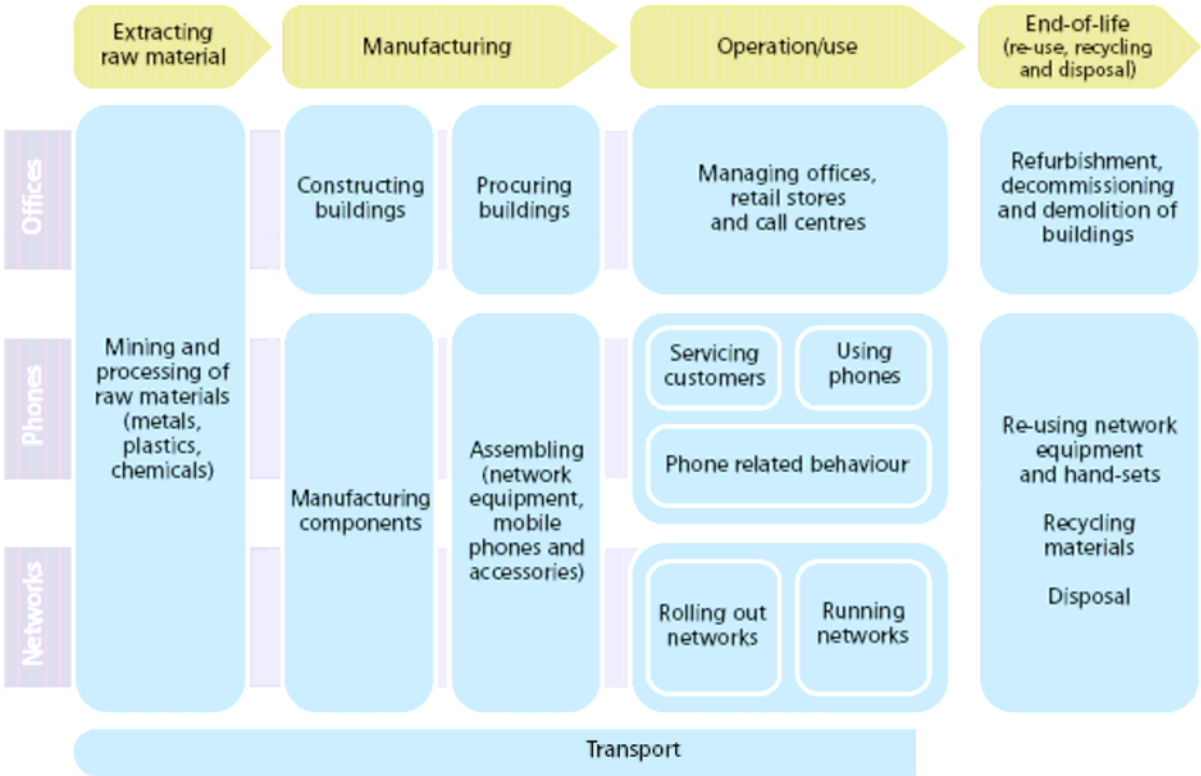
Unwiring the Planet - Wireless Communications and Climate Change

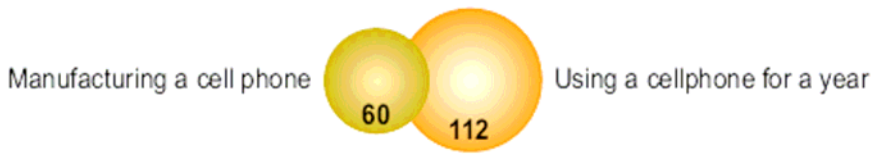
Jack Rowley, PhD, Director Research & Sustainability
Dawn Haig-Thomas, Director Development Fund

ITU International Symposium
ICTs and Climate Change
17-18 June 2008
London, UK.

© GSM Association 2008

Mobile Communications – Environmental Impacts



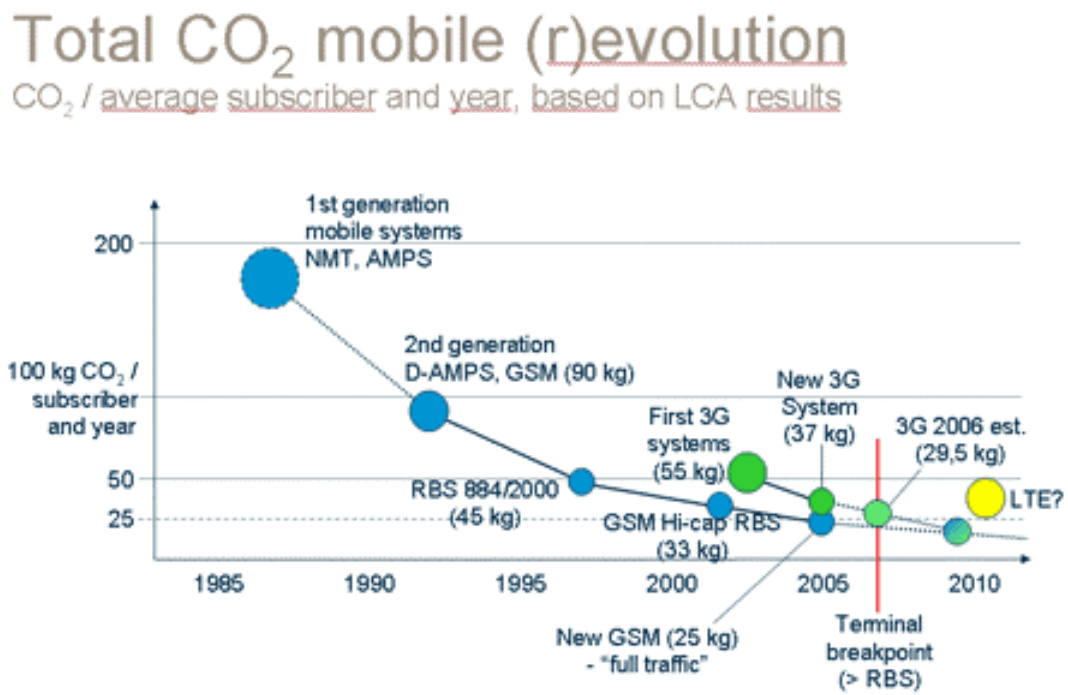


- Global impact - about 0.1% of the total CO_2 emissions.
- UK impact – about 0.3% of CO_2 emissions and around 1.8% of GDP.

Sources: Forum for the Future (2006), UNEP (2008)

© GSM Association 2008

Mobile Communications – Environmental Impacts

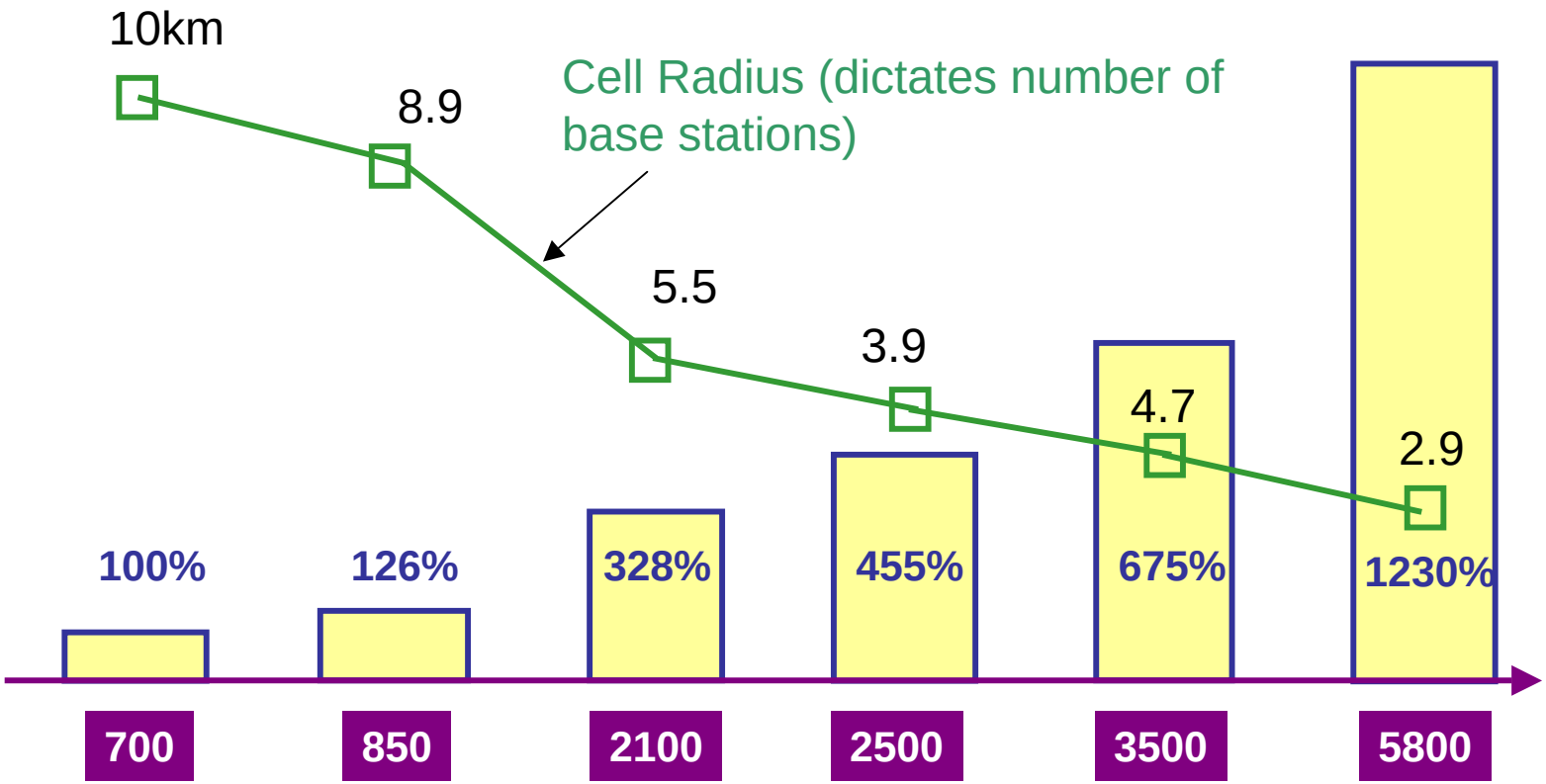


- Greater capacity with newer technologies – 8 fold increase.
- Improved amplifier efficiency – 3 fold increase.
- Modern base station can operate on 350 W.

Source: Telefonica O2 Europe, T-Mobile, Ericsson

© GSM Association 2008

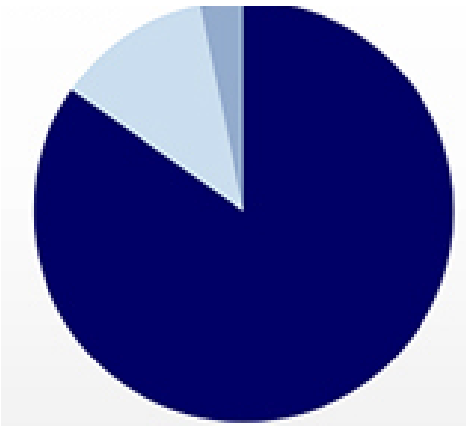
Frequency Allocations Effect Cell Size



© GSM Association 2008

Energy Use During Operations

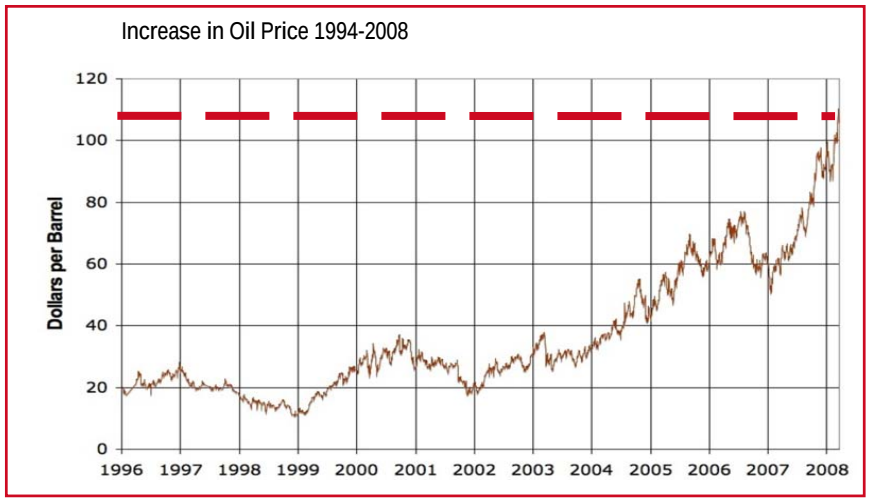
- More than 80% of a mobile operators energy is used by masts and switch centres.
- Base station energy savings:
  - Equipment efficiency and optimum siting.
  - Reduce active cooling.
  - GSMA pilots of renewable energy and bio-fuels to power base stations.



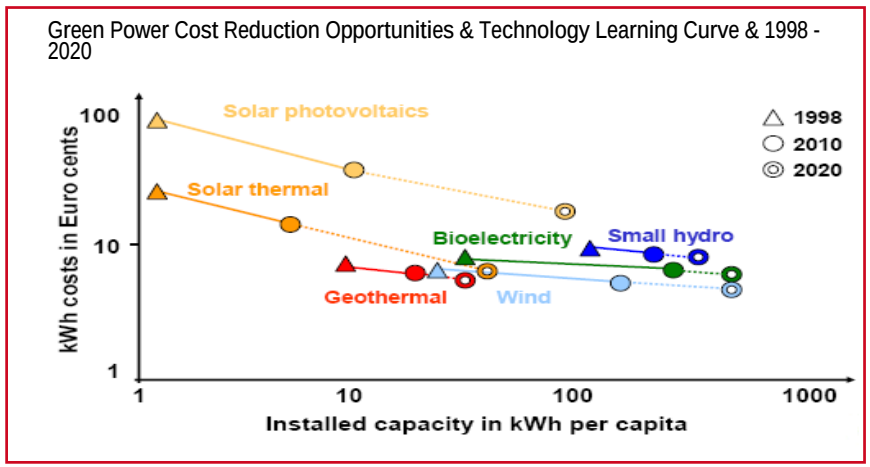
- Handset Energy Use:
  - About 11% energy wasted is the charging process.
    - If 10% of mobile phone users turned off their chargers after use, the energy saved in one year could power 60,000 European homes.
  - EU Code of Conduct on Efficiency of External Power Supplies

© GSM Association 2008

Alternative Power Opportunity



Source: Go-Tech



Source: NET Ltd

- About 1.6 bn people without access to grid electricity.
- Future mobile subscriber growth heavily dependant on off-grid.
- 100% diesel price increase since 2002.
- Solar, wind and other green power technology costs are rapidly improving.
- Current deployments about 1000 sites worldwide.

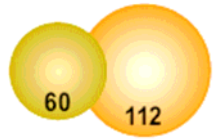
© GSM Association 2008

Case Study – MTC, Namibia

- 90 day trial started in April 2007 involving GSMA Development Fund, Mobile Telecommunications Limited (MTC) of Namibia and Motorola.
- Validate the use of wind and solar as feasible and cost-effective.
  - 6kW turbine mounted on a 15m mast with a 5.5m rotor diameter.
  - 28kW solar panels mounted on a steel structure facing north.
  - Batteries to provide 60 hours support time and monitoring electronics.
- Results:
  - Average of 198kWh of power per week (10kWh greater than necessary).
  - Return on investment period of three years.
  - MTC could save
    - roughly 4,580kg CO_2 annually versus grid electricity.
    - an additional 649.25kgs CO_2 annually by removing backup Diesel Generators.

© GSM Association 2008

Mobile Phone Lifecycle



This diagram illustrates the lifecycle of a typical mobile phone from initial design, through use, take-back, reuse and finally to end-of-life processes, such as recycling.

V USED ELECTRONIC PRODUCTS
International activities are underway on environmental management of used and end-of-life electronic products in countries that lack the specialist infrastructure. **See 'The Basel MPPI', page 14**

IV COLLECTION
Processes are needed for in-country take-back of all used electronic products.

III NEW OWNERS
Phones help people take control of their lives where telephony wasn't previously available.
See 'Life changing benefits', page 15

II NEW DESTINATIONS
Phones are resold, often in developing nations, through formal and informal channels. **See 'Extended life for mobile phones', page 7**

I REFURBISHMENT
Phones are wiped of data, physically repaired, repackaged with new instructions and sent to suppliers.
See 'The refurbishment process', page 7

Working together to increase collection rates. **For example, see Egypt case study, page 6**

1 DESIGN
New phones are becoming more energy efficient and are eliminating the use of hazardous materials.
See 'Size and functionality', page 4

2 MANUFACTURE
Includes raw material extraction, processing and phone assembly.
See 'Design for the environment', page 4

3 CUSTOMER
Customers can make a big environmental difference by turning off chargers when not needed.
See 'Energy consumption', page 4

4 TAKE-BACK
Unwanted mobile phones should be given to an official scheme not put in the trash or stored away.
See 'Take-back schemes', page 9

5 EVALUATION
Here it is decided whether the phone can be repaired and resold, or sent for recycling.
See 'Reusing mobile phones', page 5

I MATERIALS RECOVERY
Phones deemed to be beyond repair – or simply too old – still have a residual value and their parts may be reused.
See 'Recycling end-of-life phones', page 8

V PLASTICS RECOVERY
If separated, plastics can be recycled to make items such as traffic cones.

IV BATTERIES AND METALS
Batteries are dealt with according to their chemical composition. Smelting may consume plastics, while recovering metals, like gold, which can end up as jewellery.

III RECYCLING
Phones may be further dismantled and some parts shredded, or processed intact for material and energy recovery.
See 'The recycling process', page 8

II SORTING
The handsets, batteries and accessories may be separated according to their chemical and material composition.

International movement

At various points in the mobile phone lifecycle, the new phone, used phone, components and accessories may cross international borders. These potential transboundary movements may include, for example, phones being returned via take-back schemes being transported for refurbishment or recycling.

The industry view is that for the purpose of transboundary movement, used mobile phones that have been evaluated and are destined for reuse should be considered as products and not waste.

See the MPPI sidebar on page 14 for more details.

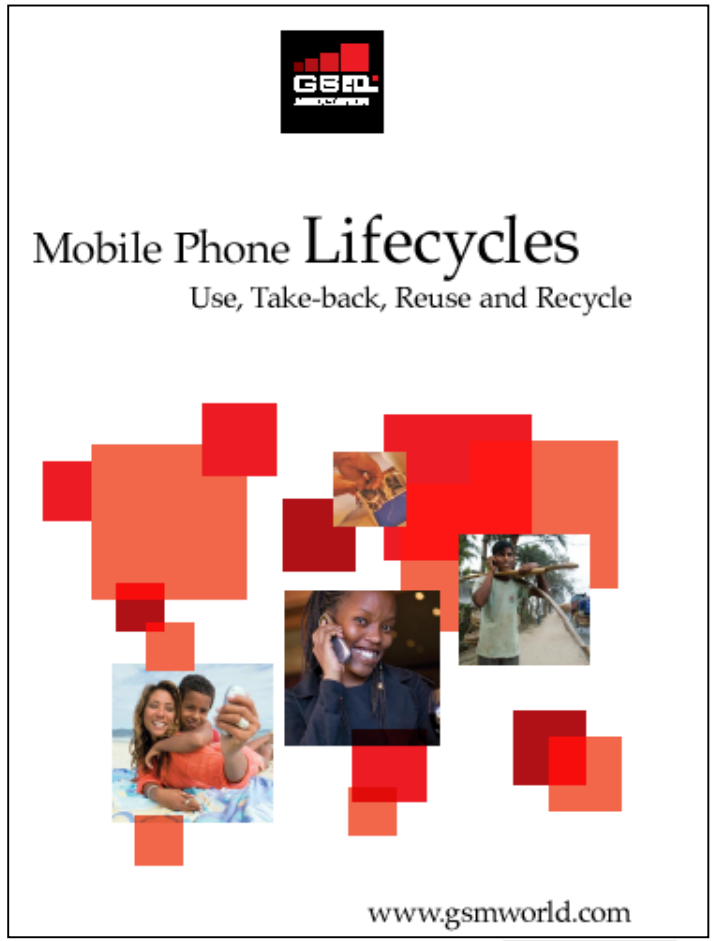
VI MINIMAL DISPOSAL
Remaining materials are made insoluble in high temperature processing so that they will not leach substances of concern, and may be safely used as a construction aggregate. **See 'Disposal', page 8**

GSMA

© GSM Association 2008

GSMA Report - Mobile Phone Lifecycles

- About 900 million mobile phones sold in 2006.
  - 50-80% as replacement phones.
  - About 10% of new customers rely on a ‘used’ phone.
- About 20 million phones collected globally.
  - Only about 5% of ‘unwanted’ phones.
  - Perceived value is a major barrier to increased collection in all countries.
  - Only waste components returned in some countries.
  - Better engagement with informal sector needed for successful takeback in some countries.
- GSMA contributing to UNEP Mobile Phone Partnership Initiative to develop guidelines for environmentally sound management.



© GSM Association 2008

http://www.gsmworld.com/health/wireless/lifecycle.shtml

Environmental Impact of Charger Incompatibility

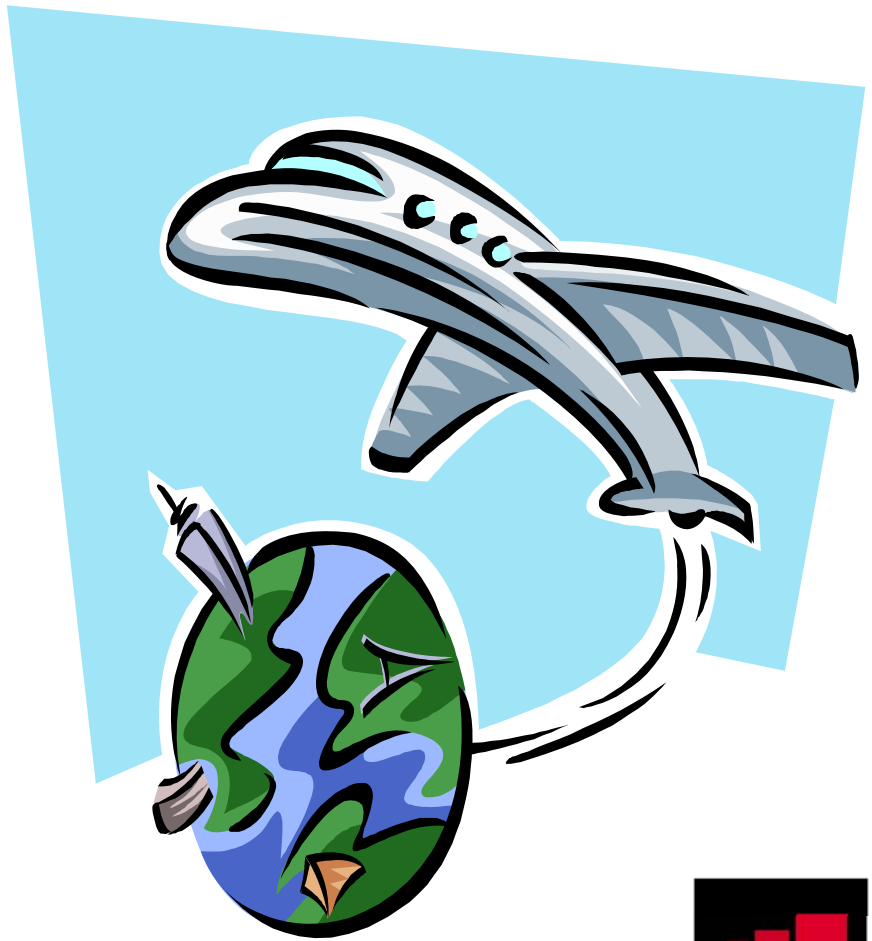
- Gartner estimates 1.2 billion mobile phones will be sold in 2008.
  - Between 50% and 80% are replacement phones.
    - 50,000 to 82,000 tonnes of replacement chargers each year.
- Charger represents about 7% of the life-time energy cost of a phone.
  - 13.6 to 21.8 million tonnes CO_2e each year in replacement chargers.
- Chinese government mandating single charger based on USB.
  - Open Mobile Terminal Platform has similar recommendation.

© GSM Association 2008

Source: GSMA analysis from UNEP, Gartner, Nokia, University of Southern Queensland data.

Environmental Benefits of Telecommunications

- Environmental burden of a roundtrip travel between Berkeley and Chicago .
  - '*Wireless teleconferencing results in 1-3 orders of magnitude lower CO_2, NO_x, and SO_2 emissions than business travel.*'
- Carbon reduction opportunities through telecommunications estimated at 4.9% of Australia's total national emissions.
- Monitoring applications:
  - Air pollution in Ghana.
  - Animal movements in South Africa.



Sources: Toffel and Horvath, Environ. Sci. Technol. (2004).
Report by Climate Risk for Telstra (2007).

© GSM Association 2008

Conclusions

- Mobile communications is small but significant contributor.
- Opportunities for companies and individuals to reduce impacts.
- Operators and manufacturers recognise the need to contribute.
- Also potential direct and indirect environmental benefits.
- Need a more systematic analysis for the wireless sector.

© GSM Association 2008

Thank You

Contact : Dr Jack Rowley

Job title : Director Research & Sustainability

email address : jrowley@gsm.org

Website: www.gsmworld.com/health

Contact : Dawn Haig-Thomas

Job title : Director, GSMA Development Fund

email address : dhaigthomas@gsm.org

Website: www.gsmworld.com/developmentfund

© GSM Association 2008