# *Methodology Slides: Should the following slides be moved to Session 7?*

# How to assess potential GHG savings from the introduction of green technologies

- ITU-T Rec. L.1410 provides a common methodology for assessing the ICT carbon footprint.
- Basis of methodology is to compare the GHG emissions from a Business as Usual (BAU) scenario and a scenario which includes the ICT service.
- Must be carried out over the full life cycle (LCA).
- Helps to establish the business case to go green.

# Using the Methodology: E-commerce

- Example Country: Pakistan
- Scenario: Customers are able to purchase a variety of goods and services without visiting stores.
- This leads to:
  - reduced fuel consumption of vehicles,
  - reduced electricity consumption for lighting, heating and cooling in buildings,
  - increased fuel consumption and GHG emissions caused by parcel delivery service since number of parcel deliveries will increase,
  - may be a rebound effect where customers do other things with the time not spent visiting stores (and therefore use energy).

# Calculating the change in GHG emissions

Data required to calculate savings for e-commerce:

- Population who have PCs or smartphones and could use online shopping is around 20 million.
- Proportion of these customers that might adopt e-commerce: assume 75%.
- Number of customers adopting e-commerce: 15 million.
- number of visits per customer per year that would be replaced by e-commerce: assume 20.
- round-trip distance to visit stores to purchase goods: around 11 km.
- extra travel distance to deliver parcels (using a light delivery van): assume 2km per parcel delivered.
- energy consumption for lighting, cooling and heating in stores.

# Comparative assessment of e-commerce

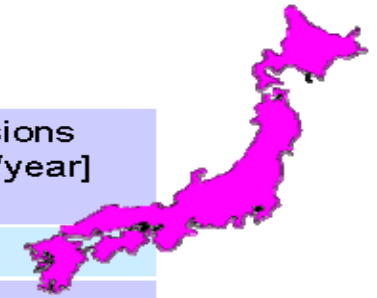
| Functional unit | Baseline scenario | ICT service scenario |
|---|---|---|
| To allow 50% of the population in Pakistan to shop and purchase goods | Purchasing carried out by consumers visiting the store. | Consumers order online and then have their shopping delivered without going to the store. |
| Travel distance of private vehicles | 27.5 billion km | 13.75 billion km |
| Travel distance of delivery vehicles | zero | 2.5 billion km |
| Electricity consumption | 3 billion kWh | 2.8 billion kWh |

- This results in a reduction of 13.75 billion km in distance travelled by private vehicles.
- Assuming the office space which is not needed is closed, there will also be a reduction of 293 million kWh of electricity usage to heat, light and air-condition the retail stores.
- This all adds up to a reduction of 1.93 $MtCO_2e$ of GHG emissions which is potentially one of the largest savings of any e-service in Pakistan.

Source: ITU Report: “Enabling Energy Efficiency through ICTs: The case of Pakistan”

# Teleworking example: Japan

Typical $CO_2$ emissions per unit area of office space:



**1. $CO_2$ emissions per unit area of office space**

| | Energy Consumption [Mcal/m²/year] A | Basic Unit of $CO_2$ Emissions [kg-$CO_2$/Mcal] B | $CO_2$ Emissions [kg-$CO_2$/m²/year] A x B |
|---|---|---|---|
| Electricity | 136 | 0.441 | 59.9 |
| Urban gas | 44 | 0.237 | 10.4 |
| Heavy oil A | 9 | 0.309 | 2.8 |
| Kerosene | 2 | 0.299 | 0.6 |
| District heat and cooling | 17 | 0.324 | 5.5 |
| **Total** | **208** | | **79.2**(1) |

**2. Space occupied by an office worker for clerical work**

**13.6 m²/person**(2)

**3. Basic unit of office space**

**(1) x (2) = 1,078 kg-$CO_2$/person/year**

*** If the annual working hours are 2040 hours (170 h x 12 m),**

**$CO_2$ emissions are estimated to be 0.528 kg-$CO_2$/person/ hour when an office worker works for one hour in Japan.**



Source: www.itu.int/rec/T-REC-L.1410-(09/12)

# Tele-working example: Japan

- Case study given in ITU-T Recommendation L.1410 (3/12) where ICTs have been used to substitute for movement of people in Japan.
- The first is where tele-working from home has been used to substitute for travel to the office.
- An office worker in Japan emits 0.528 kg CO2/person/per hour.
- For the home office, the environmental impact intensity was calculated as: 0.21 kg-CO2/person/per hour
- The saving is 0.318 kg-CO2/person/per hour

Source: www.itu.int/rec/T-REC-L.1410 (03/12)

# Teleworking example: USA

Typical $CO_2$ emissions per unit area of office space:

**1. $CO_2$ emissions per unit area of office space**

USA

| | Energy Consumption [ Mcal/m²/year] A | Basic Unit of $CO_2$ Emissions [ kg-$CO_2$ / Mcal ] B | $CO_2$ Emissions [ kg-$CO_2$/m² /year] A x B |
|---|---|---|---|
| Electricity | 134 | 0.66 | 88.8 |
| Natural Gas | 79 | 0.21 | 16.6 |
| Fuel oil | 9 | 0.29 | 2.5 |
| District heat | 24 | 0.31 | 7.5 |
| **Total** | **246** | | **115.4**(1) |

**2. Space occupied by an office worker for clerical work: 21.4 m²/person** (2)

**3. Basic unit of office space**

**(1) x (2) = 2,470 kg-$CO_2$/person/year**

*** If the annual working hours are 2040 hours (170 h x 12 m),**

**$CO_2$ emissions are estimated to be 1.21 kg-$CO_2$/person/ hour when an office worker works for one hour in USA.**



Source: ww[illegible])

# Tele-working example: USA

- Case study given in ITU-T Recommendation L.1410 (3/12) where ICTs have been used to substitute for movement of people in the USA.
- The first is where tele-working from home has been used to substitute for travel to the office.
- An office worker in USA emits 1.21 kg $CO_2$/person/per hour
- For the home office, the environmental impact intensity was calculated as: 0.80 kg-$CO_2$/person/per hour
- The saving is 0.41 kg-$CO_2$/person/per hour

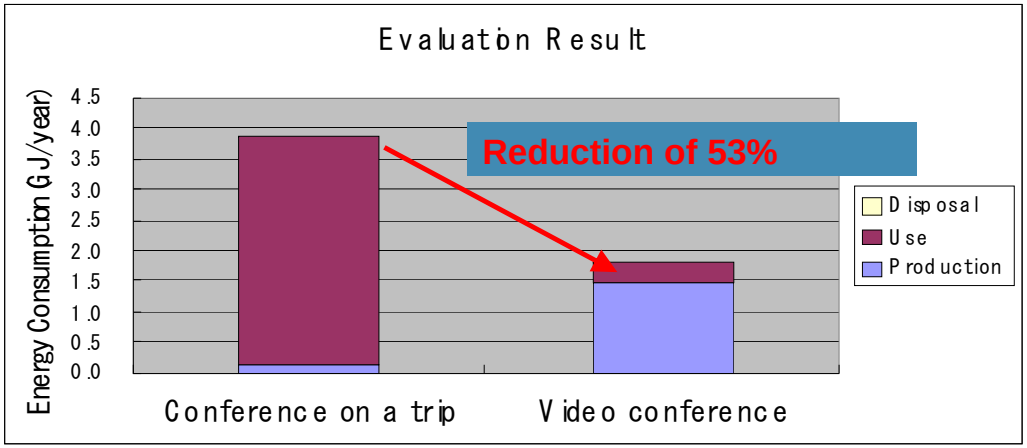
Source: www.itu.int/rec/T-REC-L.1410 (03/12)

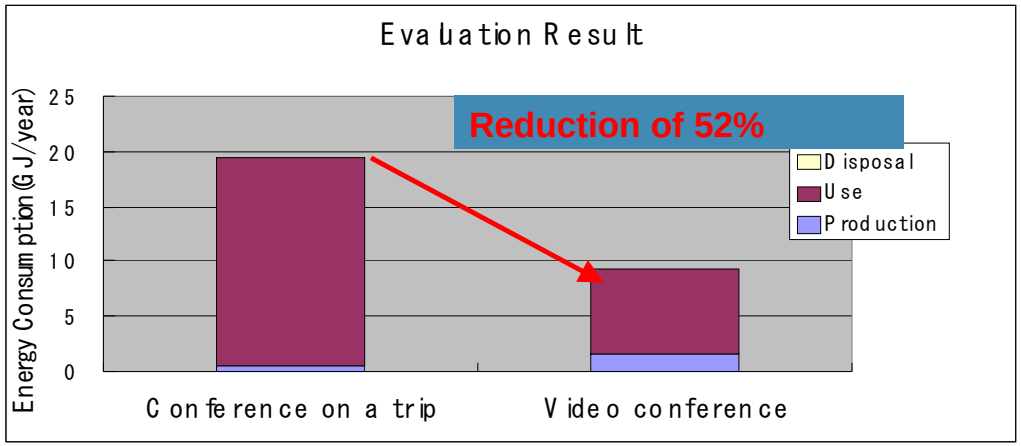
# Videoconferencing

Scenario: Video conference between Tokyo and Yokohama with two participants from each office:

Case a) once a week (48 times / year) for one hour.

Case b) every working day (240 times / year) for eight hours.

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