

Mobile Communication Networks: Energy Efficiency & Green Power

Jack Rowley, PhD

Director Research & Sustainability

GSM Association

What is the GSMA?

- Founded in 1987 by 15 operators.
- Now spanning 219 countries, the GSMA unites nearly 800 of the world's mobile operators, as well as more than 200 companies in the broader mobile ecosystem.
- Innovating, incubating and creating new opportunities for its membership, to drive the growth of the global mobile communications industry.

More than 4.6 billion mobile connections.

Energy Use by Mobile Networks

- Radio network accounts for about 80% of mobile network operator energy consumption.
 - Typical site 3.2 kW, best in class 1 kW.
 - Energy is 15-25% of network opex.
- Reduce energy needs.
- Use alternative energy sources.

Source: *Green Power for Mobile: Top Ten Findings*, GSMA Development Fund, 2008. McKinsey.



www.gsmworld.com/ee
energyefficiency@gsm.org

GSMA: Mobile Energy Efficiency

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GSMA Benchmark Methodology

- Measure mobile network energy performance by country:
 - Energy per mobile connection.
 - Energy per unit mobile traffic.
 - Energy per cell site.
 - Energy per unit mobile revenue.

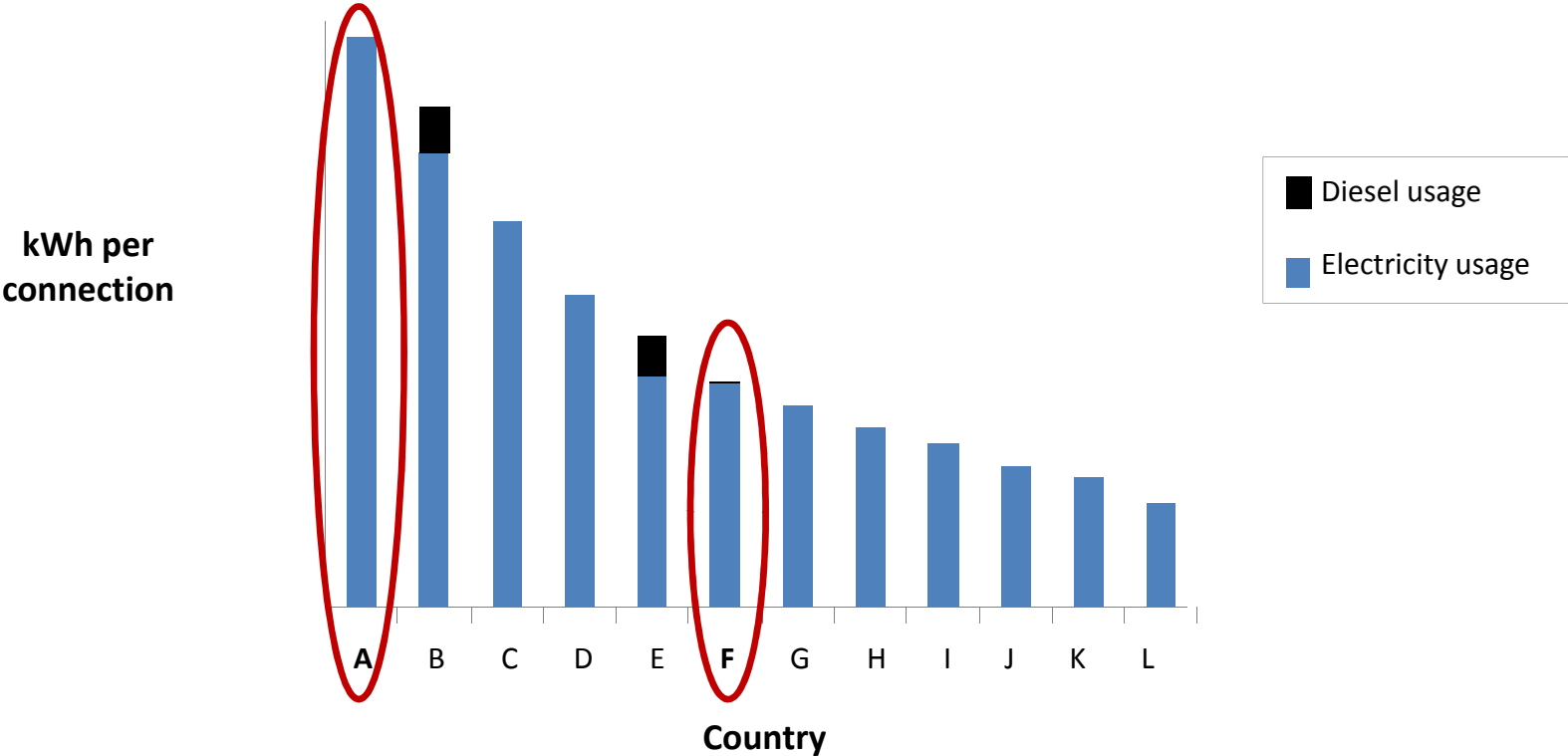
- Compare like-for-like:
 - Normalise for variables outside the energy manager's control for example country, geography and technology factors.
 - Uses multi-variable regression analysis.

- Compare networks anonymously.

Prior to “Normalisation” Spread Can Be High

Operator X

Mobile operations average electricity and diesel usage per connection, 2009

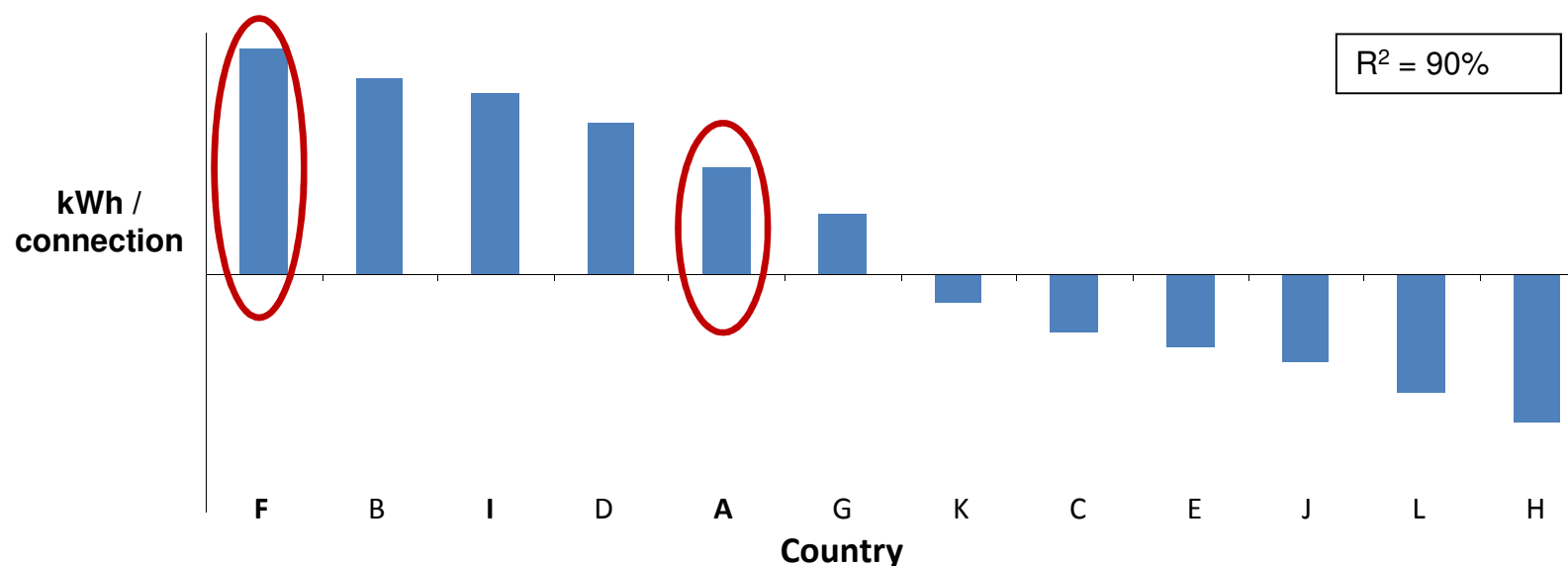


Source: Operator X, GSMA data and analysis

Regression Gives a True “Normalisation”

Operator X

Normalised electrical and diesel energy usage per mobile connection, 2009



- Mobile operations diesel & electricity usage per connection regressed against:
 - % 2G connections of all mobile connections
 - Geographical area covered by all MNOs per connection
 - % urban population / % population covered by all MNOs
 - Number of cooling degree days (population weighted)

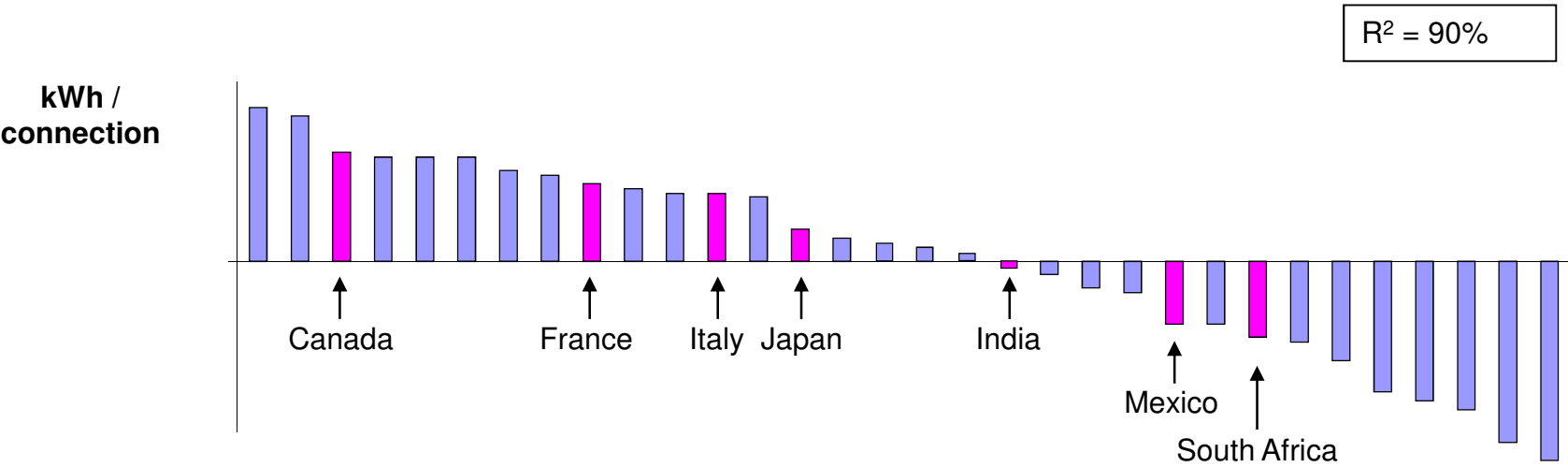
Source: Operator X, UN, GSMA data and analysis

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Anonymous Comparison Against Other Operators

Operator X

Deviation from average: average electrical and diesel energy usage per mobile connection, 2009



Key

- Operator X
- Other Operators

Regression variables

- Mobile operations diesel & electricity usage per connection regressed against:
- % 2G connections of all mobile connections
 - Geographical area covered by all MNOs per connection
 - % urban population / % population covered by all MNOs
 - Number of cooling degree days (population weighted)

Source: MNOs, GSMA data and analysis

Service for Mobile Network Operators

■ Operators get:

- A calculation of potential cost and CO2 savings for each network.
- To participate in a large dataset.
- Insight into relative efficiency of own networks and across industry.
- To demonstrate positive action to stakeholders.

■ The process:

- Step 1 - Share energy consumption data with GSMA in confidence.
- Step 2 - Review GSMA analysis and validate.
- Step 3 - Use the benchmarking results to refocus or refine current and future energy efficiency improvement initiatives.



www.gsmworld.com/greenpower

gpm@gsm.org

GSMA: Green Power for Mobile

GSMA: Green Power for Mobile Workstreams

Network Workstream:

- 640,000 off-grid base stations by 2012
- US\$14.6bn diesel bill by 2012
- Network power is responsible for 80% of an operator's carbon footprint

Handset Workstream:

- 500 million subscribers with handsets but no grid electricity
- Typical off-grid subscriber will pay US\$3 per month on charging

Communities Workstream:

- 1.6 billion people live off-grid
- No forecast change by 2020

Opportunity – ‘*extend mobile beyond the grid*’



- Promote industry to deploy 118,000 renewable energy base stations by 2012
- Enable rural, off-grid network expansion
- Reduce energy OPEX (2-3 year Return on Investment)
- Reduce carbon emissions



- Promote industry to launch off-grid charging solutions e.g. solar handsets, external solar chargers etc
- 10-14% ARPU lift for operators providing off-grid charging solutions
- US\$2.3 billion missed revenue for operators



- Mobile industry is deploying 640,000 base stations into off-grid regions by 2012
- Base stations typically have over 5kW of excess power
- Operators are trialing new business models providing excess power to the local community

Solar Powered Base Stations

■ Benefits

- No fossil fuel burn:
 - Except when sun is insufficient to charge batteries
- Long term costs saved.
- Base station can be located away from grid:
 - Reduces cost of infrastructure
 - Allows better coverage planning
 - Available to remote communities
- Excess electricity can be sold to grid (if connected).
- System continues to work when grid is off (disaster).
- Site does not need visiting so often for refuelling.

■ Issues


- 14 car size batteries would be needed to maintain 1kW power overnight.
- Greater initial cost:
 - NPV hard to estimate with high inflation
- Backup diesel needs to start when battery voltage is low.
- Site needs robust security measures:
 - Broadcast video etc

Adaptation to Climate Change Summary of Requirements for Mobile Phone Systems

- Goal - Ubiquitous coverage:
 - Independent of grid availability.
- Goal - Affordable:
 - At community and individual level.
- Voice, text:
 - (including broadcast text alerts) and broadband enabled.
- Operating Platforms which can accept specialist software:
 - (e.g. for environmental data gathering via mobile phone).
- Wide range of mobile, portable and fixed devices supported.
- Resilient and robust network design:
 - Operates with grid off, solar power for base station and handsets.
- Action plans needed with partnerships at community level:
 - to support roll-out and educational aspects.

Further information

- **Contact: Dr Jack Rowley**
- **Job title: Director**
- **Research & Sustainability**
- **email: jrowley@gsm.org**
- **Tel: +353 86 806 0849**
- **www.gsmworld.com/environment**

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Mobile and the Environment

Mobile communications has the potential to make direct and indirect contributions. Potential contributions include using mobile broadband for more efficient phone to register their presence so that heating or lighting can respond; as CDs) with digital downloads. It has been estimated that through enabling technology industry could reduce global emissions by as much as 15 per cent.

Mobile Recycling

Research indicates that it is the component manufacture and use phases of the phone's lifecycle which have the greatest environmental impact.