

Mobile Energy Efficiency
An Overview

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- **Overview of GSMA's Mobile Energy Efficiency Benchmarking and Optimisation service**

- Insights from work to date

Mobile Energy Efficiency

The GSMA's Mobile Energy Efficiency (MEE) offers two services: MEE Benchmarking and MEE Optimisation

- The GSMA's **MEE Benchmarking** service is a management tool
  - helps MNOs measure and monitor the relative efficiency of their radio access networks
  - identifies under-performing networks and quantifies the potential efficiency gains available, typically around 10% to 25% across a MNO's portfolio

- The GSMA's **MEE Optimisation** (MEEO) is a follow-on service that develops action plans for MNOs to reduce network energy costs and greenhouse gas emissions in under-performing networks
  - run in partnership with a third party, e.g. a vendor
  - identifies individual energy saving measures and assesses the business case

MEE Benchmarking: Benefits for operators / energy managers

1. Simple measurement of energy consumption has led to identification of significant cost savings in some operators, mainly by correcting utility errors. ***One network recently saved 6% pa just by checking its invoices***

2. A detailed analysis of relative network performance against a large dataset enables
   - Quantification of energy cost (and carbon emissions) savings. ***Savings of 20% to 25% per annum are typical for underperforming networks***
   - Suggested high level insights to improve efficiency
   - Annual participation to track improvements over time and quantify the impact of cost reduction initiatives
   - Demonstration of positive action on energy and emissions reduction to stakeholders

3. Benchmarking facilitates MEE Optimisation, a service which develops action plans to reduce network energy costs and GHG emissions in under-performing networks

MEE Benchmarking is currently working with 35 MNOs, representing over 200 networks, including:



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MEE Optimisation's first project identified €2m of savings per annum and paybacks of 9-30 months

- Telefonica, NSN and the GSMA agreed to collaborate on a MEE Optimisation pilot in Germany, which began in Sept 2011 and concluded by the year end

- The approach taken in the MEE Optimisation project was to:
  1. Assemble a team of energy experts from Telefonica, NSN and the GSMA
  2. Choose a subset of 20 representative cell sites, gather and analyse required data, and visit some of the sites
  3. Assess the information gathered and summarise results

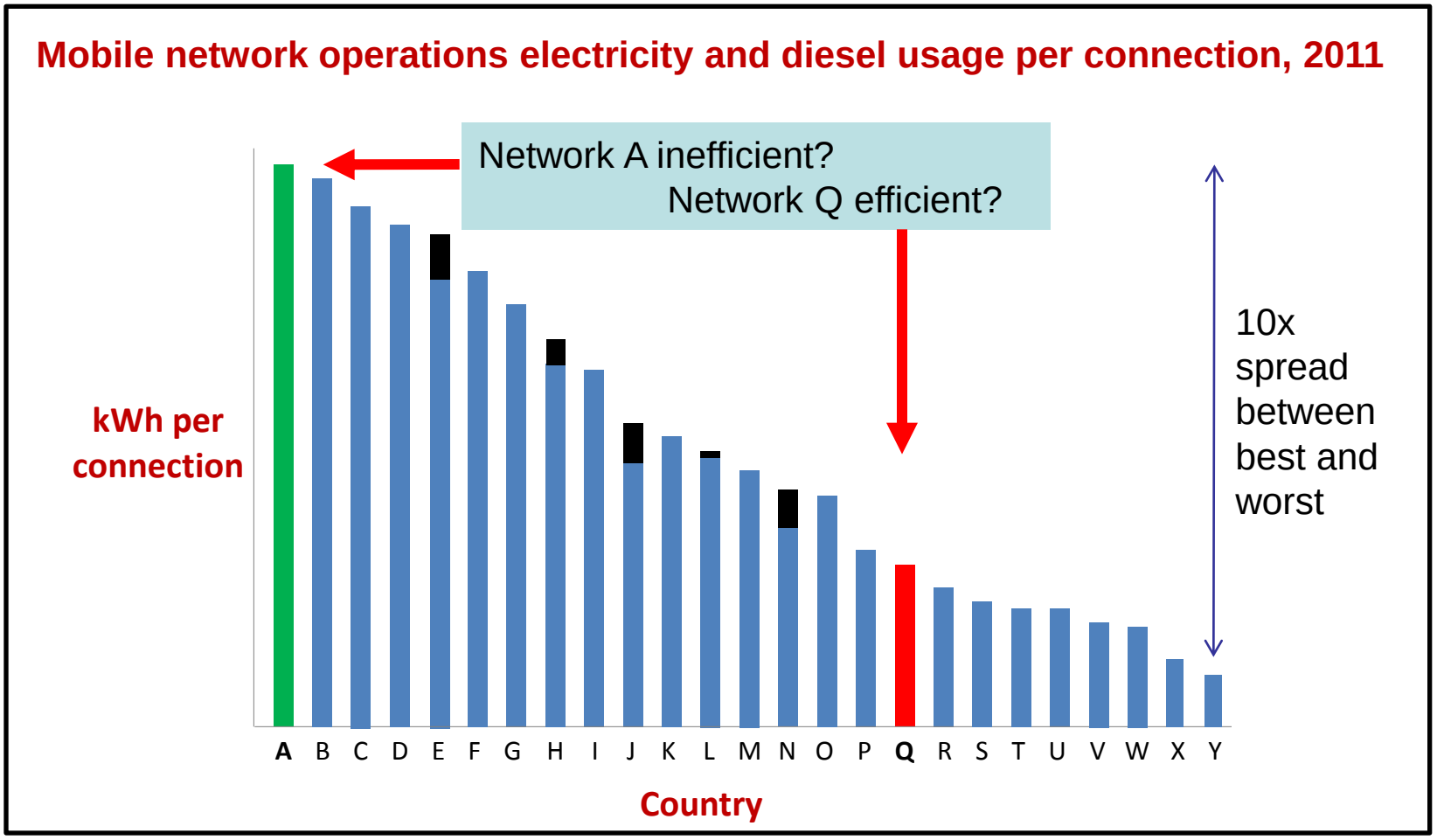
- Estimated annual savings identified of €2m in the RAN
  - financial paybacks of 9 to 30 months
  - savings are in addition to measures currently being implemented, which include switching more cell sites to free cooling

MEE Benchmarking methodology compares networks against 4 KPIs using a unique normalisation methodology

- Networks are compared against four Key Performance Indicators (KPIs)
  1. Energy consumption per mobile connection
  2. Energy consumption per unit mobile traffic
  3. Energy consumption per cell site
  4. Energy consumption per unit of mobile revenue

- Unique analytical approach allows MNOs to compare their networks against one another and against their peers on a like-for-like basis
  - Variables outside the MNO's control, e.g. population distribution and climate, are 'normalised' using regression techniques
  - Networks can then be compared like-for-like

Prior to any “normalisation”, Network A appears inefficient and Network Q efficient



Source: MNOs, UN, GSMA data and analysis

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Post-normalisation, the results for different KPIs are consistent across different networks

Summary of results for Top Mobile by network

2010	Canada	France	India	Italy	Japan	Mexico	South Africa
Pre-normalisation							
kWh per Connection	High	Low	Low	Low	Low	Avg	High
kWh per cell site	Low	Avg	Avg	Low	High	High	Avg
kWh per traffic	Avg	High	High	High	Avg	Avg	High
Post-normalisation							
kWh per Connection	Low	Low	High	Low	Avg	High	High
kWh per Cell site	Avg	Low	High	Low	Low	High	High
kWh per traffic	Avg	Low	High	Low	Avg	High	High

Key High energy network | Average energy network | Low energy network

Illustrative

The results are also used to quantify energy cost saving potential

2011	RAN energy (GWh)	Elec. cost ($/kWh)	Diesel cost ($/l)	Est'd energy cost ($m)	% saving to average	% saving to top quartile	Saving to average $m	Saving to top quartile $m
Canada	424	0.09	1.18	38	3%	13%	1	5
France	289	0.11	1.37	32	0%	2%	0	0
India	3666	0.14	0.69	313	9%	21%	28	66
Etc.	…	…	…	…	…	…	…	…
Total	**5736**			**608**			**37**	**89**

It is not possible to determine how much of the $90m p.a. is cost-effective using the MEE Benchmarking analysis. MEE Optimisation service addresses this

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Mobile Energy Efficiency

It is challenging for many operators to measure and manage energy consumption and costs

- Some major operators do not manage energy centrally, although this is beginning to change
- It is difficult for many operators to gather high quality energy consumption data from their networks
- People responsible for managing energy often struggle to obtain information regarding key drivers of energy consumption from their networks
- Concern by regulators over carbon emissions is starting to impact the way some operators manage energy

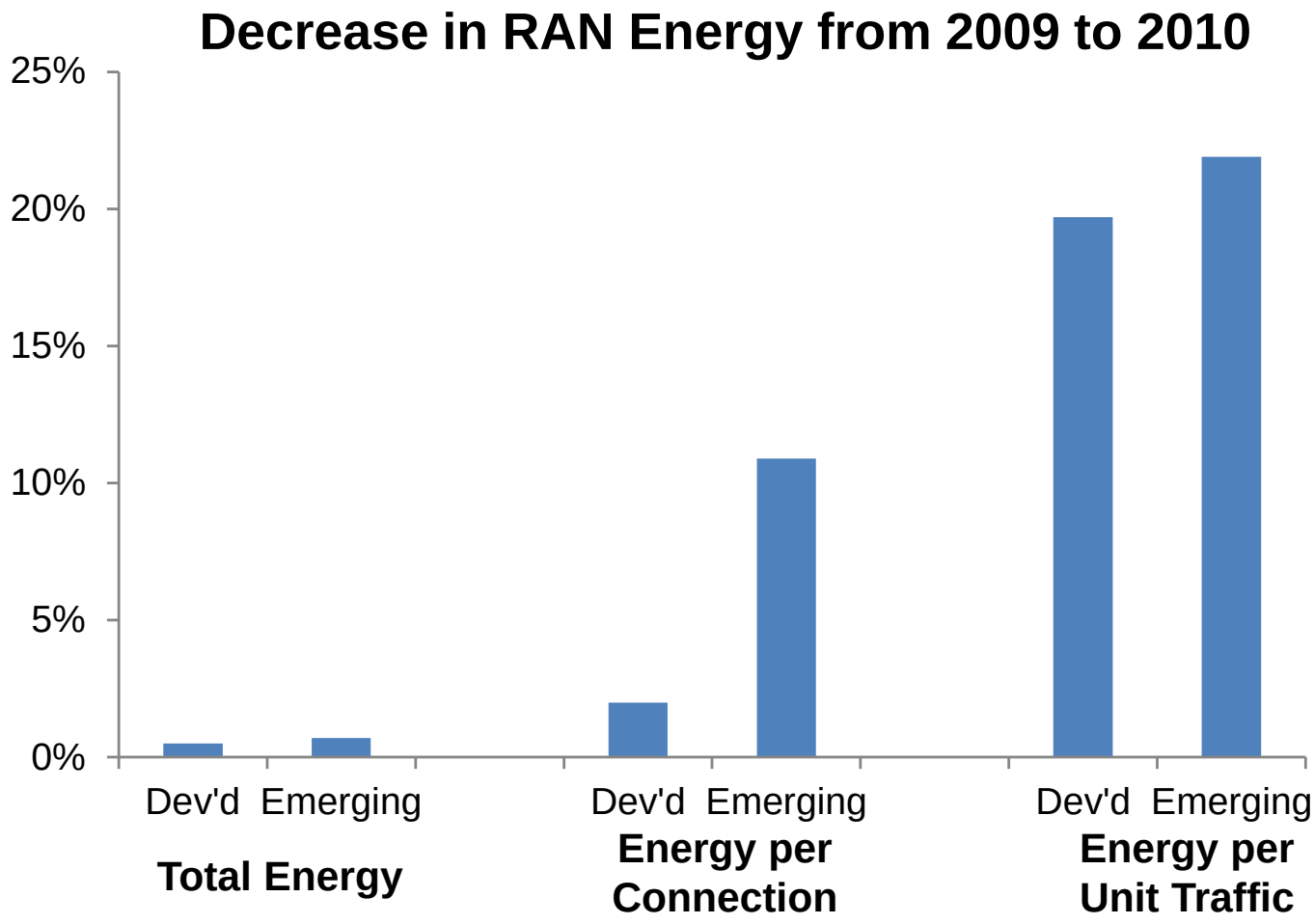
The best KPI is energy per connection; energy per traffic should be when data is better quality

KPI	Comment
Energy per connection	Simple KPI with much agreement on consistent definition of “connection”
Energy per cell site	Difficult to define “cell site” to enable like-for-like comparison
Energy per unit traffic	Theoretically good but hard to gather necessary traffic data
Energy per revenue	Too many other factors influence this KPI but strong commercial implications

The networks with the lowest energy consumption typically share several of certain characteristics

- Energy costs are managed aggressively by a person with relevant expertise, typically at group level
- High quality energy data is available
- Electricity prices are high; little usage of diesel
- Network equipment is relatively new
- A degree of network sharing is occurring

Total network energy consumption by mobile operators showed no growth from 2009 to 2010



Note: This analysis is based on 34 networks where data for 2009 and 2010 was high quality
Source: GSMA Mobile Energy Efficiency Benchmarking

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