Why EVERYONE is talking about CLIMATE CHANGE

K. Guruswamy

National Chemical Laboratory

BUT FIRST…

National Science Day – 28 February

Sir CV Raman
1930 Nobel Prize in Physics

"for his work on the scattering of light and for the discovery of the effect named after him"

A New Type of Secondary Radiation.

If we assume that the X-ray scattering of the 'unmodified' type observed by Prof. Compton corresponds to the normal or average state of the atoms and molecules, while the 'modified' scattering of altered wave-length corresponds to their fluctuations from that state, it would follow that we should expect also in the case of ordinary light two types of scattering, one determined by the normal optical properties of the atoms or molecules, and another representing the effect of their fluctuations from their normal state. It accordingly becomes necessary to test whether this is actually the case. The experiments we have made have confirmed this anticipation, and

case of gases and vapours, owing to the excessive feebleness of the effect. Nevertheless, when the vapour is of sufficient density, for example with ether or amylene, the modified scattering is readily demonstrable.

C. V. Raman.
K. S. Krishnan.

210 Bowbazar Street,
Calcutta, India,
Feb. 16.

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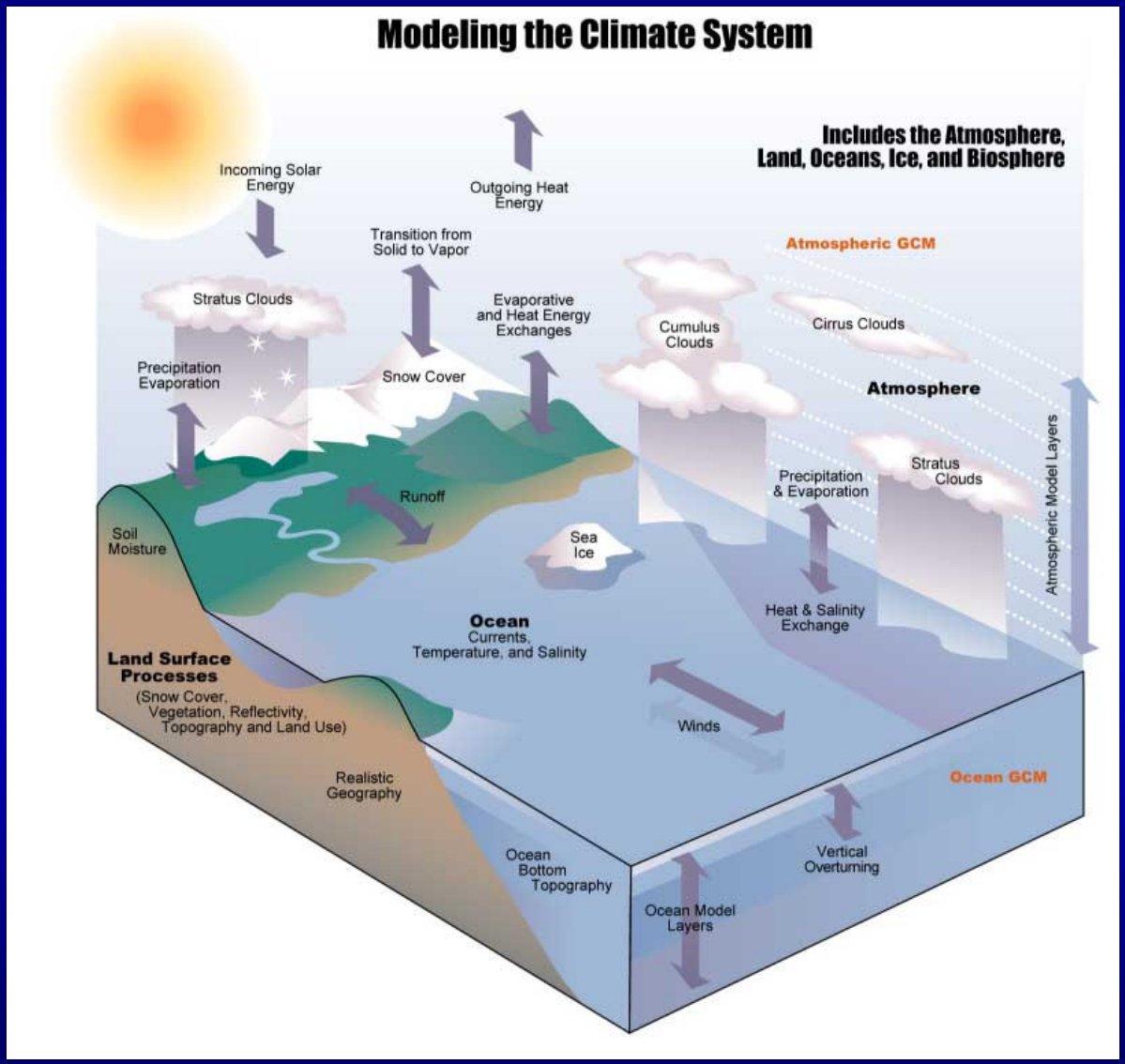
Let us understand climate



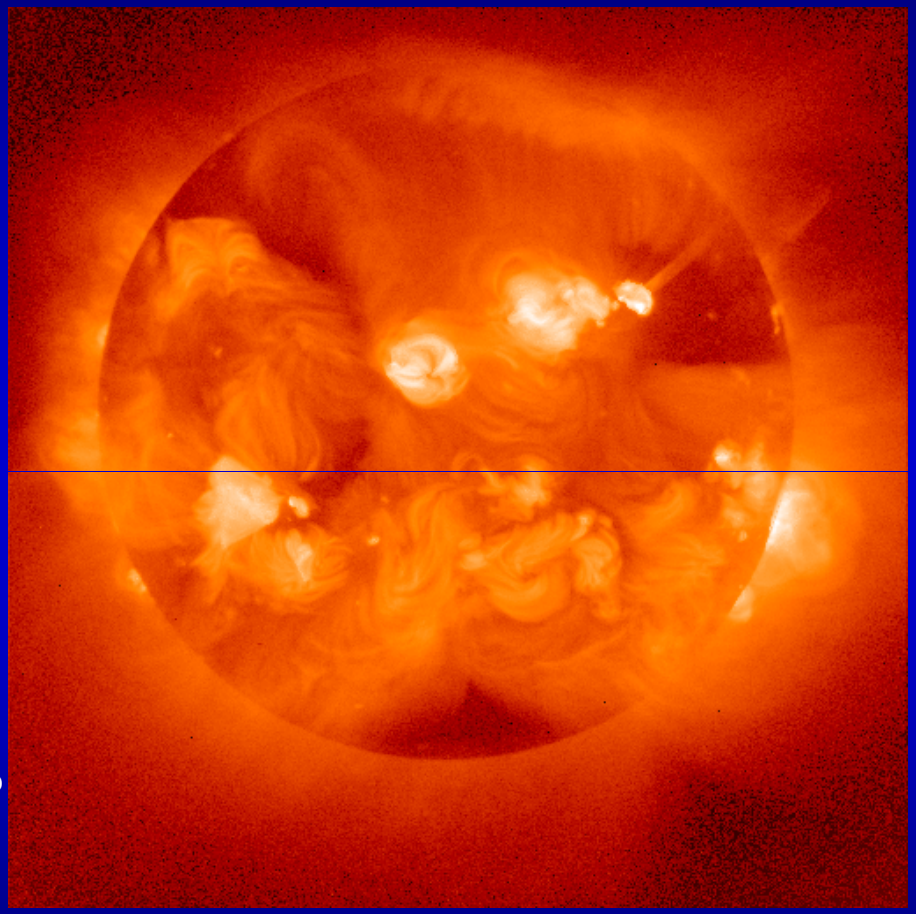
"Climate is what you expect, weather is what you get"

Climate patterns: snow melting, wind & ocean currents, ocean evaporation – energy input for all these from the SUN

Climate – *incredibly* complicated due to the number of processes. "The Butterfly effect" Study of weather laid the foundation of chaos theory.

http://www.usgcrp.gov

Energy inputs to the earth: The SUN



The BIG guy in the solar system

99.86% of all the mass in the solar system; about 100x earth diameter

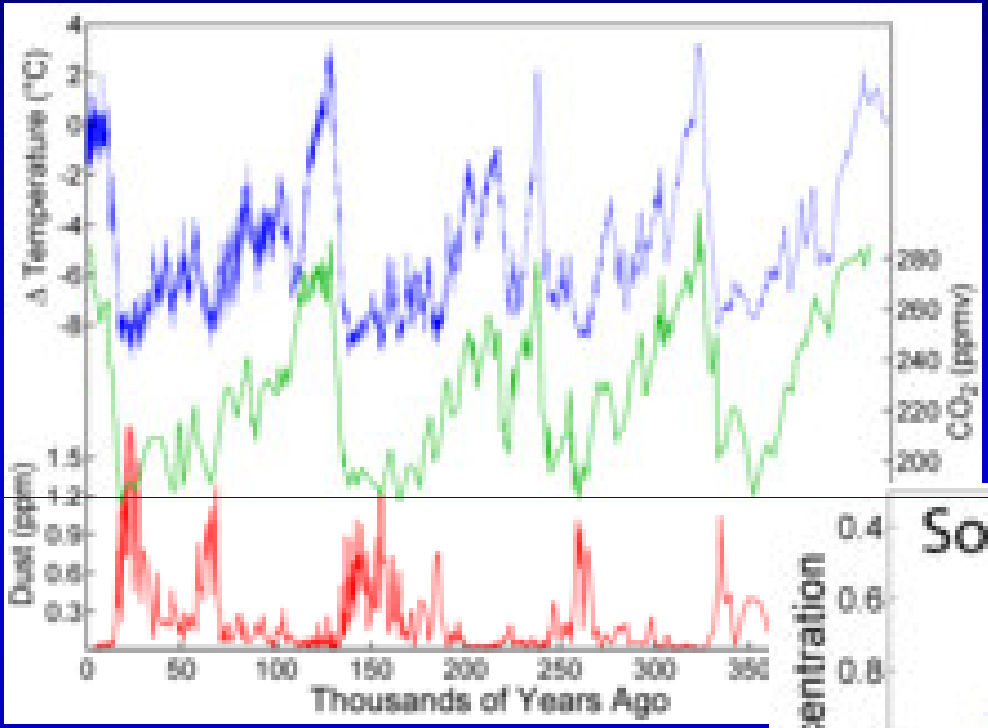
Chemical reactions in stars release energy. Light from the sun delivers energy to the earth. This energy decides the climate/weather.

Changes in the sun, for example, sun spots, have a huge impact on our climate.

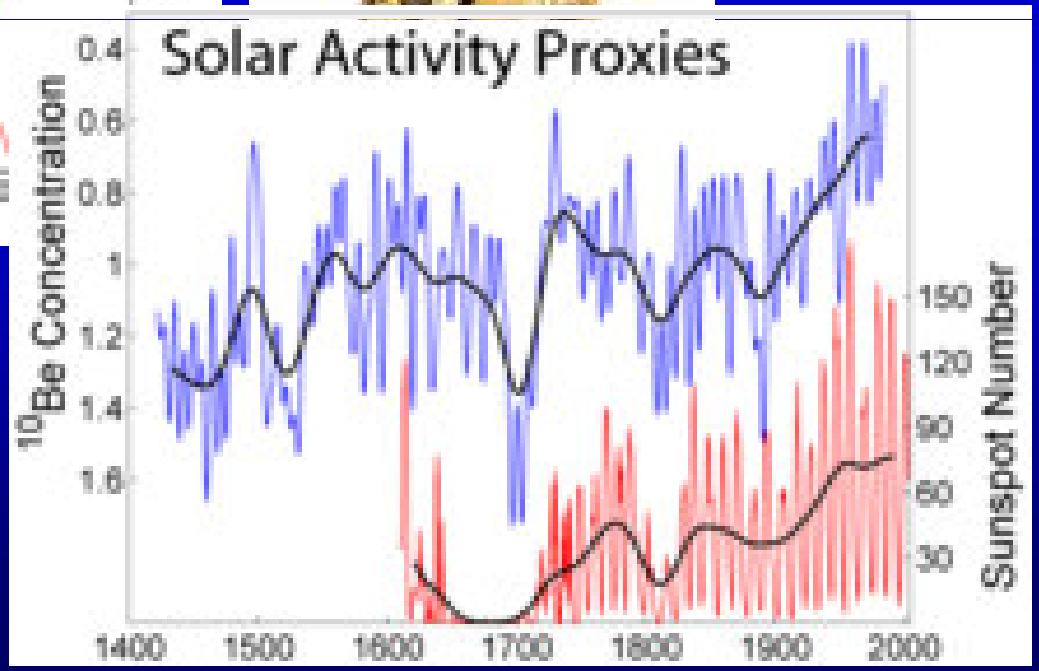
Solar energy: about 100 million billion watts
Total energy consumption on earth: about 15 million million watts (viz. 1/10000th the solar energy)

http://www.wikipedia.org

Climate change: Natural causes



100,000 year periodicity corresponding to the Milankovitch cycles (variations in earth's orbit)



11 year cycle for sun spots

http://www.wikipedia.org

People are talking about ***man-made climate change***

PRESS TRUST OF INDIA

Climate change clear and present danger: Ban

Share Print E-mail Comment

THE BRIDGE TRAGEDY • MURDOCH'S WAR PLAN

Newsweek

Global Warming Is

THE INDEPENDENT

The ultimate supergroup

Andy Gill tells the extraordinary story of The Traveling Wilburys

EXCLUSIVE

BY STEVE CONNOR, SCIENCE EDITOR

The Earth today stands in imminent peril and nothing short of a planetary rescue will save it from the environmental cataclysm of dangerous climate change. Those are not the words

Ripped from the Headlines

The Enforcement

Global Warming

THE HINDU

News » National

Published: February 25, 2010
Updated: February 25, 2010 12:46 IST

Per capita CO2 emissions to rise 3-fold by 2030

PTI

Man-made Global Warming – Is it real?

Will our Himalayan glaciers disappear by 2035???

TIMESONLINE

From The Times

February 4, 2010

IPCC chief Rajendra Pachauri under pressure to go over glacier error

Pacha

Ben We

The he
environ
climatic

guardian.co.uk

Climate wars damage the scientists but we all stand to lose in the battle

It is open season on climate scientists, but such hand-wringing has allowed the creeping rehabilitation of climate scepticism

David Adam
guardian.co.uk, Tuesday 23 February 2010 08.00 GMT

A larger | smaller

Rajendra Pachauri to defend handling of IPCC after climate change science row

Rajendra Pachauri, the embattled Chairman of the Intergovernmental Panel on Climate Change (IPCC), is to fly into this idyllic Indonesian island today in an attempt to end the crisis that has beset his organisation - and himself – over the past two months.

By Geoffrey Lean, in Bali
Published: 3:52PM GMT 24 Feb 2010

He will try to regain the confidence of his ultimate bosses – the world's governments –after repeated calls for his resignation in the wake of the discovery of errors in its latest report.

eland in 2007. Climate change. Environment. Global warming.
onnico/AP

IPCC: What is this? How does it work?

Rachel Pike's TED Talk
www.ted.com

OK, so is man-made global warming real?

Al Gore's 2008 TED Talk
www.ted.com
(start at 5.05 min; end at 9 min)

James Balog's TED talk
www.ted.com
(start at 3.53 min; end at 17.48 min)

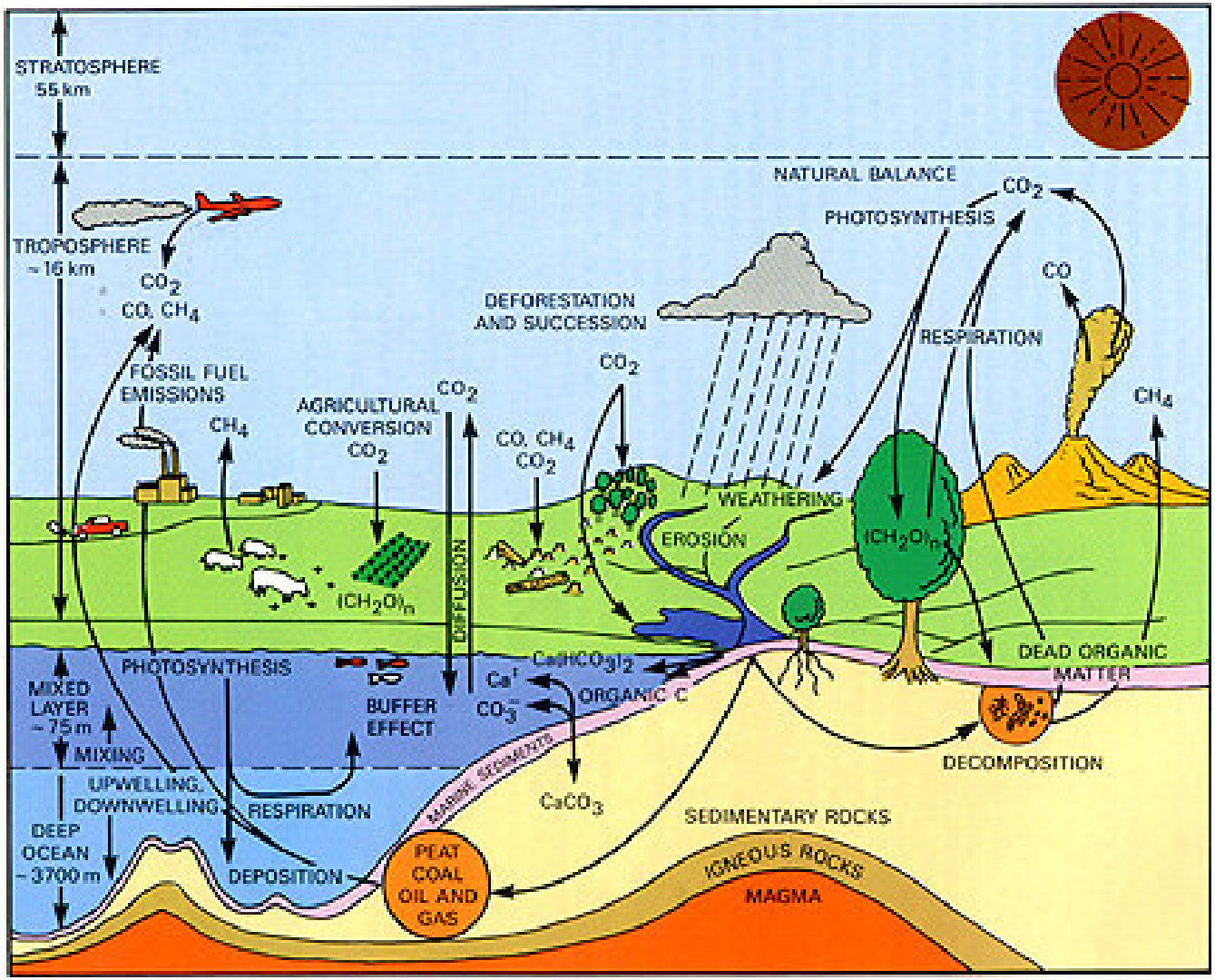
Appear to be reasonably believable evidence that the current warming that we are seeing is caused, at least in part, by humans

How can we cool down the earth?

A Radical Idea – “Geoengineering”

David Keith’s TED Talk
www.ted.com

The Carbon problem

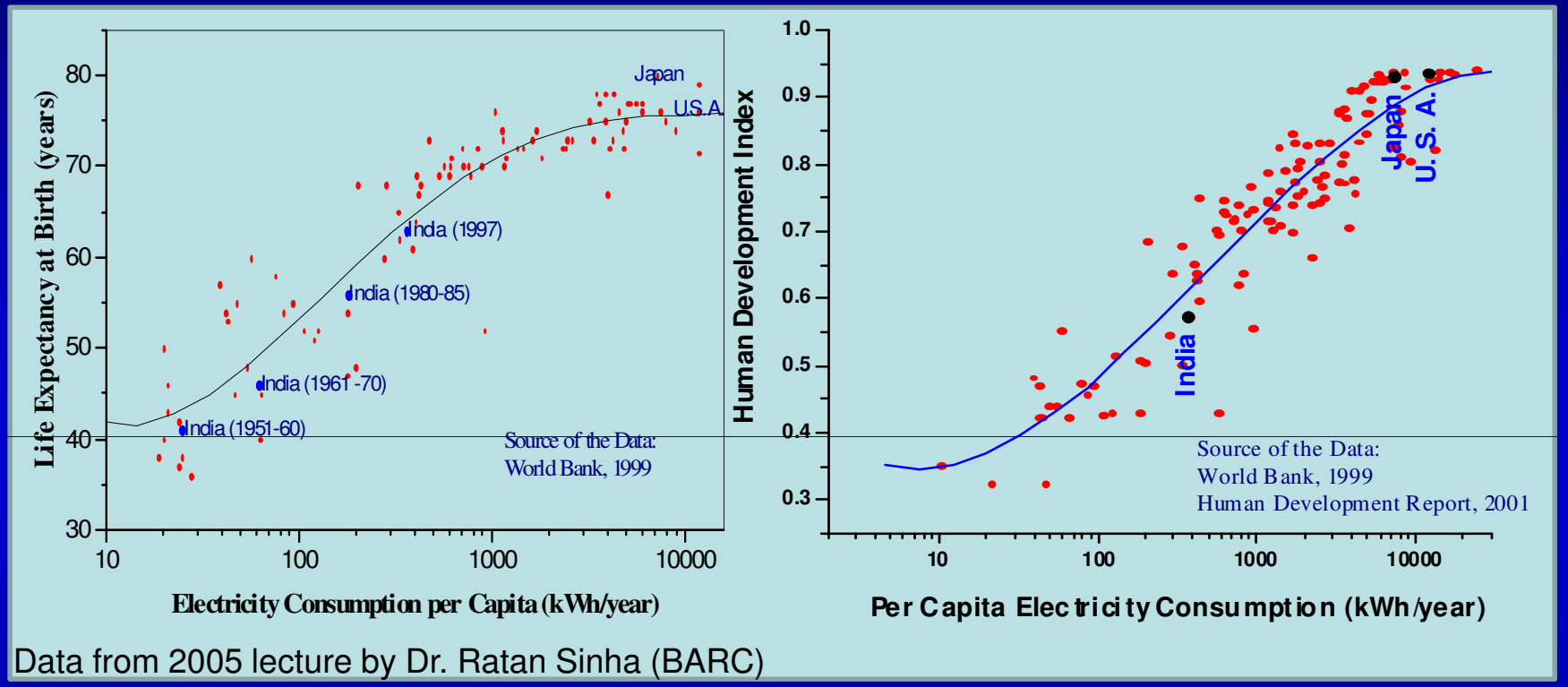


rst.gsfc.nasa.gov/Sect16/Sect16_4.html
http://en.wikipedia.org/wiki/Carbon_cycle

The Carbon problem

Al Gore's 2009 TED Talk
www.ted.com

Energy and the Carbon problem

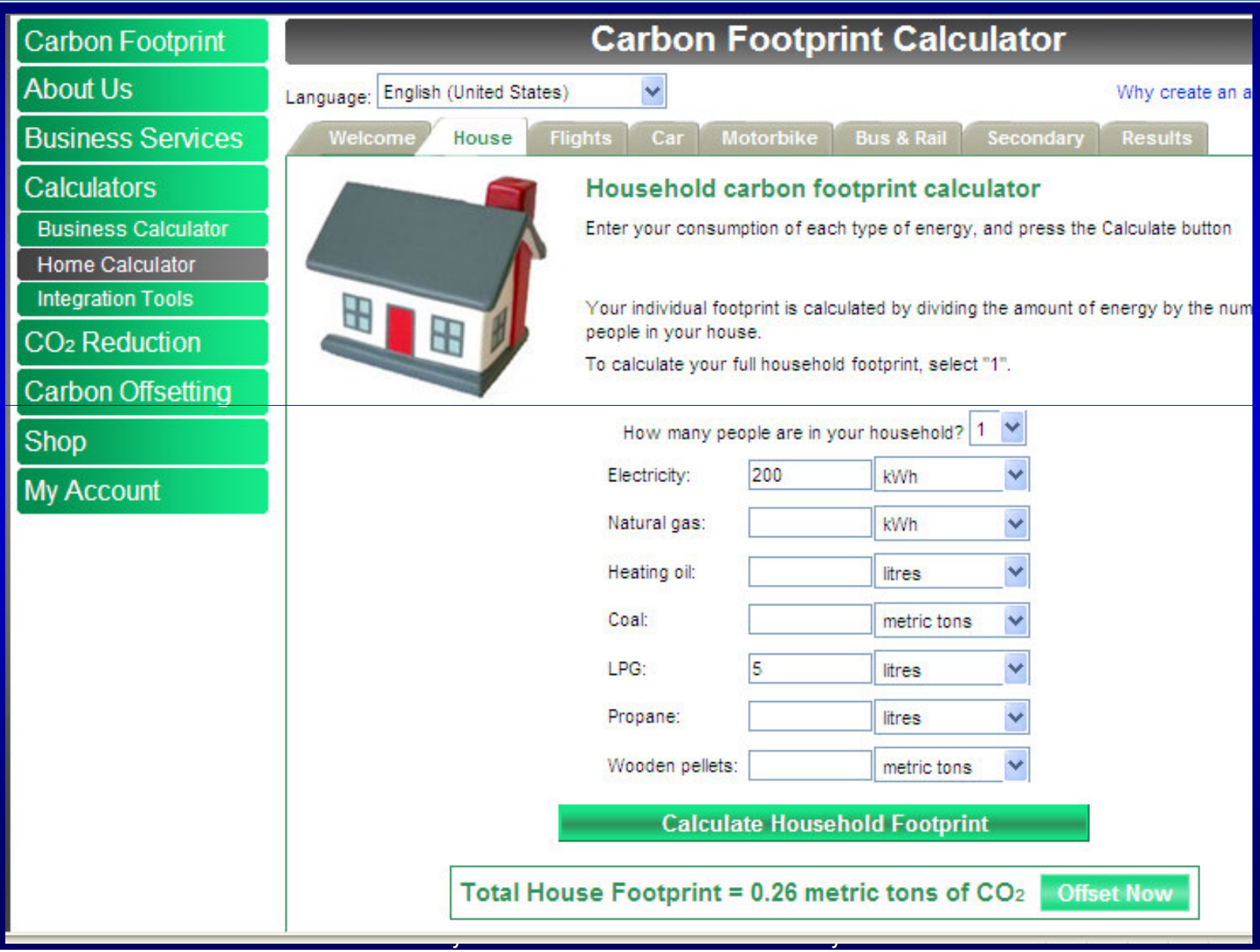


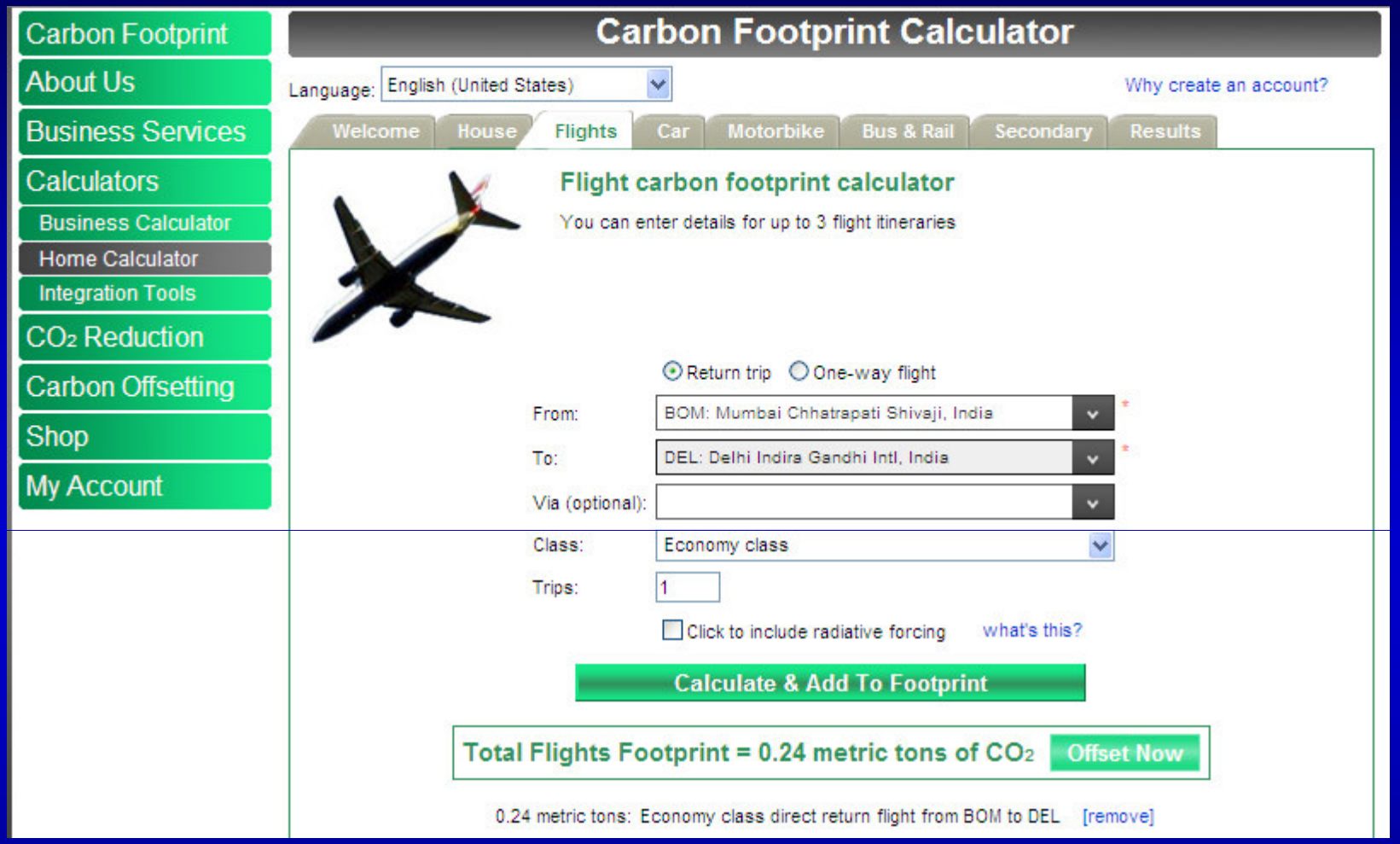
Data from 2005 lecture by Dr. Ratan Sinha (BARC)

With the economy growing, energy consumption WILL go up (a lot !)

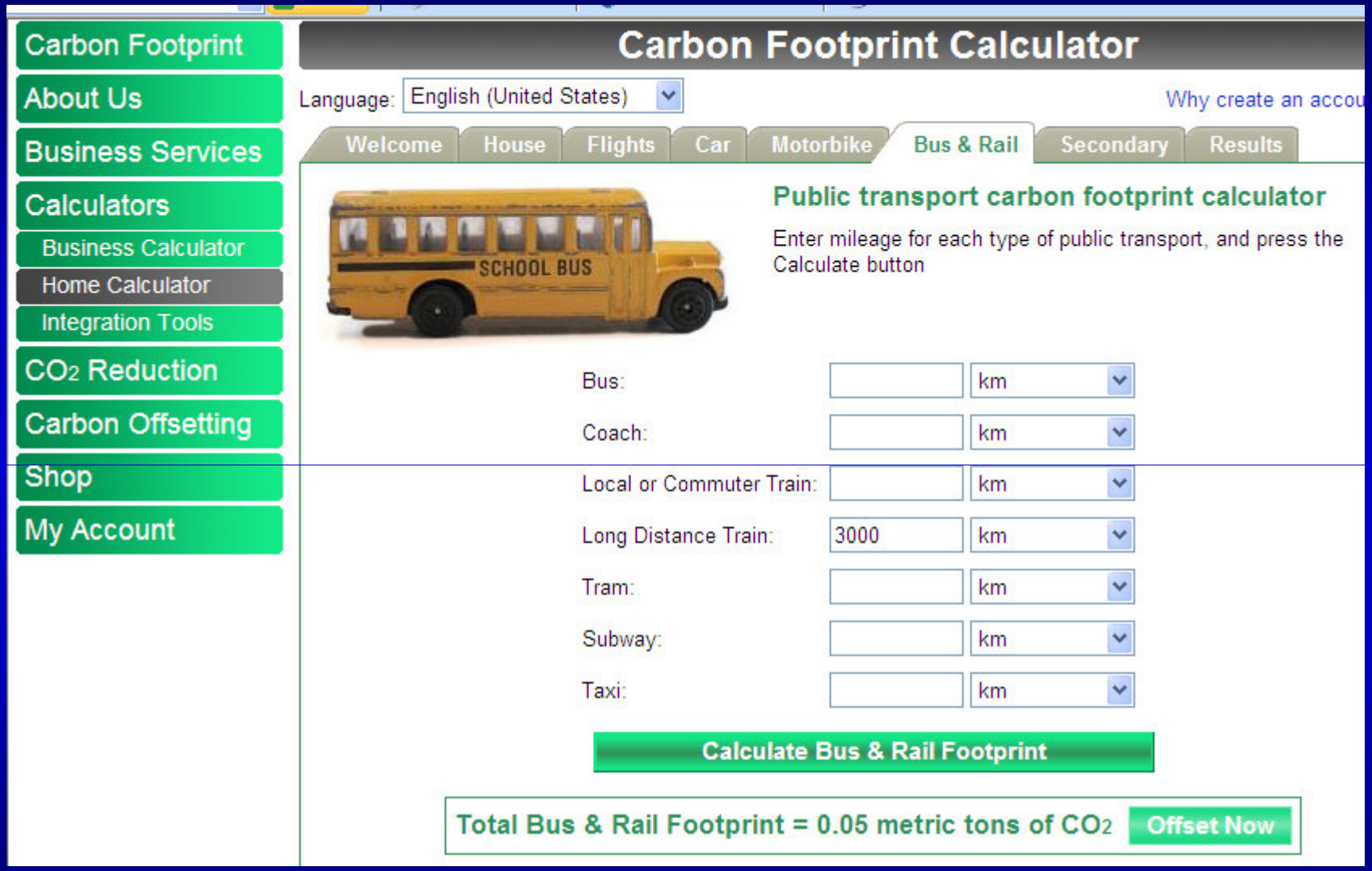
Where will this come from?
Mix of coal, nuclear, and NON CONVENTIONAL (Renewable budget increased by 61% to 1000 crores; National Action Plan on Climate Change)
NCL – Large program on solar energy

What is your Carbon Footprint? http://calculator.carbonfootprint.com





One return flight between Mumbai and Delhi



A return journey by train between Pune and Delhi

Carbon Footprint
About Us
Business Services
Calculators
Business Calculator
Home Calculator
Integration Tools
CO_2 Reduction
Carbon Offsetting
Shop
My Account

Carbon Footprint Calculator

Language: English (United States)

Why create an account?

Welcome | House | Flights | Car | Motorbike | Bus & Rail | Secondary | Results

Car carbon footprint calculator

You can enter details for up to 2 cars

Mileage: 1200 km

Choose vehicle: EU car database

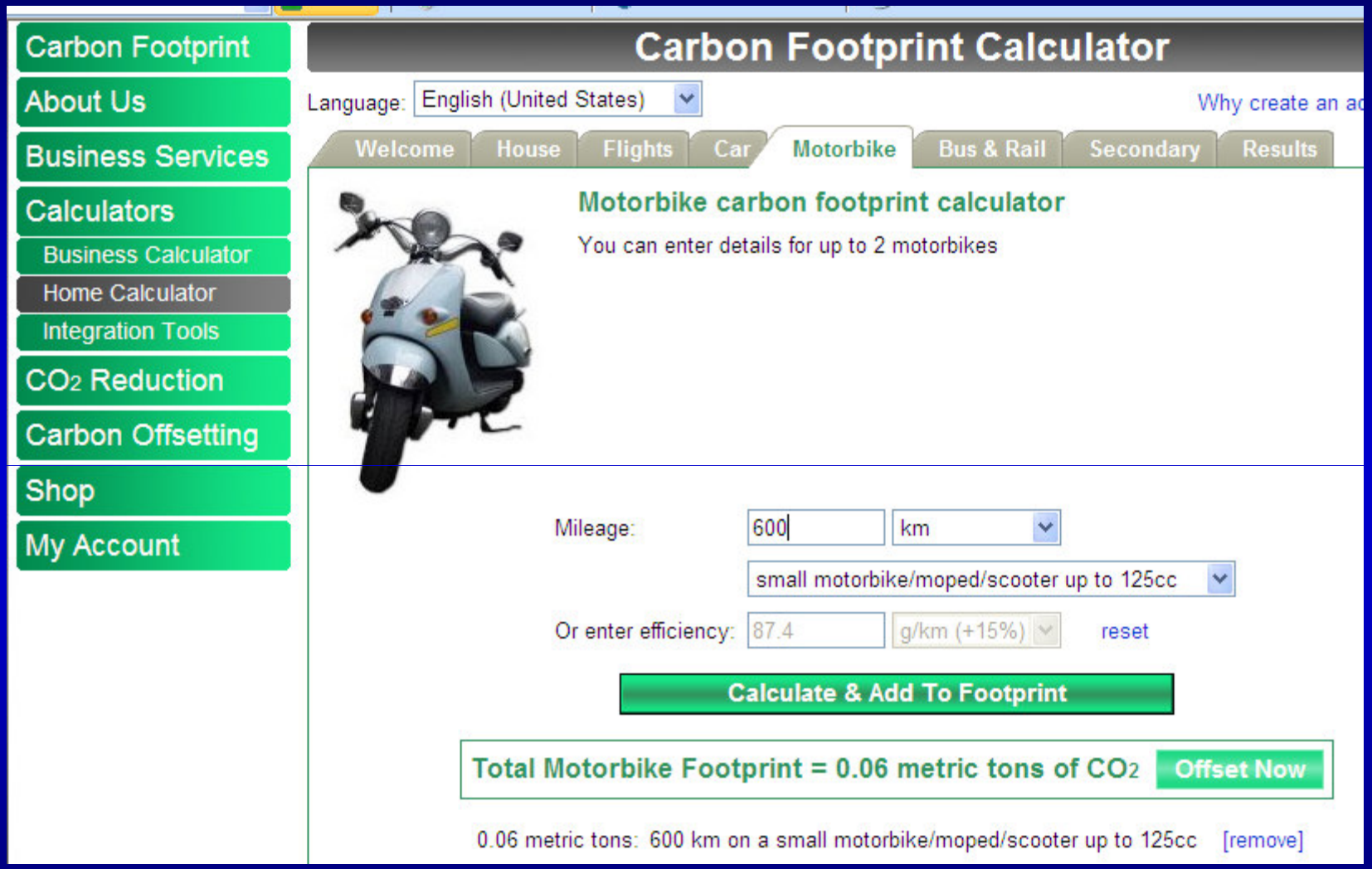
- select year of manufacture -

30 km/day * 30
1 trip to Mumbai: 300
Maruti – 14 km/liter

Or enter efficiency: 7.2 L/100km petrol

Calculate & Add To Footprint

Total Car Footprint = 0.20 metric tons of CO_2 Offset Now


Carbon Footprint
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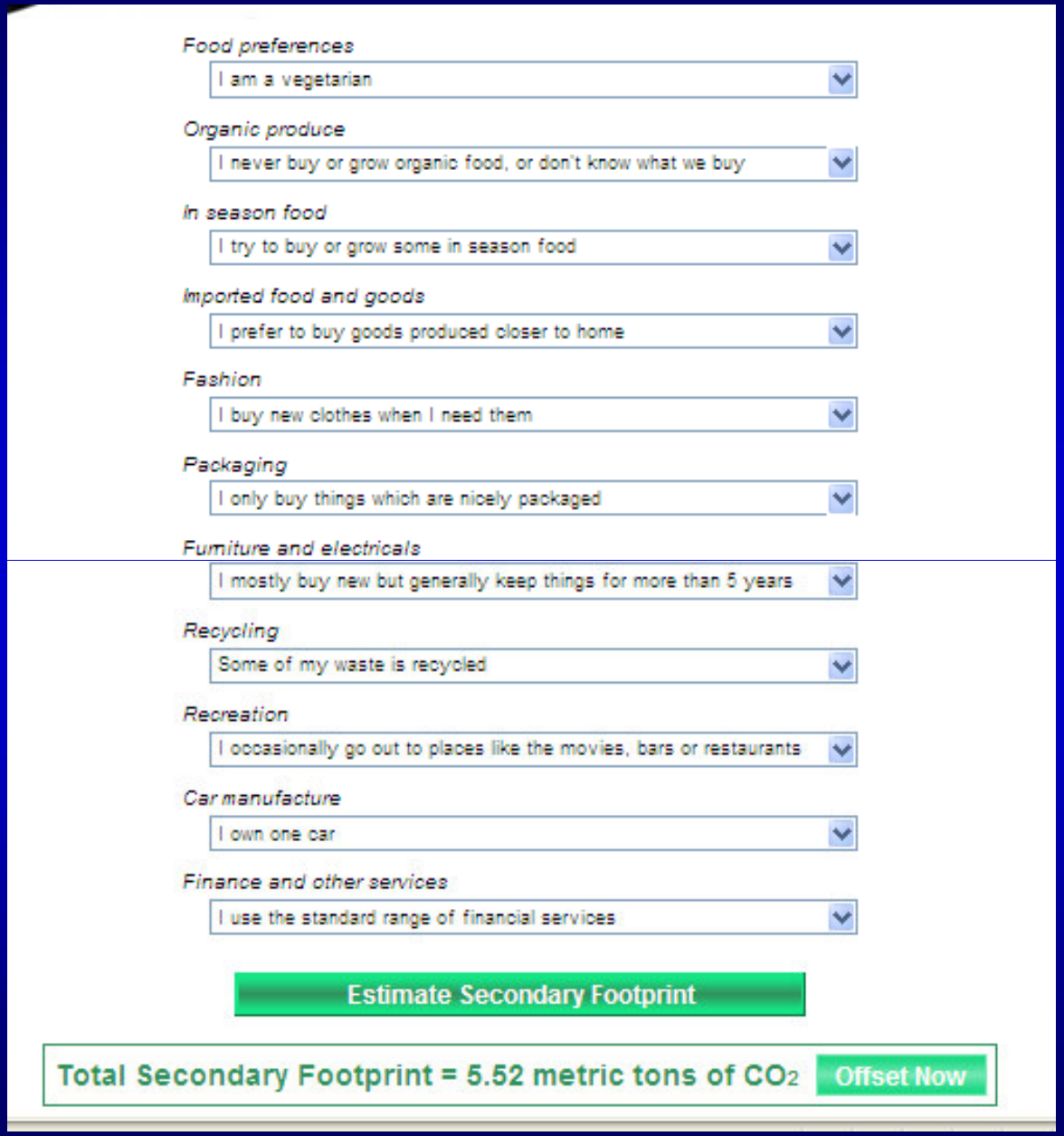
Calculators
Business Calculator
Home Calculator
Integration Tools
CO2 Reduction
Carbon Offsetting
Shop
My Account
Carbon Footprint Calculator
Language: English (United States)
Why create an ac
Welcome
House
Flights
Car
Motorbike
Bus & Rail
Secondary
Results
Motorbike carbon footprint calculator
You can enter details for up to 2 motorbikes
Mileage: 600 km
small motorbike/moped/scooter up to 125cc
Or enter efficiency: 87.4 g/km (+15%) reset
Calculate & Add To Footprint
Total Motorbike Footprint = 0.06 metric tons of CO2
Offset Now
0.06 metric tons: 600 km on a small motorbike/moped/scooter up to 125cc [remove]

Secondary carbon footprint comes to 0.42 MT/month

Eating red meat instead of being vegetarian increases the footprint by ~16%

Owning 2 cars instead of 1 increases the footprint by about 16%

Remember: Also need to count cost of manufacture, transport of product to you



Carbon Footprints: Some numbers

India average: 1.2 MT/year/person
China: 3.84 MT/year/person

Germany: 9.8 MT/year/person
USA: 20.8 MT/year/person

Bangladesh: 0.25 MT/year/person

Based on our calculation: 8.22 MT/year >> National average
(assuming 3 flights/year)

What we talked about today

Climate
Man made climate change, IPCC
Global warming – Geoengineering
The carbon problem and carbon footprints
and we watched several TED videos

A few of the resources available on the web:
http://pmindia.nic.in/climate_change.htm
http://www.ipcc.ch
http://www.epa.gov/climatechange/
http://en.wikipedia.org/wiki/climate_change
http://www.climatecrisis.net
“Will Jellyfish rule the world”; Hickman, L.; Puffin, India 2009

Thank you