

A Light Reading Webinar

Energy Efficiency In Telecom Networks: The Path to Opex Reduction

Tuesday, April 22, 2007

Hosted by
Andy Bray
Light Reading



Introducing Alcatel-Lucent

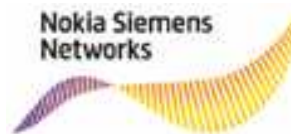
Who We Are

- Comprehensive portfolio of market-driven integrated end-to-end solutions
- Unparalleled strategic partnerships
- Industry-leading research and innovation technologies
- Strong relationships with every major service provider and enterprise around the world
- People with the energy and expertise to provide innovative solutions to your challenges



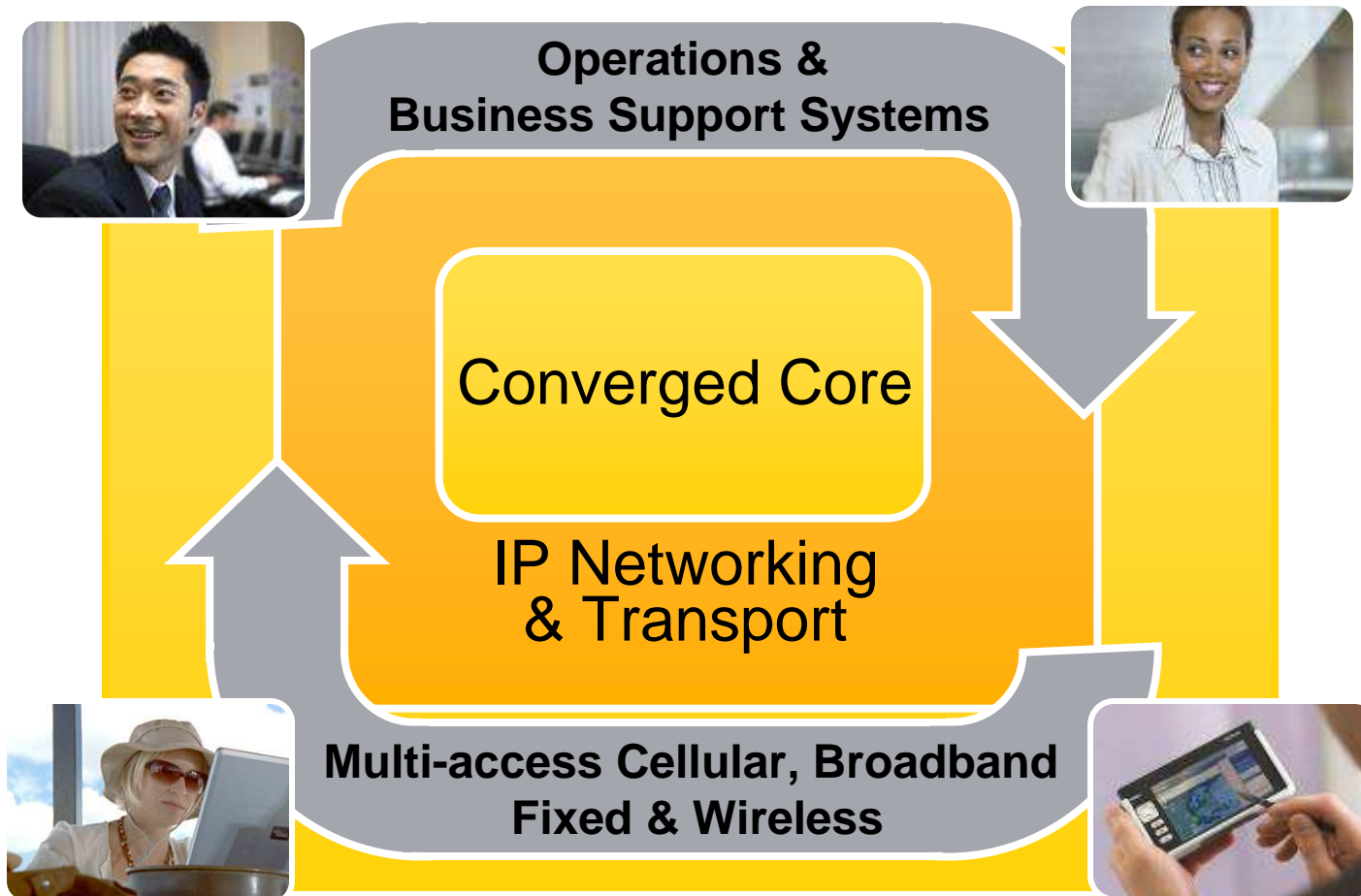
Global Expertise and Assets

- 77,000 employees worldwide
- Presence in more than 130 countries
- Global leader in communications
 - #1 in wireline, #3 in wireless, #2 in services
- Leading R&D capabilities
 - 25,000 active patents held
 - 6 Nobel Prizes won



Introducing Nokia Siemens Networks

A full portfolio to meet customer needs



1400 customers in 150 countries

Over 1 billion people connect through our systems



Agenda

- Why worry? The business benefits of being greener
- The holistic approach: Energy savings from being better connected
- Challenges and actions for the network operator
- Increasing energy efficiency in the mobile networks
- Case studies and conclusions

Why? Environmental Consciousness

Environmental Challenges: Consumer & Enterprise Views



- 85% of consumers are willing to change brands or their consumption habits to make tomorrow's world a better place
- When choosing between two brands of same quality and price, social purpose is what would most affect consumers' decisions (41%)
- Over half of consumers (55%) would help a brand promote a product if there was a good cause behind it, and 56% are more likely to recommend a brand that supports a good cause than one that does not
- 40% of US consumers are more involved in social causes than they were two years ago and expect their brands to be so as well

Source: Edelman, goodpurpose study, 2007

- 60% of global executives view climate change as important to consider within their companies' overall strategy
- 50% consider it important to account for climate change in product development, investment planning, and purchasing and supply management
- 61% view issues associated with climate change as having positive effect on profits if managed well
- Nearly 70% see climate change as important consideration for managing corporate reputation and brand



Source: McKinsey & Co, How Companies Think About Climate Change, 2008

NOW TAKING ACTIONS

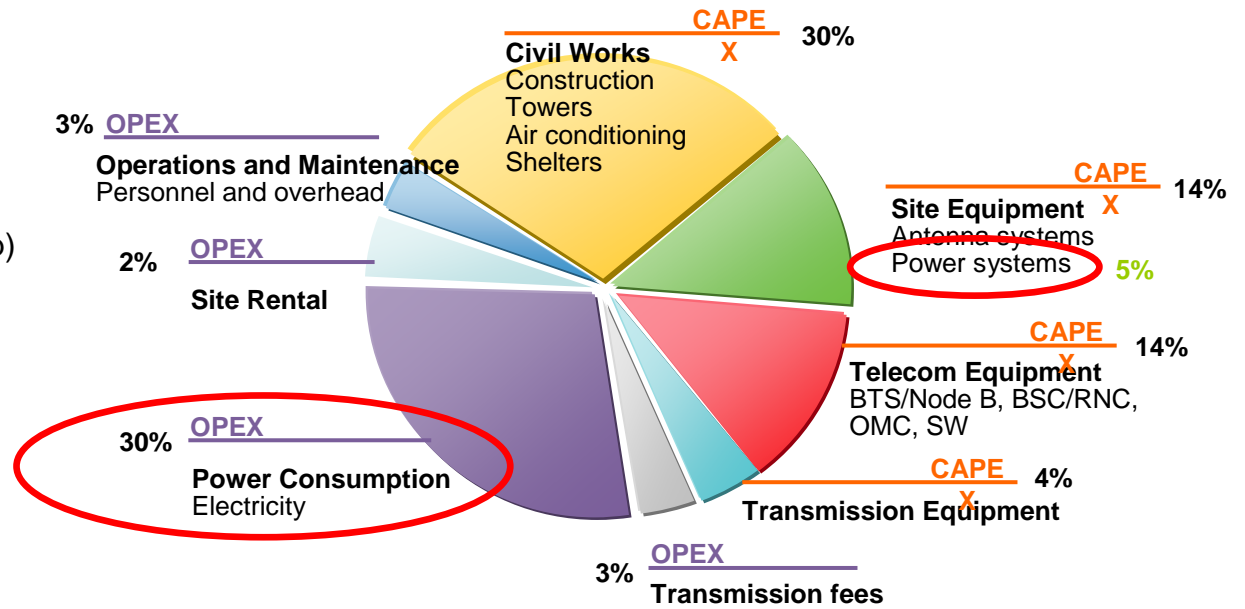


Why? Power Is a Major Source of Cost for Operations

Case study for a rural site in emerging country :

- ▶ Outdoor BTS with tower
- ▶ Outdoor power supply (battery backup)
- ▶ Genset

**POWER SUPPLY
CAN REACH
35% OF SITE TCO**



ENERGY SOLUTION MAY BE A DECIDING FACTOR

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Being Connected Means Being Green



Net positive impact on environment

Combining environmental and business benefits

Maximizing positive influence

Minimizing environmental footprint

The Connected World Enables People & Industries to Change Their Impact on the Environment

Connectivity brings
convenience,
economic and
environmental
benefits



Online tax report



SMS car pooling



Music / Video
download

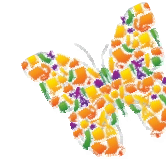
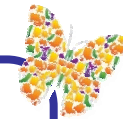
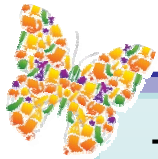


Fleet management



Tele working

Hidden Opportunities to Reduce Emissions



CO2-saving applications
Incentives drive adoption

Tax authorities save money
30m tax payers save
30 kt CO2 / year
Online tax report



SMS car pooling



Music / Video download



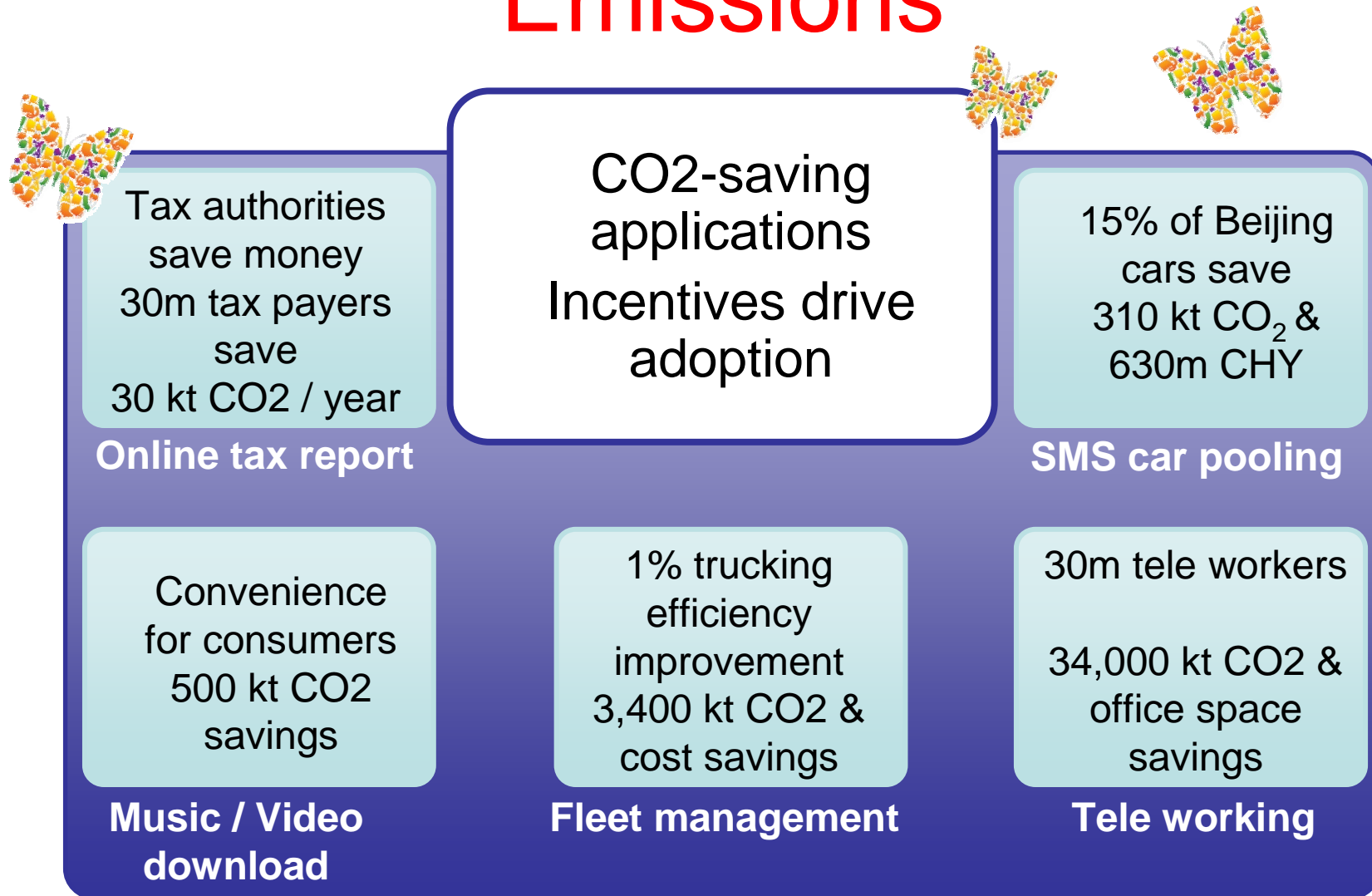
Fleet management

30m tele workers
34,000 kt CO2 & office space savings

Tele working

Source, WWF, ETNO, AEA, NSN

Hidden Opportunities to Reduce Emissions

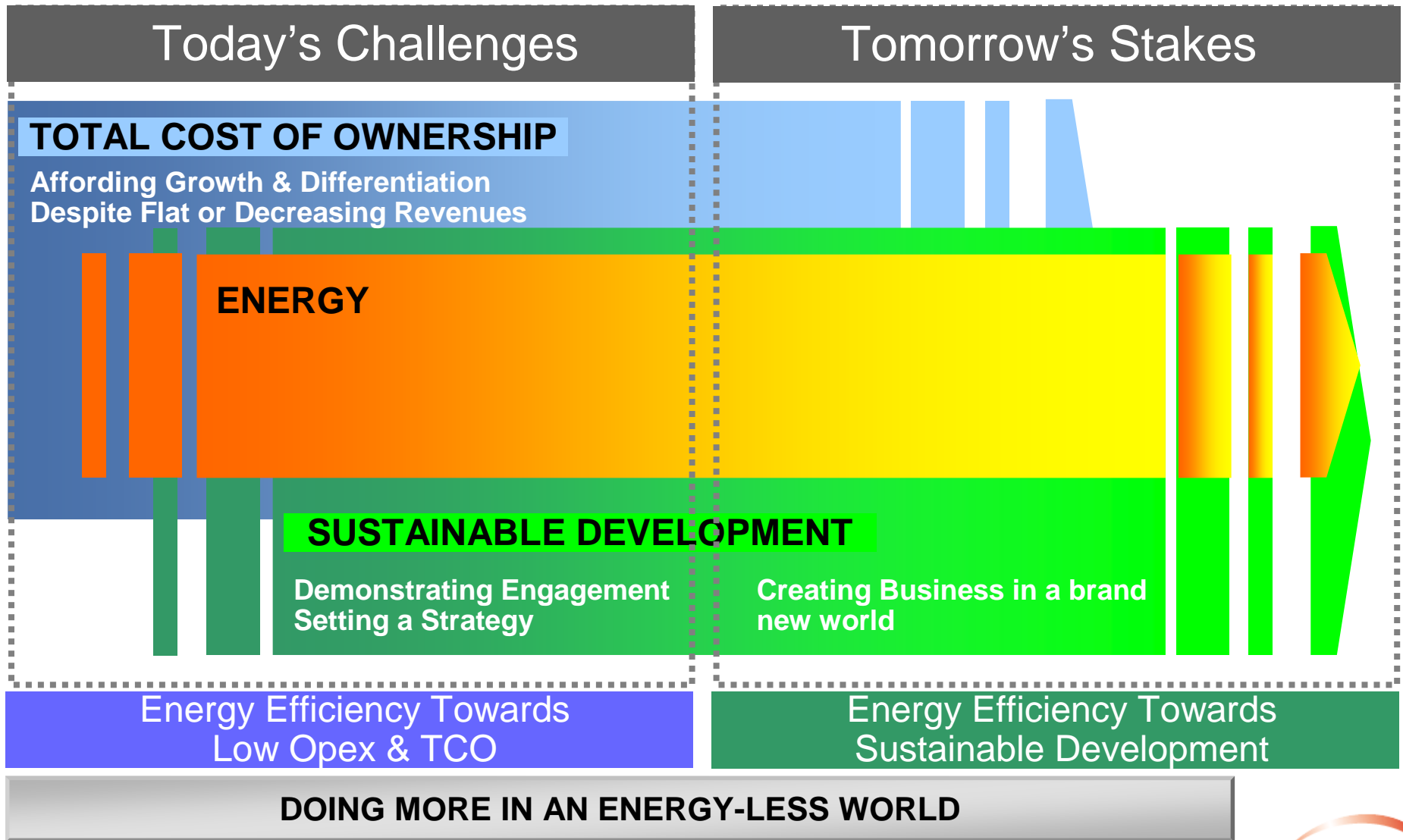


Source, WWF, ETNO, AEA, NSN

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Telecom Operators' Challenge



Solutions

Challenge

Energy Efficiency Towards
Low Opex and TCO

Energy Efficiency Towards
Sustainable Development

Alcatel-
Lucent
Solution

Equipment Level



Site Level



Network Level



**All-Layers TCO-Minded
Energy Solutions**

Global Telecom Portfolio

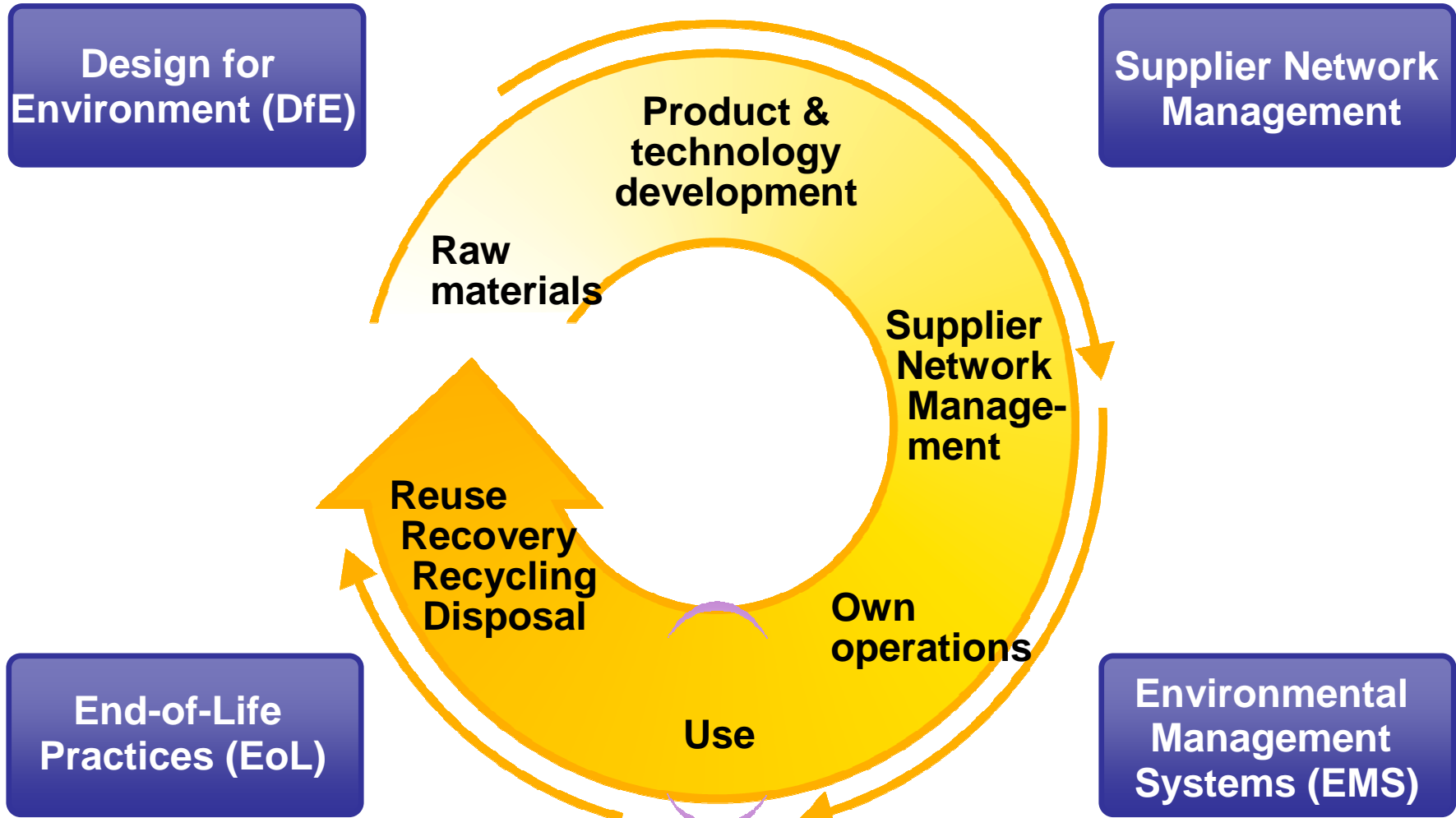
**Local operations
Worldwide**

INNOVATION

**GLOBAL TELECOM PLAYERS TO DRIVE THE MARKET
TOWARDS SUSTAINABLE DEVELOPMENT**

Basis for Our Environmental Work: Lifecycle Thinking & Long Experience

Nokia Siemens Networks comprehensive approach to achieving environmental goals



Audience Poll #1

What is your major motivator for energy efficiency?

- Finance: Reduce opex – overall energy bills are too high and growing percentage of costs
- Social: Customer demand for a greener approach
- Corporate: Company philosophy to operate to a greener approach
- Legislative: The Government(s) will force us to have to do this
- Operational: Driven by continuous growth in mobile base station sites in remote areas/countries

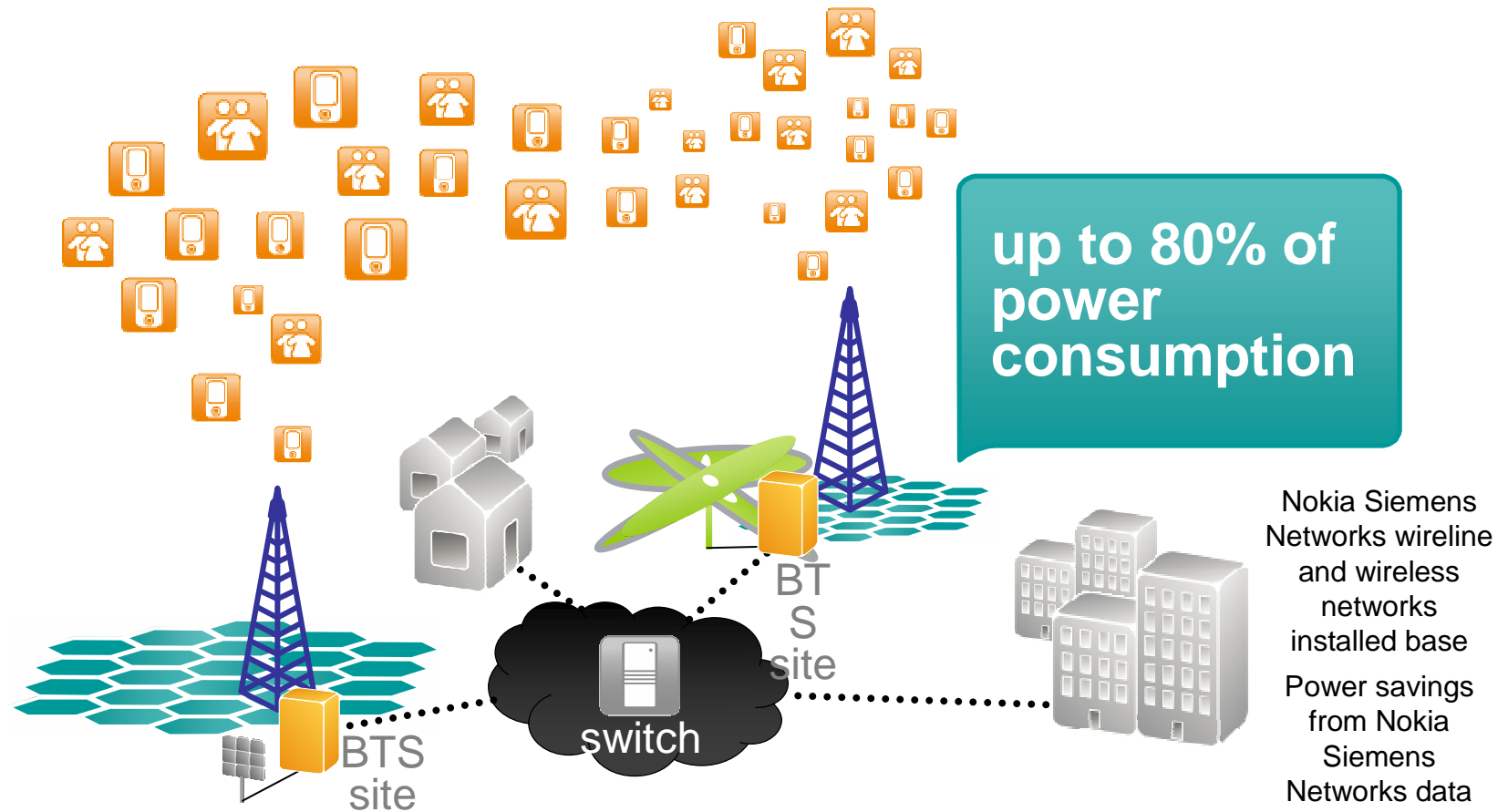
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Energy Savings in Mobile Access Network

- Shared infrastructure
- Better coverage from fewer sites
- Avoid the “coverage tax”
- Reduce need for cooling
- Alternative sources of power

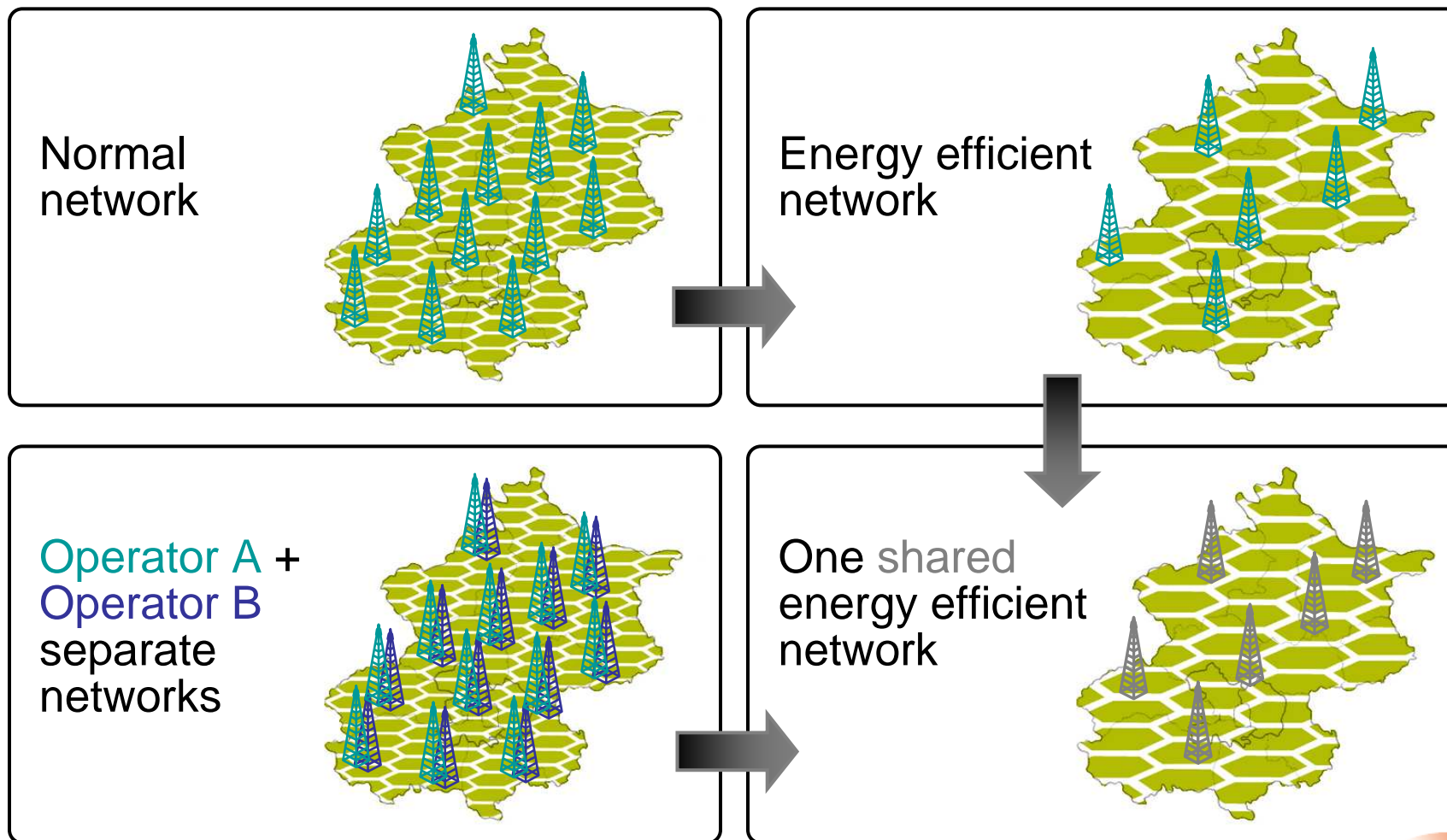
Full Scope but Clear Focus On Highest Impact



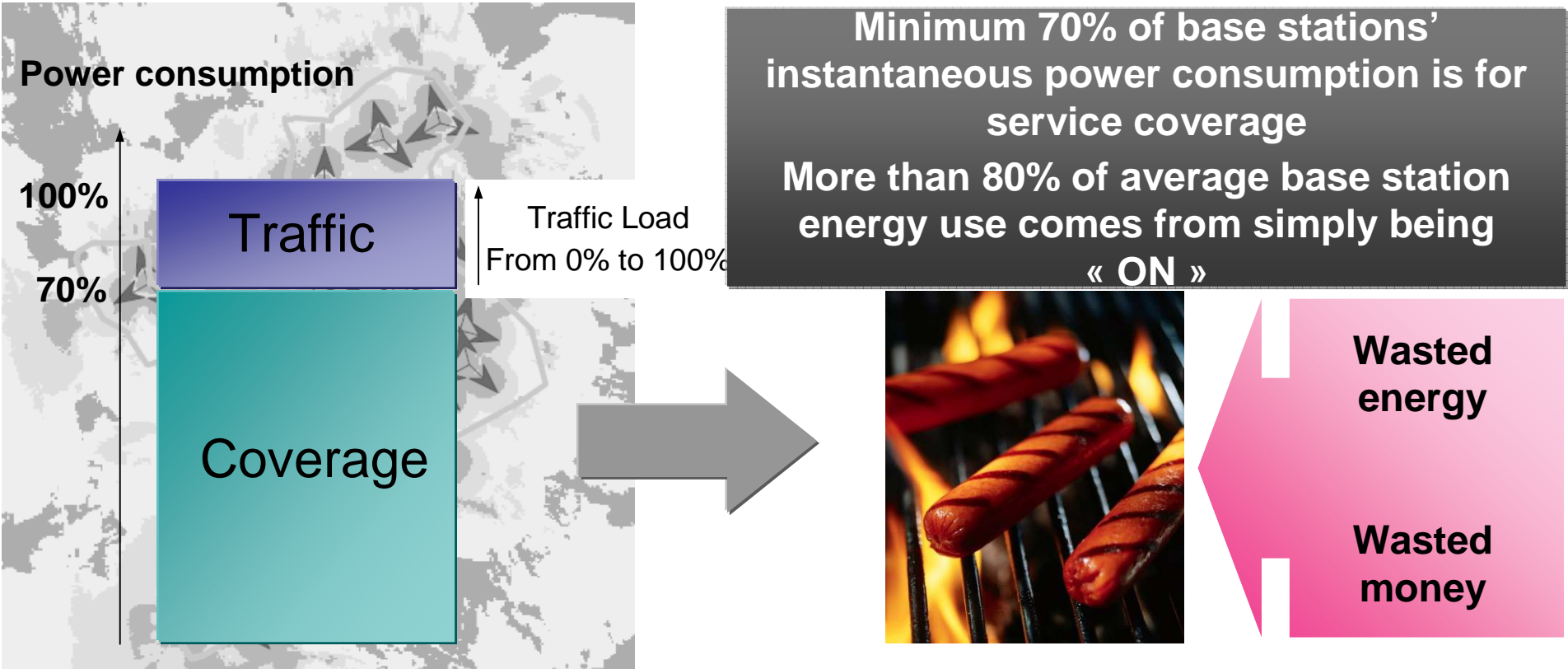
Maximize Energy Efficiency

NSN uses leading technology and planning

Nokia Siemens Networks unique approach to environmental planning



Coverage Tax



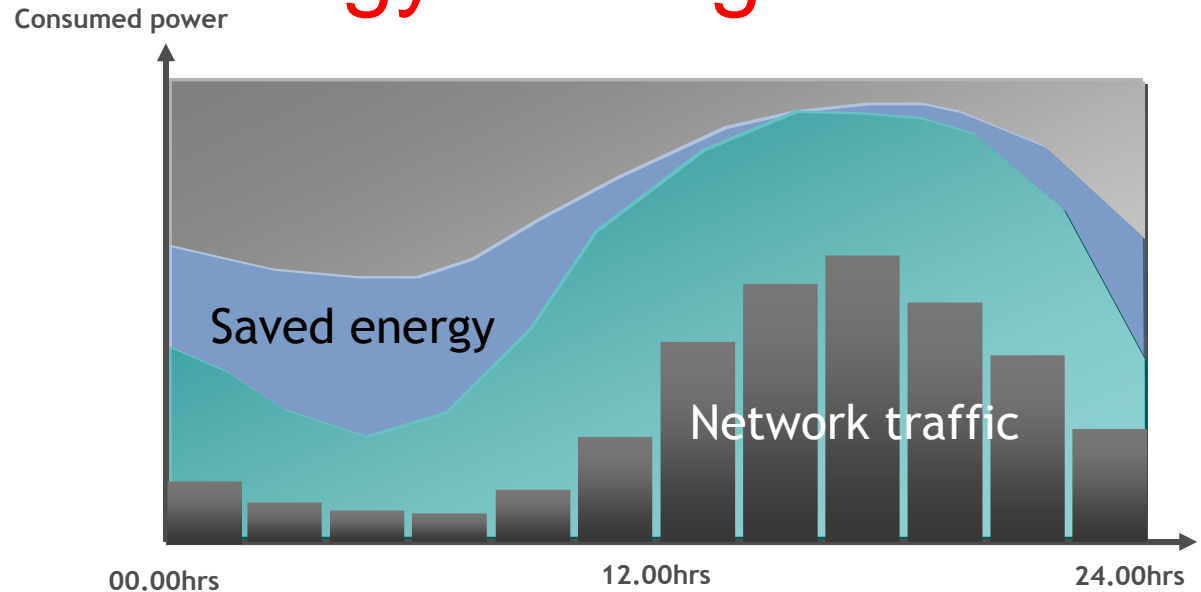
Power savings from Alcatel Lucent data

CAN'T WE JUST TURN THEM OFF ?

Coverage Tax




Dynamic Energy Saving

- Base station switch-off is not possible: idle mode instead
 - Some elements (e.g. Controller) must remain active for later power-on



↑ responsiveness

- At what level?
 - Component level (CPU, FPGA)
 - Board level (Channel Element)
 - Cell level (Carrier)
 - Site level (Base station)

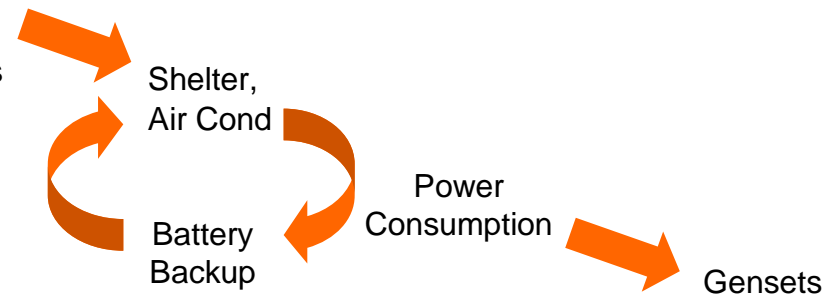
To be applied, whenever possible to new and already deployed equipments

- Especially the equipment with lowest power efficiency

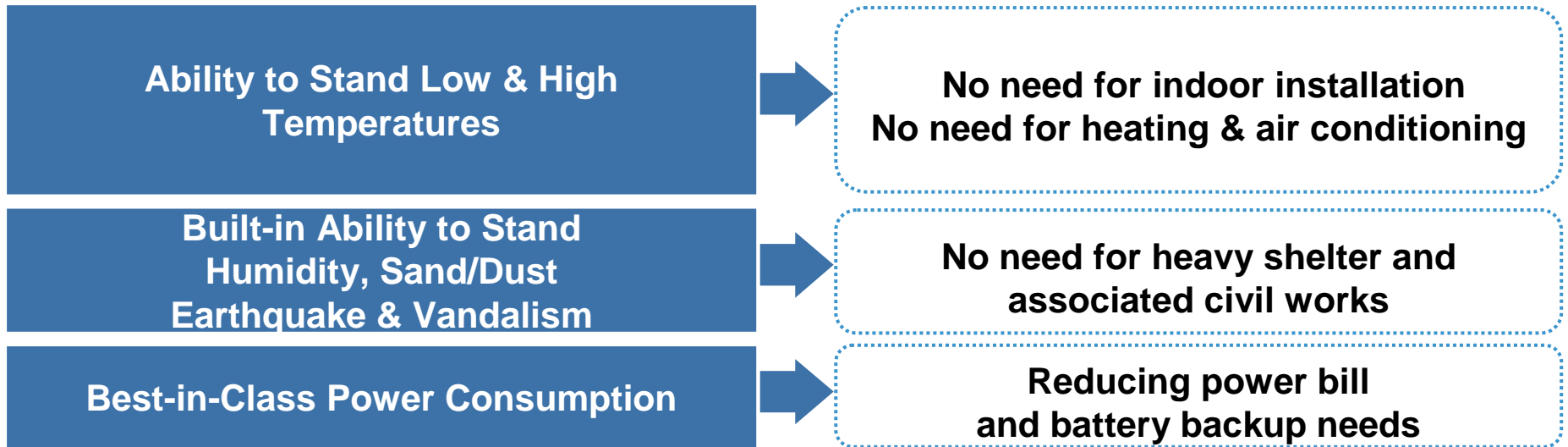
Reduce Need for Heating/Cooling

Breaking the Vicious Circle

Poor Base Station
Ability to Stand
High Temperatures
°C



Alcatel-Lucent Case for Outdoor



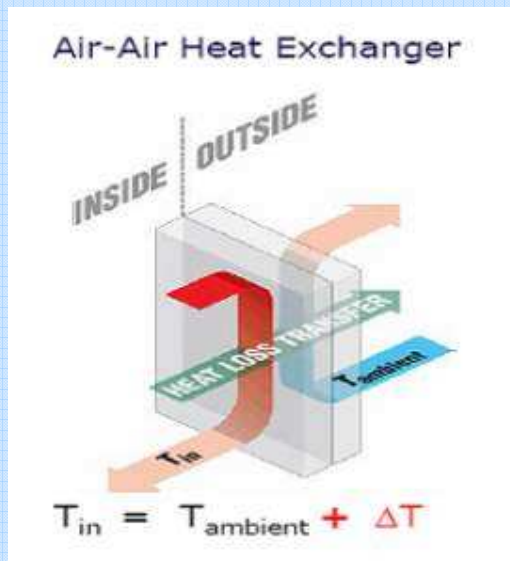
**MATCHING SHELTER & AIR CONDITIONING PERFORMANCES
WITH OUTDOOR CABINET**

Reduce Need for Cooling

Two options
WITHOUT AIR CONDITIONING

Optimized Heat Exchanger

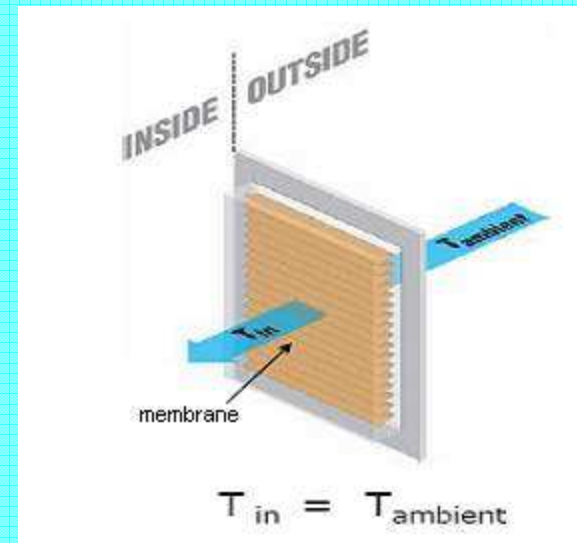
- Up to **45°C** with full configuration
- Heat exchangers located in front doors



Power savings from
Alcatel Lucent data

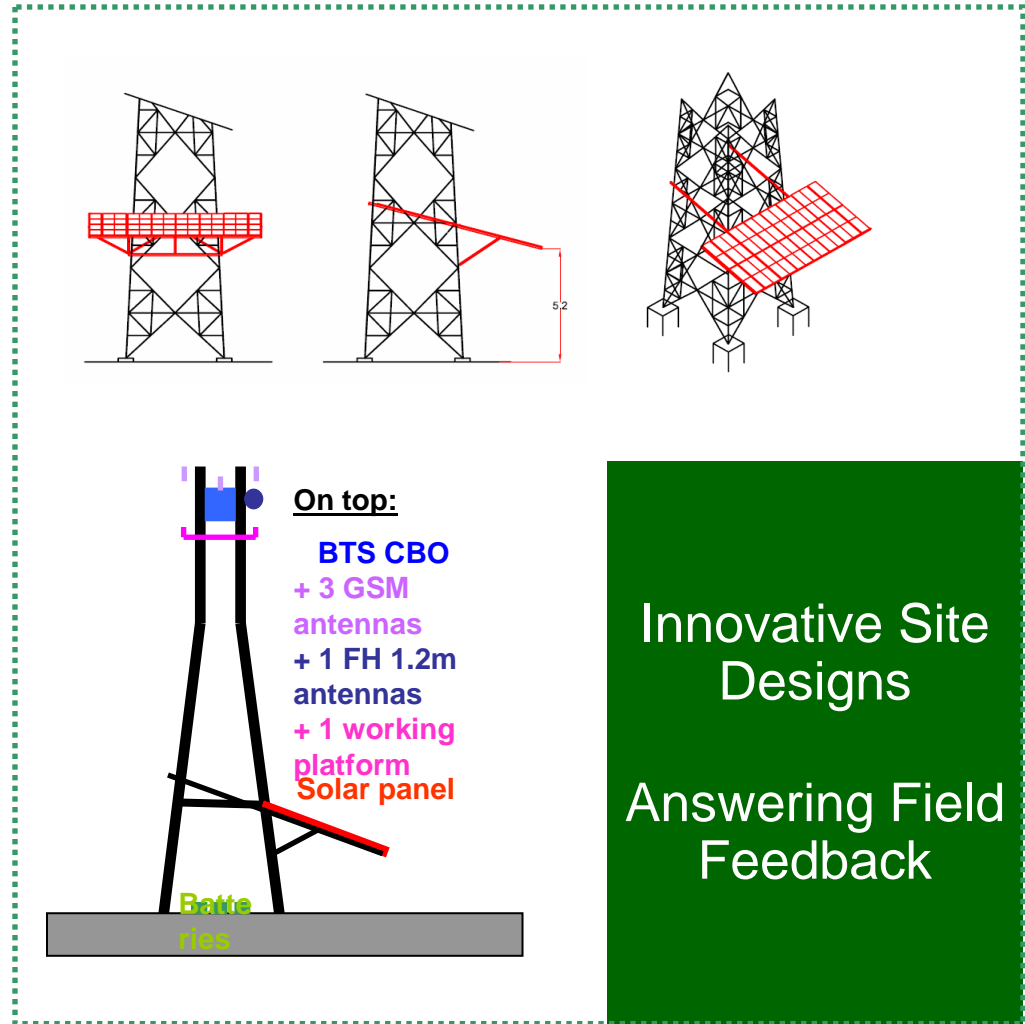
Direct Air Cooling System

- Up to **55°C** with full configuration
- DACS located in front doors



WITHSTANDING HIGH AMBIENT TEMPERATURES
WITH MINIMUM POWER CONSUMPTION

Solar Power



Affordable solar panel surface...



... thanks to very low power consumption

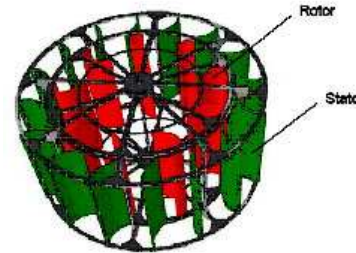
Innovative Site Designs
Answering Field Feedback

TURNKEY APPROACH & FIELD EXPERIENCE ARE KEY

Wind Power & Hybrid Solar + Wind

Wind solution

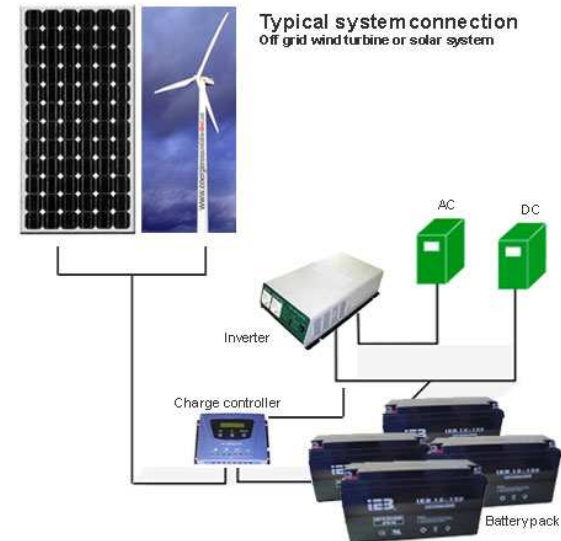
- Horizontal or vertical axis
- Cost effective and without power limitation, but not predictable enough to be sole power source



Vertical Axis Designs

Hybrid Solar + Wind

- Complementary (cost efficiency, predictability)



Hybrid Solar + Wind Architecture

HYBRID SOLAR + WIND A CANDIDATE FOR LARGE DEPLOYMENTS ?

Audience Poll #2

What do you see as the barrier to adopting a more energy-efficient approach?

- Has management visibility but they need a better business case – social responsibility alone will not be enough to drive a change
- Proposition seems fine for reducing power consumption of mobile access networks but we don't own those
- Waiting for the next generation of more efficient hardware to come along
- Can only act when existing hardware comes up for replacement at end of life
- This whole area is just not seen as an issue for the board and the exec team yet

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Empower T-Mobile Service Differentiation With Optimized Opex

Stimulating New Usage...

"The average Internet usage for an iPhone customer is more than 100 MBytes. This is 30 times the use for our average contract-based consumer customers."

René Obermann, CEO of Deutsche Telekom AG

... with service differentiation...



Wer alles gibt, wird ausgezeichnet!

1 connect Festnetz-Telefon-Anbieter Platz des Jahres 2007	1 connect Mobilfunk-Netzbetreiber Platz des Jahres 2007
1 connect DSL- und Festnetzmodem Platz des Jahres 2007	1 connect Prepaid-Karte Platz des Jahres 2007
1 connect Internet- und DSL-Anbieter Platz des Jahres 2007	1 connect Hotspot-Anbieter Platz des Jahres 2007
1 connect Video-on-Demand-Anbieter Platz des Jahres 2007	1 connect Festnetz-Ersatzprodukte Platz des Jahres 2007

8 x 1. Platz. Laut connect-Leserwahl Heft 05/2007

- **1st** in customer voting in Germany
- **1st** "Mobile Broadband Everywhere" in Germany

... empowered by Full BSS Renovation

- Nation-wide EDGE coverage complementing HSPA
- Made affordable thanks to huge opex savings
- Full readiness for EDGE evolution, to keep 2G/3G service consistency as technologies evolve

"The renovation of our BSS with Alcatel-Lucent equipment enabled us to benefit from power consumption savings in the range of 30% to 40%. These huge opex savings helped finance our service differentiation objectives." Frank Meywerk, Radio Networks, T-Mobile Germany



Addressing Growing Consumer, Governmental & Operator Demand for Cost-Effective & Environmentally Friendly Solutions

Easy & quick
installation

Save space

Save energy

Save money

.....

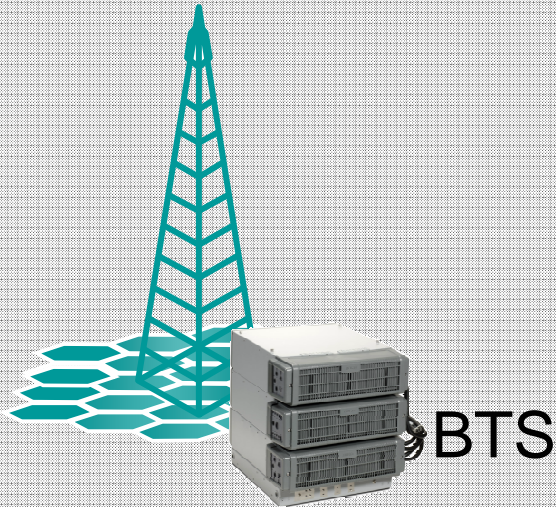
*Supporting
Green
Olympics*



- China Mobile Group Beijing Ltd. selected Nokia Siemens Networks GSM base stations to provide telecommunication services for 2008 Olympics

Savings at Beijing

~13m subscribers supported by Nokia Siemens Networks equipment



86 GWh electricity & 73k tons CO₂ annual savings

Equals annual emission of 21 000 cars

Conclusions

- Green issues are unavoidable – and it makes good business sense
- Take a holistic view first – you are probably achieving more than you realize
- Look for the big wins – mobile access networks are energy hogs
- Look for alternative energy sources as a more radical solution to simply cutting the electricity bill

Q&A

