Green Mobile Power
&
Community Power Project

Ericsson Approach
Agenda

› Ericsson Approach to Energy Efficiency
› Ericsson Energy Efficient Solutions
  – Network Features
  – RBS 6000-Next Generation RBS
  – Tower Tube- Re-inventing the site
  – Blue Batteries
Many different energy efficiency measures possible

- Use convection cooling
- Increase site to site distance
- Eliminate feeder losses
- Extend equipment's temperature range
- Enable free air cooling
- Operate primary power source "part time" at highest efficiency
- Do traffic shaping based on predicted available power
- Do time sharing of hardware for low traffic
- Use higher order modulation
- Use multi-carrier radio hardware
- Use state of the art PA design
- Use higher efficiency PA transistors
- Adjust PA bias to transmitted power
- Eliminate feeder losses
- Focus radiated power
- Cell load sharing
- Increase site to site distance
- Low frequencies for coverage
- Use high voltage for long distances
- Use efficient converters
- Use convection cooling
- Use multicarrier (on shared HW) rather than MIMO for high bit rates
- Use ASICs rather than generic CPUs/DSPs
- Use more efficient coding (AMR-HR, VAMOS)
- Adjust clock frequencies based on load
- Do partial shut down based on traffic
- Use trunking / resource pooling
- Many different energy efficiency measures possible
Efficient Energy Solution Content

I. Optimal network energy design
   Energy optimized network design, maintaining the desired coverage, capacity and quality

II. Site energy optimization
   The energy efficiency of entire sites – optimized or decreased energy consumption

III. Alternative energy sources
   Ericsson efficient equipment makes it economically and technically feasible to use alternative energy sources
I. Optimal Network Energy Design

› Network Energy Optimization
  - Network and site energy consumption investigation
  - Energy optimized network and site design

› Environmental Consulting
  - Assess environmental strategy and related business processes

› Network Life Cycle Assessment
  - Assess the environmental impact of operating a telecom network
  - Quantify CO₂ emissions

› Power Saving features
  - Implemented throughout the network the RBS power consumption is reduced

› Remote Power
  - One feeding power station, up to 10 receiving stations
  - Reduction of the number of site diesel generators
II. Site Energy Optimization

› **Efficient cooling concept**  
  – Alternative cooling methods which reduces power consumption

› **Generator-battery hybrid solutions**  
  – Reduction of diesel consumption by optimal use of batteries

› **Special durable batteries**  
  – Deep cyclic and high recharging time performance

› **Tower Tube**  
  – Innovative design and top mounted equipment ensures energy efficiency
III. Alternative Energy Sources

› **Solar power**
  – Ericsson sun site solution removes electricity grid dependency

› **Wind power**
  – By deploying wind powered sites, Ericsson enables cost efficient expansion

› **Fuel cells**
  – Replaces combustion engines and batteries in specific applications

› **Bio-fuels**
  – A clean burning fuel derived from animal or vegetable basis, a replacement for fossil diesel
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› The Community Power Project
Energy Efficiency Features

› BTS Power savings
  – TRX PA switch-off based on network traffic.
  – Applicable to the entire installed base of base-stations

› Time-Slot Power Savings
  – PA switched on only when the TS is carrying traffic
  – New TRX hardware

› Network Power Savings
  – Halt the sites that are installed for capacity purposes during lean traffic hours

› MCPA based base-stations for GSM
  – Enables use of main-remote concept for high capacity sites as well
Automatic Power Savings in MGw
Taking Energy Efficiency into Core Nodes

› When traffic load is decreased the media stream processing boards (MSB4) will go to low power state.

› A certain number of boards are always in active state to ensure capability to accept new connections.

› When the load of active boards exceeds 80% boards from low power state are taken into use.

› The power save gain depends on the selected hardware option and traffic load conditions and same is expected around 15-20%.
RBS 6000: The Site Becomes the Cabinet
Example of an Indoor Site

Before

Today

Power Consumption Reduced by 40%
Tower Tube: The All-in-one, ENCAPSULATED SITE

› All equipment inside
› Indoor climate
  – No need for active cooling
› Small footprint
  – Approx. 5m diameter
› RBS in the Top
  – Lower feeder loss
  – Positive impact on capacity, coverage and power consumption

› Prepared for site sharing

The equipment is installed in the base of the tower…

… and is then lifted to the top with an elevator.
The Design and Construction

› Flexible antenna structure
  – No Radome
  – Visual Radome
  – Radome with cloth

› Protection from the weather, wind, dust and lightning

› 360° radio transparency
Lower TCO

› All-in-one
  - Fences
  - Shelter
  - Grounding
  - Cooling
  - Feeders

› Requires a minimum of maintenance
  - No need for security or gardening

› Prepared for multi vendor site sharing
  - Indoor equipment may be used

› 60-75% less footprint needed
  - Easier to find site locations
  - Faster revenue back
  - Lower rental costs
Lower Environmental Impact

› Greatly reduced feeder loss and no need for active cooling
  - A 40% CO₂ emission reduction could be obtained
› The construction material has lower environmental impact, uses 1/10th of steel compared to traditional sites
› CO₂ emissions related to material – production and transport – are at least 30% lower
› Consumes lower amounts of energy – 40% reduction
Tower tubes worldwide

- Sweden, Kista and Uppsala,
- China, Wuhan
- India, Hyderabad
- Saudi, Riyadh…
Blue Battery – Background & Features

Background
• Need to solve Customer problems with poor power grid
  • Unique chemical design
  • Joint development Ericsson/ Northstar Battery

Battery Features
• Advanced Battery Chemistry
  • Increased Charge Acceptance
  • Able to support PSOC cycling
  • Ability to operate in a low SOC for extended periods
  • Designed to achieve a high number of PSOC Cycles

The unique combination of Thin Plate Technology, premium Mechanical construction, premium metallurgy and Electrochemical design offers

• Higher Temperature Performance
• Longer Float Life
• Higher Cycling Capabilities
Blue battery technology has a very high charge acceptance. As a result it can recharge quickly and efficiently even at Float voltage.

At Float Voltage NSB Blue can be fully recharged in 5 Hours that is 5 times Faster than standard AGM.
Blue battery Trial Results

South East Asia Case

A standard battery will fail after a couple of hundred cycles where the Blue Battery will continue to work.

Trial Results with North Star Standard Battery

Blue battery, with enhanced charge acceptance, can maintain the float-cyclic requirement even at float voltage. The SE Asia ongoing tests are showing already over 1800 cycles without any failure.