



Session - Sustainable Energy Futures:

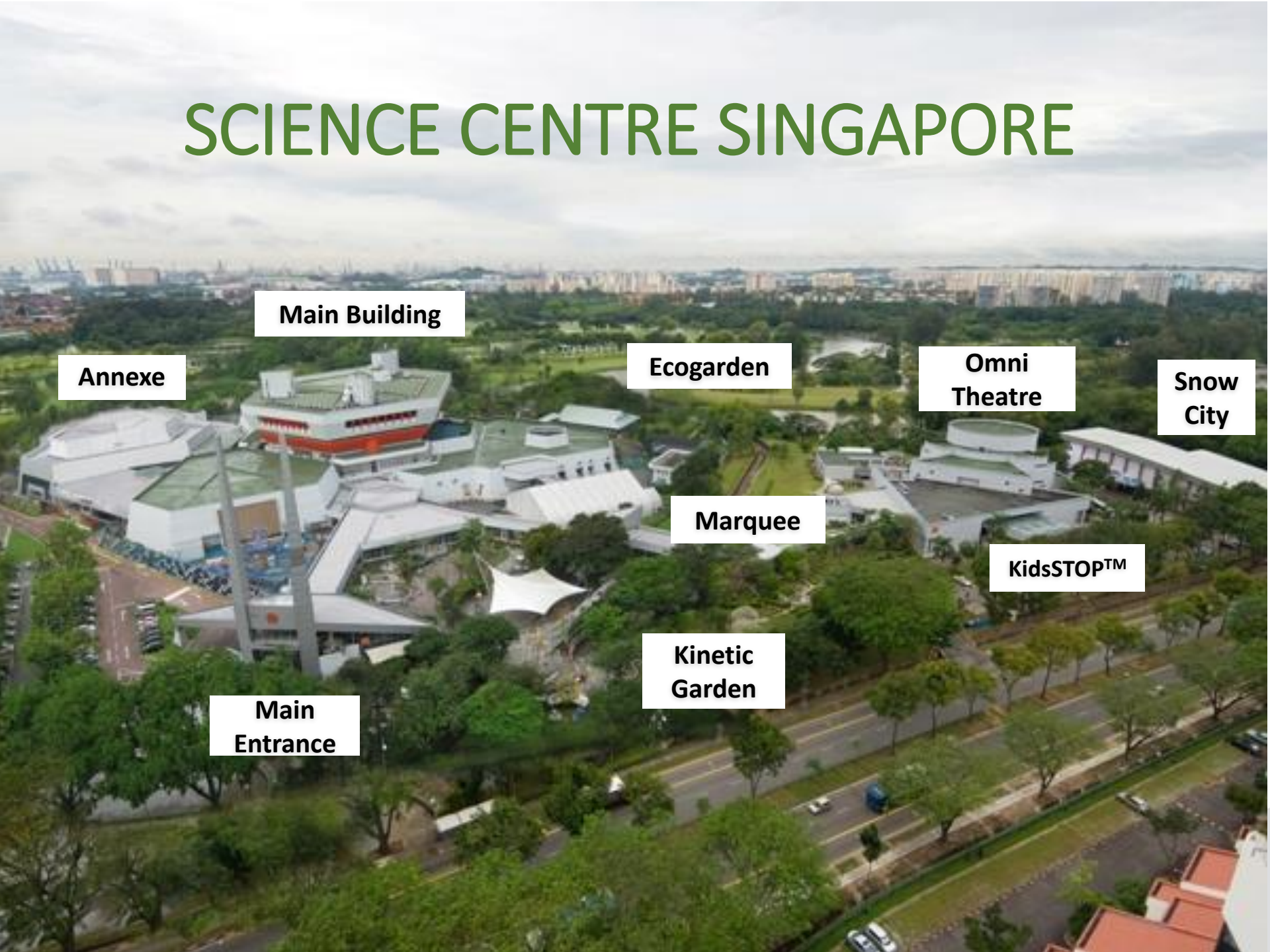
Science Centres Globally Approaching a Multifaceted
Key Challenge

Anne Dhanaraj, Education Programmes

Science Centre Singapore

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SCIENCE CENTRE SINGAPORE



Main Building

Annexe

Ecogarden

**Omni
Theatre**

**Snow
City**

Marquee

KidsSTOP™

**Main
Entrance**

**Kinetic
Garden**

VISION

... where Science befriends and transforms the minds of millions

MISSION

To Promote Interest, Learning and Creativity in Science and Technology through Imaginative and Enjoyable Experience and Contribute to the Nation's Development of its Human Resource



Focus on the Energy and the Environment at Science Centre Singapore

Exhibitions on these topics since 1981, although the focus has varied, such as:

Ecology, Energy, Man's Impact on the Environment, Biodiversity.

Climate Change seen as a natural evolution of the earlier themes especially on energy sustainability and greener actions. First exhibition in 2008, completely revised in 2014.

Relevant exhibition at Science Centre to inform on energy issues



National focus on climate change

- Singapore has no natural resources, issues of climate change, water and energy taken seriously
- Study of Singapore's climate analysed up to 2100, projected a rise in temperatures, more frequent and heavier storms and rising sea levels.
- These changes can pose risks such as
 - loss of coastline
 - water supply with severe dry spells and flooding from intense storms
 - change in biodiversity
 - impacts on food supply and human health

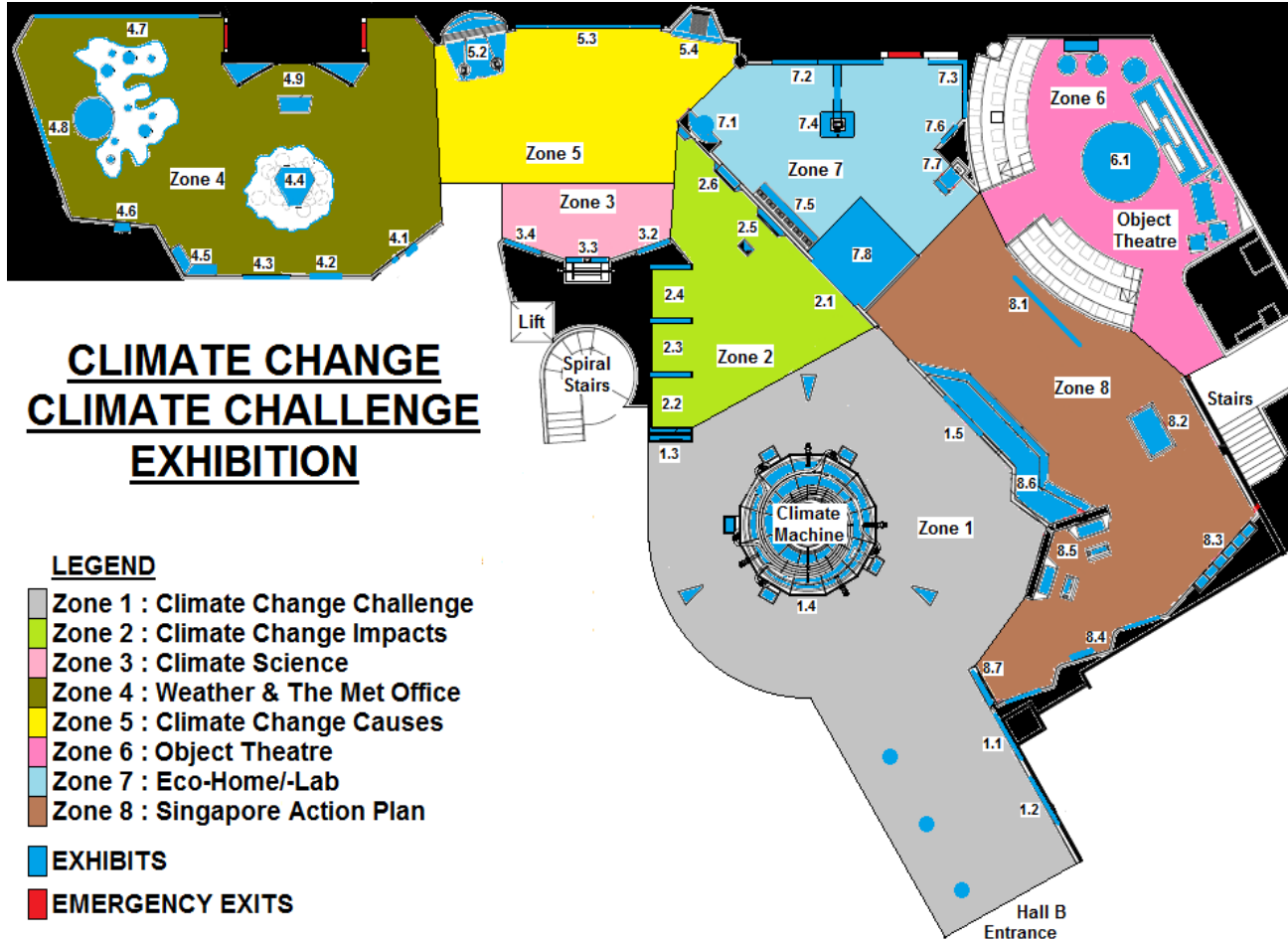


National Strategy for Climate Change

- A Climate Research Strategy Group was formed to study weather and climate in Singapore as well as in the wider Southeast Asia regions.
- National Climate Change Secretariat set up in 2010 developed a roadmap for Singapore to tackle climate change, especially to:
 - mitigate carbon emissions
 - help country to adapt to effects of climate change
 - harness opportunities from green efforts
 - create public awareness and action on climate change



Climate Change Climate Challenge



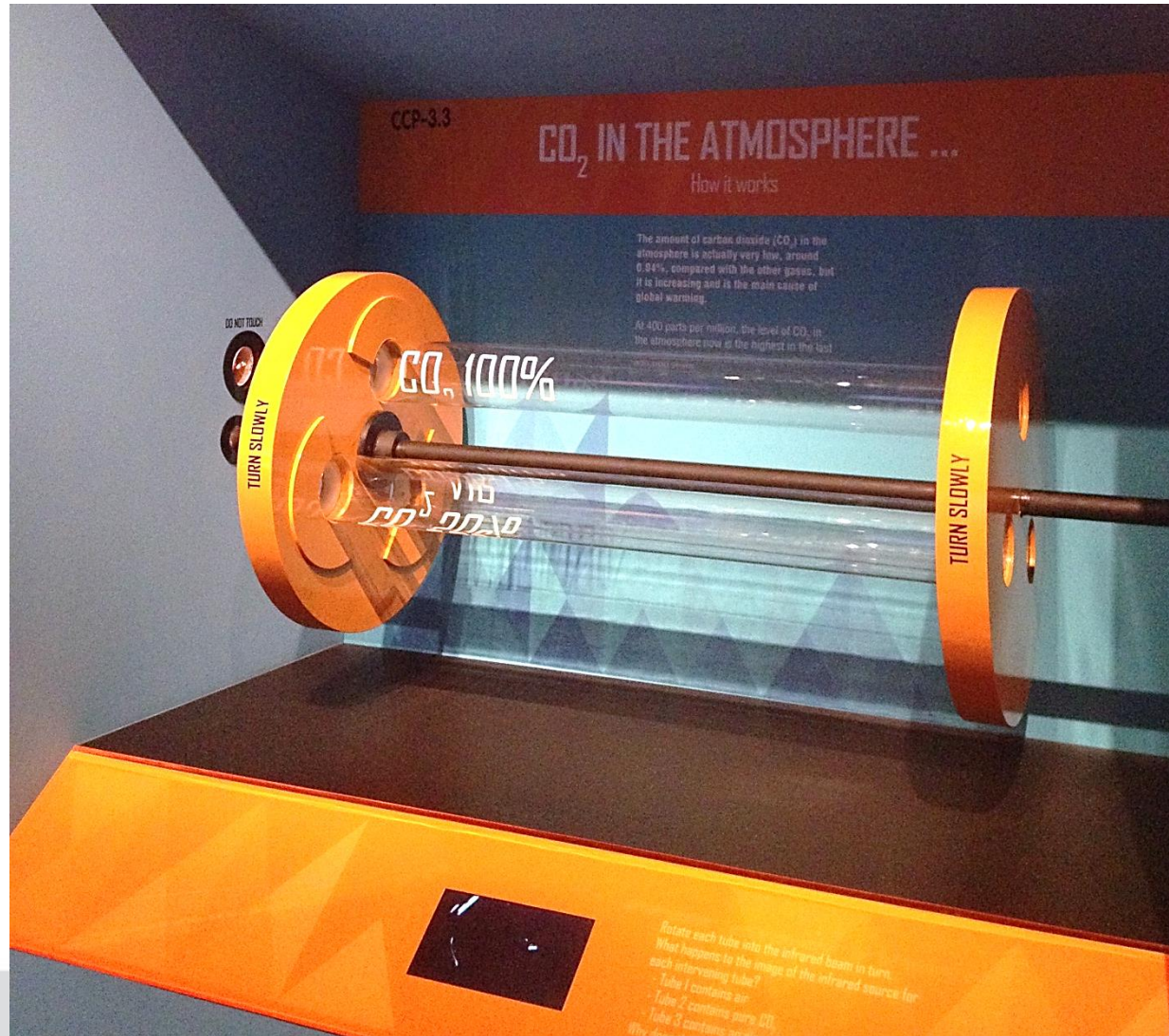
- 1.1 Climate Change - Climate Challenge
- 1.2 Arctic Seasons
- 1.3 Weather Wall
- 1.4 Climate Machine
- 1.5 Take the Challenge
- 2.1 Carbon Emissions
- 2.2 Impact: Sea Level
- 2.3 Impact: Extreme Weather
- 2.4 Impact: Health & Food
- 2.5 Temperature in 2100
- 2.6 Losing Biodiversity
- 3.1 Clouds
- 3.2 The Carbon Cycle
- 3.3 The CO₂ Trap
- 3.4 Greenhouse Effect
- 4.1 Measuring Sunshine
- 4.2 Hot Air Rises
- 4.3 Land & Sea Breezes
- 4.4 What Drives the Weather
- 4.5 Measuring Rainfall
- 4.6 Measuring Wind
- 4.7 The Atmosphere
- 4.8 Up, Up & Away
- 4.9 The MET Office
- 5.1 Clouds
- 5.2 Target GHG
- 5.3 Cloud Maker
- 5.4 History of Emissions
- 6.1 The Changing Climate Show
- 7.1 Smarter Buildings
- 7.2 Green Appliances
- 7.3 Reuse Water
- 7.4 Light for Free
- 7.5 Greener Materials
- 7.6 Efficient Lifts
- 7.7 Cool Materials
- 7.8 Smart Energy
- 8.1 Senoko EV
- 8.2 The Power Game
- 8.3 The Four Rs
- 8.4 "Voices on Climate Change" Pledge Place Your Say
- 8.5 Ask an Expert
- 8.6 Singapore's Climate Change Strategy
- 8.7 Our Beautiful Earth

The Climate Machine



Introductory exhibit, most popular with visitors but difficult to understand

The CO₂ Trap



Light For Free

The Power Game



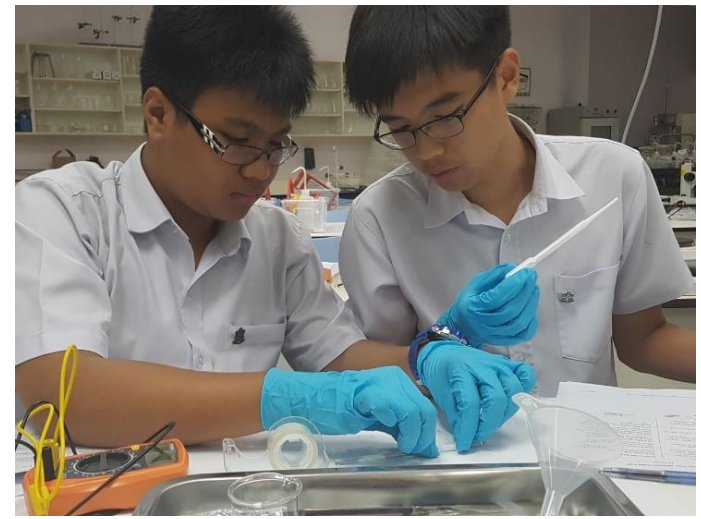
Programmes with Climate Change Climate Challenge

- Gallery Pathways: worksheets for Primary and Secondary classes (elementary and middle school)
- Lecture-demonstration: “Our Environment & Us”
- School lab workshops on clean energy,
- Young Scientist Badges: “Meteorologist”; “Environmentalist”; “Energy Saver” + Activity Sheet
- A trial using iBeacons for gallery hunt: iPadTrail



“I AM A YOUNG ENERGY SAVER” BADGE		
		Earn 15 stars ★
16.	Visit Climate Change exhibition at Science Centre Singapore. Find out how much more energy an incandescent bulb use compared to a compact fluorescent bulb. Observe the readings on the ammeters and describe the difference in the readings.	***
17.	Design a game that can spread the message of energy conservation.	***
18.	Design an experiment to show that a compact fluorescent light bulb is more energy efficient than an incandescent bulb.	***

Student workshops



Clean energy workshop: Dye-sensitised solar cells

Workshops to prepare students for the Energy Innovation Challenge – this year's theme of using urban heat island effect



Pilot ipad trail for the exhibition



Development of an ipad trail and evaluated through a 2-tier quiz pre, and post visit to the Climate Change exhibition, and a retention quiz 3 months later. Sample=82, 11-14 year old students from 4 schools.



Results from the pilot survey

What students knew well

- Actions to mitigate climate change such as recycling and the preference for public over private transport.

Not so well

- How greenhouses gases reflect infra-red radiation from the atmosphere.
- Water as a greenhouse gas.
- Students who believe that climate change could lead to skin cancer.
- Not aware of the role of heat in expanding the various seas and oceans.
- Unaware of national effort to increase the use of photovoltaic cells in housing estates to power community services like lifts



Challenges for adopting alternate energy options in Singapore

- Very small, 719 square km
- High urban density
- Low wind speeds
- Relatively flat terrain
- No geothermal resources
- Solar used to be a challenge with high cloud cover, but is now being actively explored. New exhibit on solar energy technology developed with Solar Energy Research Institute Singapore



Thank you

