Half a day workshop on Steps towards to Green University
Organized by Faculty of Graduate Studies, University of Sri Jayewardenepura
Science Faculty Auditorium, USJP, Nugegoda.
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SUSTAINABLE LIFESTYLE
- from the perspective of energy -

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OVERVIEW

- The Background
- Solutions for Sustainability
- Sustainable Lifestyle
  - The Rationale
  - Decisive Choices
  - The Dimensions
  - Key behaviours
  - The Broad Context
  - Synergetic Approach
THE BACKGROUND

- Energy and the Biosphere
  - Biosphere: All organisms & their non-living environments
  - Sun provides a constant energy source for the biosphere:
    - Which is equivalent to 8,500 time global energy demand.
  - Global systems transfer energy through the biosphere.
    - On average 10% of the energy at one trophic level is transferred to the next level in the food chain.
    - All organisms use this energy to grow, maintain body processes, and reproduce. Many organisms require energy to move, as well.
      - Human use much more energy (and natural resources) than what requires for basic living, thus challenging sustainability.
      - This is further aggravated by local & global environmental impacts, particularly due to the use of fossil fuels for energy.
THE BACKGROUND

- Energy, Environment and Development
  - Consumption of natural resources

<table>
<thead>
<tr>
<th>Material Extraction</th>
<th>GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Billion tons</td>
<td>Trillion International Dollars</td>
</tr>
</tbody>
</table>

- **Construction Minerals**
- **Ores and Industrial Minerals**
- **Fossil Energy Carriers**
- **Biomass**
- **GDP**
THE BACKGROUND

- Energy, Environment and Development
  - Consumption of energy

Global Primary Energy Supply by Source (in EJ)

- Biomass
- Coal
- Oil
- Natural Gas
- Hydro Electricity
- Nuclear
- Other

Fossil Fuels: 81% in 2015
THE BACKGROUND

- Energy, Environment and Development
  - Energy has become a prime requirement for the development of human society.
  - However, extensive use of fossil fuels & their conversion technologies have resulted energy and environment issues in many facets, challenging the sustainability.
THE BACKGROUND

- Energy, Environment and Development
  - GHG emissions continue to accelerate despite reduction efforts

Increased use of coal relative to many other energy sources has reversed a long-standing pattern of gradual decarbonization of the world’s energy supply.

The decline of energy intensity of economic output has had an offsetting effect on global emissions arisen from growth in population.

IPCC AR5, 2014
SOLUTIONS FOR SUSTAINABILITY

- Sustainable Developments – The Drivers
  - Socio Economic Development
  - Energy Security
  - Environment Sustainability
- Through transformation in energy sector

(A) Developing Renewable Energy
(B) Improving Energy Efficiency
(C) Practicing Energy Modesty (Sustainable lifestyle)
SUSTAINABLE LIFESTYLE

The Rationale

- Current lifestyles/consumption patterns are unsustainable.
- Aspirations for prosperity are intrinsically linked to current unsustainable economic growth.

- There are many factors that contribute to human behaviour and the choices of individuals make in choosing how they live.
- Lifestyles have huge impact on the flow of goods & services, and are closely linked to production & consumption patterns the societies.
- Meeting the needs and desires of all citizens, while addressing the global megatrends which promise widespread resource constraints, scarcity and threats to well-being, is the major challenge of the future.
SUSTAINABLE LIFESTYLE

- Decisive Choices
  - Example: Choice of food

Energy required to produce 1kg

- Corn
- Milk
- Apples
- Eggs
- Chicken
- Cheese
- Pork
- Beef

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SUSTAINABLE LIFESTYLE

- Decisive Choices
  - Example: Choice of food

<table>
<thead>
<tr>
<th>Food Type</th>
<th>LC Water requirement (liters/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potatoes</td>
<td>500</td>
</tr>
<tr>
<td>Wheat</td>
<td>900</td>
</tr>
<tr>
<td>Sorghum</td>
<td>1100</td>
</tr>
<tr>
<td>Maize</td>
<td>1400</td>
</tr>
<tr>
<td>Rice</td>
<td>1900</td>
</tr>
<tr>
<td>Soya beans</td>
<td>2000</td>
</tr>
<tr>
<td>Chicken</td>
<td>3500</td>
</tr>
<tr>
<td>Beef</td>
<td>50,000</td>
</tr>
</tbody>
</table>

Liters of water required to produce 1kg
SUSTAINABLE LIFESTYLE

- Decisive Choices
  - Example: Choice of food

Per Capita Meat Consumption vs GNI/capita/yr

- More development
- More meat!

Why not this?

GNI/capita/yr vs Meat consumption/capita/yr
SUSTAINABLE LIFESTYLE

- Decisive Choices
  - Example: Choice of energy

**Carbon Intensity of Energy Sources**

<table>
<thead>
<tr>
<th>Energy Resource</th>
<th>Carbon Emissions (tCO\textsubscript{2e}/GWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td>0</td>
</tr>
<tr>
<td>Hydro</td>
<td>0</td>
</tr>
<tr>
<td>Nuclear</td>
<td>0</td>
</tr>
<tr>
<td>Bioenergy</td>
<td>0</td>
</tr>
<tr>
<td>Geo-thermal</td>
<td>0</td>
</tr>
<tr>
<td>Solar PV</td>
<td>0</td>
</tr>
<tr>
<td>NG</td>
<td>500</td>
</tr>
<tr>
<td>Oil</td>
<td>800</td>
</tr>
<tr>
<td>Coal</td>
<td>1,000</td>
</tr>
<tr>
<td>Lignite</td>
<td>1,200</td>
</tr>
</tbody>
</table>

**Legend:**
- Renewables
- Fossiles

**Note:**
- LC GHG Emissions (tCO\textsubscript{2e}/GWh)
### SUSTAINABLE LIFESTYLE

- **Decisive Choices**
  - Example: Choice of water resource

#### Energy requirement for water supply

<table>
<thead>
<tr>
<th>Water Resource</th>
<th>Energy Requirement (kWh/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake or river</td>
<td>0.37</td>
</tr>
<tr>
<td>Ground Water</td>
<td>0.48</td>
</tr>
<tr>
<td>Wastewater treatment</td>
<td>0.62 – 0.87</td>
</tr>
<tr>
<td>Wastewater reuse</td>
<td>1.0 – 2.5</td>
</tr>
<tr>
<td>Seawater</td>
<td>2.85 – 8.50</td>
</tr>
</tbody>
</table>
SUSTAINABLE LIFESTYLE

- Decisive Choices
  - Example: Choice of Transport

  **Energy requirement for passenger transportation**

<table>
<thead>
<tr>
<th>Mode</th>
<th>Energy Requirement (liters/passenger km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>0.05</td>
</tr>
<tr>
<td>Bicycle</td>
<td>0</td>
</tr>
<tr>
<td>Bus</td>
<td>0.025</td>
</tr>
<tr>
<td>Train</td>
<td>0.008</td>
</tr>
<tr>
<td>Motorcycle</td>
<td>0.0025</td>
</tr>
</tbody>
</table>

- Car: 0.05 liter/passenger km
- Bicycle: 0 liter/passenger km
- Bus: 0.025 liter/passenger km
- Train: 0.008 liter/passenger km
- Motorcycle: 0.0025 liter/passenger km
SUSTAINABLE LIFESTYLE

- Decisive Choices
  - Example: Choice of Appliances

![Image of energy-efficient light bulbs and fans with their respective wattages: 100 W, 20 W, 15 W, 45 W, 30 W, and 0 W.]
SUSTAINABLE LIFESTYLE

- The Dimensions

**Technical**

- Appliances, materials, services etc. that use energy efficiently

**Organizational**

- Systems that can support the achievement of energy efficiency goals

**Behavioural**

- Personal values, attitudes and practices of individuals that impact on energy use
SUSTAINABLE LIFESTYLE

- Key behaviours for a sustainable lifestyle
  - Greening the home (retrofitting)
  - Using energy (and other utilities) wisely
  - Extending the life of things (to minimize waste)
  - Managing cooking and a sustainable & healthier diet
  - Choosing eco-products & services
  - Travelling sustainably
  - Setting up & using resources in the community
  - Using & futureproofing outdoor spaces
  - Being part of improving the environment.
SUSTAINABLE LIFESTYLE

- Key Performance Indicator
  - HH Energy Modesty Index

**Energy Services**

ES1: Lighting
ES2: Refrigeration
ES3: Ironing
ES4: Cloth Washing
ES5: Food preparation
ES6: Cooking
ES7: Rice cooker / Oven / Microwave
ES8: Water Heating / boiling
ES9: Water pump
ES10: Ventilation and Air Conditioning
ES11: Mobile Charger / CDMA
ES12: Computer
ES13: TV
ES14: Cassette Recorder / Radio / DVD
ES15: Other equipment / Services
The Broad Context

- A shift from unsustainable to sustainable lifestyles is complex, involves many changes on many levels, in many domains and among many people, regulations, institutions, etc.

Diagram:

- **LIFESTYLE**
  - Immediate context
    - Home
    - Neighborhood
    - Work/study environment
    - Norms, Values, Culture
  - Intermediate context
    - City
      - Transport systems & Infrastructure
      - Public spaces & facilities
      - Local business & Industry
    - National & International markets
      - Systems of provision, e.g. water, electricity, waste management
      - National & International Institutions
  - Broad context
    - Country
      - Province/Local Authority
SUSTAINABLE LIFESTYLE

- Synergetic Approach

Energy is Life … It eats Resources!

Lifestyle determines the Sustainability, and thus the Future!!