems
- Infrastructure Requirements to Optimise Energy Efficiency
- Improvement of Energy Efficiency of Power Distribution Systems

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Topic 1 – Calculating Energy Consumption for Base Stations

- Discuss and define:
  - Is it possible to estimate/calculate the BTS energy consumption based on vendor equipment and configuration?
    - E.g. Vendor X 2/2/2

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Topic 2 - Principle Factors Leading to Poor Energy Efficiency

- Discuss principle factors of poor energy efficiency in following:
  - Transmission infrastructure
  - Environmental control systems
  - Physical infrastructure
  - Power distribution systems

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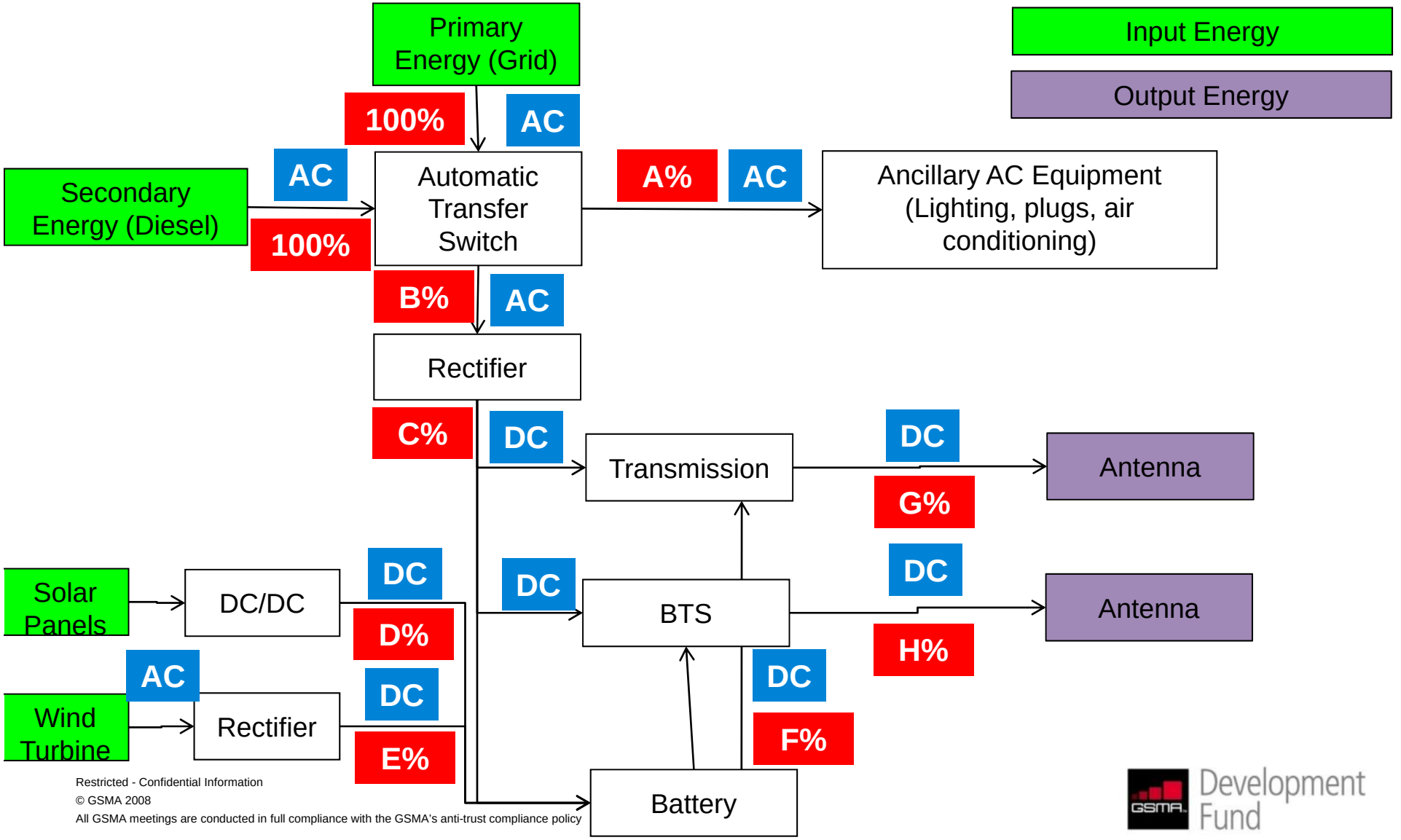
Topic 3 - Schematic of Energy Consumption and Wastage in Base Stations

- Document base station schematic
- Identify AC/DC conversion points
- Identify points in system of energy consumption
- Calculate % energy losses at loss points (future)
- Calculate ratio of: (future)
  - input energy: output energy

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Topic 3 - Schematic of Energy Consumption and Wastage in Base Stations



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Topic 4 - KPIs for energy efficiency of base stations

- Discuss and define:
  - KPIs for energy efficient base stations

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Topic 5 - Increasing the Energy Efficiency of Transmission Infrastructures

- Discuss and define:
  - Activation of basic power management features
  - Activation of “sleep” mode
  - Reduction of energy consumption of transmission infrastructure

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Topic 6 - Reducing the Energy Demand of Environmental Control Systems

- Discuss and define:
  - Measurement of thermal behaviour
  - Improvement of cooling efficiency
  - Alternative cooling mechanisms
  - Enhancements of cooling systems
    - Optimisation of mobile base station airflow configuration
    - Sizing/re-sizing of cooling systems and the configuration of redundancy to maximize efficiency

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Topic 7 - Infrastructure Requirements to Optimise Energy Efficiency

- Discuss and define:
  - Infrastructure requirements inc:
    - Towers
    - Sites

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Topic 8 - Improvement of Energy Efficiency of Power Distribution Systems

- Discuss and define:
  - Energy capacity management
  - Correctly sized power distribution and conversion to optimize efficiency

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