DELHI 2010
XIX COMMONWEALTH GAMES

LOW CARBON LIFESTYLES

सत्यमेव जयते

Ministry of Environment & Forests (MoEF), India

gef
GLOBAL ENVIRONMENT FACILITY

SGP The GEF Small Grants Programme

a trainer's guide to low carbon lifestyles

Mother Earth is the only planet we have. Global warming can lead to irreversible changes in the delicate balance that exists in the planet's climate and life systems. It is a growing crisis with large scale implications on mortality, health, economics and security.

The importance of **action at all levels** to tackle this problem cannot be overemphasized. All of us will be affected, irrespective of economic status or nationality and it is up to each one of us to apply our creative knowledge to move towards the common goal and also save money. We have still not reached a point of no return and the most dangerous climate changes can still be avoided. It is **action on the ground**, which makes all the difference in achieving our goals ! In this each one of us has a role to play as a symbol of a responsible society.

This 'Training toolkit on low carbon lifestyles' is a set of materials in an easy to understand language, based on up to date science and policy inputs. It aims to arm a trainer with facts and figures on how small changes in everyday actions can help reduce an individual's contribution to greenhouse gas emissions in the atmosphere and also save money. It focuses on **climate friendly choices** we all can make in the use of electrical appliances, transport, paper, water, etc. All data is relevant to the Indian context and the choices presented are practical and easy to adopt. The toolkit consists of:

- *A trainer's guide with **practical climate friendly actions** that can be adopted in our daily life and a quantitative estimation of reduction of greenhouse gas emissions by individual actions*
- *An excel sheet with necessary calculations, which can be used by trainers to quantify energy and cost savings, and carbon dioxide emissions reduction*
- *A powerpoint presentation on climate change basics, how we are responsible, and the impacts on India*

Our vision is to create a prosperous, but not a wasteful society, and an economy that is self sustaining. Individual efforts may seem like drops in the ocean. However, the impacts from the positive changes from these efforts in lifestyles and consumption patterns by millions of people will make significant contributions towards a more climate friendly Mother Earth. Let us do our bit now for our city, country and our environment. As **Mahatma Gandhi** once said, **"Whatever you do may seem insignificant to you, but it is most important you do it."**

Assumptions:
Emission factor[1] = 0.82 kg CO_2/kWh
(Average emission of all stations in the grid weighted by net generation)

Average cost of electricity[2] = ₹ 4/kWh

Electricity

Switch to CFLs

Replace just one 100W ICL bulb with a 20W Compact Fluoroscent Lamp (CFL)

Reduce annual CO_2 emissions by 84 kg on every replacement

Reduce annual electricity bills* by ₹ 409

Appliance	Wattage (W)*	Estimated Daily Use (hrs)	Annual Electricity Consumption (kWh)	Emission Factor (kg CO_2/ kWh)	Annual CO_2 Emission (kg)	Electricity Cost (₹/kWh)	Annual Cost (₹)
Bulb (ICL)	100	3.5	127.75	0.82	**104.76**	4	**511.0**
CFL	20	3.5	25.55	0.82	**20.95**	4	**102.2**
Savings					**83.81**		**408.8**

⋆ *Endnotes 3 & 4*

Use a table lamp while studying

Table lamps provide more effective lighting

Reduce annual CO_2 emissions by 57 kg on every change

Reduce annual electricity bills by ₹ 277

Appliance	Wattage (W)*	Estimated Daily Use (hrs)	Annual Electricity Consumption (kWh)	Emission Factor (kg CO_2/ kWh)	Annual CO_2 Emission (kg)	Electricity Cost (₹/ kWh)	Annual Cost (₹)
ICL room light	100	2	73	0.82	**59.86**	4	**292.0**
LED table lamp	5	2	3.65	0.82	**2.99**	4	**14.6**
Savings					**56.87**		**277.4**

⋆ *Endnote 5*

Come out and play

Go out for a couple of hours everyday instead of watching TV/computer and be healthy

- **Reduce annual CO_2 emissions by 62 to 93 kg per person**
- **Reduce annual electricity bills by ₹ 301 to 453**

Appliance	Wattage (W)*	Estimated Daily Use (hrs)	Annual Electricity Consumption (kWh)	Emission Factor (kg CO_2/ kWh)	Annual CO_2 Emission (kg)	Electricity Cost (₹/ kWh)	Annual Cost Savings (₹)
BEE 5 star rated LCD TV (32")	103	2	75.2	0.82	**61.7**	4	**300.8**
Desktop with LCD monitor	155	2	113.2	0.82	**92.8**	4	**452.6**

★ *Endnote 8*

Switch from a desktop to a laptop

Reduce annual CO_2 emissions by 205 to 279 kg per person

Reduce annual electricity bills by ₹ 1000 to 1360

Appliance	Wattage (W)*	Estimated Daily Use (hrs)*	Annual Electricity Consumption (kWh)	Emission Factor (kg CO_2/ kWh)	Annual CO_2 Emission (kg)	Electricity Cost (₹/ kWh)	Annual Cost (₹)
Desktop with LCD screen	155	8	310	0.82	**254.2**	4	**1240**
Laptop	30	8	60	0.82	**49.2**	4	**240**
Savings					**205**		**1000**

** Endnote 6*

Appliance	Wattage (W)*	Estimated Daily Use (hrs)	Annual Electricity Consumption (kWh)	Emission Factor (kg CO_2/ kWh)	Annual CO_2 Emission (kg)	Electricity Cost (₹/ kWh)	Annual Cost (₹)
Desktop with CRT screen	200	8	400	0.82	**328.0**	4	**1600**
Laptop	30	8	60	0.82	**49.2**	4	**240**
Savings					**278.8**		**1360**

** Endnote 6*

Turn off lights and fans when not in use

Reduce annual CO_2 emissions by 28 kg per household

Reduce annual electricity bills by ₹ 134

Appliance	Wattage (W)*	Daily Consumption in use (hrs)	Annual Electricity Reduction (kWh)*	Emission Factor (kg CO_2/ kWh)	Annual CO_2 Emission Consumption (kg)	Electricity Cost (₹/ kWh)	Annual Cost (₹)
ICL Bulb	60	1	21.9	0.82	**18.0**	4	**87.6**
Fan	65	1	11.7	0.82	**9.6**	4	**46.8**
Savings					**27.6**		**134.4**

** Endnote 7*

ENERGY SAVINGS GUIDE

Annual Energy Consumption (kWh/Year)
152*

Brand : XX
Model No./Year : ABC/XXXX
Equipment Type : CRT/LCD/ Plasma TV
Screen Size : Inches/cm

*Under test conditions, when tested in accordance to EC 62301 and 62087. Actual electricity consumption will depend on how the equipment is used.

ENERGY IS LIFE
BEE/XYZ/00
BEE
CONSERVE IT

POWER SAVINGS GUIDE

ENERGY EFFICIENCY
2.90
EER (W/W)

Appliance/Type	: RAC/XXX
Brand	: XXX
Model/Year	: ABCYYYY
Cooling Capacity (W)	: XXXX
Power Consumption (W)	: XXXX
Variable Speed Compressor	: Yes/No
Heat Pump	: Yes/No

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CONSERVE IT

*Under test conditions, when tested in accordance with XXX.
Actual electricity consumption will depend on how the appliance being used.

POWER SAVINGS GUIDE

ELECTRICITY CONSUMPTION
700*
UNITS PER YEAR

Appliance	: Refrigerator
Brand	: XX
Model/Year	: XX/YYYY
Type	: XX
Gross Volume	: XX/Litres
Storage Volume	: XX/Litres

ENERGY IS LIFE
BEE
CONSERVE IT

*Under test conditions, when tested in accordance with XXX.
Actual electricity consumption will depend on how the appliance being used.

Buy BEE 5 star rated appliances

This will help each one of us to reduce our energy consumption, energy bills and carbon footprint.

• Use a BEE 5 star rated fan (1200mm sweep)

Reduce annual CO_2 emissions by 36 kg on every fan

Reduce annual electricity bills by ₹ 176

Appliance	Wattage (W)*	Estimated Daily Use (hrs)	Annual Electricity Consumption (kWh)*	Emission Factor (kg CO_2/kWh)	Annual CO_2 Emission (kg)	Electricity Cost (₹/ kWh)	Annual Cost (₹)
Regular fan	65	12	195	0.82	**159.90**	4	**780**
BEE 3 star rated fan	60	12	180	0.82	**147.60**	4	**720**
BEE 5 star rated fan	50.3	12	150.9	0.82	**123.74**	4	**603.6**
Savings					**36.16**		**176.4**

⋆ *Endnote 9*

• Use a BEE 5 star rated frost free refrigerator

Reduce annual CO_2 emissions by 269 kg on every refrigerator

Reduce annual electricity bills by ₹ 1312

Appliance	Annual Electricity Consumption (kWh)*	Emission Factor (kg CO_2/kWh)	Annual CO_2 Emission (kg)	Electricity Cost (₹/ kWh)	Annual Cost (₹)
BEE 2 star rated 235 lts fridge	693	0.82	**568.26**	4	**2772**
BEE 5 star rated 240 lts fridge	365	0.82	**299.30**	4	**1460**
Savings			**268.96**		**1312**

⋆ *Endnote 10*

• Use a BEE 5 star rated split air conditioner (1.5 tons)

Reduce annual CO_2 emissions by 283 kg on every air conditioner

Reduce annual electricity bills by ₹ 1382

Appliance	Wattage (W)*	Estimated Daily Use (hrs)*	Annual Electricity Consumption (kWh)	Emission Factor (kg CO_2/kWh)	Annual CO_2 Emission (kg)	Electricity Cost (₹/ kWh)	Annual Cost (₹)
BEE 2 star rated AC	1970	8	2127.6	0.82	**1744.6**	4	**8510.4**
BEE 5 star rated AC	1650	8	1782.0	0.82	**1461.2**	4	**7128.0**
Savings					**283.4**		**1382.4**

⋆ *Endnote 11*

Install a solar water heater

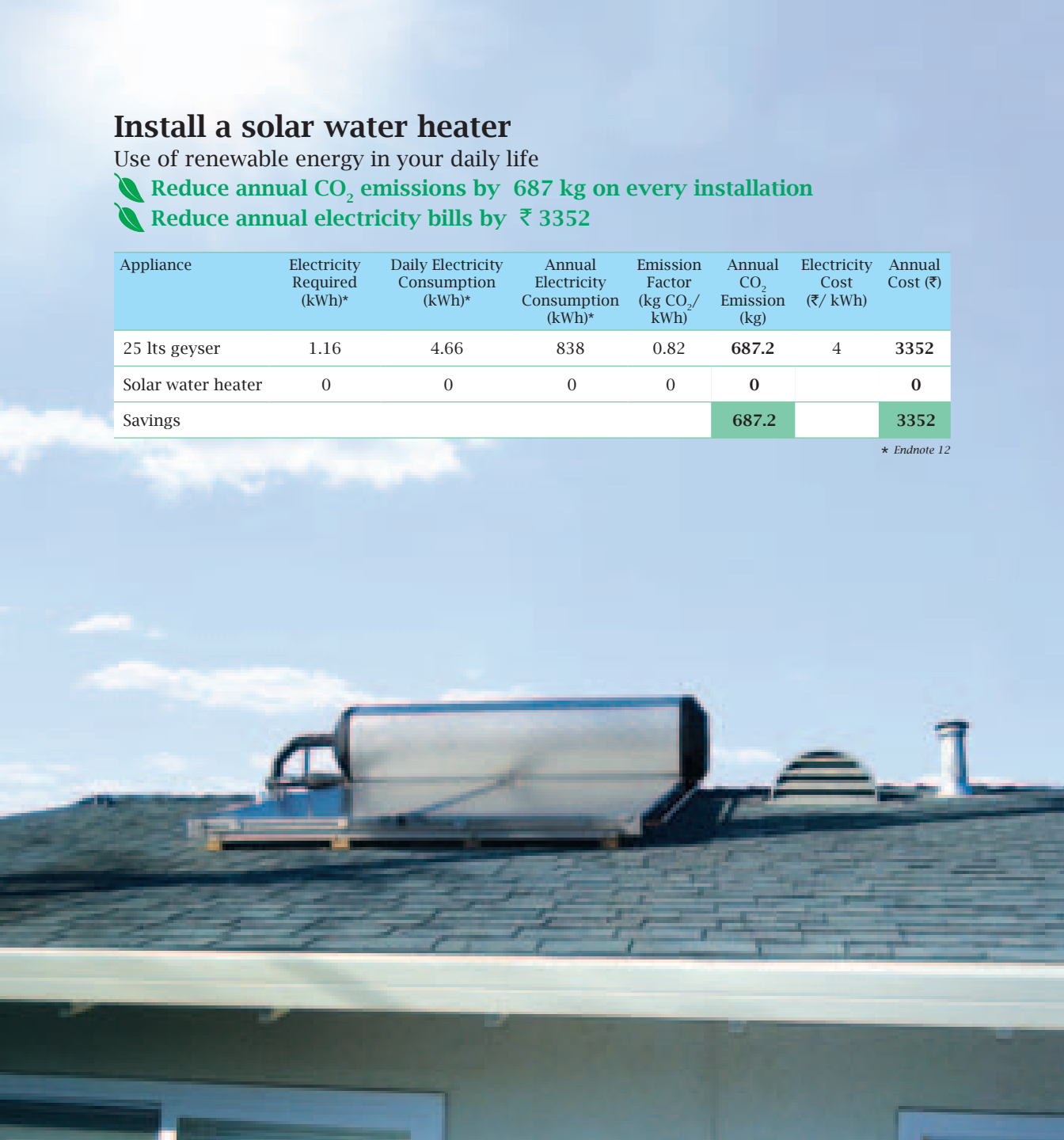
Use of renewable energy in your daily life

Reduce annual CO_2 emissions by 687 kg on every installation

Reduce annual electricity bills by ₹ 3352

Appliance	Electricity Required (kWh)*	Daily Electricity Consumption (kWh)*	Annual Electricity Consumption (kWh)*	Emission Factor (kg CO_2/ kWh)	Annual CO_2 Emission (kg)	Electricity Cost (₹/ kWh)	Annual Cost (₹)
25 lts geyser	1.16	4.66	838	0.82	**687.2**	4	**3352**
Solar water heater	0	0	0	0	**0**		**0**
Savings					**687.2**		**3352**

* *Endnote 12*



Use the geyser efficiently

Bathe in quick succession and switch off the geyser

Reduce annual CO_2 emissions by 344 kg per household

Reduce annual electricity bills by ₹ 1676

Appliance (25 lts geyser)	Electricity Required (kWh)	Daily Electricity Consumption (kWh)*	Annual Electricity Consumption (kWh)	Emission Factor (kg CO_2/ kWh)	Annual CO_2 Emission (kg)	Electricity Cost (₹/ kWh)	Annual Cost (₹)
4 people (bathe at different times)	1.16	4.66	838	0.82	**687.2**	4	**3352**
4 people (bathe in quick succession)	1.16	2.33	419	0.82	**343.6**	4	**1676**
Savings					**343.6**		**1676**

** Endnote 13*

Reduce the temperature setting on the geyser

Geysers come with a factory setting of 60°C but you need water at only 40°C for a comfortable bath

Reduce annual CO_2 emissions by 172 kg per household

Reduce annual electricity bills by ₹ 838

Appliance (25 lts geyser)	Electricity Required (kWh)	Daily Electricity Consumption (kWh)	Annual Electricity Consumption (kWh)	Emission Factor (kg CO_2/ kWh)	Annual CO_2 Emission (kg)	Electricity Cost (₹/ kWh)	Annual Cost (₹)
Temperature setting 60°C	1.16	2.33	419	0.82	**343.6**	4	**1676**
Temperature setting 40°C	0.58	1.16	209.5	0.82	**171.8**	4	**838**
Savings					**171.8**		**838**

** Endnote 14*

Eat together

Heat food at one go to reduce unnecessary use of microwave oven for just 5 mins a day

Reduce annual CO_2 emissions by 30 kg per household

Reduce annual electricity bills by ₹ 146

Appliance	Wattage (W)*	Estimated Daily Consumption (hrs)	Annual Electricity Consumption (kWh)	Emission Factor (kg CO_2/ kWh)	Annual CO_2 Emission Reduction (kg)	Electricity Cost (₹/ kWh)	Annual Cost Saving (₹)
Microwave oven (20l)	1200	0.08	36.5	0.82	**29.9**	4	**146**

⋆ *Endnote 15*

Use a cold cycle in the washing machine

Ensure proper temperature controls in washing machines

Reduce annual CO_2 emissions by 98 kg per washing machine

Reduce annual electricity bills by ₹ 478

Appliance	Electricity Consumption / cycle (kWh)*	Estimated cycles / week	Annual Electricity Consumption (kWh)	Emission Factor (kg CO_2/ kWh)	Annual CO_2 Emission (kg)	Electricity Cost (₹/ kWh)	Annual Cost (₹)
Wash temp 60^{0}C	1.4	2	145.6	0.82	**119.4**	4	**582.4**
Wash temp 25^{0}C	0.25	2	26.0	0.82	**21.3**	4	**104.0**
Savings					**98.1**		**478.4**

⋆ *Endnote 16*

Switch off appliances at the plug point

Switch off the TV, Set top box and DVD player at the plug, not with a remote

Reduce annual CO_2 emissions by 106 kg per household

Reduce annual electricity bills by ₹ 518

Appliance	Stand-by Wattage (W)	Estimated Daily time on stand-by (hrs)*	Annual Electricity Reduction (kWh)	Emission Factor (kg CO_2/ kWh)	Annual CO_2 Emission Reduction (kg)	Electricity Cost (₹/ kWh)	Annual Cost Saving (₹)
TV, Set top box and DVD player	19.7	18	129.4	0.82	**106.1**	4	**517.7**

⋆ *Endnote 17*

Trees & Paper

Use paper only when required

Reduce printing by just one ream of paper a month.

Reduce annual CO_2 emissions by 87 kg for every user

Just 50 sheets of double sided printing a month

Reduce annual CO_2 emissions by 8.7 kg

Activity	No. of sheets / month	Weight of paper conserved annually (kg)	Emission Factor (kg CO_2 /kg paper)	Annual CO_2 Emissions (kg)
Reduce printing by 1 ream	500	30	2.9	**87**
Print on both sides	50	3	2.9	**8.7**

Request for e-statements

Reduce annual CO_2 emissions by 5.22 kg for every user

Activity	No. of sheets / month	Weight of paper conserved annually (kg)	Emission Factor (kg CO_2 /kg paper)	Annual CO_2 Emissions (kg)
Asking for e-statements	30	1.8	2.9	**5.22**

Assumptions:

One 80gsm A4 sheet of bond paper (210 mm x 297 mm) = 4.989 gm = 5 gm

Emission factor of paper producing units = 2.9 kg CO_2 / kg of dried product[18]

Note: Calculations consider only carbon dioxide emissions at the paper manufacturing site and do not include emissions related to transportation and postage (where relevant) of paper.

Do not use fresh paper for rough work

100 students doing rough work on one side used paper instead of fresh paper

Reduce annual CO_2 emissions by 870 kg for every 100 students

Activity	no of sheets / month [33]	Weight of paper conserved annually (kg)	Emission factor	Annual CO_2 emissions (kg)
Rough work on one side used paper	5000	300	2.9	**870**

⁎ *Endnote 19*

Use and pass on textbooks

100 students use and pass on their 10 well maintained textbooks to juniors

Reduce annual CO_2 emissions by 870 kg for every 100 students

Activity	Weight / book (kg)	Weight of paper conserved annually (kg)	Emission Factor (kg CO_2 /kg paper)	Annual CO_2 Emissions (kg)
Hand down 1000 textbooks to juniors	0.3	300	2.9	**870**

⁎ *Endnote 20*

Plant trees

One tree can sequester anywhere between 3.66* to 10 kg of carbon dioxide every year. Plant and nurture 50 trees.

Reduce annual CO_2 emissions by 183 – 500 kg every year for 100 years

Assumptions:
Emission factors for fuels[21]: *Petrol – 2.325 kg CO_2/l, Diesel – 2.734 kg CO_2/l*
Average cost of fuels[22]: *Petrol = ₹ 51.66 / l, Diesel = ₹ 37.60 / l*
Mileage: *Cars[23] = 17.6, Motorcycles[24] – 78, Buses[25] – 4.3*

Transportation

Carpool to work

Every small car that goes off the road

- **Reduces annual CO_2 emissions by 1321 kg**
- **Reduces annual fuel cost by ₹ 29352**

Action	km / day	km/ year*	Mileage (km/l)	Annual fuel consumption (l)	Emission factor (kg/l)	CO_2 emission per year (kg)	Fuel cost (₹/l)	annual cost savings (₹)
1 car off the road on working days	40	10000	17.6	568.18	2.325	**1321**	51.66	**29352**

⋆ *Endnote 26*

Take a bus to school

Use transport provided by school

- **Reduce annual CO_2 emissions by 477 kg**
- **Reduce annual fuel cost by ₹ 6941**

Vehicle	passenger km/year*	Mileage (km/l)	Annual per passenger fuel consumption (l)	Emission factor (kg/l)	Annual per passenger CO_2 emission (kg)	Cost/km (₹)*	Annual cost (₹)
Car (5 km one way)	4000	17.6	227.27	**2.325**	**528.41**	**2.94**	**11741**
Bus to school	80	4.3	18.60	**2.734**	**50.87**	**60**	**4800**
Savings					**477.54**		**6941**

⋆ *Endnote 27*

Get driven to work....in a bus

- **Reduce annual CO_2 emissions by 1194 kg**
- **Reduce annual fuel cost by ₹ 29352 if you use the company bus**

Vehicle	Passenger km/year	Mileage (km/l)	Annual fuel consumption (l)	Emission factor (kg/l)	CO_2 emission per year (kg)	Fuel cost (₹/l)	Annual Cost (₹)
Car	10000	17.6	568.18	2.325	**1321.02**	**51.66**	**29352**
Bus	200	4.3	46.51	2.73	**127.16**		-
Savings					**1193.9**		**29352**

Put on your walking shoes for short trips

Reduce annual CO_2 emissions by 11 to 48 kg per vehicle

Reduce annual fuel cost by ₹ 242 to 1071

	km/ day	km/ year	Mileage (km/l)	Annual fuel Consumption (l)	Emission Factor (kg/l)	CO_2 Emission per year (kg)	Fuel cost (₹/l)	Annual cost (₹)
Car	1	365	17.6	20.74	2.325	**48.2**	51.66	**1071.4**
Motorcycle	1	365	78	4.68	2.325	**10.9**	51.66	**241.7**
Walking						**0**		**0**

Switch off ignition at traffic red lights

Reduce annual CO_2 emissions by 48 to 64 kg per vehicle

Reduce annual fuel cost by ₹ 1071 to 1417

Vehicle	Daily Idling time Reduction (hrs)	Annual Idling time Reduction (hrs)	Fuel Saving / hr (l)*	Annual Fuel Saving (l)	Emission Factor (kg/l)	Annual CO_2 Emission Reduction (kg)	Cost Saving if idling is cut down (₹)
Small Car	0.167	60.95	0.45	27.43	2.325	**63.8**	**1417.0**
2 Wheeler	0.167	60.95	0.34	20.73	2.325	**48.2**	**1070.6**

⋆ *Endnote 28*

Regularly inflate vehicle tyres

Reduce annual CO_2 emissions by 150 kg per vehicle

Reduce annual fuel cost by ₹ 3344

	km/ day	km/ year	Mileage (km/l)*	Annual fuel consumption (l/year)	Emission factor (kg/l)	CO_2 emission per year (kg)	Fuel cost (₹/l)	Annual cost (₹)
Car, 25% under inflated tyres	40	10000	15.8	632.91	2.325	**1471.5**	51.66	**32696.2**
Car, properly inflated tyres	40	10000	17.6	568.18	2.325	**1321.0**	51.66	**29352.3**
Savings						**150.5**		**3343.9**

⋆ *Endnote 29*

Fuel efficient cooking techniques:

- Cover cooking pots and pans with lids
- Reduce the flame once food starts boiling
- Use optimum quantity of water for cooking
- Keep all ingredients ready and at hand before turning on the gas
- Use broad bottom vessels
- Allow refrigerated food to come to room temperature before heating it
- Clean the burners regularly
- Soak rice, dal etc. for some time before cooking
- Eat together so that food is not heated multiple times

Assumptions:

Emission factor for LPG[30] = 2.9 kg CO_2/ kg of LPG
Rate of use of LPG (big burner, high flame)[31] = 177 g/hr
Cost of 14.2 kg LPG cylinder[32] ₹ 345.35

1 kg organic waste releases an equivalent of 0.182 kg CO_2.[33]
Average daily per capita organic waste generated[34] = 0.20 kg
Average household size in India[35] = 5

In Kitchens

Use pressure cookers daily

Reduce annual CO_2 emissions by 125 kg per household

Reduce annual fuel cost by ₹ 1048 (cost of 3 cylinders)

Activity	time (min)	time (hr)	total time in a year (hr)	LPG used in a year (kg)	Annual CO_2 Emissions (kg)	Annual cost (₹)
Cooking pots & pans with lids						
• Cooking rice - 2 cups	25	0.42	395.42	69.99	**202.97**	**1702.2**
• Cooking dal - 1 cup	40	0.67				
Pressure cooker						
• Cooking rice - 2 cups	25	0.42	152.08	26.92	**78.06**	**654.7**
• Cooking dal - 1 cup						
Savings				43.07 Approx. 3 cylinders	**124.90**	**1047.5**

Use fuel efficient cooking methods

Reduce gas usage by 20 mins a day per household

Reduce annual CO_2 emissions by 62 kg per household

Reduce annual fuel cost by ₹ 524

Activity	Cooking time reduced (min)	Cooking time reduced (hr)	Annual time reduced (hr)	Annual LPG Reduction (kg)*	Annual CO_2 Emissions Reduction (kg)	Annual cost Savings (₹)
Using fuel efficient cooking techniques	20	0.33	121.67	21.54	**62.45**	**523.7**

⋆ *Endnote 36*

At home compost your kitchen wastes

Reduce annual CO_2 emissions by 68 kg per household

Activity	Daily organic waste generated per household (kg)	Annual organic waste generated per household (kg)	Emission Factor (kg CO^2e/kg waste)	Annual Emissions (kg CO^2e)
Compost organic wastes	1.02	371.51	0.182	**67.61**

Water

Conserve water

Conserve just 100 litres per household per day through various measures

Reduce annual CO_2 emissions by 24 - 63 kg

Supply	Electricity required to pump 1 kl of water (kWh)	Emission factor (kg CO_2/kWh)	CO_2 emissions per kl of water pumped (kg)	Annual water conserved (kl)	Annual CO_2 emission reductions (kg)
Borewell supply	0.82	0.82	0.67	**36**	**24.12**
Municipal supply	2.13	0.82	1.70	**36**	**63**

Measures to reduce water consumption by 100 litres a day,

- Fix leaky taps, showers and flushes
- Do not let the tap run when you wash hands or brush your teeth
- Use a bucket and small mug to water plants, instead of a hosepipe
- Use a bucket and a cloth to wash vehicles, instead of a hosepipe
- Water potted plants with water that has been used to wash vegetables and lentils
- Change old flush cisterns to water efficient dual flush cisterns
- Wash only full loads in the washing machine

Look around and you can find many more ways in which you can conserve this most precious resource

Harvest rainwater

Harvest 1000 litres per household per day over 40 days of rainfall

Reduce annual CO_2 emissions by 27 to 70 kg per household

Supply	Electricity required to pump 1 kl of water (kWh)	Emission factor (kg CO_2/kWh)	CO_2 emissions per kl of water pumped (kg)	Annual water conserved (kl)	Annual CO_2 emission reductions (kg)
Borewell supply	0.82	0.82	0.67	**40**	**26.8**
Municipal supply	2.13	0.82	1.70	**40**	**70**

In half an hour, a rooftop of 100 m^2 can harvest 1000 litres in a downpour of 25 mm/hr

Assumptions:
Electricity required to pump 1000 lts of groundwater from a depth of 150 mts[37] = 0.82 kWh
Electricity required to supply 1000 lts of water by the municipal authorities[38] = 2.13 kWh

Endnotes

[1] Reference: CO_2 baseline database for the Indian Power Sector, User Guide, Version 5, November 2009. Emissions are considered at the power generation point only since estimation of emissions at end-use point depends on a number of variable factors. This also gives us the most conservative estimate of emissions.

[2] Middle slab of residential electricity tariff in some metros

[3] Cost reductions only consider annual electricity charges and not capital to ensure uniformity in all electricity related energy efficiency messages.

[4] The lumen output of 20W Compact Fluorescent Lamp (CFL) corresponds to that of a 100W Incandescent Lamp (ICL). The Small-Scale Clean Development Mechanism (CDM) Programme Activity of the Bachat Lamp Yojana aims to distribute 20 W CFLs replacing around 600,000 ICLs.

Hours of use per day as per Bachat Lamp Yojana = 3.5 Reference: CDM SSC-PoA-DD-Version 01

[5] BPL's StudyLite Light Emitting Diode (LED) table lamp consumes 5W when connected to the mains. This is compared with a 100W ICL since a higher wattage bulb is usually used for reading.

[6] Reference:http://www.eu-energystar.org/en/en_022p.shtml accessed July 2010

250 working days considered in a year (excluding weekends and national holidays)

[7] 60W is the wattage of the most commonly used ICL.

65 W is the wattage of a commonly used 1200 mm sweep fan (reference: http://www.orientfansindia.com/pageData.aspx?Id=13 accessed July 2010).

It is estimated that a fan is used only for 6 months of the year.

[8] Reference:http://www.eu-energystar.org/en/en_022p.shtml accessed July 2010

Reference: http://220.156.189.23:8080/beeLabel/Search.page?et=ET0017&en=Color%20Televisions accessed July 2010

[9] Reference:http://220.156.189.23:8080/beeLabel/SearchFANSpage?etype=ET0019&ename=Ceiling%20Fans accessed July 2010

It is estimated that a fan in an office is used on all working days (250 days in a year).

[10] Reference:http://220.156.189.23:8080/beeLabel/SearchFFRpage?etype=ET0010&ename=Frost%20Free%20Refrigerator accessed July 2010

[11] Reference:http://220.156.189.23:8080/beeLabel/Search.page?et=ET0008&en=AC accessed July 2010

AC assumed to be on for 8 hrs a day (9am – 5 pm in offices or 10pm to 6 am in homes). Corresponding with Bureau of Energy Efficiency (BEE) assumptions, 75% compressor run time considered and therefore number of hours the AC compressor is on is 6 hrs during the 8 hour period.

It is assumed that an AC is used only for 6 months of the year (March / April – August/September)

[12] Energy (Q) = Specific heat capacity of water at constant pressure (Cp)*mass (m)* difference in temperature (dT). It is assumed that 25 lts of water is heated from 20°C to 60°C; Cp of water = 4.19 kJ/kg°C and 1 kJ = 3600 kWh.

It is assumed that the geyser is turned on 4 times a day.

It is assumed that the geyser is required only for an average of 6 months in a year.

[13] For a bucket bath of 15 lts / person, it is assumed that the geyser needs to be turned on twice if 4 people have their baths in quick succession and 4 times if they do not.

[14] It is assumed that the hot water is used efficiently.

[15] Operating manual of IFB microwave oven.

[16] Operating manual of a 6 kg IFB washing machine

[17] The TV, DVD player and set-top box are assumed to be in use for 6 hrs and on stand-by mode for the rest of the day. Stand-by data source: Bureau of Energy Efficiency (BEE)

[18] Centre for Science and Environment (CSE)'s green rating of Indian pulp and paper industry 2004

[19] 2 sheets everyday used for 25 days of the month by each student = 50 sheets per student i.e. 5000 sheets for 100 students

[20] One tree of Terminalia species in a forested area can sequester 3.66 kg CO_2 per year. Teak species can sequester twice this amount. Source: Centre for Ecological Studies, Indian Institute of Science, Bangalore

[21] Emission Factors Development for Indian Vehicles, Central Pollution Control Board, Government of India, August, 2007

[22] Prices in Delhi in July 2010

[23] Average mileage of 9 variants of A2 size cars considered. Reference: Fuel economy information brochure, Society of Indian Automobile Manufacturers, January 2010

[24] Average mileage of fuel efficient models of motorcycles. Reference: Fuel economy information brochure, Society of Indian Automobile Manufacturers, January 2010

[25] Fuel efficiency of Bangalore Metropolitan Transport Corporation buses, Reference: Xavier Godard and Innocent Fantonzoun, Urban mobility for all, International Scientific Committee, 2002

[26] 250 working days considered in a year (excluding weekends and national holidays)

[27] 200 working days (excluding weekends, holidays and vacations)

Assumption of 50 persons per bus

http://www.dtc.nic.in/dt3.htm accessed July 2010

[28] http://pcra.org/English/transport/Central Road Research Institute (CRRI) study.htm accessed June 2010

[29] 25% reduction in tyre pressure assumed to cause 10% reduction in fuel efficiency as per http://pcra.org/English/transport/CRRIstudy.htm accessed June 2010

[30] http://www.carbonmetrics.com/ipcc.html accessed July 2010

[31] http://www.sunflame.com/3Burners.asp accessed July 2010

[32] Prices in Delhi in July 2010

[33] Towards a sustainable waste management system for Bangalore, H N Chanakya, T V Ramachandra and Shwetmala, IISc Bangalore.

[34] Study on Solid Waste Management in 59 cities conducted by Central Pollution Control Board and National Environmental Engineering Research Institute (NEERI) (2004-2005)

[35] Census of India 2001 states mean household size to be 5.3. Here it is assumed to be 5.

[36] Assuming the use of only 1 big burner at high flame.

[37] Electricity required for pumping 1cu m (1000l of ground water over a height of 150 m (kWh) = Q (qty)*h (head)*9.81/3600*efficiency of pump = 1*150*9.81/3600*0.5

[38] Electricity required to pump 1000 l of water by Bangalore Water Supply and Sewerage Board = 2.13 units. Discussions with officials

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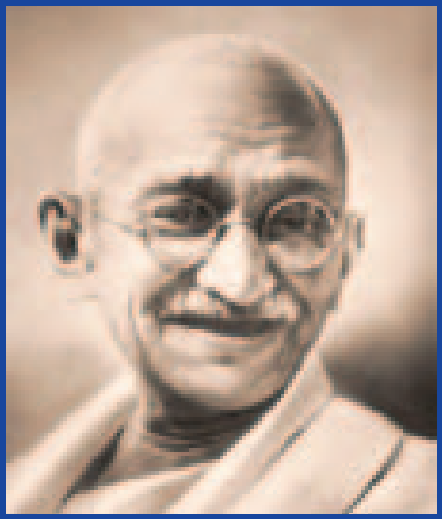

The difference between what we do
and what we are capable of doing
would suffice to solve
most of the world's problems.

–Mahatma Gandhi

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