Ministry of Industry and Trade

# Opportunities for LCMT Development in Viet Nam

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Department of Energy Efficiency and Sustainable Development

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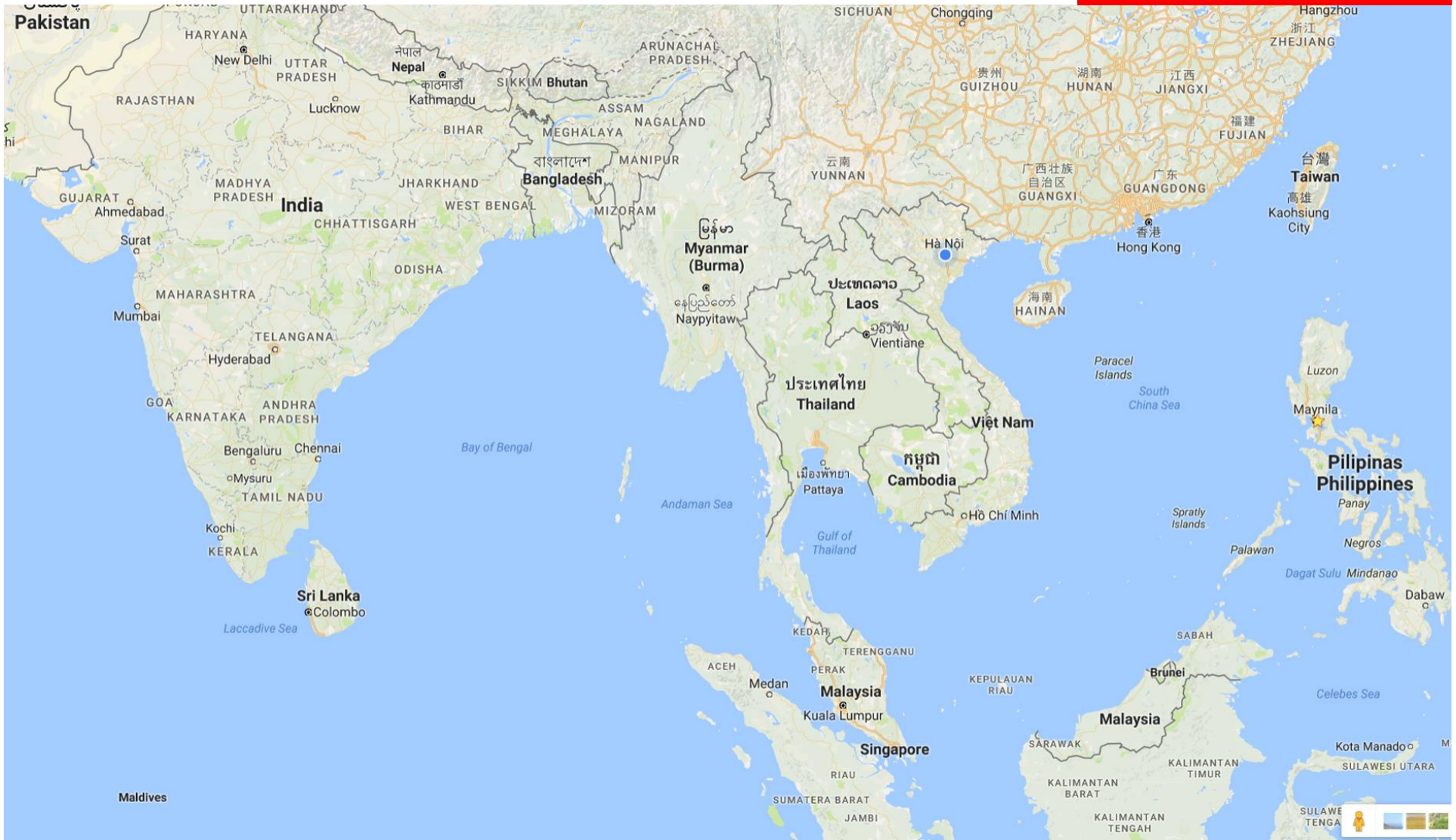
B. Why do we promote LCMT?

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# A. About Vietnam



# 1. General Information




1. Official name: The Socialist Republic of Vietnam
2. Total Area: 331.698 $Km^2$
3. Capital: Hanoi
4. Population: ≈ 92,7 million (2016)
5. Population density: 282/km2
6. Urban pop: 32.753 mil
7. GDP per capita: USD 2,215 (2016)
8. Economic growth rate: 6.21% (2016: GSO)
9. Monetary unit: Vietnam Dong (VND)
10. Internet domain: ".vn"
11. International dialing code: +84

# B. Why do we promote LCMT?

# Status of urbanization in Vietnam

**795 cities and towns**

**2 special metropolitan**

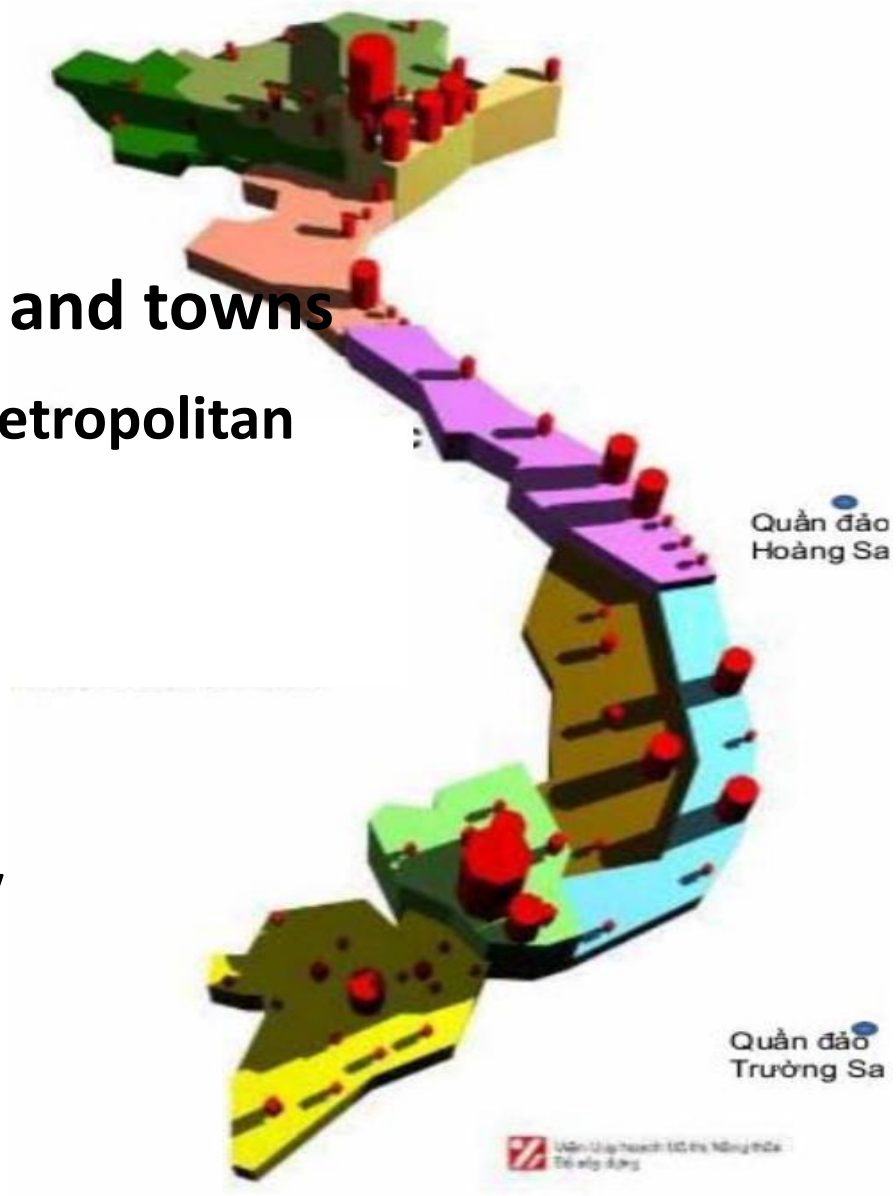
**17 grade I**

**25 grade II**

**41 grade III**

**82 grade IV**

**628 grade V**




## Vietnam's population

**100 million by 2025, an increase of 5,8% from 2016 (The UN source)**

## Urbanization rate

**Urban areas in Vietnam have expanded spatially at 2.8% per year and this is among the fastest rates in the region (WB)**

# Towns/Urban areas and Greenhouse gases (GHG)

## Towns/urban areas: sources of GHG

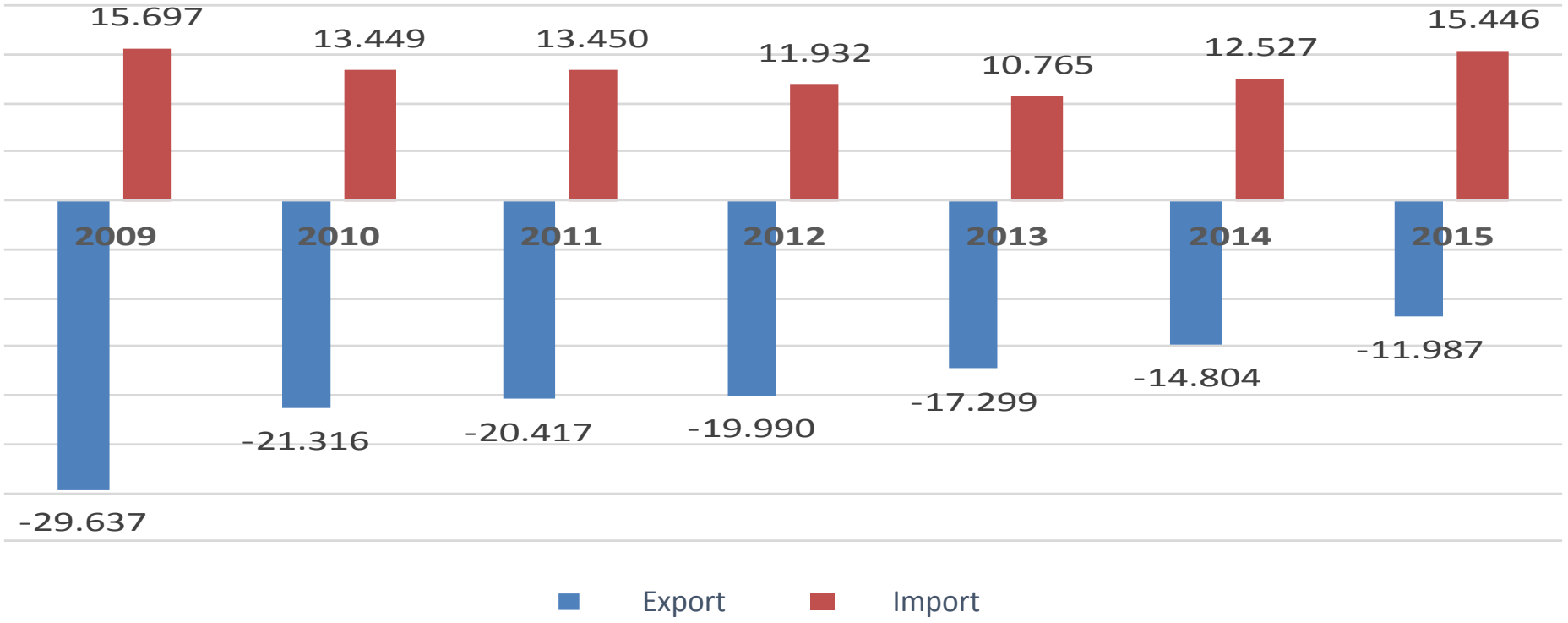
***Towns are the solution to the climate change***

- As towns/urban areas today are home to about half the global population but represent almost two-thirds of global energy demand and 70% of carbon emissions from the energy sector (IEA) and therefore crucial to meeting Vietnam's carbon reduction targets.
- Building sector represents 40% of the world's energy consumption and contributes to one-third of GHG emissions.

# Energy Consumption in Vietnam

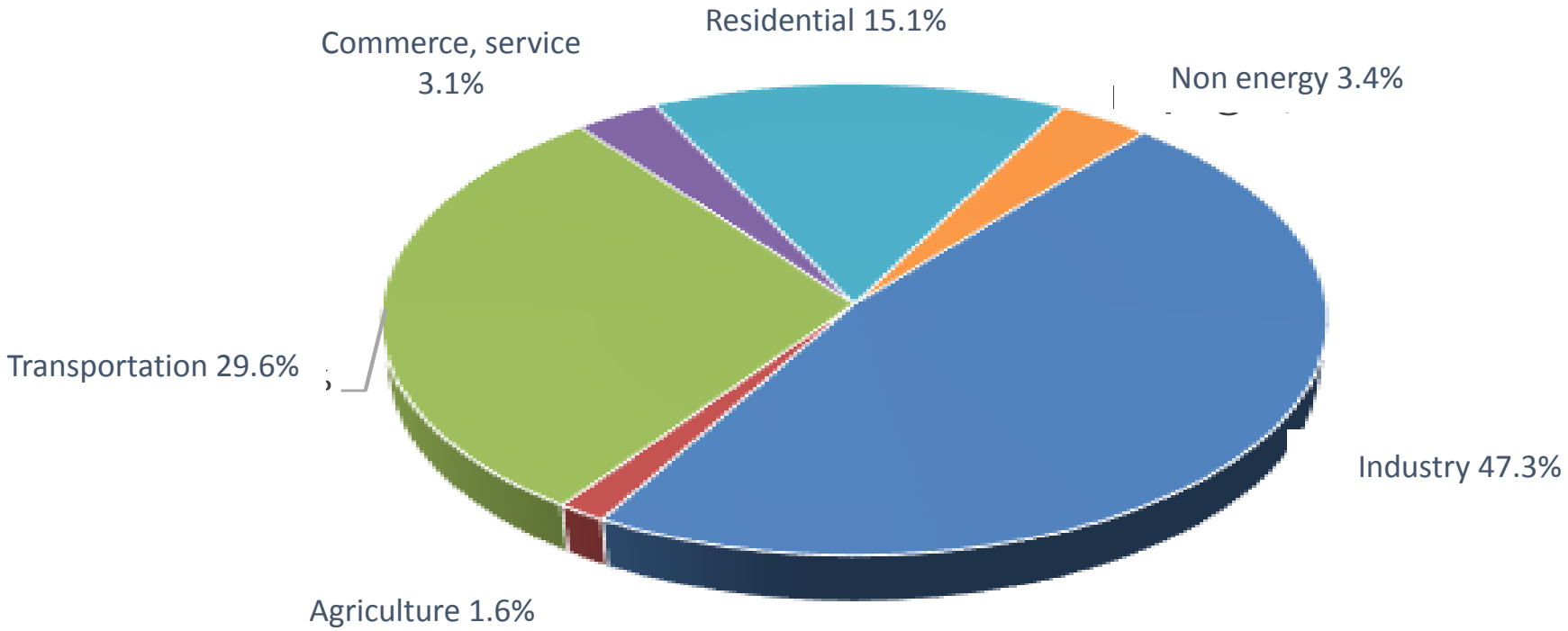
- GDP grew at average rate of 7.26%/year during the period of 2001-2010 and 5.91% during the period of 2011-2015.
- Energy demand grew at rate of 10% during 2001-2010, and at 13%/year during the period of 2001-2010 and about 11% during 2011-2015.
- Greenhouse gas emission from energy sector accounted for 63% of total GHG emission in 2010 in Vietnam and will account for 83% and 86% in 2020 and 2030 respectively
- According to forecast in the National Power Development Plan (Revised PDP VII), in the next 15 years (2016 - 2030), Vietnam's power demand would increase 8.7%/year on average.
- Domestic power supply capacity increase from 38,358 MW in 2015 to 60,000 MW in 2020 and 129,500 MW in 2030.

# Energy Consumption in Vietnam




**Import-Export during the period of 2009-2015, KTOE**

# Energy Consumption in Vietnam




**Energy consumption per sectors, 2015**

# C. Climate-Energy Policies for Low-carbon Development in Vietnam

# Climate - Energy  Policies for Low-carbon Development

## ✓Party Central Committee Resolution dated June 3, 2013

- *Developing a low-carbon economy;*
- *Reducing GHG emissions on a GDP unit by between 8% and 10% against base year 2010.*



# Climate - Energy  Policies for Low-carbon Development

## ✓National Green Growth Strategy - Targets (2012)

- *Reduce the intensity of greenhouse gas (GHG) by 8%-10% as compared with the 2010 base*
- *Reduce energy consumption per unit of gross domestic product by 1%-1,5% per year.*
- *Reduce GHG emissions in the energy sector by 10%-20% compared with business as usual (BAU)*



# Climate - Energy  Policies for Low-carbon Development

## ✓National Green Growth Action Plan – 2014

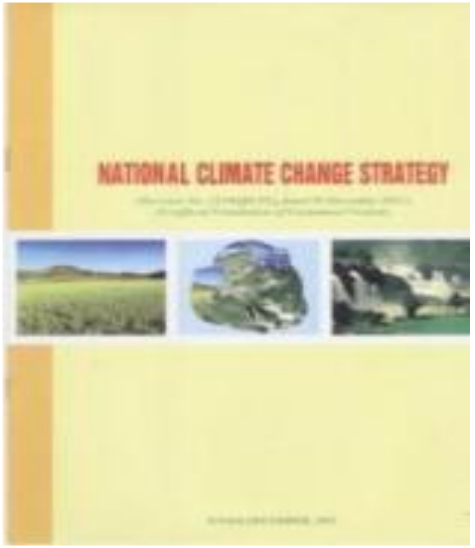
- *Urban planning/ master planning,*
- *Development of urban technical infrastructure,*
- *Development of green cities, eco-urban areas and greenworks, urban transportation, and*
- *greening urban landscape*



# Climate - Energy  Policies for Low-carbon Development

## ✓National Climate Change Strategy dated Dec. 5, 2011

- *Carry out GHG mitigation options;*
- *Ensure sustainable*
- *development goals; and Develop a low-carbon economy to protect and enhance quality of life;*

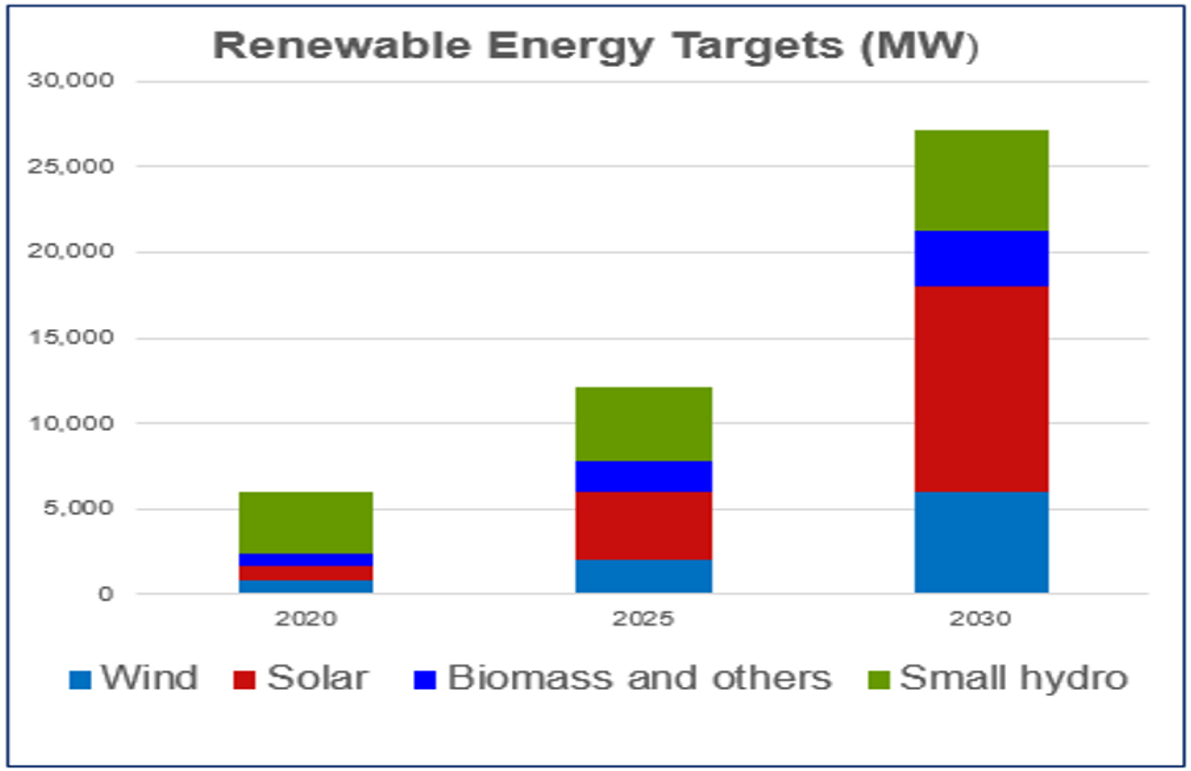


# Climate - Energy  Policies for Low-carbon Development

## ✓ Renewable Energy Development – Targets

*(Source: Viet Nam's power development plan up to 2030, with vision to 2050, issued 18 Mar 2016)*

| Renewable Energy (MW) | 2020 | 2025 | 2030 |
|---|---|---|---|
| Wind | 800 | 2,000 | 6,000 |
| Solar | 850 | 4,000 | 12,000 |
| Biomass and others | 750 | 1,824 | 3,281 |
| Small hydro | 3,540 | 4,239 | 5,915 |
| **Total** | **5,940** | **12,063** | **27,195** |



# D. The National Targeted Program on Energy Efficiency – VNEEP

# The National Targeted Program on Energy Efficiency - VNEEP

Decision 79/2006/QD-TTg dated 14/4/2006 by the Prime Minister approving The Program Phase I for the period 2006 – 2015.

Decision No. 1427/QD-TTg dated 12/10/2012 by the Prime Minister approving the Phase II of the Program during the period 2012 – 2015.

Proposal for the National Program on Energy Efficiency during the period 2019-2030 Phase III.

# Key Achievements from VNEEP 1 & 2

## Results from VNEEP 1 & 2

| | VNEEP I | VNEEP II |
|---|---|---|
| Duration | 2006-2010 | 2011-2015 |
| Energy efficiency targets (%) | 3-5 | 5-8 |
| Energy saving (%) | 3,4 | 5,65 |
| Total energy saving (million TOE) | 4,5 | 11,261 |

- Energy savings during the period 2006-2010 was 3,4%; total energy saved 4.5 million TOE.
- Energy savings during the period 2011-2015 was 5,65%; total energy saved 11,261 million TOE.

# Key Achievements from VNEEP 1 & 2

## Formulation and completion of the legislation

-Law on Energy Efficiency and Conservation (50/2010/QH12) dated 28/6/2010

- Decree 21/2011/NĐ-CP dated 29/3/2011 promulgates the details for implementing the Law

- Decree 134/2013/NĐ-CP dated17/10/2013 promulgates on the fines in administrative violations on electricity area, dam safety, and the efficient use of energy

- A series of Decisions, Circulars and regulations on energy efficiency in industry, construction, agriculture, transport sector… was issued.

# Key Achievements from VNEEP 1 & 2

## Energy Efficiency in Industry sector

-The list of key energy users are developed and issued annually; Monitor and promote energy efficiency solutions;

-Supported energy efficiency and develop energy management system; Provided in-depth training and capacity building to implement EE solutions and optimize energy system for enterprises;

-Implemented capacity building for financial institutions to develop investment and financial services for the EE related projects;

-Piloted Energy Service Companies (ESCO) models and provided consultancy and financial support services to emplment EE investment projects.

# Key Achievements from VNEEP 1 & 2

## Energy Labeling Program








> 60W



- More than 10,000 products from 15 product target groups were labeled with energy stamps.
- Local and foreign Testing Labs have been nominated for EE testing for labeling and MEPS program.
- The number of consumed incandescent lamps reduced from 50-55 million bulbs in 2011 to below 5 million bulbs in 2015.

# Key Achievements from VNEEP 1 & 2

## EE in Buildings and Public Facilities

- Promoted the implementation of The National Technical Standards on EE in Buildings QCVN 09/2013/BXD;
- Developed database on energy usages in key and big buildings;
- Piloted assessment criteria and certified for green buildings;
- Organized competitions on EE buildings, competitions for design and application of EE measures in buildings;
- Developed EE public lighting system in many provinces and cities nationwide.



# Key Achievements from VNEEP 1 & 2

## EE in Transport sector

- Conducted surveys, developed and implemented EE solutions in public transport means such as big buses in cities;
- Develop standards, technical norms for energy consumption for some road motorized vehicles;
- Implemented energy labeling program for under 7 seat – cars;
- Developed technical and management solutions to save fuel cost in waterway transportation and aviation.

# Proposal of VNEEP3 for the Period 2019-2030

## The draft of VNEEP 3 – core objectives are:

- To mobilize all domestic and international resources for the promotion of energy efficiency and conservation via the synchronous and end-to-end solutions in governance of government and development of policy enforcement; research and development of science, product, and technology; training and development of human resources; international collaboration in energy efficiency and conservation;
- To establish the habit of energy efficiency and conservation in all aspects of social activities; decrease energy intensity in industrial sectors; make energy conservation a mandatory indicator for key energy-utilizing facilities with guidance towards green growth, greenhouse gas emission reduction, and sustainable development.
- To achieve the efficiency rate of 8 - 10% per total national commercial energy consumption for 2019 - 2030 against the energy demand forecast in the National Power Development Plan for 2011 - 2020 with consideration up to 2030

# Proposal of VNEEP3 for the Period 2019-2030

## The draft of VNEEP 3 – Challenges and Remedies

***Challenges***

- Implementation time of the Program, especially in 2019, is not much left;
- Energy price structure does not promote the urgent need of energy efficiency and conservation;
- Expenditure on the project (scale and budget distribution).

***Remedies***

- Determination of the political system;
- Support from domestic and foreign experts, international funding for promoting energy efficiency and conservation in Vietnam.

# Proposal of VNEEP3 for the Period 2019-2030

## The draft of VNEEP 3 – Social-economic impacts

- Contribute to the implementation of National Energy Policy;
- Reduce the increase in commercial energy source by average 0.8%/year for 2020 - 2030;
- Reduce greenhouse gas emission by 10 – 15 millions tons of $CO_2$ equivalent;
- Achieve energy saving of 55 – 60 millions TOE.

# E. Conclusion

# F. Conclusion

❑ **Potential of LCMT development in Vietnam:**

- To be in line with current policies of the Party and the State
- To promote the cooperation between Vietnam and the international community
- High potential for greenhouse gas reduction in Vietnam

❑ **Next Plan**

- Extend to other cities
- Capacity building: planning and monitoring
- Assist in LCS scenarios development, monitoring
- Integration of LCMT development in provincial climate change planning process

# THANK YOU FOR YOUR KIND ATTENTION!

# SHARING THE PROJECT

# BUILDING EFFICIENCY ACCELERATOR (BEA)

# IN DA NANG CITY

## (2016-2018)

# CONTENT:

Part 1. INTRODUCTION ON BEA – DA NANG

Part 2. RESULTS OF BEA DA NANG

Part 3. NEXT ACTIVITIES

# PART 1.
# INTRODUCTION OF BEA –DA NANG CITY

# 1.1. INTRODUCTION OF BEA

- The Building Efficiency Accelerator (BEA) is one of six initiatives of Sustainable Energy for All (SE4ALL) of United Nations (UN) and World Bank (WB).

**One Goal:**
**Achieving Sustainable Energy for All by 2030**

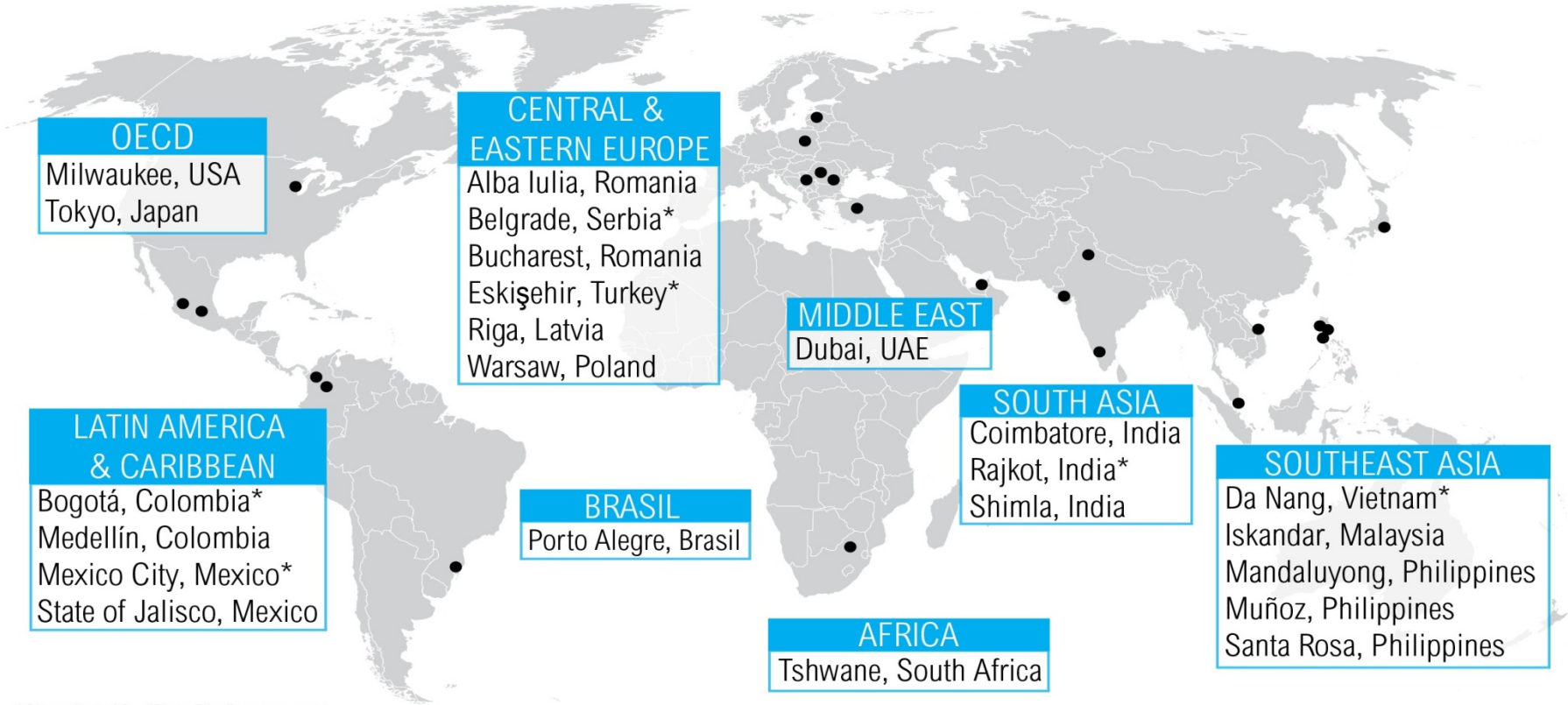



**Three Objectives:**

- ENSURING *universal access* TO MODERN ENERGY SERVICES.
- DOUBLING THE GLOBAL RATE OF IMPROVEMENT IN *energy efficiency.*
- DOUBLING THE SHARE OF *renewable energy* IN THE GLOBAL ENERGY MIX.

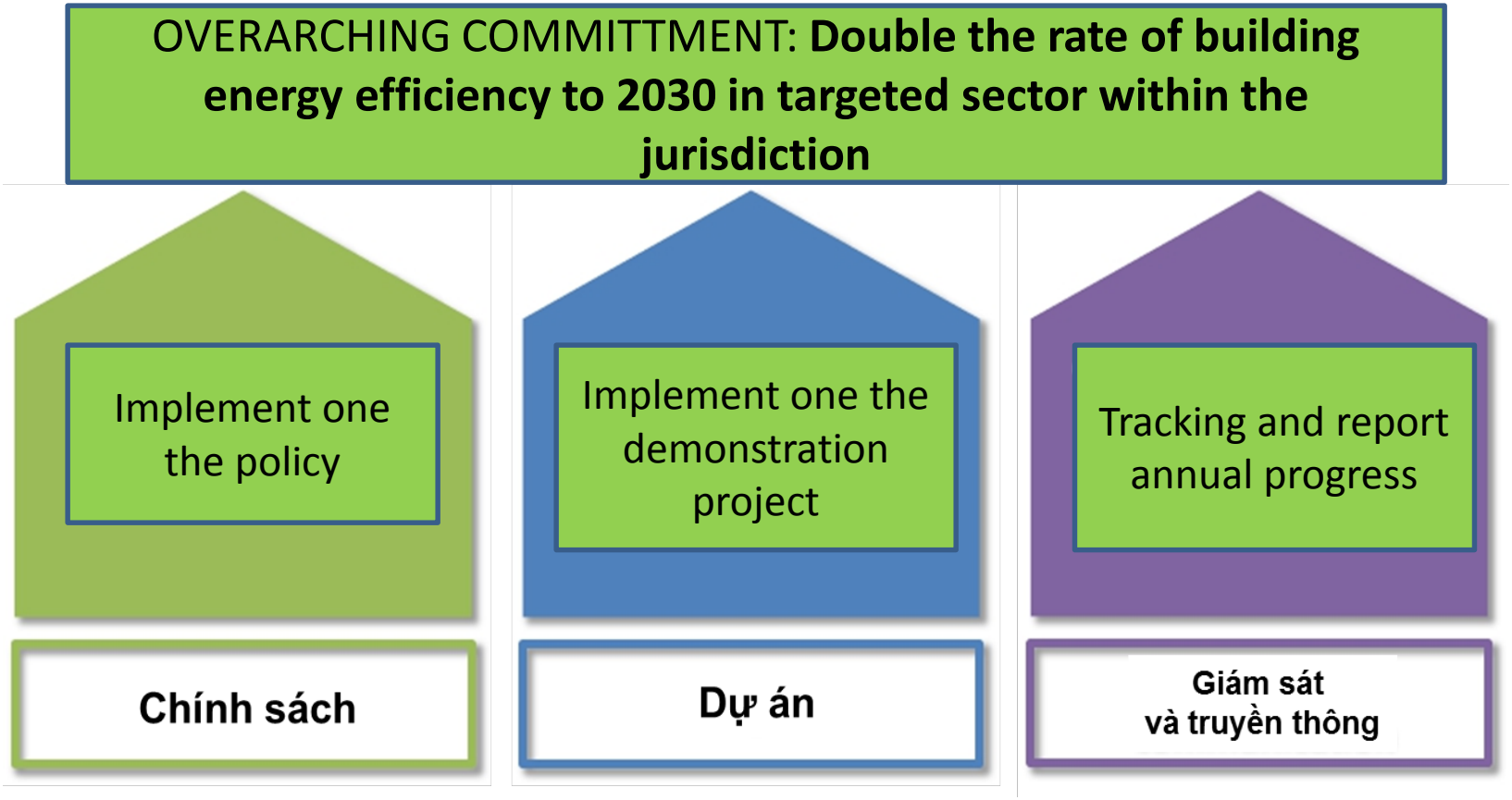
# 1.2. INTRODUCTION OF BEA DANANG

- in 2016-2017, WRI selected Da Nang city to become one of six deep dive partnership city to implement BEA.



## 1.2. INTRODUCTION OF BEA DA NANG

Da Nang city has been committed to WRI once participating into BEA as follows:



## 1.2. BEA DA NANG

- Implementation process: **5** steps

*Hội thảo khởi động (T.9/2016)*

*Triển khai dự án (T.1/2017 – T.11/2017)*




| | | | | |
|---|---|---|---|---|
| -Agreement signed<br>- Priority issues are identified | - Detailed assessment of priority issues.<br>- The main activities of the project selected. | -Develop the activities<br>- The implementation plan approved. | -Implementation | -Evaluate and recommend new contents |

# PART 2.
# RESULTS OF BEA DA NANG

## 2.1. Policy component

### *2.1.1. Goal*

Develop the cooperation and management mechanism for line departments to accelerate building energy efficiency in Da Nang city (**including existing and new buildings with square of over 2,500 $m^2$**).

(1) Contents and scope of the policy are consented by line departments.
(2) Policy is promulgated by Da Nang's People's Committee.
(3) Policy will be communicated and trained to government staffs and property owners
(4) The new building project is licensed under the specific provisions of the Policy.

## 2.1. POLICY COMPONENT

### *2.1.2. Results*

***Directive No. 08/CT-UBND dated 16/9/2017*** *of the People's Committee of Da Nang City on strengthening the saving and efficiency energy using in the buildings in Da Nang.*

- **8% - 12%** energy is saved.
- **30** tasks, requirements are identified.
- **Stakeholders** implement the Directive.

## 2.1. POLICY COMPONENT

### *2.1.2. Results*

***Plan no. 7007/KH-UBND dated 06/9/2017 of Da Nang city*** *on communication and training on energy saving and efficiency in buildings Da Nang city to 2018 and to 2020.*

- **17** activities planed.
- **500 people** participated
- **Stakeholders** related and implement the plan.
- **2** field trips on sharing on the saving energy experiences.


Building Efficiency Accelerator
HỘI THẢO
PHÁP VỀ SỬ DỤNG NĂNG LƯỢNG
HIỆU QUẢ TRONG TÒA NHÀ
ngày 17 tháng 5 năm 2017


IFC
Building Efficiency Accelerator
HỘI THẢO
GIỚI THIỆU CÁC GIẢI PHÁP VỀ SỬ DỤNG NĂNG LƯỢNG
TIẾT KIỆM VÀ HIỆU QUẢ TRONG TÒA NHÀ
17 tháng 5 năm 2017







Hình 1. Làm việc với Chương trình 100RC (Singapore)



Hình 2. Tham quan Triển lãm Quy hoạch đô thị (Singapore)




Hình 3. Tham dự Hội thảo Phát triển công trình xanh trong bối cảnh biến đổi khí hậu ở Việt Nam (TP. Hồ Chí Minh)



Hình 4. Làm việc với Sở Xây dựng TP. Hồ Chí Minh

## 2.2. DEMOSTRATION COMPONENT

### *2.2.1. Goal*

Electricity consumption at the hotel saved by **10-15%**







## The demonstration activities in LION SEA hotel









# 2.2. DEMONSTRATION COMPONENT

## *2.2.2. Results*

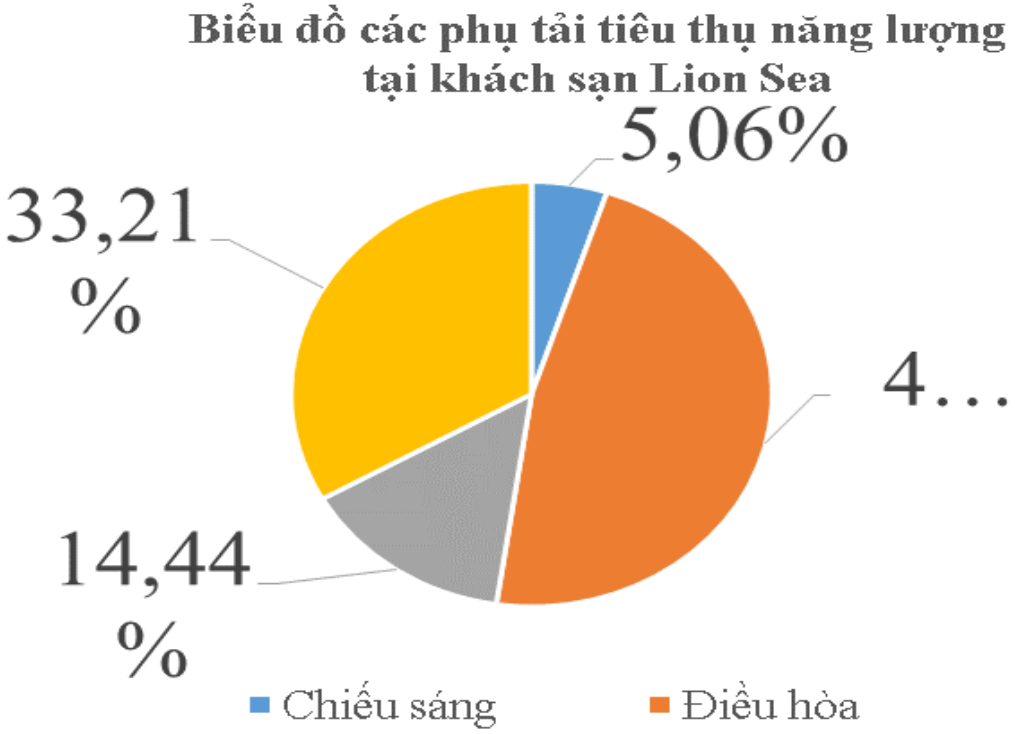
*Report on preliminary results of potential energy saving in 12 hotels 2-3 stars in Da Nang city*

| Name of hotel | Energy consumption kWh/m2 | Energy saving potential (from 1 – 3 points) | Participation of investors (from 1 – 3 points) |
|---|---|---|---|
| Minh Toàn | 73,76 | 2 | 1 |
| Moonlight | 97,21 | 1 | 3 |
| Saigontourane | 39,37 | 2 | 1 |
| BambooGreen Haboside | 47,92 | 2 | 1 |
| BambooGreen Central | 46,27 | 2 | 2 |
| Xanh - Đà Nẵng | 45,37 | 2 | 1 |
| Magnolia | 82,39 | 3 | 2 |
| Vian | 72,39 | 2 | 1 |
| BambooGreen Riverside | 22,67 | 2 | 1 |
| Thu Bồn | 66,35 | 1 | 1 |
| Lion Sea | 58,67 | 3 | 3 |
| Faifo | 90,01 | 3 | 1 |

## 2.2. DEMONSTRATION COMPONENT

### *2.2.2. Results*

*Energy audit report in Lion Sea Hotel: current status of energy consumption and proposed energy saving solutions for the Hotel.*



# 2.2. DEMONSTRATION COMPONENT

## *2.2.2. Results*

| Level of solutions | Solutions |
|---|---|
| Easy to implement and highly effective | - Replace the LEDs.<br>- Replacement air conditioner usually by inverter air conditioner.<br>- Paste thermal insulation film for guest bedroom windows.<br>- Apply a coat of paint on the roof of the restaurant and hotel. |
| Easy to implement, high efficiency but difficult to measure efficiency | - Design of instruction stickers and energy management handbooks for hotel.<br>- Raise the awareness of employees and customers through guidelines and how to use the equipment effectively. |
| Easy to implement but low efficiency | - Design of the shade for the heater.<br>- Install high efficiency pumps.<br>- Intensive maintenance, elevator maintenance and water pump.<br>- Use water saving kit.<br>- Use the device to automatically turn off the time. |
| Difficult to implement and low efficiency | - Install solar water heater system<br>- Planting vegetation |

## 2.3. Tracking progress

### *2.3.1. Goal*

Develop tracking progress indicators on energy efficiency that adequate with current situation and management of the city;

➔ Assess and monitor before and after implementing BEA.

➔ Propose monitor and control solutions for buildings.

## 2.3. Tracking progress

### *2.3.2. Results*

*The set of indicators for energy use in buildings (from 2.500m² up) in Da Nang city with* ***15 indicators.***

| STT | Tên chỉ tiêu/chỉ số |
|---|---|
| 1 | Sô lượng tòa nhà có diện tích từ 2.500m2 trở lên trên địa bàn thành phố Đà Nẵng |
| 2 | Số hoạt động truyền thông về sử dụng năng lượng tiết kiệm và hiệu quả |
| 3 | Tổng số lượt người tham gia các hoạt động truyền thông về sử dụng năng lượng tiết kiệm và hiệu quả |
| 4 | Tỷ lệ chủ sở hữu công trình tòa nhà hiểu biết các chính sách về sử dụng năng lượng tiết kiệm và hiệu quả |
| 5 | Tỷ lệ số công trình tòa nhà xây mới được kiểm tra, giám sát sau khi phê duyệt hồ sơ |
| 6 | Tỷ lệ cán bộ được nâng cao năng lực thẩm định hồ sơ thiết kế |
| 7 | Số công trình tòa nhà được kiểm tra, đánh giá mức sử dụng năng lượng |
| 8 | Tỷ lệ công trình tòa nhà có xây dựng kế hoạch tiết kiệm năng lượng hằng năm |
| 9 | Tỷ lệ công trình tòa nhà hoàn thành trên 50% kế hoạch tiết kiệm năng lượng hằng năm |
| 10 | Mức năng lượng ước lượng tiết kiệm được sau khi các công trình tòa nhà triển khai các kế hoạch tiết kiệm năng lượng của mình |
| 11 | Tỷ lệ tăng/giảm điện năng tiêu thụ của khách sạn trình diễn trong năm 2018 so với mức tiêu thụ trong giai đoạn 2015-2017 sau khi triển khai các giải pháp tiết kiệm năng lượng trong năm 2017. |
| 12 | Tiêu thụ năng lượng bình quân 1$m^2$ sàn của tòa nhà |
| 13 | Tỷ lệ tăng/giảm tiêu thụ năng lượng bình quân của tòa nhà |
| 14 | Tỷ lệ công trình tòa nhà đạt chứng chỉ công trình xanh |
| 15 | Tỷ lệ công trình số tòa nhà mới xây được thẩm định là đạt Quy chuẩn 09 |

# Part 3. NEXT ACTIVITIES

- Assessment of energy use status and related current policies;

- Implementing propaganda programs on E & E in the city;

- Mobilize resources to support and implement:

+ Establish a team of consultants and propagandists on energy saving in the city.

+ Demonstrate the application of energy saving solutions for potential sectors as hotels, aiming at replicating performance results to other buildings and hotels in the city.

+ Investigating to collect building data and energy use of buildings in the city, aiming to build the baseline on energy use of the city's buildings.

WORLD RESOURCES INSTITUTE

Building Efficiency Accelerator

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100 RESILIENT CITIES

ĐÀ NẴNG

# Thank you!

Centre for Energy and Environmental Markets

UNSW THE UNIVERSITY OF NEW SOUTH WALES SYDNEY • AUSTRALIA





# Low Carbon Model Towns – *Australian insights on possible roles for Universities*


***Iain MacGill***

Associate Professor, School of Electrical Engineering and Telecommunications
Joint Director (Engineering), CEEM


*Second APEC Low-Carbon Model Town Symposium*

Da Nang, Vietnam

September 2018

# Presentation outline

- Australian cities
  - their living, economic roles.. and environmental impacts
  - Current efforts in low-carbon transition
- Australian Universities
  - their context, capabilities
- Some relevant examples of collaboration between Universities, Government and Industry
  - Cooperative Research Centre for Low Carbon Living
  - The Australian PV Institute
  - Centre for Urban Research
  - Cooperative Research Centre for Water Sensitive Cities
- Possible lessons
  - Stakeholder partnerships - ready, willing and able to contribute
  - Funding partnerships – end-user contributions from Government and Industry, in-kind from Universities
- Facilitating collaboration
  - Open data
  - Open source models
  - Open processes for decision making

# Australian cities

## EMPLOYMENT

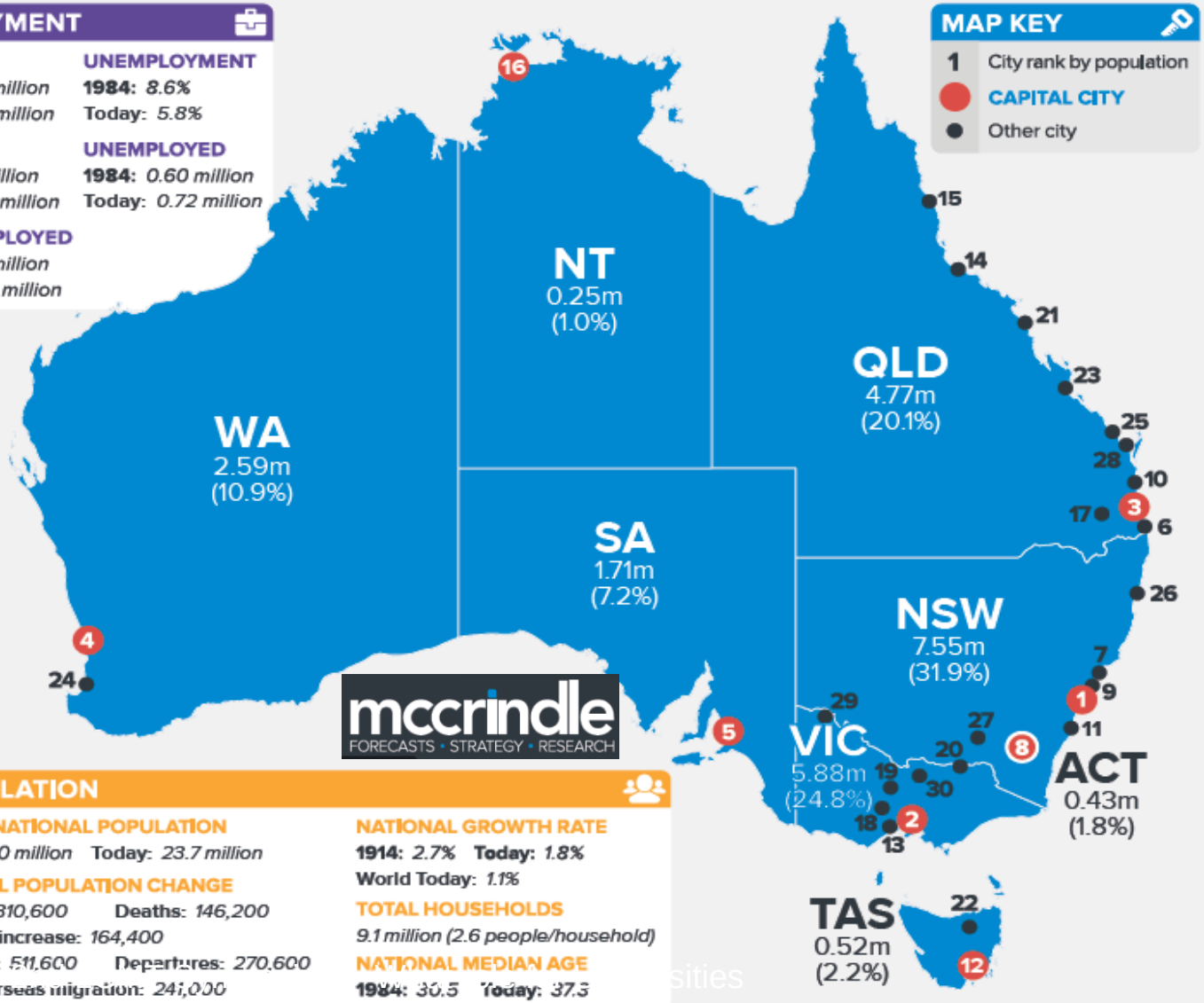
**FULL TIME**
**1984:** *5.3 million*
**Today:** *8.1 million*

**UNEMPLOYMENT**
**1984:** *8.6%*
**Today:** *5.8%*

**PART TIME**
**1984:** *1.1 million*
**Today:** *3.5 million*

**UNEMPLOYED**
**1984:** *0.60 million*
**Today:** *0.72 million*

**TOTAL EMPLOYED**
**1984:** *6.4 million*
**Today:** *11.6 million*




## MAP KEY

1 City rank by population
CAPITAL CITY
Other city

## POPULATION

**TOTAL NATIONAL POPULATION**
**1914:** *5.0 million* **Today:** *23.7 million*

**ANNUAL POPULATION CHANGE**
**Births:** *310,600* **Deaths:** *146,200*
**Natural increase:** *164,400*
**Arrivals:** *511,600* **Departures:** *270,600*
**Net overseas migration:** *241,000*

**NATIONAL GROWTH RATE**
**1914:** *2.7%* **Today:** *1.8%*
**World Today:** *1.1%*

**TOTAL HOUSEHOLDS**
*9.1 million (2.6 people/household)*

**NATIONAL MEDIAN AGE**
**1984:** *30.5* **Today:** *37.3*

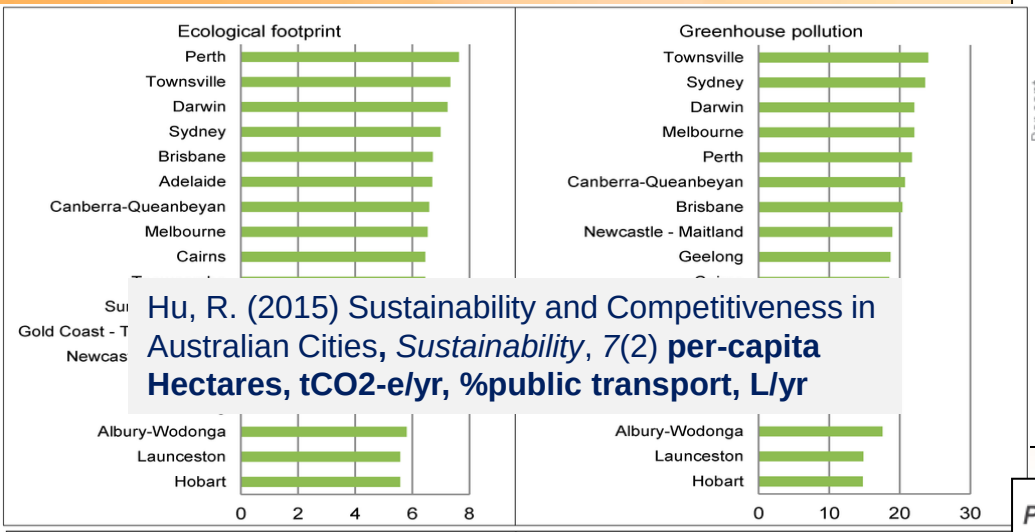
## CITY BY POPULATION

| # | CITY | '000 |
|---|---|---|
| 1 | SYDNEY | 4,488 |
| 2 | MELBOURNE | 4,375 |
| 3 | BRISBANE | 2,207 |
| 4 | PERTH | 1,995 |
| 5 | ADELAIDE | 1,283 |
| 6 | Gold Coast | 623 |
| 7 | Newcastle | 433 |
| 8 | ACT/CANBERRA | 429 |
| 9 | Central Coast | 324 |
| 10 | Sunshine Coast | 301 |
| 11 | Wollongong | 291 |
| 12 | HOBART | 208 |
| 13 | Geelong | 186 |
| 14 | Townsville | 182 |
| 15 | Cairns | 149 |
| 16 | DARWIN | 124 |
| 17 | Toowoomba | 115 |
| 18 | Ballarat | 100 |
| 19 | Bendigo | 93 |
| 20 | Albury/Wodonga | 88 |
| 21 | Mackay | 87 |
| 22 | Launceston | 86 |
| 23 | Rockhampton | 82 |
| 24 | Bunbury | 76 |
| 25 | Bundaberg | 71 |
| 26 | Coffs Harbour | 69 |
| 27 | Wagga Wagga | 55 |
| 28 | Hervey Bay | 52 |
| 29 | Mildura | 50 |
| 30 | Shepparton | 49 |

Centre for Energy and Environmental Markets

Australian Government
Department of Infrastructure and Regional Development

# Their living, economic role .. & environment impacts







Hu, R. (2015) Sustainability and Competitiveness in Australian Cities, *Sustainability*, *7*(2) **per-capita Hectares, tCO2-e/yr, %public transport, L/yr**

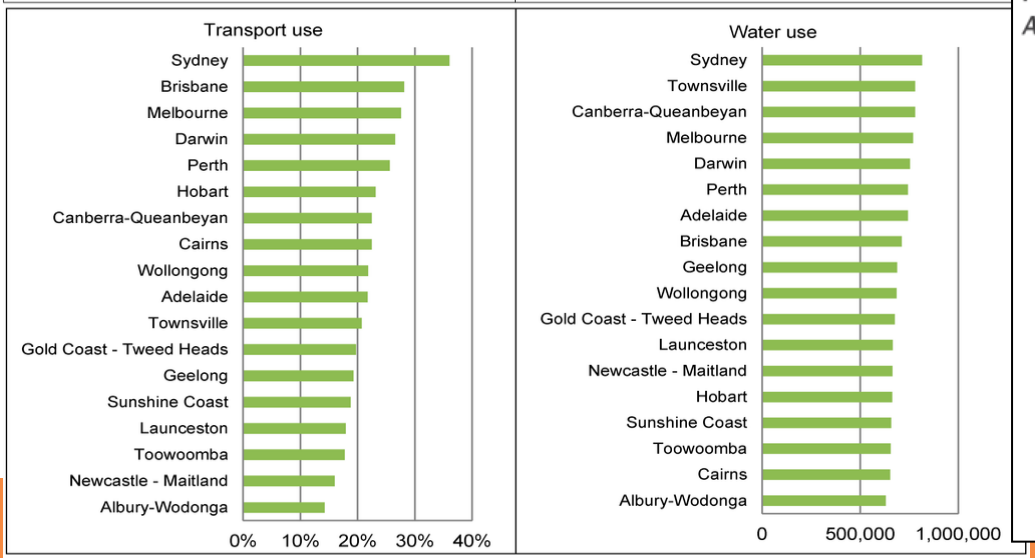
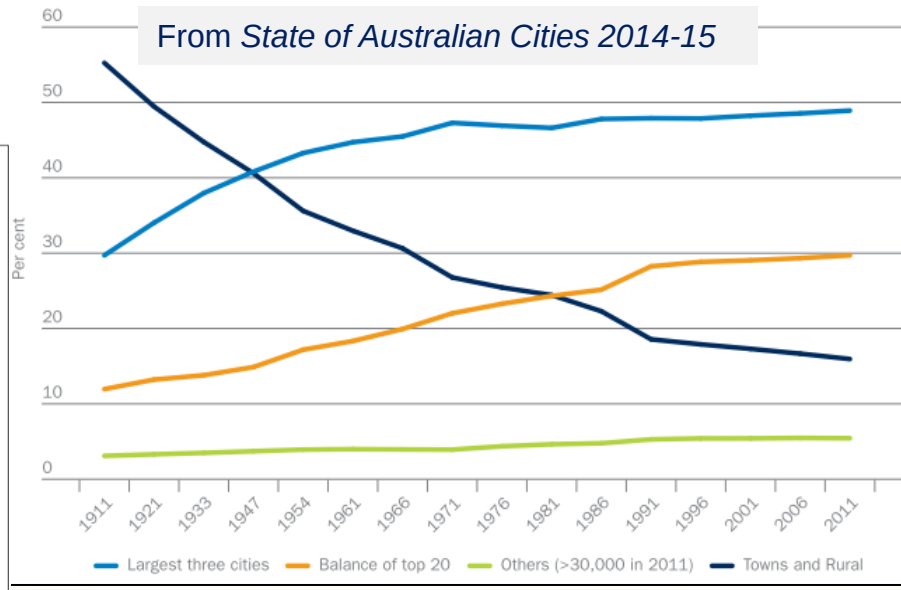




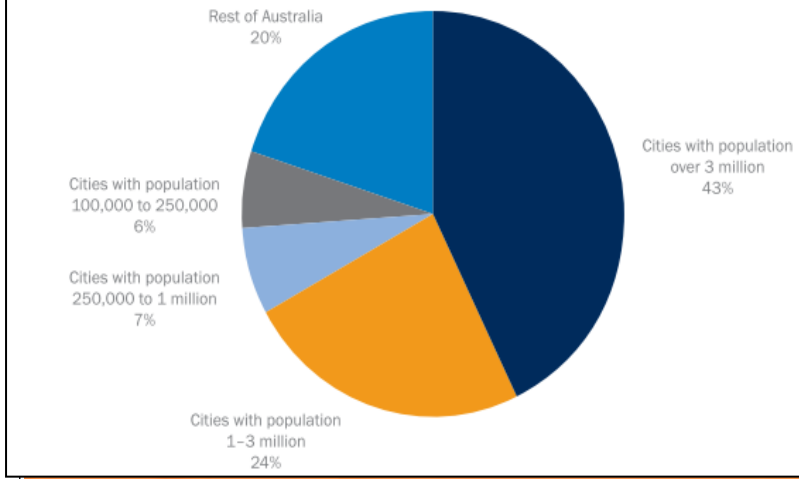


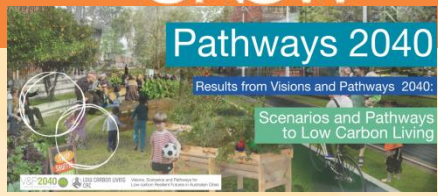
*Figure 2.2a Population proportion by settlement type, 1911–2011*

From *State of Australian Cities 2014-15*




*Proportion of Gross Domestic Product attributed to cities and regional areas of Australia, 2010*





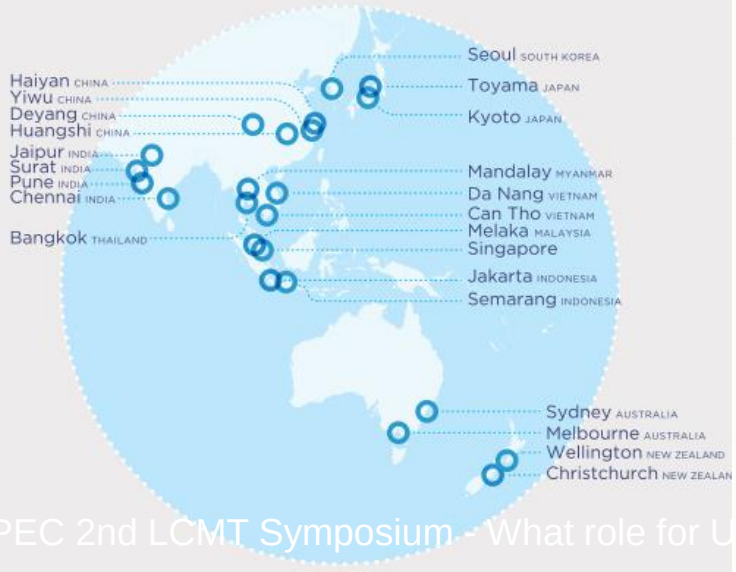

# Some with ambitious climate targets

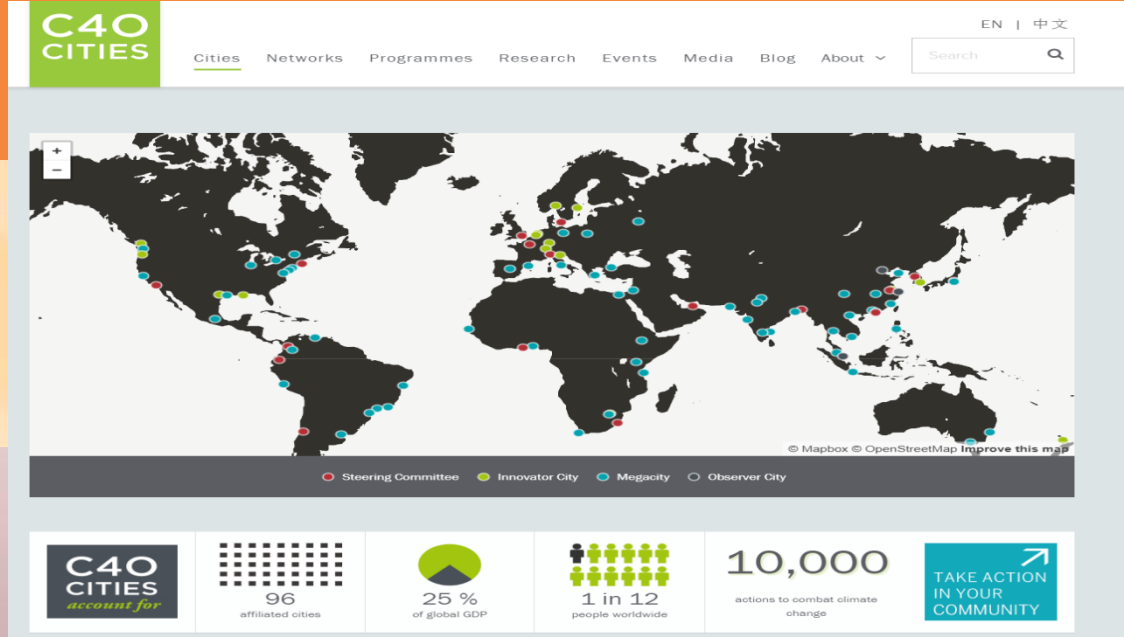
| *Target and Scope*[a,b] | *City Jurisdiction* | *Climate change policy framework and planned actions/ goals* | *Progress since baseline and influential policies / actions* |
|---|---|---|---|
| *City of Melbourne*<br><br>*Target: zero net emissions by 2020, 25% renewable electricity by 2018; 4.5%/year council emissions (2011/12)*<br>*Scope: $CO_2e$, cons.* | *Pop. 128K*<br>*Area: 36 km2* | *Zero Net Emissions by 2020* (2002, update 2008 and 2014) actions include:<br>• Council operations: Queen Victoria Market renewal, Urban Forest Strategy<br>• Buildings & industry: commercial building retrofits (1200 Buildings Program)<br>• Energy: Collaborate with CitiPower on energy management & supply system<br>• Transport & freight: implement Bicycle Plan, develop walking plan<br>• Waste: trial precinct solutions that improve resource recovery | Overall emissions increased by 18% since 2008/9. Target of 10% reduction in council operation compared to 2010/11 achieved. Highlights since 2003:<br>• Queen Victoria Market solar array installed (25,000 kW capacity) in 2003<br>• NCOS Certified Carbon Neutral status for council operations in 2012<br>• Swanston Street redevelopment increased public transport & cycling access<br>• Melbourne Renewable Energy Purchasing Group with 3 other councils |
| *City of Darebin*<br><br>*Target: zero net emissions by 2020; zero net emissions council by 2022 (2006/7)*<br>*Scope: $CO_2e$, cons.* | *Pop. 147K*<br>*Area: 53 km2* | *Darebin Climate Emergency Plan* (2017) actions focus on 2017-2022:<br>• Energy: expanded Solar $aver Program to install 11,000kW, Solar Bulk Buy<br>• Buildings: new buildings high ESD standard, streetlights to energy-efficient LEDs<br>• Transport: Darebin Cycling Strategy, explore electric vehicles for council fleet<br>• Consumption and waste: Investigate food waste service options to residents<br>• Other: Climate Emergency campaign, invest with fossil-free financial institutions | Council emissions reduced by 45% from 2006/7 levels. Successful actions:<br>• Solar systems installed for app. 500 pensioners & low-income households<br>• 142 businesses had their lights upgraded to energy-efficient LEDs<br>• Energy efficiency information in several languages<br>• Increased comfort & reduced energy costs in 482 vulnerable households |
| *City of Adelaide*<br><br>*Target: Carbon neutral, i.e. 65% by 2025 (2007); carbon neutral council by 2020*<br>*Scope: $CO_2e$, cons.* | *Pop. 22K*<br>*Area: 16 km2* | *Carbon Neutral Adelaide Action Plan 2016-2021* (2016) action highlights:<br>• Buildings: support adaptive reuse of commercial buildings, Green City Plan<br>• Transport: encourage 100% renewable energy for all electric vehicle recharging<br>• Energy: increase investment in large scale renewables, battery storage<br>• Waste & water: reduce emissions from solid and liquid waste | Community emissions have reduced by 20% in 2007-2013. Highlights:<br>• City office emissions cut by 23% e.g. through green building design<br>• $2.6 billion invested to extend tram network & electrify the train network<br>• Cycling journeys in and through the city have doubled since 2003<br>• 43% of State's grid electricity sourced from renewable energy |
| *City of Sydney*<br><br>*Target: 70% by 2030, zero net emissions by 2050; 50% of renewable electricity by 2030; council 44% by 2021 (2006)*<br>*Scope: $CO_2e$, cons.* | *Pop. 208K*<br>*Area: 25 km2* | *Environmental Action 2016-2021 Strategy and Action Plan* (2017) actions:<br>• Buildings: net zero carbon buildings challenge, non-residential tune-up program<br>• Energy: trigen system at Town Hall House, invest up to $10M in renewables<br>• Transport: update car sharing policy, 10 high-priority regional cycling routes<br>• Waste: review & update waste treatment contracts to avoid landfilled waste<br>• Other: plant 700 street trees each year until 2021 | Community emissions reduced by 17% in 2006-2015. Highlights:<br>• Better Buildings Partnership collectively reduced annual emissions by 45%<br>• Over 6,600 LED street lights installed across the local area since 2011<br>• 650 on-street parking spaces dedicated to car share vehicles<br>• 69% of household waste diverted from landfill each year |
| *Moreland City Council*<br><br>*Target: 22% by 2020 (in line with zero net emissions by 2045, 2011)*<br>*Scope: $CO_2e$, cons.* | *Pop. 163K*<br>*Area: 51 km2* | *Zero Carbon Evolution Strategy* (2014) actions by 2020:<br>• Energy: low-interest finance for solar PV systems, Community Solar Cooperative<br>• Buildings: energy efficiency retrofits on 36k homes, Green Tradies program<br>• Transport: Improve north-south and east-west bike networks, 500 car share bays<br>• Other: Urban Heat Island Action Plan, minimise food waste | Council operation emissions reduced by 4% in 2011/12-2013/14. Highlights:<br>• 2nd in VIC certified as carbon neutral for its corporate operations in 2012<br>• Over 1000 low income homes retrofitted in 2012<br>• Significant energy efficiency improvements of key city buildings since 2009<br>• 6 public electric vehicle charging stations installed in 2013 |
| *City of Perth*<br><br>*Target: 30% by 2030, (BAU baseline), 20% renewable/ low carbon energy by 2030; council 30% by 2030*<br>*Scope: $CO_2e$, no cons.* | *Pop. 21K*<br>*Area: 20 km2* | *Environment Strategy* (2016) highlights:<br>• Energy: generate renewable energy from city properties<br>• Buildings: retrofitting and improved energy performance initiatives<br>• Transport: work with community to increase the use of public transport<br>• Waste: improved residential & commercial waste, recycling,green waste services<br>• Water: implement and promote water sensitive urban design | Highlights:<br>• 380,000 trees planted in the City's carbon offset tree planting program<br>• Penny Lane Green Star affordable housing project completed in 2013<br>• $500k invested into the City of Perth Cycle Plan 2029 adopted in 2012 |

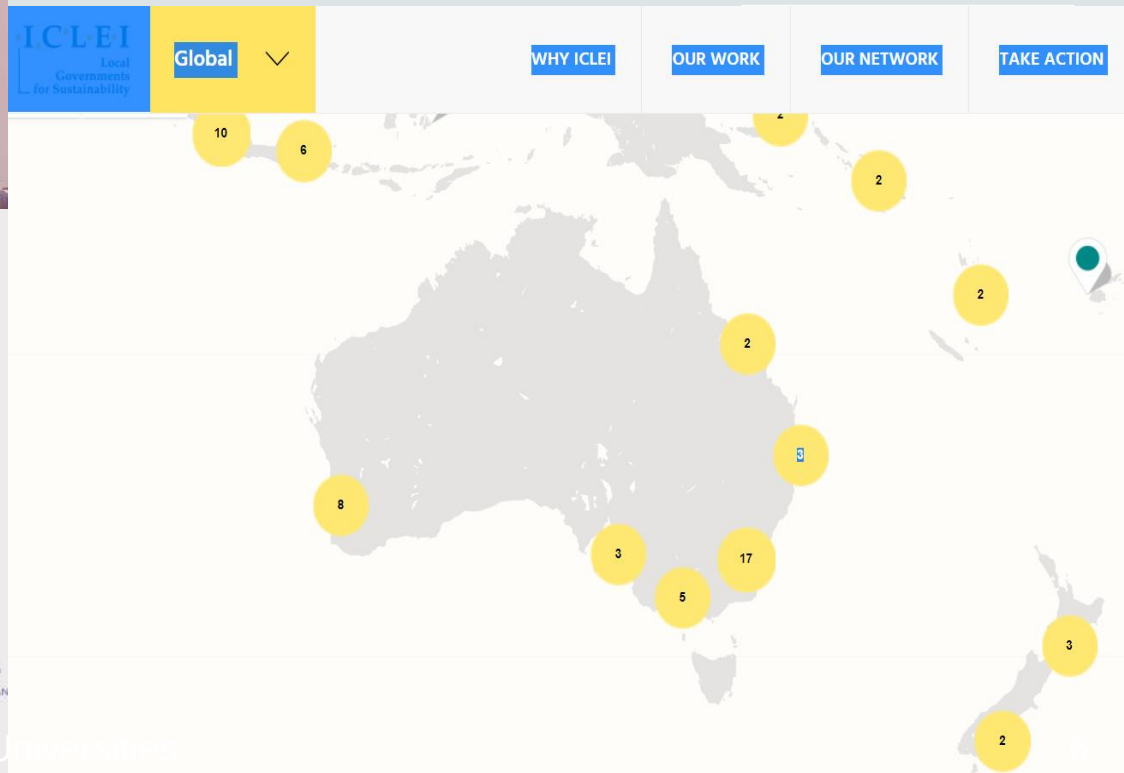
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# ..and international partnerships

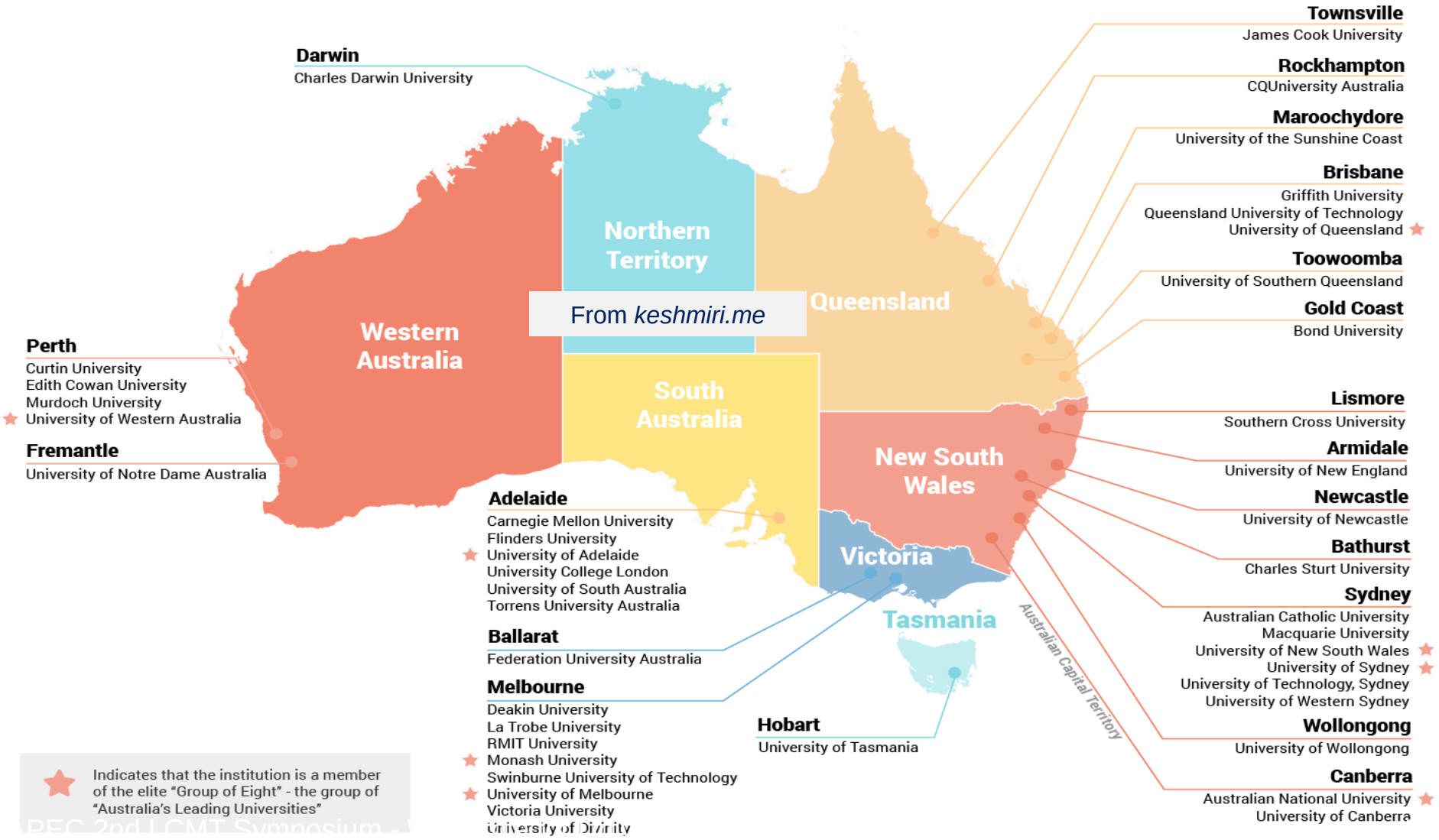


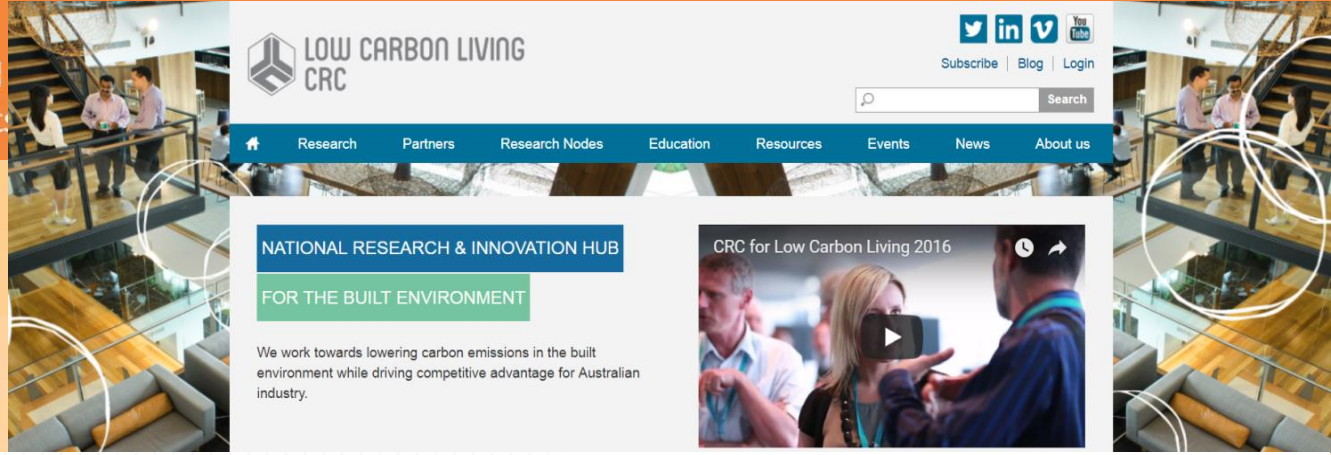



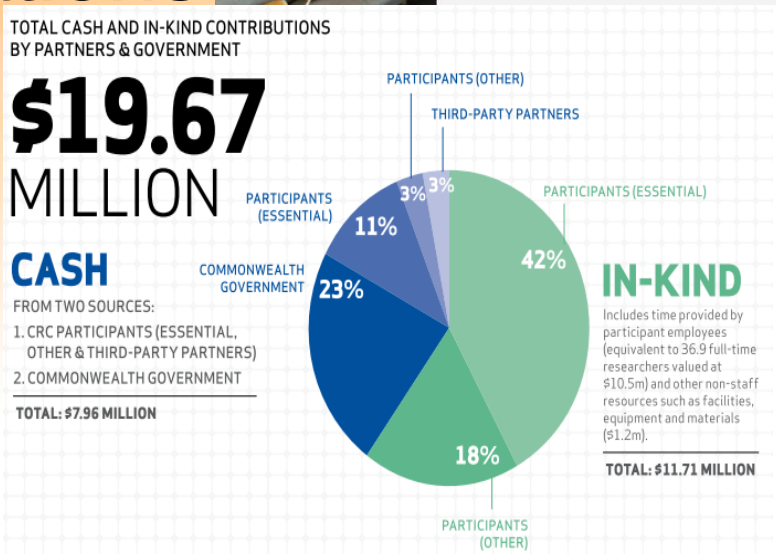



# Australian Universities



# Some key university collaborations






# How: An end-user focus

## Government

NSW Government – Office of Environment & Heritage

Government of South Australia

Australian Government – Department of Climate Change and Energy Efficiency

City of Melbourne

City of Sydney 2030

**Evidence base for ~$1billion/yr investment in government programs**

## Manufacturing

CSR

BlueScope Steel

**Incubating next generation multi-purpose building products**

## Development

UrbanGrowth NSW

VBA Victorian Building Authority

Multiplex

RenewalSA – people partnerships progress

Government of South Australia

**Enabling world class low carbon property development**

## Professionals

AECOM

Consult Australia – Business | Engineering | Design

Hassell

asbec – Australian Sustainable Built Environment Council

Australian Institute of Architects

**Tools for Australia's building design services industry**

# CRC LCL - Research program

PROGRAM 1



## Integrated Building Systems

1. Harnessing the Australian sun
2. Lowering the embodied carbon in buildings
3. Mainstreaming low carbon buildings

Developing new low carbon embodied products and services, and finding ways to communicate best practice design through rating tools, standards and display homes.

PROGRAM 2



## Low Carbon Precincts

4. Designing integrated low carbon precincts

Creating planning techniques and data for delivering low carbon developments at a precinct level. Communicating best practice in sustainable city planning through exemplar precinct developments and tools.

PROGRAM 3



## Engaged Communities

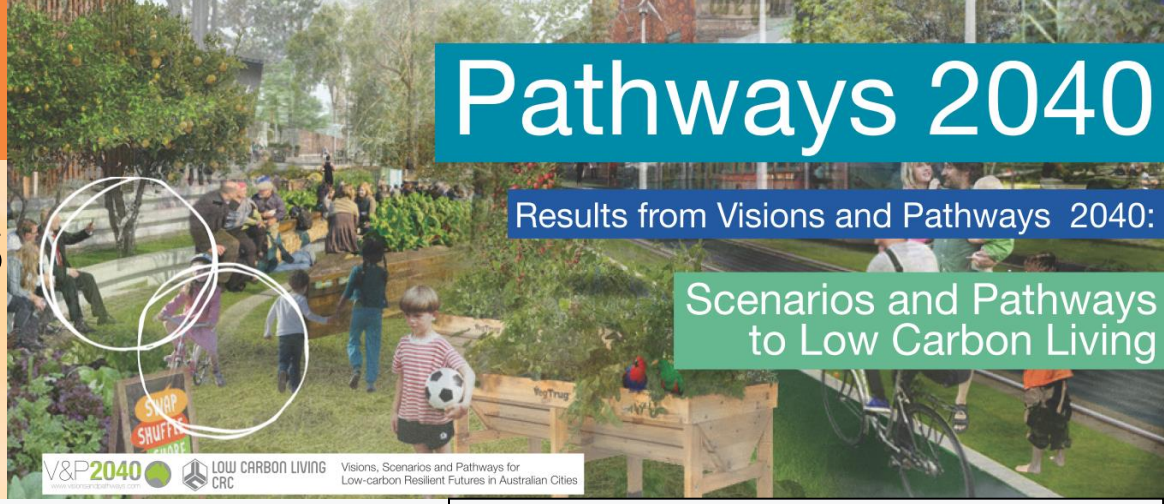
5. Evidence base for low carbon living policy
6. Enhancing community engagement

Capturing a new community appetite for low carbon living. Through research, [illegible] the vision of a prosperous, liveable and sustainable society.

7. Living laboratories as low carbon lifestyle narratives
8. Enhance education and capacity building

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# Relevant projects -*some big picture*



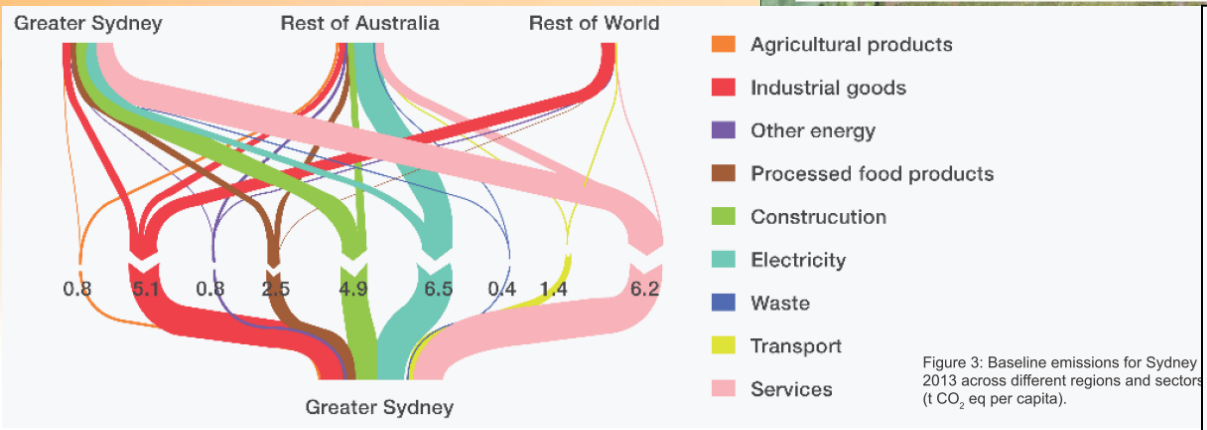
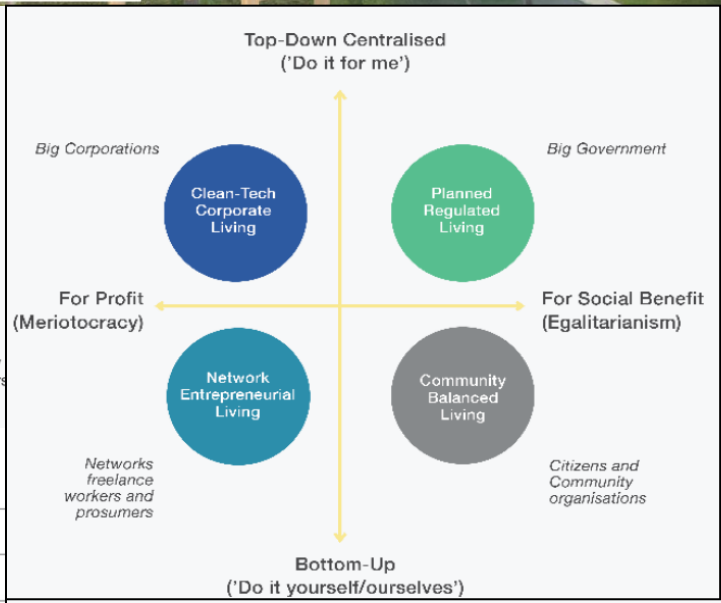




Figure 3: Baseline emissions for Sydney 2013 across different regions and sectors ($t CO_2$ eq per capita).



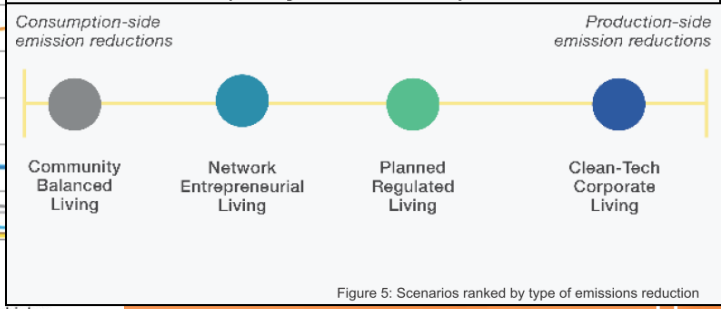
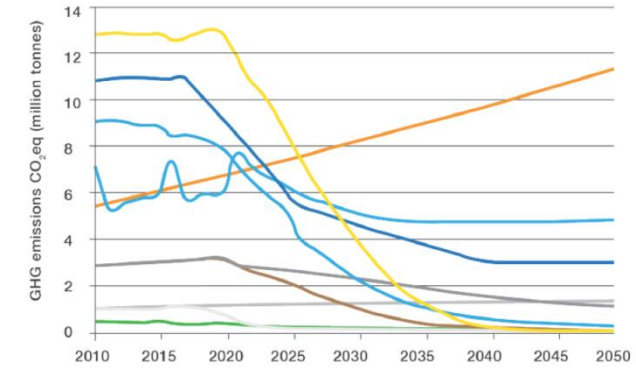
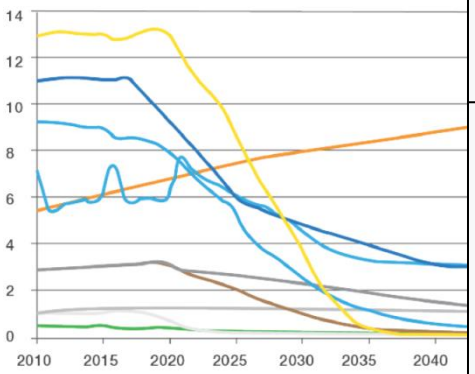




Figure 5: Scenarios ranked by type of emissions reduction

*Green Growth*




*Commons Transition*






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# Others more specific: *Enhancing National House Energy Rating Scheme*

Review NatHERS assumptions, logic and settings against contemporary data and develop models for

- Ventilation
- Thermal comfort
- Ceiling fans

AusZEH Design (Lite & Heavy)






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# Distributed PV

AUSTRALIAN PV INSTITUTE

About Us | Publications | Projects | IEA / PVPS | Talks/Events | IEA / SHC | Sola 2018

AUSTRALIAN PV INSTITUTE

Live Solar PV | PV Performance | Solar PV Status | Market Analyses | SunSPoT | Solar Animation | PV Postcode Data

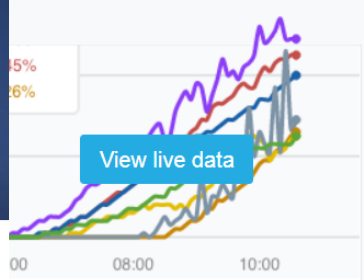
## Solar PV Maps and Tools

Understand the Australian solar PV market with live generation data, historical maps and animations, and tools to explore rooftop PV potential and per-postcode market penetration.

This project has been funded by the Australian Renewable Energy Agency

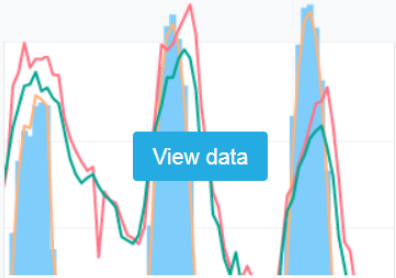
ARENA Australian Government Australian Renewable Energy Agency






### Live Solar PV

Live performance data from nationwide PV installations, with total electricity demand and PV contribution



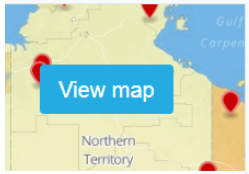

### PV Performance by Climate Region

Compare and chart PV generation data from over 50 locations across Australia, and download data for offline analysis



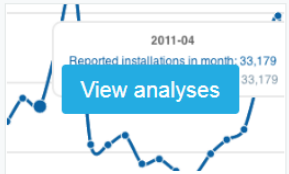

### SunSPoT

Rooftop solar mapping tool using 3D data, for assessing annual and per-month PV potential in urban environments



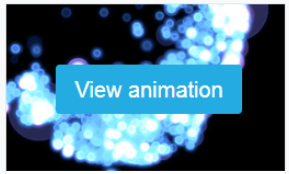

### Solar PV Status

Estimated percentage of dwellings with PV systems and total installed capacity, by postcode and LGA



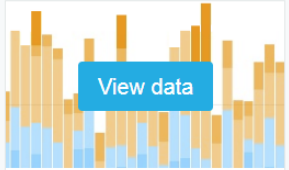

### Market Analyses

Charting per-month PV installations registered under the Commonwealth Government's Renewable Energy Target




### Solar Animation

Visualise per-postcode PV installations across Australia since January 2007, by average system size and PV penetration




### PV Postcode Data

Explore PV installations by postcode and system size, with per-month installation figures since 2007

**APVI LARGE CORPORATE MEMBERSHIP**

| Industry | Government | Research |
|---|---|---|
| Origin Energy | Powerlink | Australian Centre for Advanced Photovoltaics |
| Global Roam | Ergon Energy | Institute for Sustainable Futures |
| Trina Solar | | University of New South Wales |
| | | CSIRO |
| | | Australian National University |

**APVI MEDIUM CORPORATE MEMBERSHIP**

| Industry | Government | Research |
|---|---|---|
| Solar Analytics | | |
| IT Power Australia | | |
| Green Energy Trading | | |

**APVI SMALL CORPORATE MEMBERSHIP**

| Industry | Government | Research |
|---|---|---|
| Enosi Australia | | Murdoch University |
| QGE | | Centre for Renewable Energy, Charles Darwin University |
| Ingeteam Australia | | |

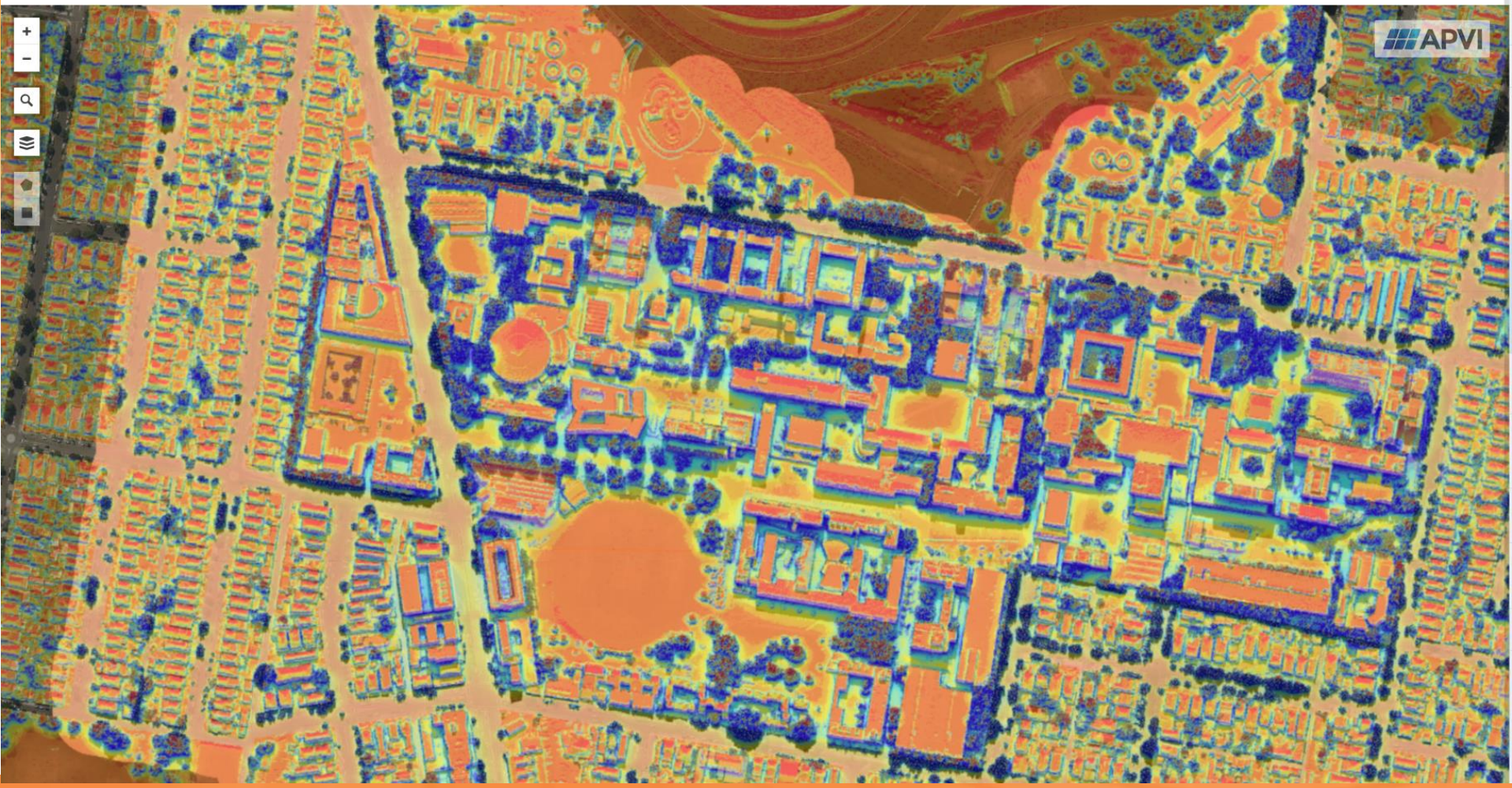
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Live Solar PV | PV Performance | Solar PV Status | Market Analyses | SunSPoT | Solar Animation | PV Postcode Data

## SunSPoT Solar Potential Map

Help

More information on how to use the map is located here

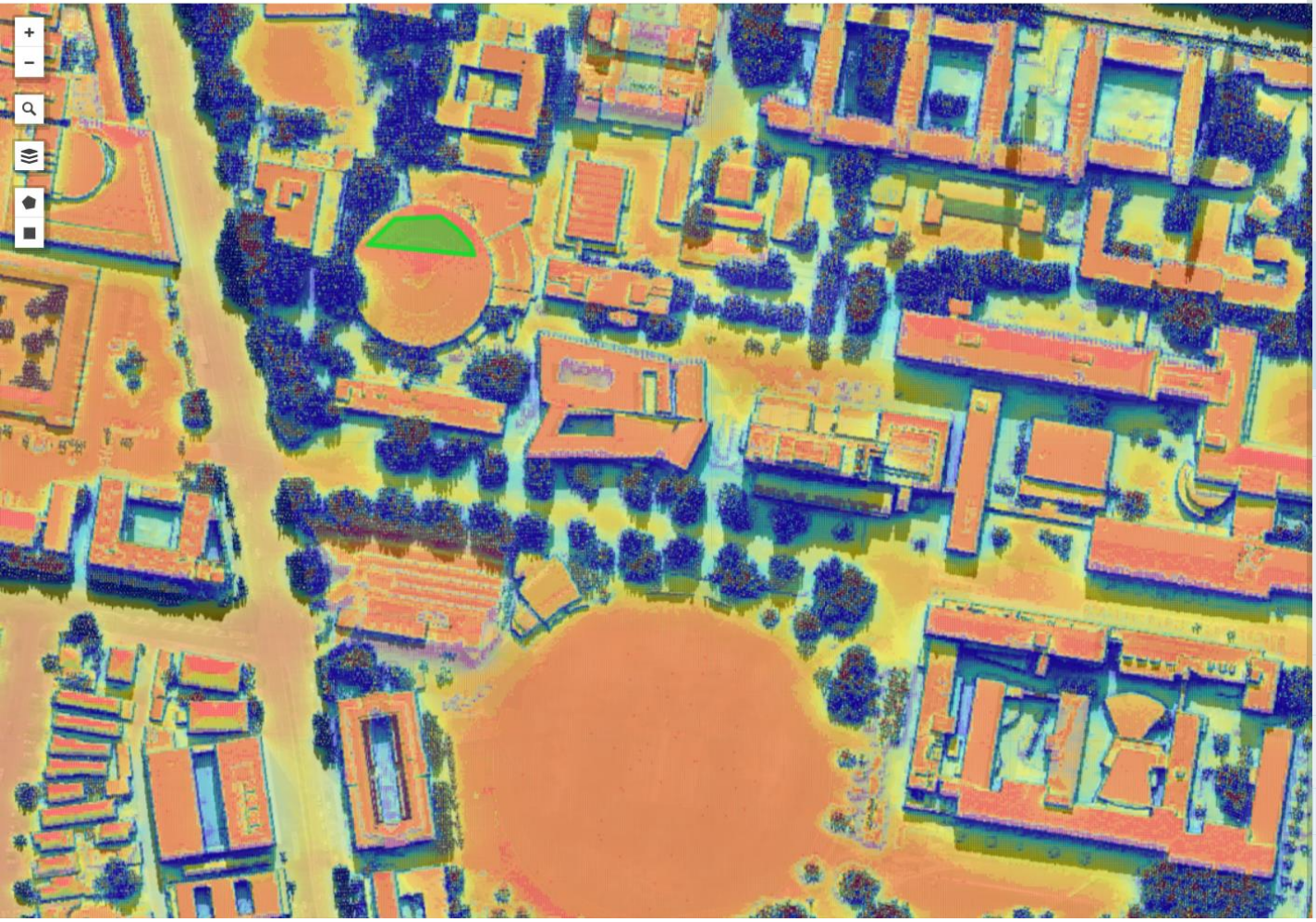


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Live Solar PV | PV Performance | Solar PV Status | Market Analyses | SunSPoT | Solar Animation | PV Postcode Data

## SunSPoT Solar Potential Map

Help



SELECTED AREA — Clear selection

| | |
|---|---|
| Approximate area | 400.58m$^2$ |

| Insolation | Orientation | Tilt |
|---|---|---|
| 4.52 kWh/m$^2$/day | 358° | 9° |

OPTIONS

Flush mounted | Rack mounted

Flush mounted system size 62.5 kW

AC power output per month

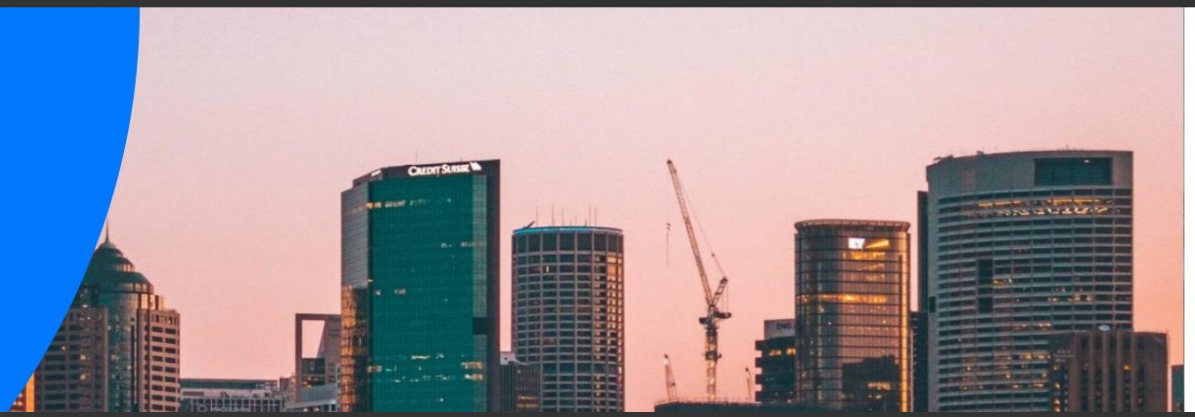



| | |
|---|---|
| Annual AC output | 79,295.75 kWh |
| Annual output per kW of installed capacity | 1,268.73 kWh/kW |

| Estimated annual value | Annual $CO_2$ offset |
|---|---|
| $19,823.94 | 63,040.12 kg |
| at 25 ¢ per kWh | at 0.84 kg per kWh |

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# What's the score?

New report reveals Sydney's urban wins and fails

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Research Programs

## Beyond Behaviour Change

The Beyond Behaviour Change research program draws on theories of social practice to inform research aimed at reorienting policy and programs intending to achieve social and environmental change.

+ Find out more

Research Programs

## Climate Change and Resilience

Engaging with society's climate change challenges

+ Find out more

Research Programs

## Critical Urban Governance

The Critical Urban Governance program brings together urban researchers and educators at RMIT to focus critical attention on how cities are governed, and for whom.

+ Find out more

Research Programs

## Healthy Liveable Cities Group

Learning more about the relationship between health and the places people live, work, learn and play can better prepare us for the challenges of tomorrow.

+ Find out more










Research Programs

## Housing and Urban Economics

Developing a better understanding of how policy and economic activities can be enacted to improve micro- and macro-economic prosperity.

+ Find out more

Research Programs

## Interdisciplinary Conservation Science

The Interdisciplinary Conservation Science Research Group is a team of researchers working to understand the interaction between society and our environment.

+ Find out more

Research Programs

## Planning and Transport in City Regions

The Planning and Transport in City Regions Program seeks to understand processes of urban development and patterns of mobility at the metro-regional scale.

+ Find out more

Research Programs

## Urban Cultures and Technologies

This program examines the interplay of culture, technology and city spaces.

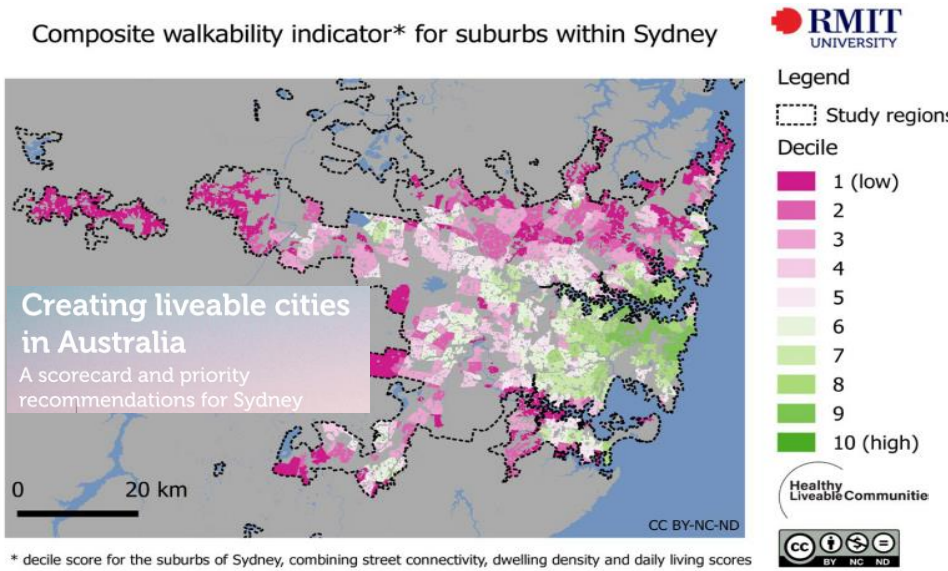
+ Find out more

# What makes a liveable city?

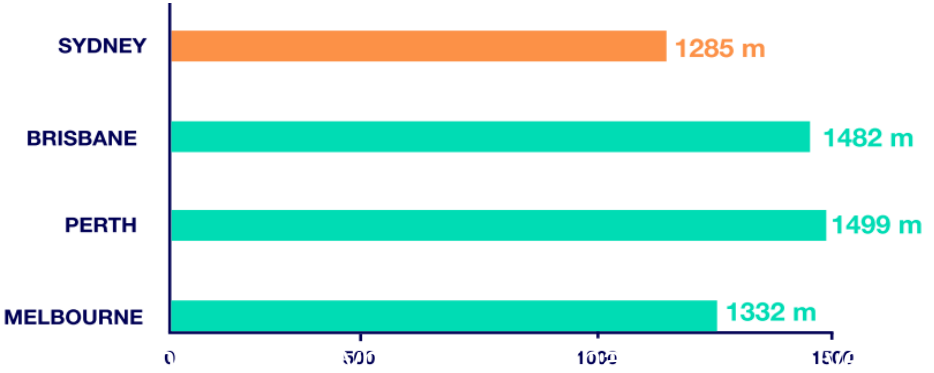
The term 'liveability' is widely used in Australia and across the world, yet it is rarely defined. We define a 'liveable' community as one that is:

> 'safe, attractive, socially cohesive and inclusive, and environmentally sustainable; with affordable and diverse housing linked by convenient public transport, walking and cycling infrastructure to employment, education, public open space, local shops, health and community services, and leisure and cultural opportunities [1].'

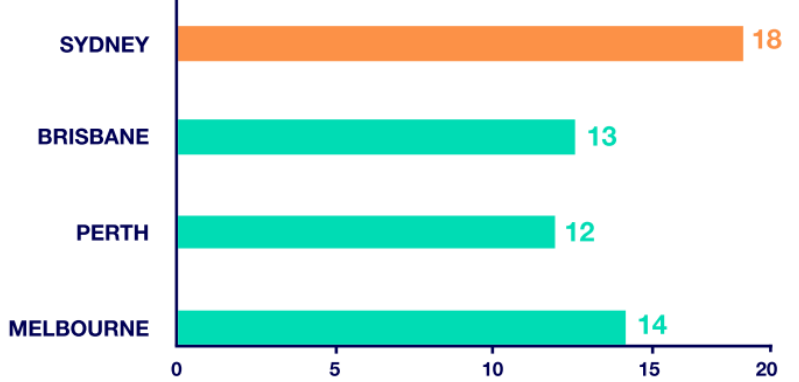
Liveable, walkable neighbourhoods can improve public health, and can increase environmental, economic and social sustainability [2, 3]. Creating healthy, liveable communities will therefore help cities achieve the United Nations Sustainable Development Goals [4] and United Nations Habitat's New Urban Agenda [5]. We have identified seven domains that help make neighbourhoods liveable:



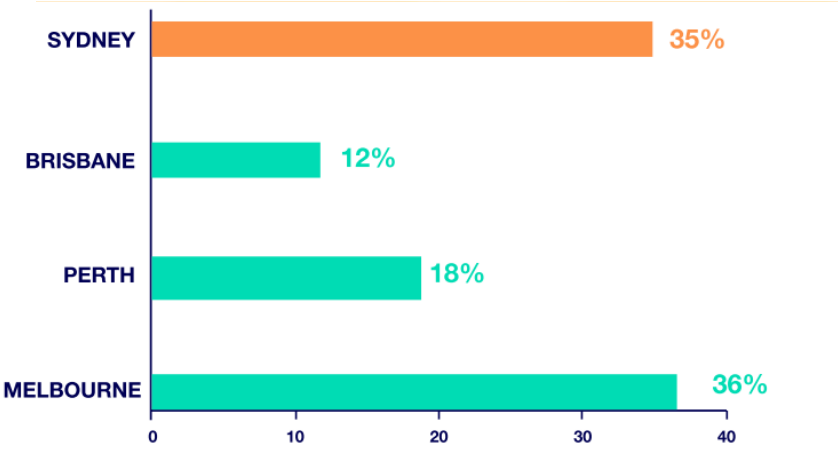

* decile score for the suburbs of Sydney, combining street connectivity, dwelling density and daily living scores



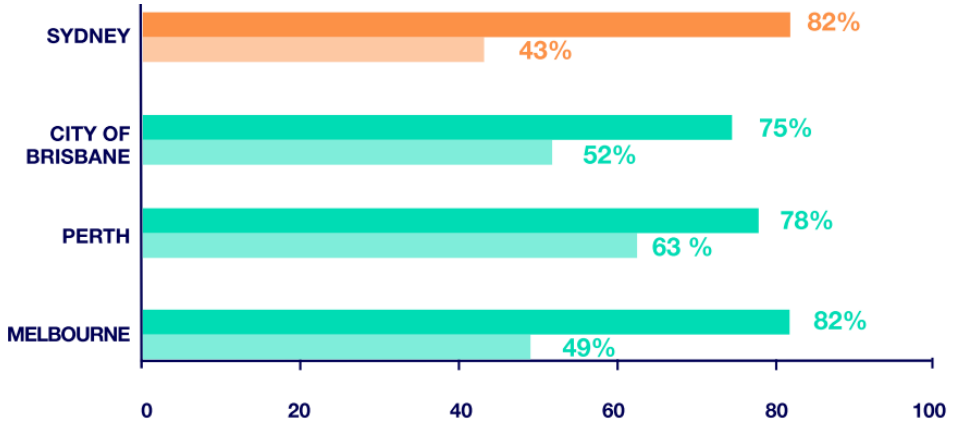

*Average distance in meters to the closest activity centre*



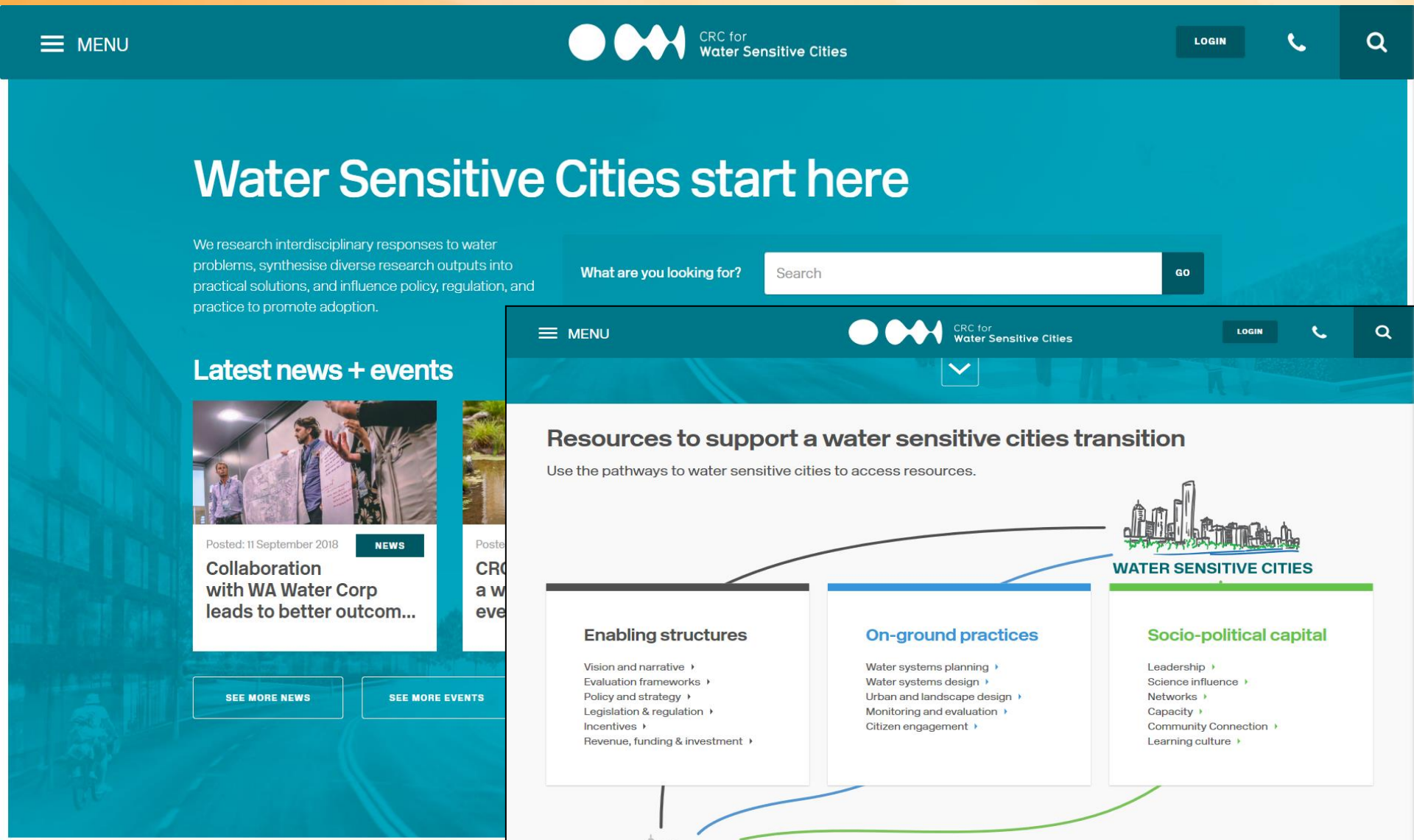

*Dwelling density (dwellings per hectare)*




*Percentage of residences within 400 m of a public transport stop with a service at least every 30 mins*

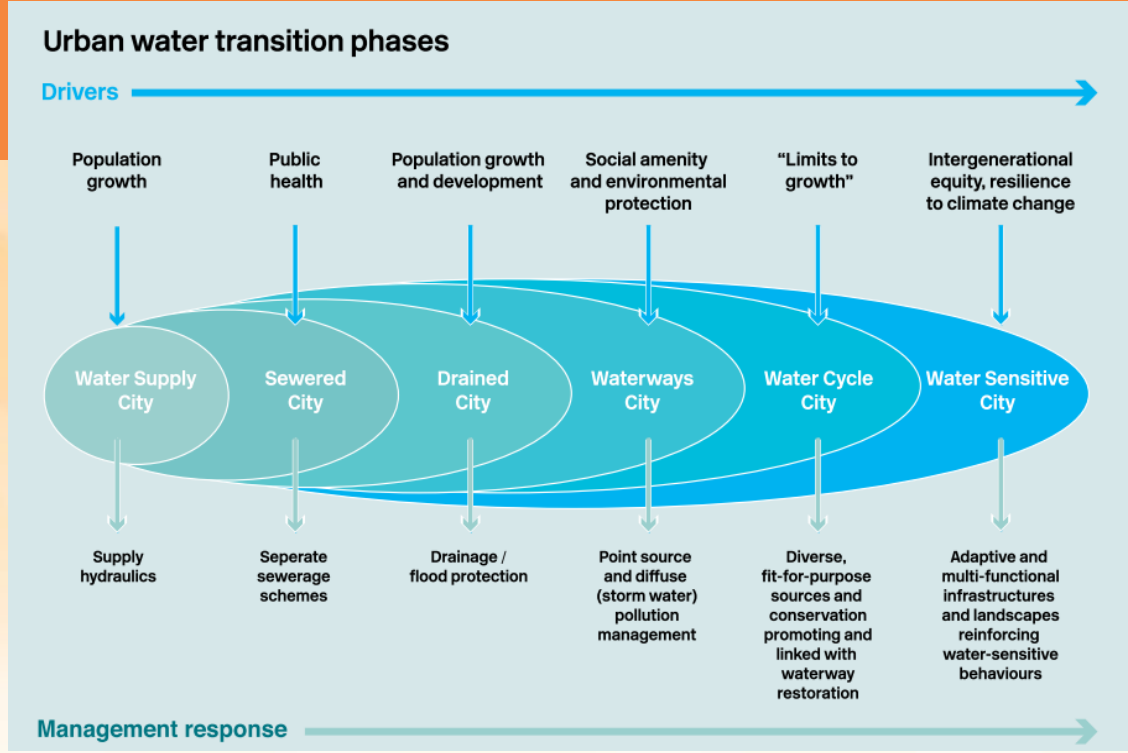


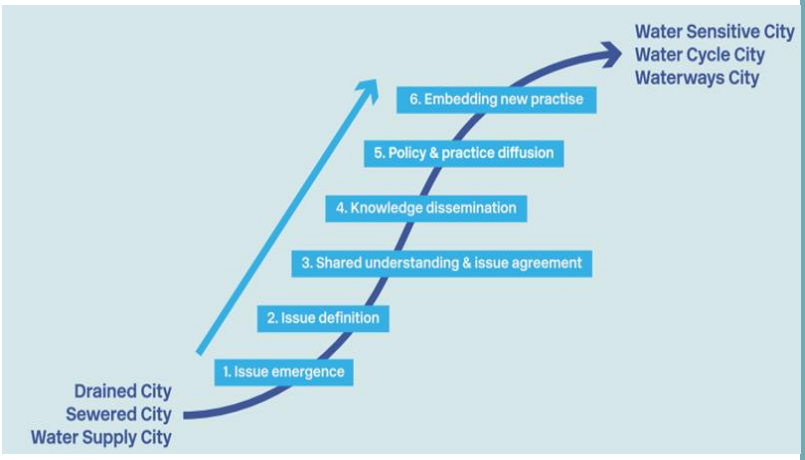

*Top bar: Percentage of residences within 400 m of a public open space*
*Bottom bar: Percentage of residences within 400 m of a public open space larger than 1.5 hectares*


MENU
CRC for Water Sensitive Cities
LOGIN
Water Sensitive Cities start here
We research interdisciplinary responses to water problems, synthesise diverse research outputs into practical solutions, and influence policy, regulation, and practice to promote adoption.
What are you looking for?
Search
GO
Latest news + events
Posted: 11 September 2018
NEWS
Collaboration with WA Water Corp leads to better outcom...
SEE MORE NEWS
SEE MORE EVENTS


MENU
CRC for Water Sensitive Cities
LOGIN
Resources to support a water sensitive cities transition
Use the pathways to water sensitive cities to access resources.
WATER SENSITIVE CITIES
Enabling structures
Vision and narrative
Evaluation frameworks
Policy and strategy
Legislation & regulation
Incentives
Revenue, funding & investment
On-ground practices
Water systems planning
Water systems design
Urban and landscape design
Monitoring and evaluation
Citizen engagement
Socio-political capital
Leadership
Science influence
Networks
Capacity
Community Connection
Learning culture
CURRENT SYSTEMS

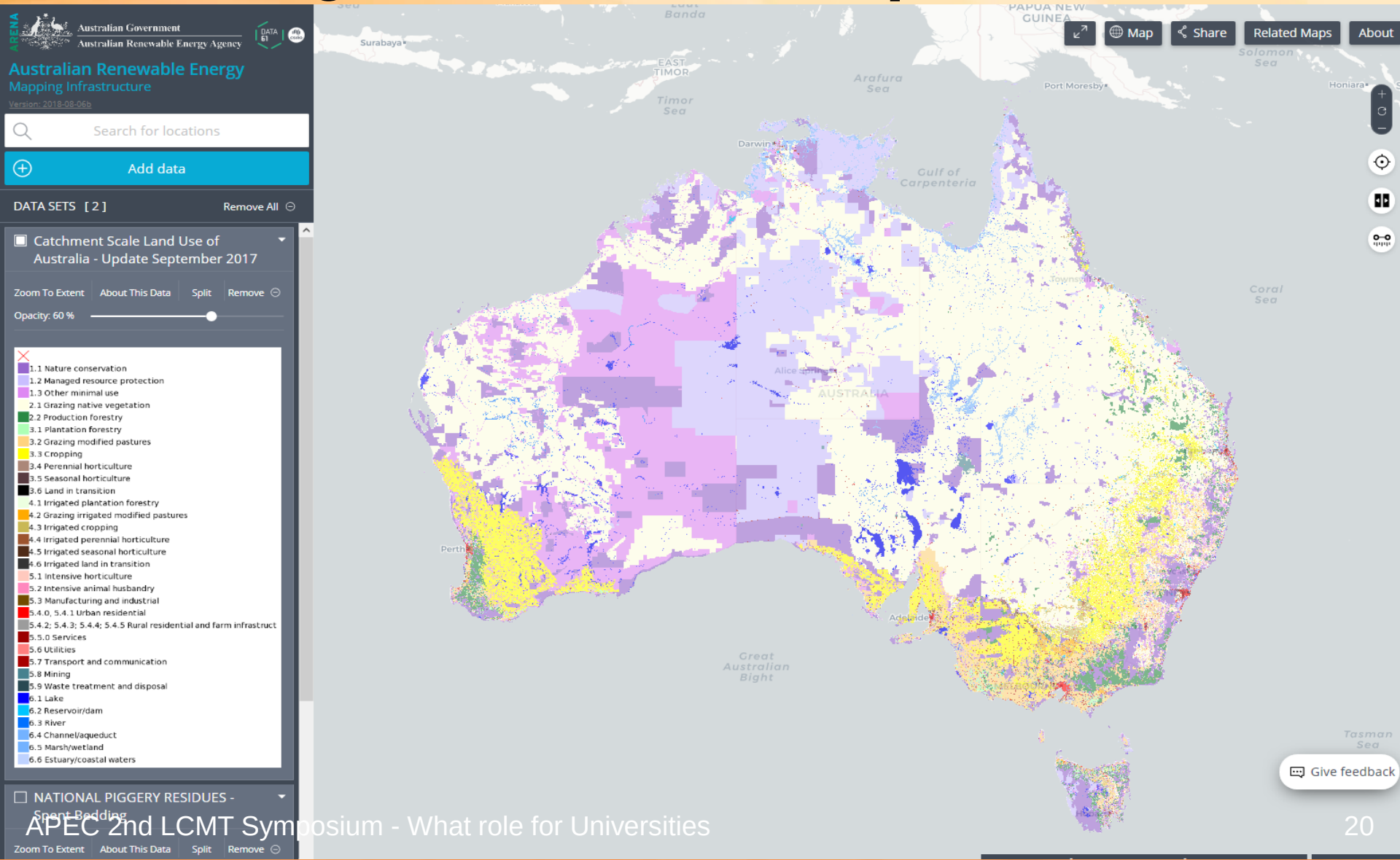

Water Utilities of the Future
Australia's experience in starting the transition
CRC for Water Sensitive Cities
Australian Government Department of Industry, Innovation and Science | Business Cooperative Research Centres Programme
ThinkTank

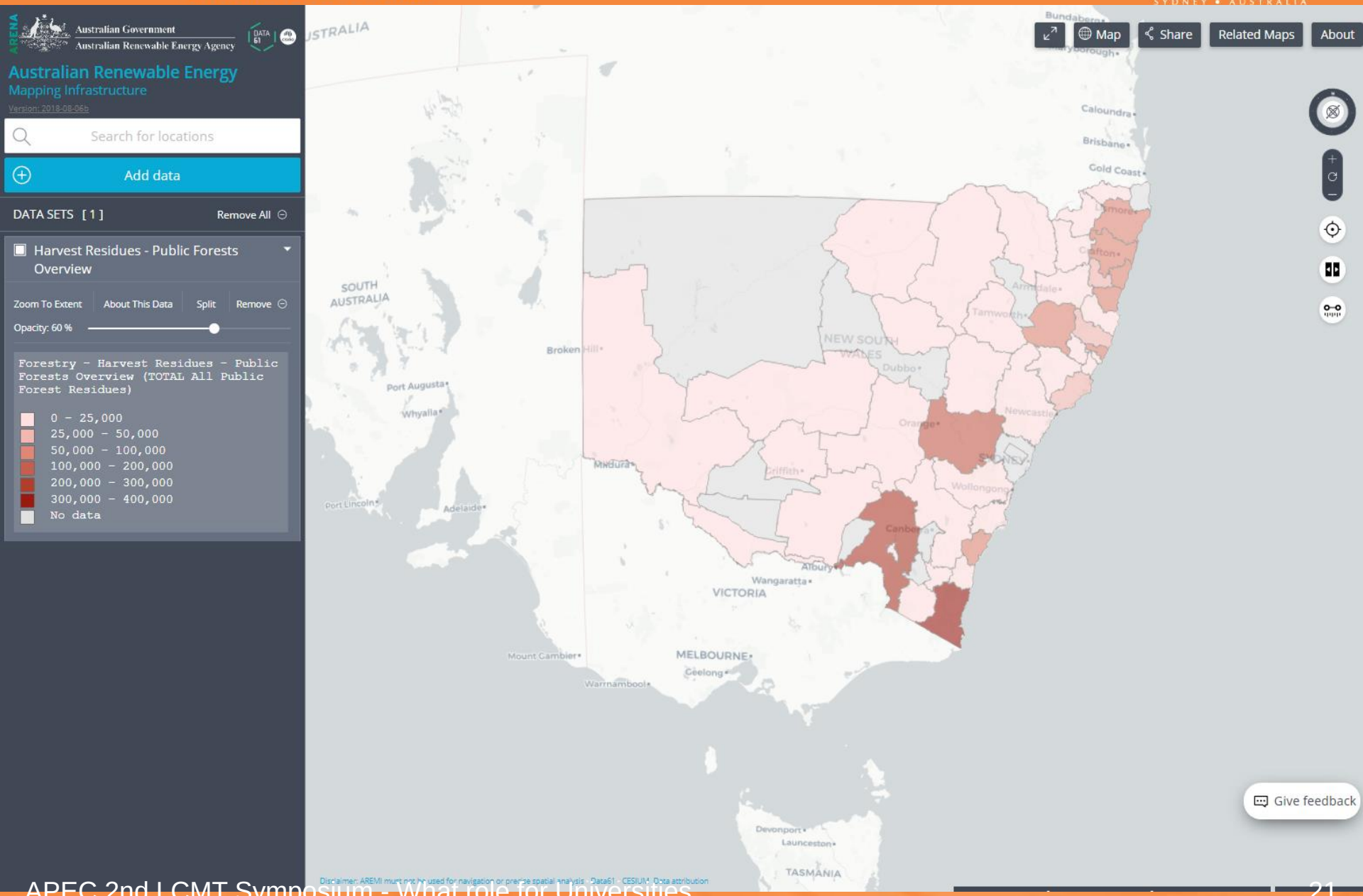

Urban water transition phases
Drivers
Population growth
Public health
Population growth and development
Social amenity and environmental protection
"Limits to growth"
Intergenerational equity, resilience to climate change
Water Supply City
Sewered City
Drained City
Waterways City
Water Cycle City
Water Sensitive City
Supply hydraulics
Seperate sewerage schemes
Drainage / flood protection
Point source and diffuse (storm water) pollution management
Diverse, fit-for-purpose sources and conservation promoting and linked with waterway restoration
Adaptive and multi-functional infrastructures and landscapes reinforcing water-sensitive behaviours
Management response

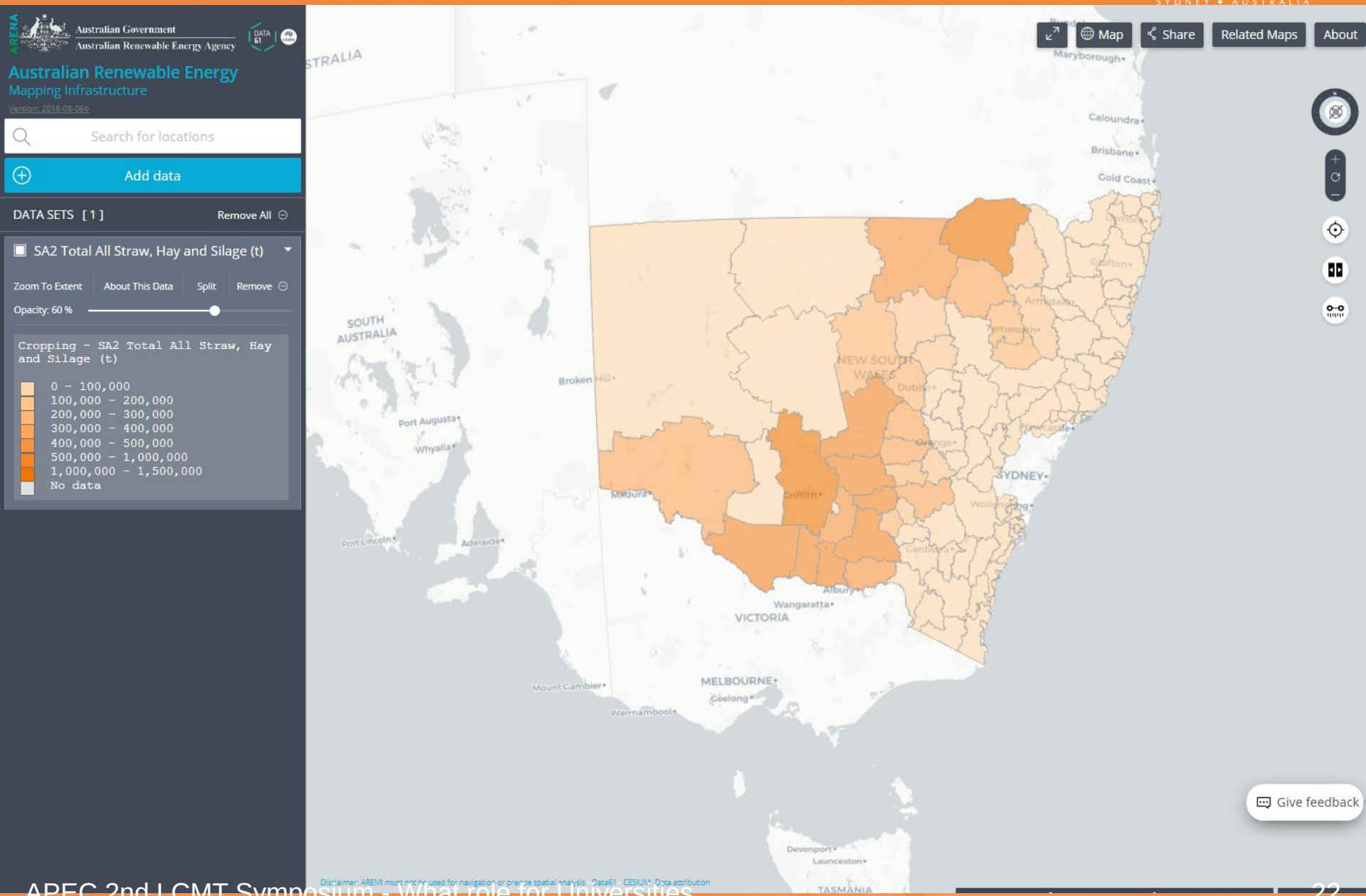

Water Sensitive City
Water Cycle City
Waterways City
6. Embedding new practise
5. Policy & practice diffusion
4. Knowledge dissemination
3. Shared understanding & issue agreement
2. Issue definition
1. Issue emergence
Drained City
Sewered City
Water Supply City

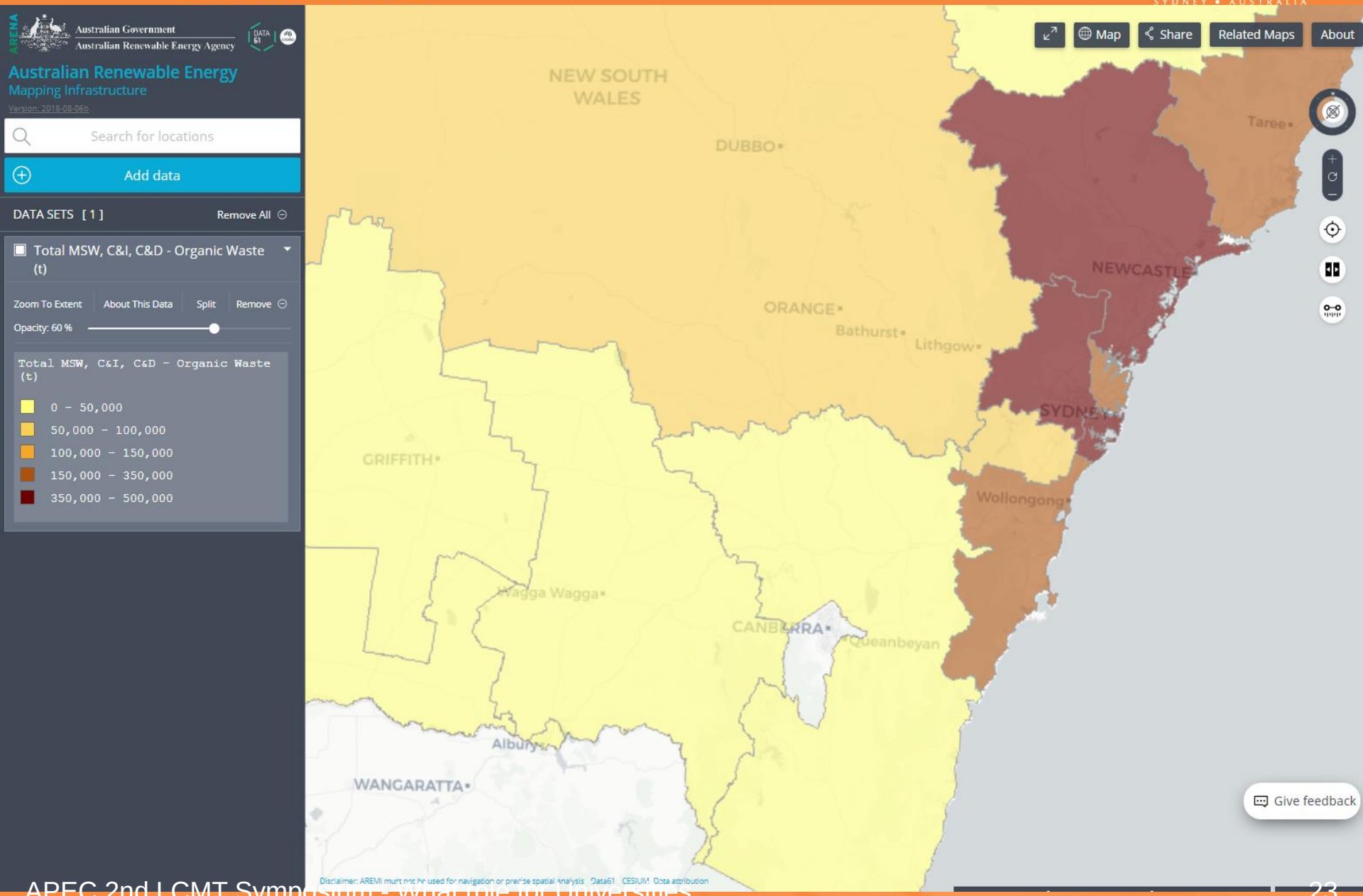

FUTURE
Urban Water Policy Reform
• Water for Victoria
Working with community
• Involving community in setting prices and service levels
• Mobilising community action during extreme events
• Increasing access to assets to increase community value
Building industry capacity to effect change
• Stormwater quality and flood management
Efficiency and innovation in core services
• Improving the efficiency of existing networks
• Digital innovation
• Diversifying and integrating water sources
• Establishing a culture of innovation and collaboration
State-owned Enterprises
New business models
• Green waste to energy
• Partnering for innovative servicing solutions
EXISTING WATER UTILITIES
"Activism", Demonstration, Proof-of concept and advocacy for policy reform
• Precinct-scale stormwater harvesting
Internal Initiatives
External Initiatives
New authorising environment

# Facilitating collaboration – **open data**




Australian Government
Australian Renewable Energy Agency
Australian Renewable Energy
Mapping Infrastructure
Version: 2018-08-06b
Search for locations
Add data
DATA SETS [1]
Remove All
Harvest Residues - Public Forests Overview
Zoom To Extent
About This Data
Split
Remove
Opacity: 60 %
Forestry - Harvest Residues - Public Forests Overview (TOTAL All Public Forest Residues)
0 - 25,000
25,000 - 50,000
50,000 - 100,000
100,000 - 200,000
200,000 - 300,000
300,000 - 400,000
No data
Map
Share
Related Maps
About
Give feedback
SOUTH AUSTRALIA
NEW SOUTH WALES
VICTORIA
TASMANIA
Broken Hill
Port Augusta
Whyalla
Mildura
Port Lincoln
Adelaide
Mount Gambier
Warrnambool
MELBOURNE
Geelong
Wangaratta
Albury
Canberra
SYDNEY
Wollongong
Orange
Dubbo
Tamworth
Armidale
Newcastle
Grafton
Coffs Harbour
Gold Coast
Brisbane
Caloundra
Devonport
Launceston


Australian Government
Australian Renewable Energy Agency
Australian Renewable Energy
Mapping Infrastructure
Version: 2018-08-06b
Search for locations
Add data
DATA SETS [1]
Remove All
SA2 Total All Straw, Hay and Silage (t)
Zoom To Extent
About This Data
Split
Remove
Opacity: 60 %
Cropping - SA2 Total All Straw, Hay and Silage (t)
0 - 100,000
100,000 - 200,000
200,000 - 300,000
300,000 - 400,000
400,000 - 500,000
500,000 - 1,000,000
1,000,000 - 1,500,000
No data
Map
Share
Related Maps
About
Give feedback
SOUTH AUSTRALIA
NEW SOUTH WALES
VICTORIA
TASMANIA
SYDNEY
MELBOURNE
Broken Hill
Port Augusta
Whyalla
Mildura
Griffith
Port Lincoln
Adelaide
Mount Gambier
Warrnambool
Geelong
Albury
Wangaratta
Maryborough
Caloundra
Brisbane
Gold Coast
Dubbo
Canberra
Devonport
Launceston


Australian Government
Australian Renewable Energy Agency
Australian Renewable Energy
Mapping Infrastructure
Version: 2018-08-06b
Search for locations
Add data
DATA SETS [ 1 ]
Remove All
Total MSW, C&I, C&D - Organic Waste (t)
Zoom To Extent
About This Data
Split
Remove
Opacity: 60 %
Total MSW, C&I, C&D - Organic Waste (t)
0 - 50,000
50,000 - 100,000
100,000 - 150,000
150,000 - 350,000
350,000 - 500,000
Map
Share
Related Maps
About
NEW SOUTH WALES
DUBBO
Taree
NEWCASTLE
ORANGE
Bathurst
Lithgow
SYDNEY
GRIFFITH
Wollongong
Wagga Wagga
CANBERRA
Queanbeyan
Albury
WANGARATTA
Give feedback

Transport Roads & Maritime Services

# Traffic Volume Viewer

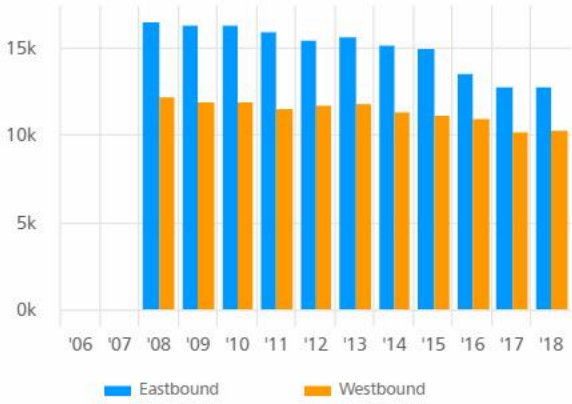
## Cleveland Street

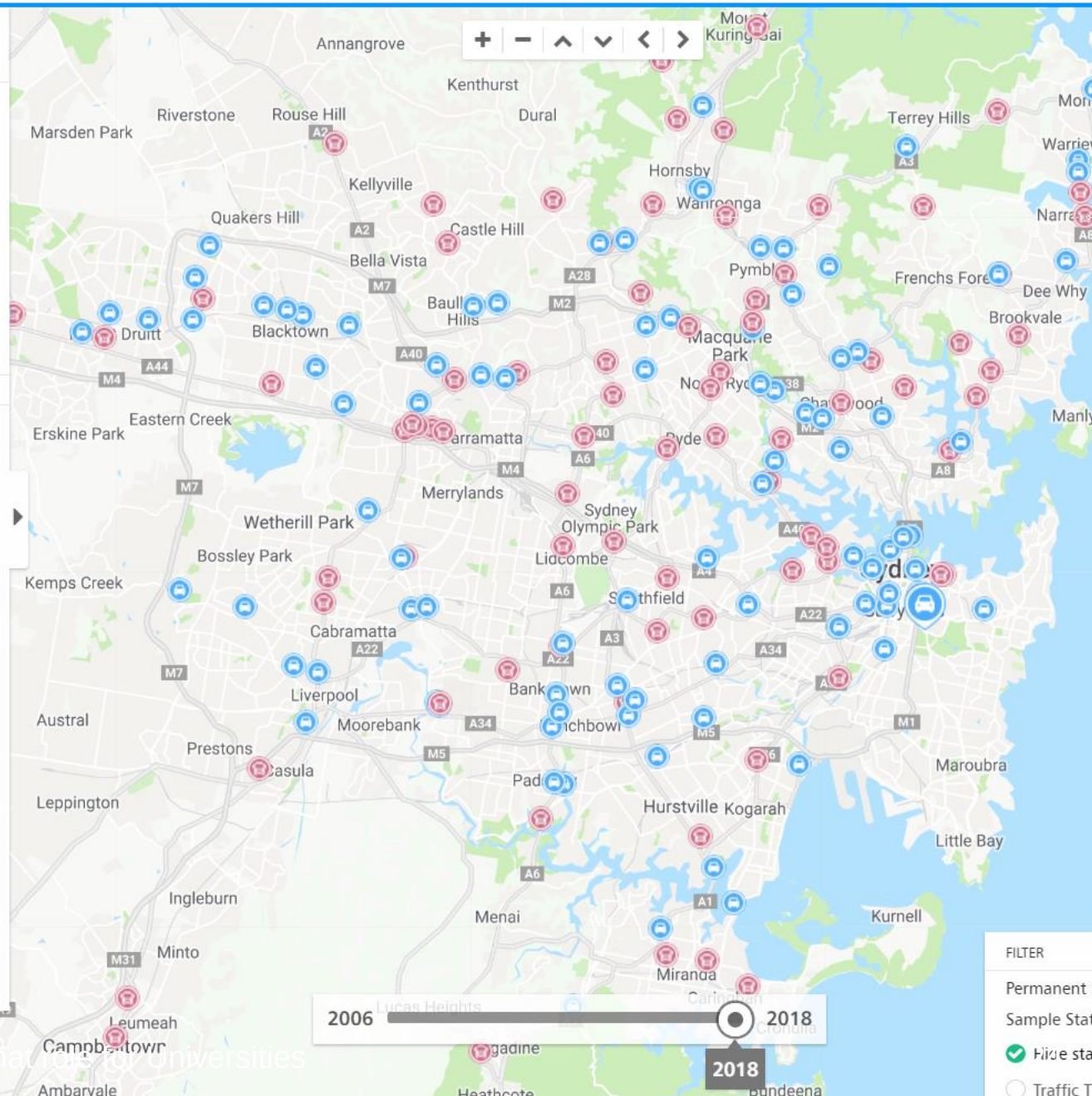
Location
60m West of Anzac Parade, Moore Park 2021

★★★★☆
Station Id: 03022




All Days




APEC 2nd LCMT Symposium - What's next for universities

Centre for Energy and Environmental Markets

# …and open-source tools

openmod open energy modelling initiative



# Energy scientists must show their workings

*Public trust demands greater openness from those whose research is used to set policy, argues* **Stefan Pfenninger**.

The global transition towards a clean and sustainable energy future is well under way. New figures from Europe this month show that the continent is on track to reach its goal of a 20% renewable-energy share by 2020, and renewable capacity in China and the ical and economic s used to underpin on, and yet energy t open to scrutiny. ne economic and l NEMS) are met ergy Information onounces: "Most found out that it

that remain hidden, like the costs of technologies, can largely determine what comes out of such models. In the United Kingdom, opaque and overly optimistic cost assumptions for onshore wind went into models used for policymaking, and that may well have delayed the country's decarbonization.

This closed culture is alien to younger researchers, who grew up with collaborative online tools and share code and data on platforms such as GitHub. Yet academia's love affair with metrics and the pressure to publish set the wrong incentives: every hour spent on cleaning up a data set for public release or writing open-source code is time not spent working on a peer-reviewed paper.

Nevertheless, some academic-led projects are pushing towards more openness. The Enipedia project is building a worldwide open database on power plants, with data such as their locations and emissions. The Open Power System Data project gathers data such as electricity consumption from government agencies and transmission-network operators, and pushes for clarity on the licensing under which these data are made available. The Open Energy Modelling Initiative is emerging as a platform for coordinating and strengthening such efforts.

**BLACK-BOX SIMULATIONS CANNOT BE VERIFIED, DISCUSSED OR CHALLENGED.**

Regulation can also help. The European Union has mandated open access to electricity-market data, resulting in the creation of the ENTSO-E Transparency Platform to hold it, and there are good arguments for the creation of national energy-data agencies to coordinate the collection and archiving of a range of important data.

ge of qualitatively and for numbers neration level of a

tes to policies on n — that produce ny, and so can be driving forces that l and solar power. e not openly avail- er the security of l scrutiny; worries ontext; and a lack

nown that closed mple is the spread- Rogoff paper used y. The European model that could sm. Assumptions

The vast majority of published research is still untouched by these fledgling initiatives. Only one energy journal — *Energy Economics* — currently requires data and models alongside submissions. Other journals should follow suit.

The open sharing of code and data is also important because it permits more meaningful collaboration between academics. Sharing a DNA sequence in an established format is, of course, easier than sharing the unstructured assumptions behind a techno-economic scenario study, for which no standard format exists yet. So the energy community must decide on standards for sharing code, data and assumptions.

A change in journal policies would help to kick-start these discussions. In policy-focused research, where one 'truth' does not exist, one cannot assess whether a modelled scenario is 'correct', so the important yardstick is not truth, but trust. The arrival of the post-truth world shows that trust in experts is lower than ever — and surely this is partly the experts' fault. ■

**Stefan Pfenninger** *is a postdoctoral researcher in the Department of Environmental Systems Science, ETH Zurich, Switzerland.*
*e-mail: stefan.pfenninger@usys.ethz.ch*

## Openmod in a nutshell

The Open Energy Modelling (openmod) Initiative promotes open energy modelling in Europe.

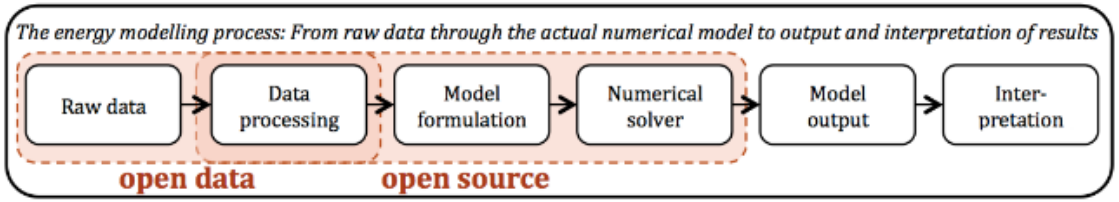
Energy models are widely used for policy advice and research. They serve to help answer questions on energy policy, decarbonization, and transitions towards renewable energy sources. Currently, most energy models are black boxes – even to fellow researchers.

"Open" refers to model source code that can be studied, changed and improved as well as freely available energy system data.

We believe that more openness in energy modelling increases transparency and credibility, reduces wasteful double-work and improves overall quality. This allows the community to advance the research frontier and gain the highest benefit from energy modelling for society.

We, energy modelers from various institutions, want to promote the idea and practice of open energy modeling among fellow modelers, research institutions, funding bodies, and recipients of our work.

## The idea of openmod





# Open Source Tools

CEEM's researchers believe in the value of open source modelling in the Energy and Environmental research space. In this regard, we have developed a series of open source tools which are listed below. For a list of some of our under development tools you can refer CEEM's Github page.

**Nem Data Tool**:

Nem-data is a simple tool for creating custom data sets using publicly available information about the Australian National Electricity Market (NEM).

Links: Github

**National Electricity Market Optimiser (NEMO) Tool**:

NEMO, the National Electricity Market Optimiser, is a chronological dispatch model for testing and optimising different portfolios of conventional and renewable electricity generation technologies. It has been developed since 2011 and is maintained by Ben Elliston through his PhD at CEEM. NEMO is available under a free software license (GPL version 3) and requires no proprietary software to run, making it particularly accessible to the governments of developing countries, academic researchers and students. The model is available for others to inspect and to validate results.

Links: Github, OzLabs

**Tariff Design and Analysis (TDA) Tool**:

We have developed a modelling tool to assist stakeholders wishing to contribute to network tariff design in the Australian National Electricity Market. It is an open source modelling tool to assist stakeholders in assessing the implications of different possible network tariff designs, and hence facilitate broader engagement in the relevant rule making and regulatory processes in the NEM. Our tool takes public energy consumption data from over 5000 households in NSW, and allows users test a wide range of existing, proposed and possible tariffs structures to see their impacts on network revenue and household bills. Demographic survey data of the households allows you to explore the impacts of these tariffs on particular household types – for example, families with young children. The tool can also show how well different tariffs align these household bills with a households' contribution to network peak demand. The tool and data are open source – you can check, validate and add your own data sets; test existing or even design your own tariffs, and validate and even modify the underlying algorithms.

Links: Project page, Github, Researchgate

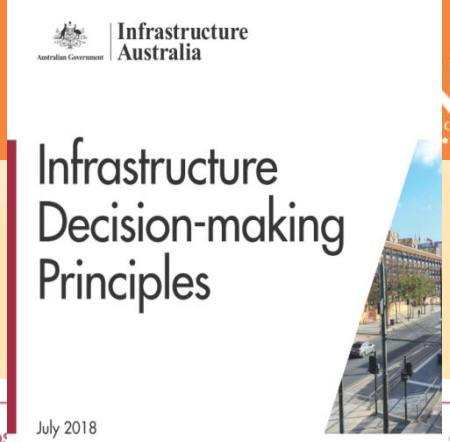
**Local Solar Sharing Scheme Model:**

Intended for modelling embedded networks, local solar and peer to peer electricity networks. This software was developed by Naomi Stringer, Luke Marshall and Rob Passey at CEEM. A working build with a simple user interface for OSX can be found here.

Links: Github

Centre for Energy and Environmental Markets

# … and **open processes** for decision making




1. **Governments should quantify infrastructure problems and opportunities as part of long-term planning processes.**

   Plans should include analysis of the performance and service levels of existing networks under a range of future scenarios. Plans should also account for interdependencies with other infrastructure, changes in technology, market and regulatory developments that are likely to impact infrastructure services over the coming decades.

2. **Proponents should identify potential infrastructure needs in response to quantified infrastructure problems.**

   These infrastructure needs should be framed as broad potential responses that are likely to be required under several future scenarios. Governments should publicly release information on strategic planning processes to explain clearly to the community what the problem is, the cost of the problem, and proposed solutions.

3. **Proponents should invest in development studies to scope potential responses.**

   These development studies should seek to identify risks to the viability and delivery of these potential responses. As part of these development studies, proponents should consider a range of options, including those that make better use of existing infrastructure, or pursue reform of regulatory and pricing settings. Investment in development studies should be proportional to the scale of the problem.

4. **Where an infrastructure need is identified, governments should take steps to ensure potential responses can be delivered efficiently and affordably.**

   Governments should look to protect sites and corridors for likely future infrastructure investments, and ensure infrastructure needs are appropriately integrated into long-term land use plans.

5. **Governments should undertake detailed analysis of a potential project through a full business case and should not announce a preferred option or cost profile before undertaking detailed analysis involving multiple options.**

   Business cases should include rigorous examination of the potential project's benefits relative to its costs, show the project to be resilient to change under a range of future scenarios, and show the split between public and private benefits.

6. **Proponents should assess the viability of alternative funding sources for each potential project.**

   Proponents should look to minimise the call on public funds through consideration of a range of funding options, and determine a fair funding split between taxpayers, users and other beneficiaries.

7. **Project proposals should be independently assessed by an appropriate third party organisation.**

   For all nationally significant projects, proposals should be submitted to Infrastructure Australia and align with the *Assessment Framework*. For smaller projects or programs of investment, proposals should be independently assessed through structured and transparent review processes in each jurisdiction.

8. **Governments and proponents should undertake meaningful stakeholder engagement at each stage, from problem identification and option development to project delivery.**

   This engagement should seek early input and feedback from a range of stakeholders, including local communities, businesses and industry groups, infrastructure users, private infrastructure owners and operators, and, where public funding is required, taxpayers.

9. **Governments and proponents should publicly release all information supporting their infrastructure decisions.**

   This should include all analysis underpinning long-term plans, option development and assessment, through to full business cases once they have been independently assessed. Governments' and proponents' protection of information should be genuine and justifiable. In particular, commercial-in-confidence protections should only be used where a material commercial risk exists. Where risks are time-limited, governments and proponents should release information in full once risks are no longer relevant.

10. **Governments should commit to, develop and release post-completion reviews.**

    Delivery dates for staged reviews should be confirmed at the outset of a project, and released at set intervals following project delivery, including several years after commissioning. Reviews should focus on:

    - measuring whether the economic case for a project established in its business case is realised over time through performance measures
    - whether the project was delivered on time and on budget
    - whether unforeseen risks emerged and how they were managed
    - extracting lessons to feed into future infrastructure development and delivery processes.

11. **Where projects are funded as part of a broader program, the corresponding decision-making processes should be robust, transparent and prioritise value for money.**

    The objective, scope, scale and expected benefits of a funding program should be defined and reported openly against clear assessment criteria and objectives. Funding programs should be routinely assessed and reviewed to ensure investments are delivering against these objectives.

# Summary

- Australian cities
  - A key and growing role in a highly urbanised economy
  - Growing challenges including carbon transition – mixed efforts to date
- Australian Universities
  - A welcome new focus on ‘real world’ impact
- Collaboration between Universities, Government and Industry
  - A growing range of examples in the low carbon, broader sustainability spheres
  - Stakeholder partnerships - are all ready, willing and able to contribute
  - Funding partnerships – end-user contributions from Government and Industry, in-kind from Universities all have a key role
- Facilitating collaboration
  - Open data
  - Open source models
  - Open processes for decision making



Centre for Energy and Environmental Markets

UNSW
THE UNIVERSITY OF NEW SOUTH WALES
SYDNEY • AUSTRALIA

# Thank you… and *questions*

*Many of our publications are available at:*
www.ceem.unsw.edu.au

# ADB Low Carbon Development Projects

# At 2nd APEC LCMT Symposium

**Xuedu Lu**
**Asian Development Bank**

**Da Nang, Viet Nam**
**20-21 September 2018**

ADB

# Outline

1. ADB's Climate Change Program
2. Cases of ADB Low Carbon Development Projects
3. Procedures of seeking ADB support

# 1. ADB's Climate Change Program

# ADB Climate Strategy

## ADB Climate Change Operational Framework 2017-2030:

1. **Support to ambitious climate objectives (NDCs) and climate plans by developing members**
2. **Accelerating low GHG emissions development**
3. **Promoting climate change adaptation**
4. **Integrating climate change adaptation and disaster risk management**
5. **Linking climate actions to the wider sustainable development agenda.**

# ADB Climate Strategy

**ADB climate change actions:**

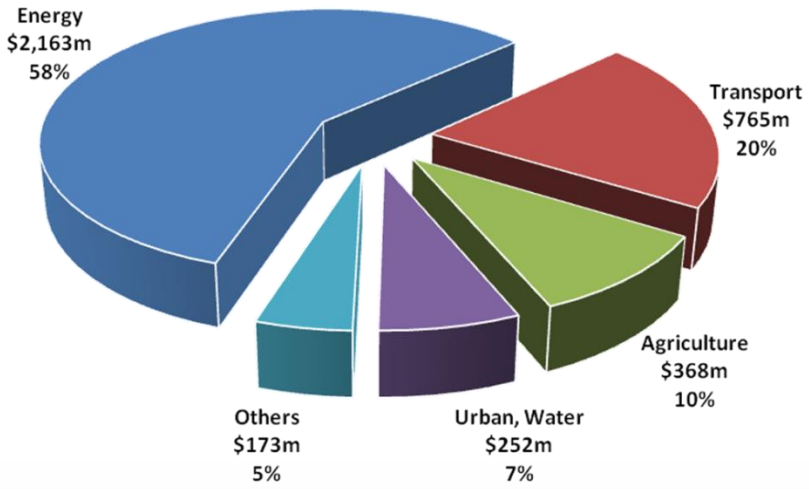
1. **Supporting institutional development and appropriate policy frameworks**
2. **Access to finance**
3. **Promoting use of climate technology**
4. **Developing knowledge solutions and capacity development**
5. **Strengthening partnerships and networks.**

# ADB Climate Finance

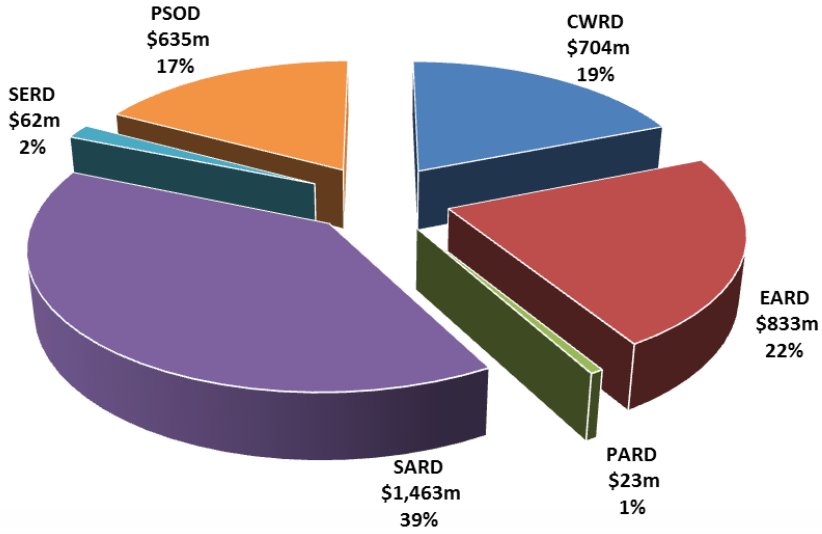
- In 2015 ADB made a commitment to double its climate financing from its own resources to $ 6 billion by 2020.
- 2016： ADB climate investments: $3.7 billion ($2.6 b in mitigation and $1.1 b in adaptation）
- 2017： ADB climate investments: $5.15 billion ($4.2 b in mitigation and $0.95 b in adaptation）
- From 2019 – 2030, ADB cumulative climate finance of own source reaches $80 billion

# ADB Climate finance in 2016

## By Sector



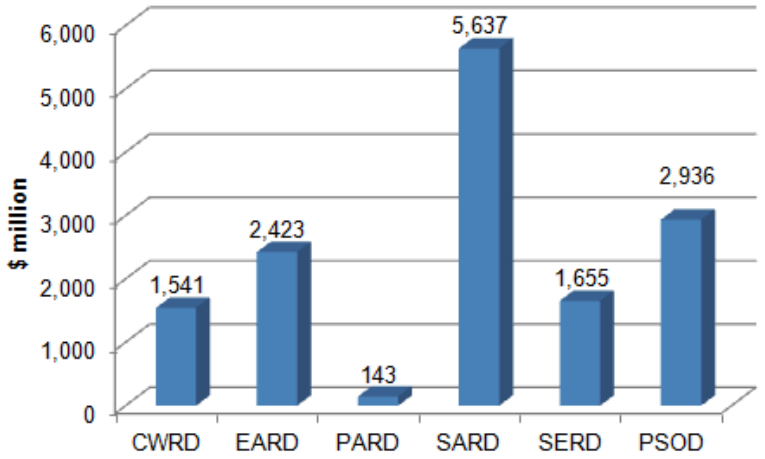

## By region




**Total climate finance: $3.7 B**

| Mitigation | Adaptation |
|---|---|
| **$2.6 B** | **$1.1 B** |

## Regional Department climate finance (2012-2016)

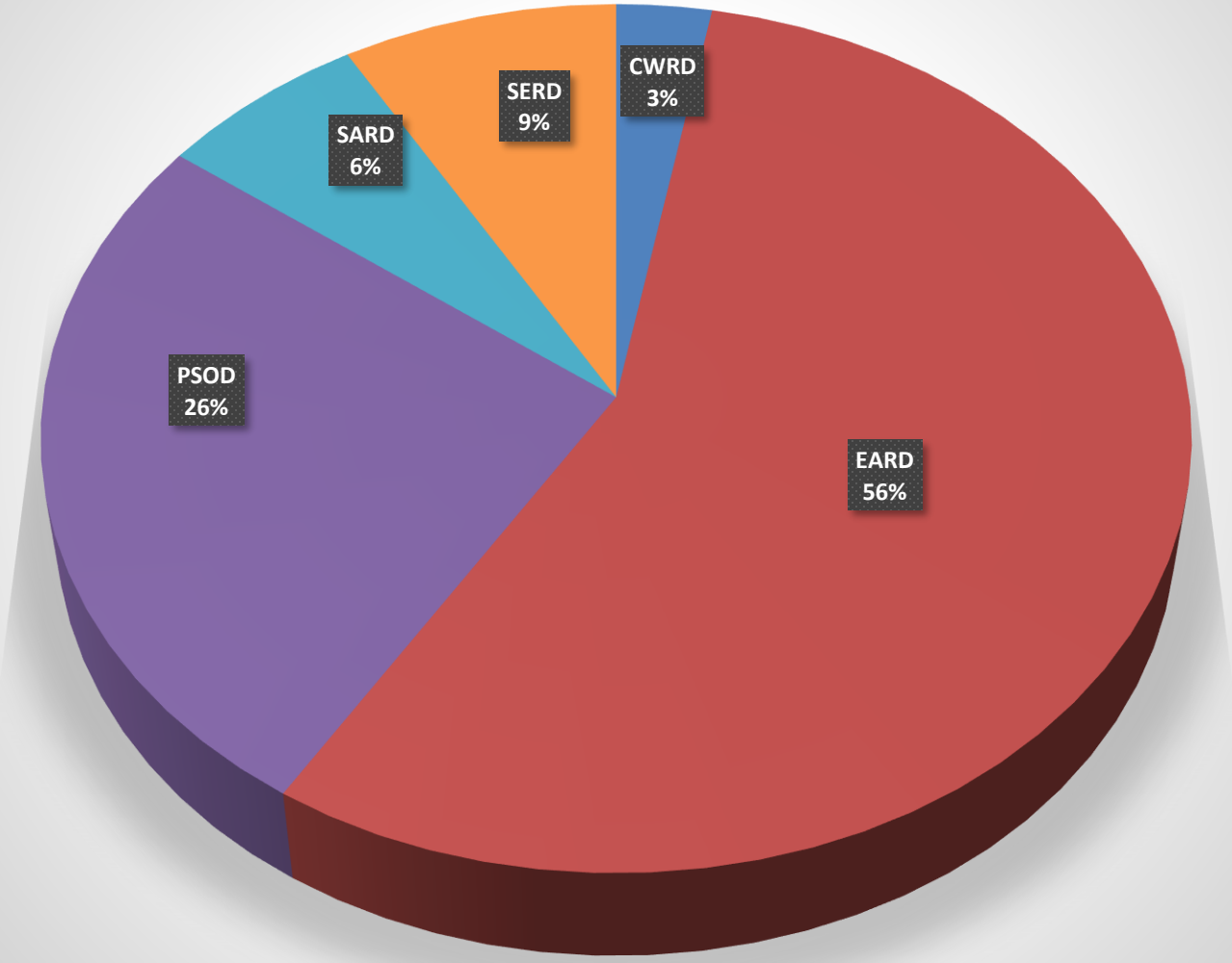



***External resources $701 million for climate support.***

## Total Annual GHG Emission Reductions by ADB Supported Loan projects (tCO2e/yr)

| Region/Year | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| PRC | 897,916 | 3,765,728 | 1,975,694 | 1,054,350 | 2,052,960 |
| CWRD | 600,000 | - | 60,000 | - | 7,989 |
| EARD | 897,916 | 3,765,728 | 343,991 | - | 1,444,222 |
| PARD | - | - | - | - | - |
| PSOD | | 830,150 | 1,787,276 | 1,571,215 | 674,133 |
| SARD | 91,000 | - | - | 383,000 | 508,790 |
| SERD | - | 258,550 | 173,789 | - | 1,497,794 |
| ADB | 1,588,916 | 4,854,428 | 2,365,056 | 1,954,215 | 4,132,928 |

# GHG Emissions Reduction by ADB Loan projects (2010-2017) (tCO2e/yr)



# ADB Approaches to Climate Finance Mobilization

## Deploying concessional resources

**Internally-managed funds**

- Clean Energy Financing Partnership Facility (CEFPF)
- Climate Change Fund (CCF)
- Others with bilaterals

**Externally-managed funds**

- Climate Investment Funds (CIFs)
- Global Environment Facility (GEF)
- Green Climate Fund (GCF)

## Maximizing market mechanisms

- **Carbon finance**
  - ✓ Asia Pacific Carbon Fund (closed in 2014)
  - ✓ Future Carbon Fund
- **Carbon Market Technical Support Facility**
  - ✓ CDM support
  - ✓ domestic emissions trading
- Supporting **other market mechanisms**
  - ✓ Japan Fund for the Joint Crediting Mechanism
  - ✓ Renewable energy credits; feed in tariffs
- **Green and climate bonds**

## Catalyzing private capital

- **Direct project finance (lending, guarantees, syndications), and equity investment**
- **Public private partnerships: (PPPs)** working with client DMCs across stages of PPPs

ADB

# ADB Climate Funds

**ADB has established more than 20 funds related to climate change. In 2017, three new climate related Funds were established:**

1. **Asia-Pacific Climate Finance Fund (ACliFF), aiming to support the development of climate-relevant financial risk management products.**
2. **High-Level Technology Fund (HLTF), providing support to promote the integration of high-level technology and innovative solutions throughout the project cycle.**
3. **Canadian Climate Fund for the Private Sector in Asia II, providing cofinancing for ADB private sector projects focused on climate change mitigation and adaption.**

# ADB Green/Climate bonds

1. $500 M green bonds issued in March 2015 for mitigation and adaptation
2. $225 M climate bonds issued in Feb 2016 to support a geothermal power project in The Philippines
3. $1.3 B Climate Bonds issued in August 2016 for mitigation and adaptation
4. $46 M green bonds issued in May 2017 to help fund more than 700 megawatts of solar and wind energy capacity in India.
5. $1.25 B green bonds issued in August 2017 to help finance climate change mitigation and adaptation projects
6. In July 2018, €600 million climate bonds issued to finance ADB climate change mitigation and adaptation projects

# Mitigation Initiatives

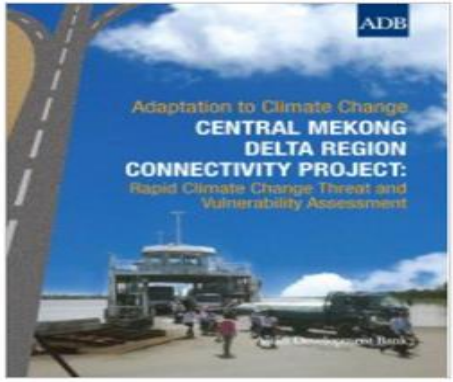
- Clean Energy
  - > $2b investments
  - Hub for SE4All Initiative/ E4All Partnership
- Sustainable Transport
  - urban transport
  - railway
  - Climate proofing of road infrastructure
- Land Use and Forest Management
  - Piloting REDD in Indonesia and Lao PDR

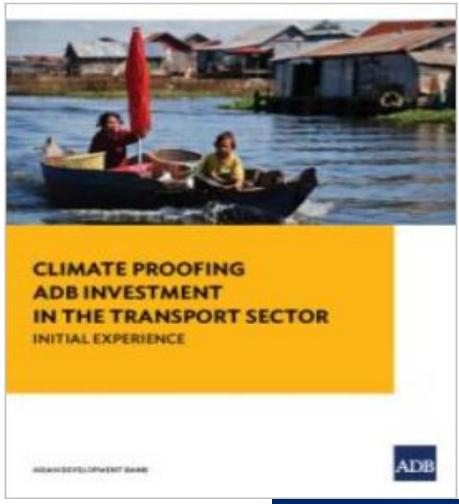
ADB

# Adaptation Initiatives

- **Mainstreaming climate resilience in core development planning**
  - **Pilot Program on Climate Resilience for Bangladesh, Cambodia, Nepal, Papua New Guinea, Samoa, Tajikistan and the Pacific**
- **Climate proofing vulnerable projects:** **roads and bridges, ports, water supply and drainage**
- **Knowledge support:** **regional climate projections consortium data facility , and tools**



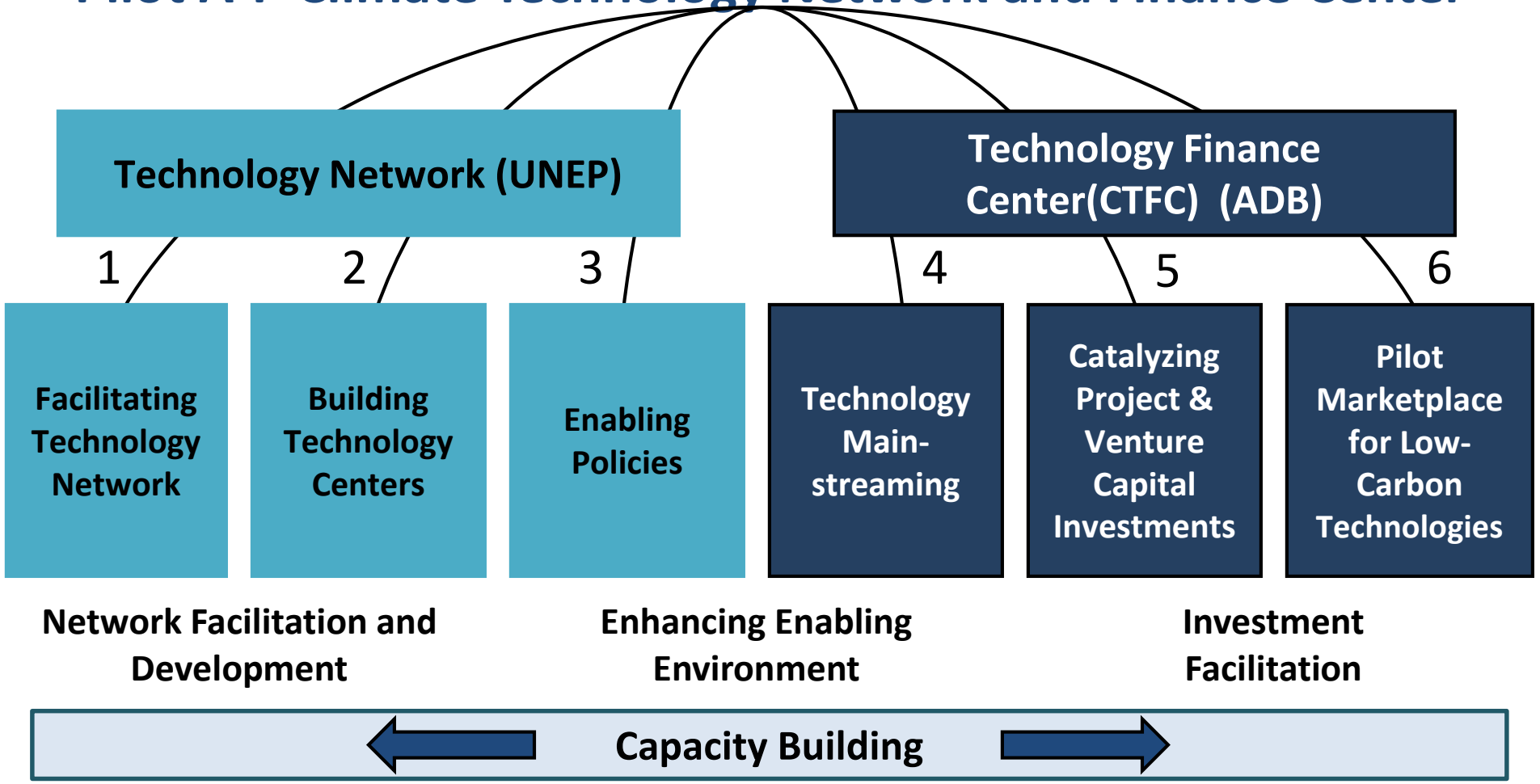
# ADB Climate Knowledge Products

- Catalyzing Green Finance: A Concept for Leveraging Blended Finance for Green Development: an innovative financing solution for enhancing both financially bankable and environmentally sustainable infrastructure projects.
- Emissions Trading Schemes and Their Linking: Challenges and Opportunities in Asia and the Pacific
- Roadmap for Carbon Capture and Storage Demonstration and Deployment in the People's Republic of China
- ……

# ADB's Pilot Asia-Pacific Climate Technology Finance Center (CTFC)

## ADB-UNEP Collaboration

## Pilot A-P Climate Technology Network and Finance Center



# 2. Cases of ADB Low Carbon Development Projects

# New Approach: Low carbon and resilient city

**ADB is supporting developing member countries to develop low carbon and resilient city to address climate change and pollution while maintaining economy development.**

- **TA: Promoting Low-Carbon Development in Central Asia Regional Economic Cooperation Program Cities**
- **Loan: Xiangtan Low Carbon City Development**

# TA: Promoting Low-Carbon City Development

**The project will strengthen the city government capacity to plan and implement climate actions in city investment plans to further enhance sustainable, inclusive, and low carbon development.**

# TA: Promoting Low-Carbon City Development

**Project budget: $2.8 million, covering four components:**

1. **GHG data management systems**
2. **Investment roadmaps for low-carbon growth**
3. **Collection of successful cases driving low-carbon development**
4. **Capacity building for city governments**

# Xiangtan Low-Carbon City Transformation

**The project will address complex development issues and support to cities for its integrated, inclusive, low carbon and green development.**

# Xiangtan Low-Carbon City Transformation

**The project cost is estimated about $400 million, covering four components.**

1. **Intelligent, integrated, low-carbon urban transport system**
2. **Green city infrastructure for increasing carbon sink and enhancing climate adaptation**
3. **Enabling ICT-based systems for informed decision-making**
4. **Green Procurement Policy and action plans**

ADB

# ADB first climate bonds project

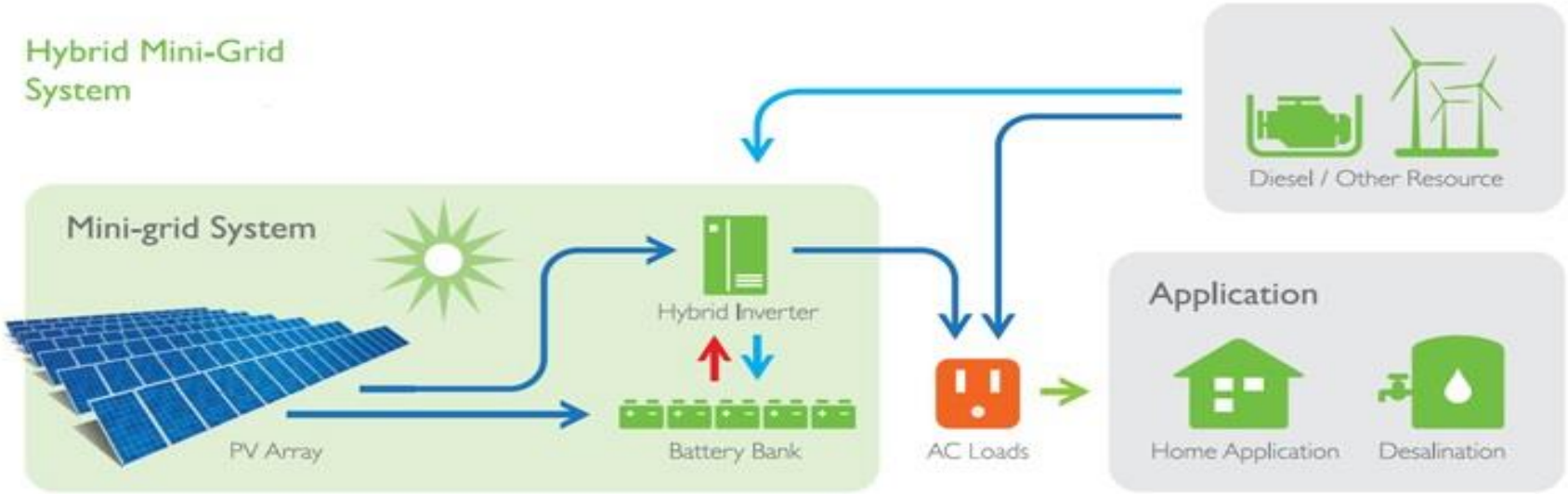
**ADB first climate bonds project: Tiwi and MakBan Geothermal Power, operated by AP Renewables, Inc. (APRI), The Philippine**



# Maldives Solar/Diesel Project

**Maldives Outer Islands for Sustainable Energy Development Project:**

**Transform the existing energy grids of outer islands into a hybrid renewable energy system, by installing energy management and control systems; energy storage; and improvements in distribution networks to reduce the need for diesel to generate electricity.**



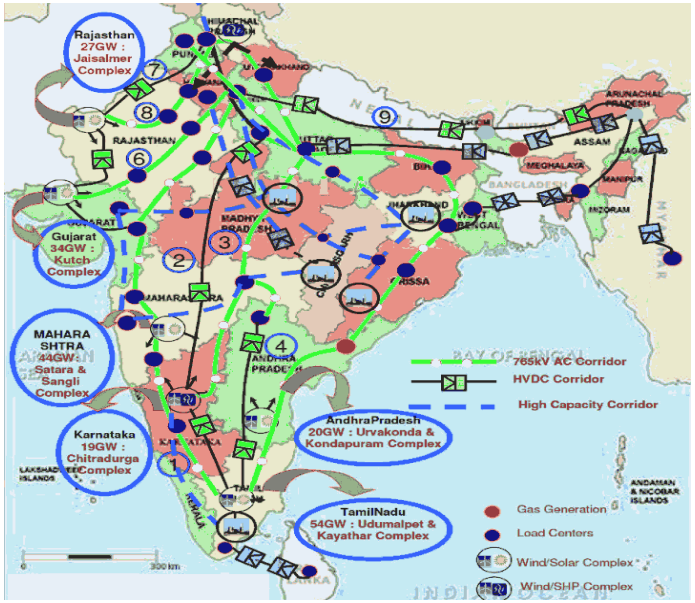
# Solomon Islands
## Solar Power Development Project

**The Project will develop a solar PV Power with capacity of 1.8MW to provide reliable, cleaner electricity supply from renewable sources**



# India Green Corridor Project

- India's "Green Energy Corridor" facilitates the transfer of RE from RE rich states to other states
- Absorption and smoothing out of the RE intermittency
- Static compensators (STATCOMs) to enhance grid stability
- $500 million sovereign + $300 million non-sovereign loans



# BTH Air Quality Improvement and CO2 reduction

## Promote high technology in major polluting sources in BTH

- Targets large industrial, urban and rural emitters to demonstrate advanced technologies – e.g. coke-oven flue gas to LNG, renewable energy-based heating, distributed renewable + smart micro grid etc.
- Partners with city governments, technology institutes, financial institutions to de-risks high technology investments and leverage co-financing
- Large co-benefits of $CO_2$ mitigation





# 3. Procedures of seeking ADB support

# Ways of ADB support

**ADB support its developing members through following:**

1. **Financing (loan) – sovereign and non-sovereign loan**
2. **Technical assistance (TA) – sovereign TA, regional TA, knowledge and policy TA, and transaction TA**
3. **Knowledge partnership/support**
4. **Others: human resources, ---**

# Procedures of seeking ADB support

- For sovereign loan and TA: consultation with counterpart of governments - governments proposed projects to be supported
- For non-sovereign loan and TA: ADB to work with clients/partners directly while keeping governments informed
- Knowledge partnership: work with knowledge institutes while keeping government informed

# Promotion of Climate Technology Transfer and Investment

## Asia-Pacific Forum on Low Carbon Technology

## 24-26 October 2018

## Changsha, Hunan, China

ADB

**Thank you!**

**Xuedu Lu**
**xlu@adb.org**



# Catalyzing Low Carbon Development in Southeast Asian Cities

**Ranell Martin M. Dedicatoria**
*Regional Program Manager*
ICLEI Southeast Asia Secretariat (ICLEI SEAS)

In 1990, ICLEI was founded as the **"International Council for Local Environmental Initiatives."** In 2003, the organization became **"ICLEI - Local Governments for Sustainability."**

ICLEI
Local Governments for Sustainability



ICLEI is the leading global network of 1,500+ cities, towns and regions committed to building a sustainable future. Through our collective efforts, we impact more than 25 percent of the global urban population.

# ICLEI Offices around the world

ICLEI Local Governments for Sustainability





# ICLEI's Five Urban Pathways

I·C·L·E·I
Local Governments for Sustainability

Low Emission Development

Nature-based Development

Equitable & People-centered Development



Circular Development

Resilient Development

# LOW EMISSION DEVELOPMENT



**The low emission development pathways curbs climate change, creates new economic opportunities and improves the health of human and natural systems.**

# ICLEI Tools and Platforms to Support the Low Emission Development Pathway

GreenClimateCities
LOW EMISSION. LOW RISK. LIVEABLE!

GREENHOUSE GAS PROTOCOL

carbonn Climate Registry

# ICLEI Tools and Platforms to Support the Low Emission Development Pathway

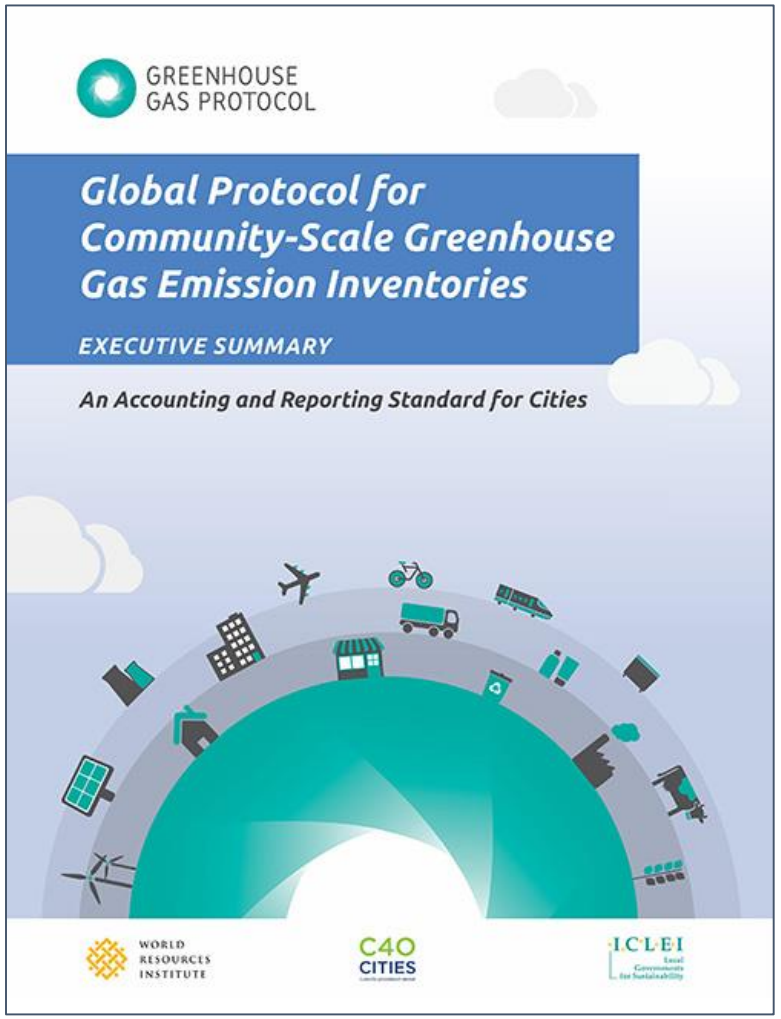
GreenClimateCities
LOW EMISSION. LOW RISK. LIVEABLE!

comprehensive *process methodology and framework* to guide and support local governments in defining, adopting and embedding a Low Emission Development (LED) pathway - helping to bring together people, policy, finance and technology to shape the transition.

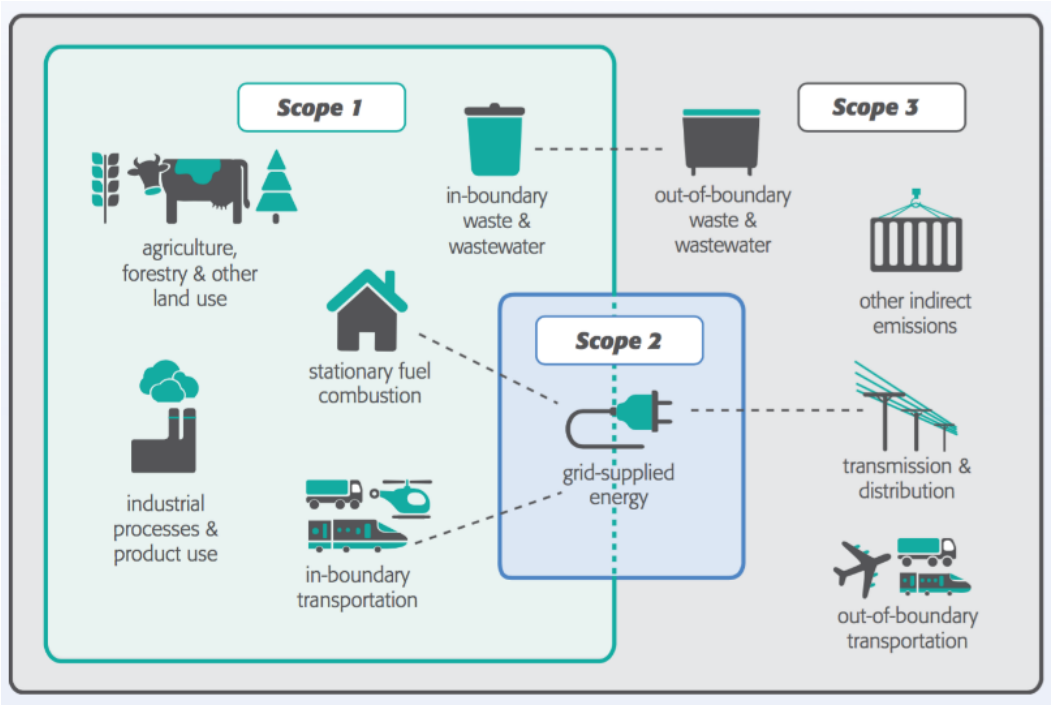
Key question the GCC responds to: How do you define and adopt low emission development in local planning and processes?



# ICLEI Tools and Platforms to Support the Low Emission Development Pathway




Key question the GPC responds to: How do you conduct a city-level GHG emissions inventory?




Jointly developed by:

WORLD RESOURCES INSTITUTE

C40 CITIES
CLIMATE LEADERSHIP GROUP

ICLEI
Local Governments for Sustainability

# ICLEI Tools and Platforms to Support the Low Emission Development Pathway

carbonn Climate Registry

- ✓ **Voluntary and public reporting platform** for local and subnational governments
- ✓ **Uses reporting tools consistent with global standards and protocols** and encourages measurable, reportable and verifiable (MRV) local climate action.
- ✓ Operated by the Bonn Center for Climate Action and Reporting, the carbonn Center, hosted by the **ICLEI World Secretariat**

Key question the cCR responds to: **How do you report climate actions in a robust and transparent manner?**

# Some ongoing ICLEI projects with strong elements of low emission development

AMBITIOUS CITY PROMISES

Engaging citizens. Driving climate action.

URBAN LEDS

URBAN LOW EMISSION DEVELOPMENT STRATEGIES




# AMBITIOUS CITY PROMISES

## Engaging citizens. Driving climate action.

An international project which aims to support selected large cities in **Indonesia**, the **Philippines**, and **Vietnam** to establish strong GHG reduction commitments, local climate action plans directed by **concrete targets**, **enhanced multi-stakeholder engagement**, and **integrated strategies**.

Supported by:

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

based on a decision of the German Bundestag

Supported by:
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
based on a decision of the German Bundestag

# AMBITIOUS CITY PROMISES

Engaging citizens. Driving climate action.

## Drawing inspiration from the Promise of Seoul

- The **Promise of Seoul** was launched at **ICLEI World Congress 2015** by Seoul Metropolitan Government.
- **Ambitious** and **comprehensive** strategy and climate action plan to reduce 20 million tons of greenhouse gas emissions by 2030.
- **10 million Seoul citizens** played a vital and active role in shaping the action plan and making their own pledges to reduce GHG emissions.

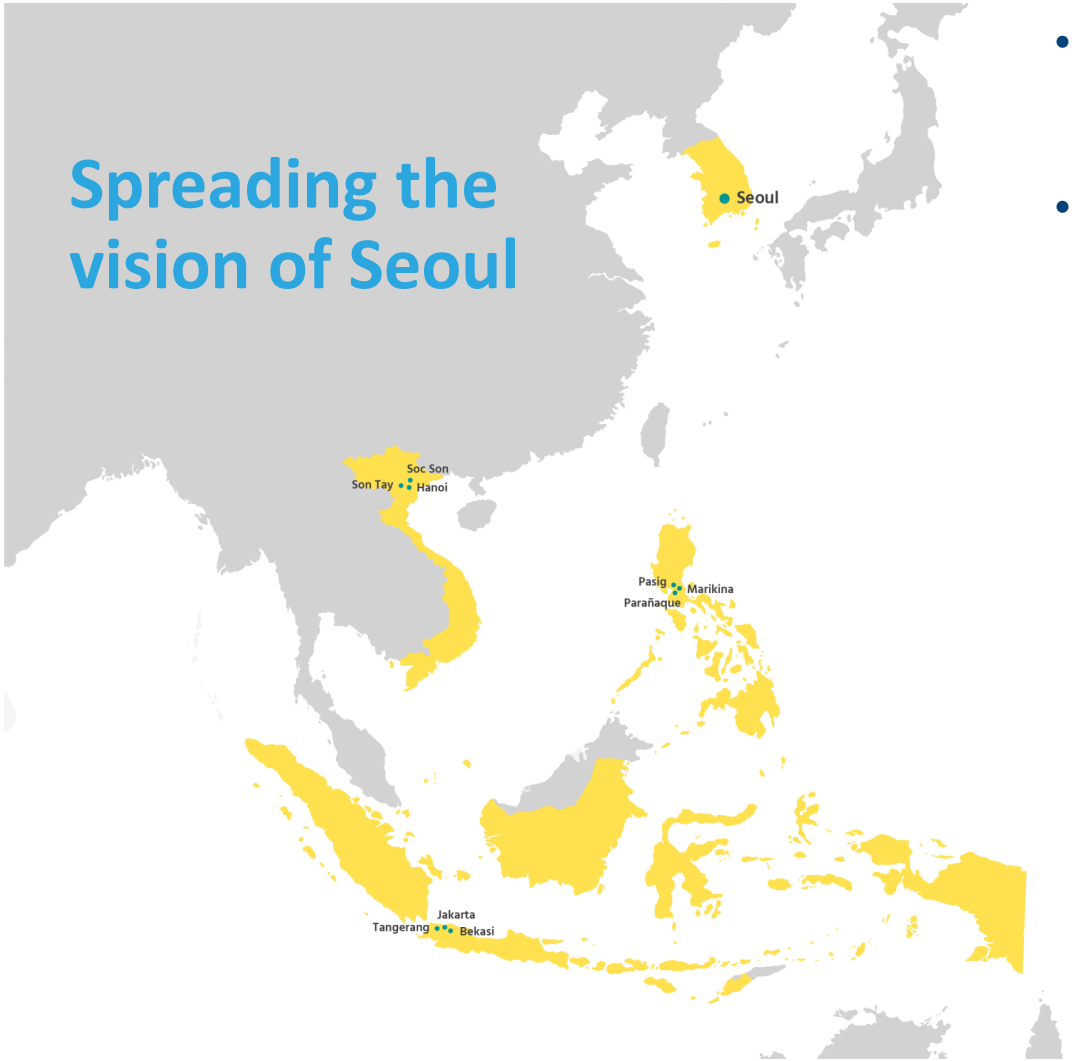


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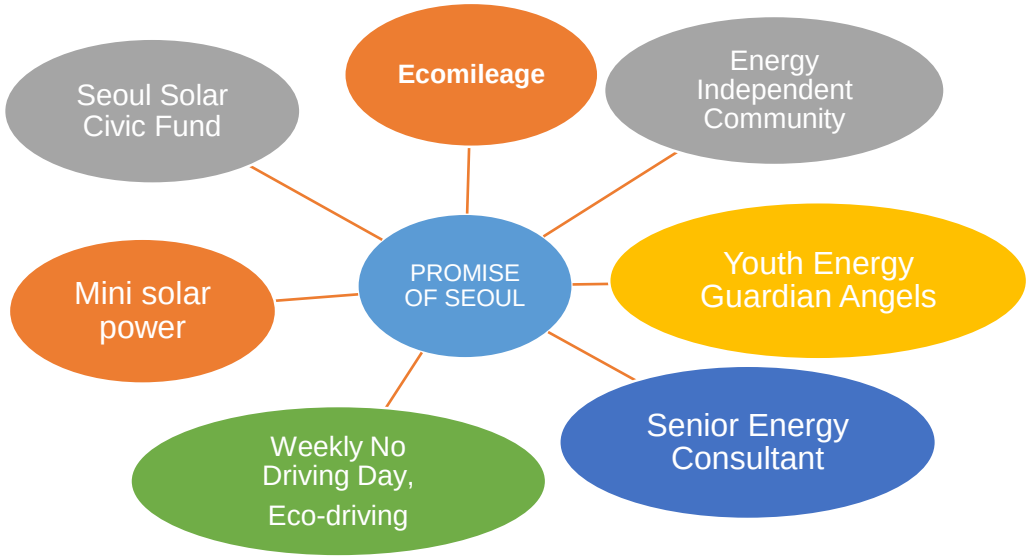
# AMBITIOUS CITY PROMISES

Engaging citizens. Driving climate action.

## Spreading the vision of Seoul




- In a rapidly urbanizing world, local governments and their communities play a pivotal role in tackling climate change.
- Need for…
  - Ambitious climate actions
  - Mainstreaming Low Emission Development
  - Capacitating local governments
  - Engaging relevant stakeholders



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ICLEI Local Governments for Sustainability

# AMBITIOUS CITY PROMISES

Engaging citizens. Driving climate action.




**@Seoul Mayors Forum on Climate Change 2017 (20 October 2017)**

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and Nuclear Safety

based on a decision of the German Bundestag

# AMBITIOUS CITY PROMISES

Engaging citizens. Driving climate action.

CITIES & REGIONS
TALANOA DIALOGUES

## and Exchange with experts from Seoul








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Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
based on a decision of the German Bundestag

# AMBITIOUS CITY PROMISES

Engaging citizens. Driving climate action.

## Support to GHG Emissions Inventory



Stationary Energy



Transportation



Solid Waste and Wastewater



Industrial Processes & Product Use (IPPU)



Agriculture, Forestry, and Other Land Use (AFOLU)

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# AMBITIOUS CITY PROMISES

Engaging citizens. Driving climate action.

## Public Consultations and Workshops with Relevant Stakeholders

- Stimulate discussion of the “City Promise”
- Solicit inputs from different stakeholder groups on how and what they can contribute to low carbon urban development



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# AMBITIOUS CITY PROMISES

Engaging citizens. Driving climate action.

## Social Media Campaign/s and Online Surveys

- Determine citizens' contributions and commitments to the "City Promise" (measure awareness of citizens and willingness to cut GHG emissions)
- Widen the project reach and induce further engagement from citizens



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# AMBITIOUS CITY PROMISES

Engaging citizens. Driving climate action.

## Upcoming Activities

**Consultation / implementation**

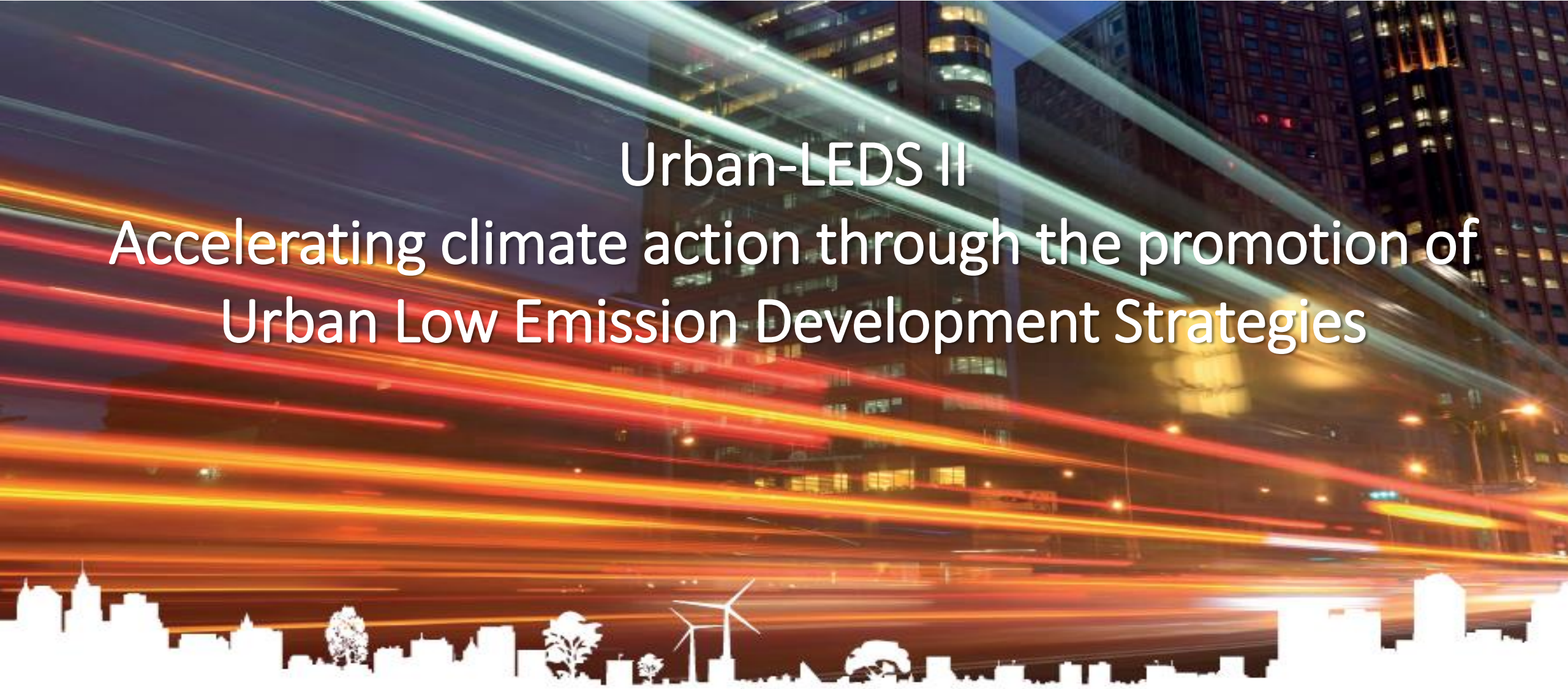
- Formulation of concrete climate action plans – called City Promises – that set ambitious targets and integrate community pledges
- Initial implementation of City Promises through pilot projects

**Citizen engagement**

- Platforms to collect pledges from key stakeholders including businesses and households

**Outreach**

- Learning and cooperation opportunities with the Seoul Metropolitan Government and other peer cities
- International reporting of aggregated city plans, actions and achievements via the carbon*n* Climate Registry (cCR)



# Urban-LEDS II
# Accelerating climate action through the promotion of Urban Low Emission Development Strategies

ICLEI Local Governments for Sustainability

UN HABITAT FOR A BETTER URBAN FUTURE

**Funded by the European Union.**
The views expressed on this document can in no way be taken to reflect the official opinion of the European Union.

An **Urban Low Emission Development Strategy (Urban LEDS)**, defines a pathway to transition a city to a low-emission, green and inclusive urban economy, through its integration into city development plans and processes.

# Project Duration: 2017 – 2021

Target Countries:

- From Phase I: Brazil, India, **Indonesia**, South Africa
- New countries in Phase II: Bangladesh, Colombia, **Lao PDR**, Rwanda
- Supported by 8 European cities



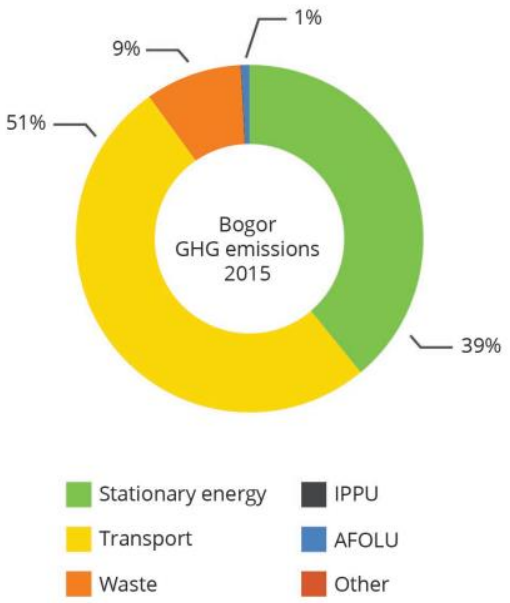
*Objective: contribute to the reduction of greenhouse gas emissions through the promotion of Urban Low Emission Development Strategies (Urban LEDS) in cities/towns in emerging economies and least developed countries.*

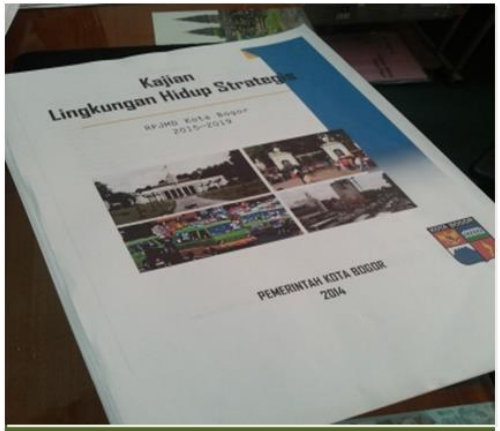
# Urban-LEDS I: Success story in Bogor City

## Community GHG inventory

**GHG emissions from the community:**

- 4'970'635 tCO2 (2013) *Scope 1 emissions

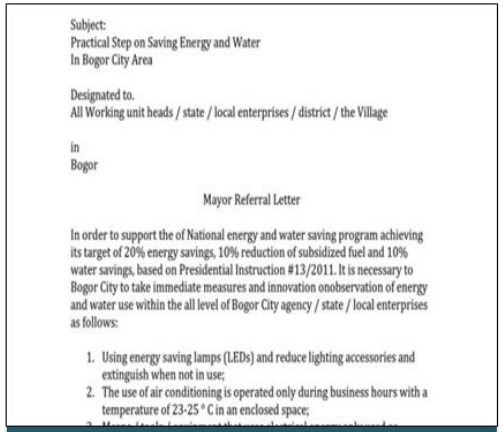



City SEA for Mid-Term Development Plan 2015-2019




Include LEDS into the 2014 City Budget Revision


Subject:
Practical Step on Saving Energy and Water
In Bogor City Area

Designated to.
All Working unit heads / state / local enterprises / district / the Village

in
Bogor

Mayor Referral Letter

In order to support the of National energy and water saving program achieving its target of 20% energy savings, 10% reduction of subsidized fuel and 10% water savings, based on Presidential Instruction #13/2011. It is necessary to Bogor City to take immediate measures and innovation onobservation of energy and water use within the all level of Bogor City agency / state / local enterprises as follows:

1. Using energy saving lamps (LEDs) and reduce lighting accessories and extinguish when not in use;
2. The use of air conditioning is operated only during business hours with a temperature of 23-25 ° C in an enclosed space;

Mayor's Referral Letter on Energy Efficiency in Municipal Buildings

# Phase I in numbers



# Urban LEDS II: Main activities

- 8 new cities in Bangladesh, Colombia, **Lao PDR,** and Rwanda join the project
- Guided through the GreenClimateCities methodology to develop Urban LEDS and action plans



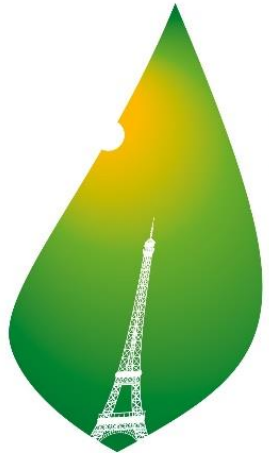
# CITY ASPIRATIONS

## New Countries

- Baseline emissions inventory
- Greenhouse gas reduction target
- Low Emission Development Strategy and Action Plan: delivering adaptation co-benefits
- Training, peer-to-peer learning, capacity building

## Phase I Countries

- Consolidation of achievements
- Implementation of  plans developed in Phase I
- Pilot projects and finance models for implementation
- Mentoring and sharing with new countries



COP21 • CMP11
PARIS 2015
UN CLIMATE CHANGE CONFERENCE

Across all countries, Urban-LEDS II focuses on **multi-level governance of climate action** in support of national and local strategies and policies under framework of the **Paris Agreement**, through enhanced climate change reporting in **Nationally Determined Contributions.**



# Disseminating Low Carbon Concepts in the APEC Region

ICLEI Local Governments for Sustainability Southeast Asia

## Production of case studies (made available online)



Bogor, Indonesia

Embedding a low emissions approach into the municipal 5-year development plan

Following a comprehensive multi-stakeholder consultation effort, the Urban-LEDS City of Bogor reviewed its existing spatial planning frameworks and strategically integrated low emission development into its 5-year Development Plan. A comprehensive Strategic Environment Assessment also increased awareness and efforts across the city government for energy efficiency and other low emissions development working areas.

186 ICLEI Case Studies March 2016

Summary

Through a comprehensive multi-stakeholder consultation process, the Urban-LEDS City of Bogor reviewed its existing spatial planning frameworks and integrated low emissions development (LEDS) principles into its 5-year mid-term Development Plan (RPJMD). The RPJMD, which speaks to Bogor's determination to strategically implement LEDS, prioritizes: introducing integrated low-emission transportation systems that emphasize pedestrians and cyclists; establishing city-wide waste management schemes and facilities; the development of green building standards to accelerate the use of low emission development technologies, materials, and design strategies; improving spatial planning and urban development projects to reduce vulnerability to climate-related risks; and enhancing accessibility and user-friendliness of urban facilities in general, in order to improve overall quality of life.

Conducting a Strategic Environmental Assessment (SEA) proved to be a helpful policy tool for the process of integrating LEDS principles and activities into the city's 5-year development planning, and doing so in a participatory manner.

Bogor's key achievements through the Urban-LEDS project included the collaborative elaboration of the above-mentioned planning documents (the SEA and 5-year Development Plan that incorporated LED principles and activities as well as budgeting for LEDS activities until 2019), and also ignited increased awareness and efforts across the city government concerning energy efficiency and other low emission development principles.

From 'Rain City' to Low Emission Development Champion

Bogor, formerly known as Buitenzorg, is located inland in a mountainous region of West Java, 60 kilometers south of Jakarta. The city is home to just over one million inhabitants and is recognized as an important economic, scientific, and cultural center. In the early 19th century, Bogor briefly served as the Dutch East Indies administrative center, and has since reinvented itself as a tourism hub with a wealth of historical and cultural heritage. For centuries, Bogor has been known as "the Rain City" because of frequent precipitation, including during the dry season.

Bogor is among the fastest growing cities in Indonesia due to its strategic location neighboring the capital. As a rapidly urbanizing city, Bogor faces numerous challenges, including controlling urban sprawl and the rapid deployment of infrastructure and

Balikpapan, Indonesia

Moving from analysis to action through low-emissions development planning

Participation in Urban-LEDS provided rapidly developing Balikpapan – known regionally as the 'Oil City' – the opportunity to ensure that development planning prioritizes activities that result in the reduction of greenhouse gas (GHG) emissions. Undertaking a GHG emissions analysis has provided a sound basis for a low emission development strategy which identifies achievable mitigation opportunities.

183 ICLEI Case Studies March 2016

Summary

Kota Balikpapan is a commercial center on the east coast of Kalimantan (Borneo) with an important role as a regional service hub for oil and mining industry. Through Urban-LEDS, Balikpapan aims to add value to its development plans by accessing national and provincial programs which support greenhouse gas (GHG) mitigation and adaptation.

The Urban-LEDS work in Balikpapan was coordinated by the municipal Environment Agency. The Environment Agency engaged with other city government departments and external agencies to collect the information required for a GHG emissions analysis. Through this process, many relevant stakeholders have been made more aware of the activities that result in GHG emissions, and the potential role that they as stakeholders can play in Balikpapan's low emission development.

This case study describes the process that Balikpapan used in conducting an initial emissions analysis, assessing mitigation options, and prioritizing opportunities.

Facts & Figures

Population | Land area
704.380 (2014) / 503 km²

Municipal budget
USD 38.6 Million (2014)

Greenhouse gas inventory
Yes, since 2010

Introduction: the importance of basing a low emissions strategy on an analysis of emission sources

As a long-standing center for extractive industry - particularly oil, gas, and mining - the Balikpapan city government is aware that the environmental impact of resource extraction presents an issue for the municipality. Prior to Urban-LEDS project, however, they had not previously analyzed GHG emissions from the area.

Kota Balikpapan chose to participate in Urban-LEDS in order to ensure that the City's urban development plans prioritized low emission development strategies. City leaders understood that the analysis of GHG emissions is a fundamental step to identifying sustainable low-carbon policies.

The management of Urban-LEDS in Balikpapan was designated to the municipal Environment Agency, Badan Lingkungan Hidup (BLH). BLH then coordinated the actions of other departments in the city government. By ensuring its future development plans are based on sound analysis, Balikpapan is proactively positioning itself to attract funding from national and provincial government budgets.

URBAN LEDS

UN HABITAT FOR A BETTER URBAN FUTURE

## Conduct of regional fora for networking and exchange

Resilient Cities Asia-Pacific 2017

ASIA LEDS PARTNERSHIP

www.asialeds.org

## Use of Website and Social Media

www.icleiseas.org

www.facebook.com/ICLEISEA

www.twitter.com/icleiseas

ICLEI Local Governments for Sustainability Southeast Asia

# Thank you!


## ranell.dedicatoria@iclei.org

**Ranell Martin M. Dedicatoria**
*Regional Program Manager*
ICLEI Southeast Asia Secretariat (ICLEI SEAS)


www.icleiseas.org

Asia-Pacific
Economic Cooperation

The 2nd APEC Low-Carbon Model Town Symposium

# Role of various stakeholders in developing a sustainable LCMT

**Nguyen Quang Huy**

*Secretary of Climate Change and Green Growth Office, MOIT of Vietnam*

Da Nang, September 2018

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**I. Scope of assessment on LCMT**

**II. Involvement of related Parties**

*2.1. APEC/APERC and other partners*

*2.2. Local government (City or Town)*

*2.3. National focal point for LCMT*

*2.4. Consultants, Research & Training Facilities*

*2.5. Enterprises to invest / provide services to implement solutions of LCMT*

**III. Resources from related Parties**




# I. Scope of assessment on LCMT

Asia-Pacific Economic Cooperation

**1. Demand**

- Town Structure
- Buildings
- Transportation

**2. Supply**

- Area Energy System
- Untapped Energy
- Renewable Energy
- Multi-Energy System

**3. Demand & Supply**

- Energy Management

**4. Environment & Resources**

- Greenery
- Water Management
- Waste Management
- Pollution

**5. Governance**

- Policy Framework.
- Education & Management

# II. Involvement of related parties to develop LCMT

Asia-Pacific Economic Cooperation



- 1 - APEC/ APERC

- 2 - Local Gov.

- 3 - Central Gov.

- 4 - Research, consultants, training units

- 5 - Enterprises

# 2.1. APEC/APERC and other partners

Asia-Pacific Economic Cooperation

- Design the TA of LCMT for specific town/city. The project has been participated of 4 other parties.

- Support resources to strengthen the capacity of all the parties. Specially for the stakeholders to be able to replicate itself.

- Set up a Network to update information, share experiences through forums, conferences, workshops and document development.



# 2.2. Local Government of Town/City

Asia-Pacific Economic Cooperation

- Formulate a research group to applying solutions of LCMT with participation of relevant agencies.
- Arrange stage budgets to implement some solutions that are responsibility of the Town's Gov.
- Call for enterprises to invest and implement solutions.
- Have policies to support and encourage the implementation of solutions.
- Be willing to share experiences with other town and international organizations.



# 2.3. National focal point for LCMT

Asia-Pacific Economic Cooperation

- Introduce, designate and support for research and training units to participate and implement the LCMT project. This will strengthen capacity and ready join to network of experts and consultancy of APEC on LCMT for each country and can expand by themselves.
- Develop and implement a plan to advertise and replicate the model into other cities / towns within country, with appropriate resources (International / National budget).
- Developing documents and guidelines for applying LCMT in their language.



# 2.4. Consultants, Research & Training Facilities

Asia-Pacific Economic Cooperation

- Benefit of knowledge, capacity, training ... everything related to LCMT.
- Willingness to participate in guiding, sharing information, knowledge and experience of applying LCMT to other cities.
- Be invited to participate in the assessment and improvement for LCMT periodically.
- Be recommended to supports or be invited to participation in the following research activities on LCMT or replication of LCMT model for other cities in the country.








# 2.5. Enterprises to invest / provide services to implement solutions of LCMT

Asia-Pacific Economic Cooperation

- Participate in the process of proposing technical solutions in developing of LCMT.
- Commitment to support city/town to implement solutions with incentive cost and quality assurance.
- Willingness to share good experiences.
- Participate in communication activities, training programs, side visits... organized by local / central government or APERC.





# III. Resources from related Parties

Asia-Pacific Economic Cooperation




**1. APEC/APERC**

*- Technical assistant.*

**2. Government of country and city/town.**

*- The institution, and the staffs of Government.*

*- Some budget from state. Policies to support and encourage.*






**3. Enterprises**

*- Reduce the cost of investment of solutions.*

*- Commitment to continue with follow activities on LCMT.*

**4. Consultants, Research & Training Facilities**

*- Commitment to participate to LCMT in future.*

Asia-Pacific Economic Cooperation

The 2nd APEC Low-Carbon Model Town Symposium

# Thank you for listening!

APEC



2nd APEC Low-Carbon Model Town Symposium
Da Nang, 20 September, 2018

# APEC LOW-CARBON TOWN INDICATOR (LCT-I) SYSTEM

Munehisa Yamashiro, Vice President, APERC

APERC
Asia Pacific Energy Research Centre

APEC
Asia-Pacific Economic Cooperation

# Key Activities of LCMT Project (Phase 1-6)

1. **Development and refinement of the "Concept of the Low-Carbon Town in the APEC Region (Concept)"**
   - **The Concept shows a basic idea/principle of a low-carbon town and provide guidance.**
   - **The APEC Low-Carbon Town Indicator (LCT-I) System has been developed based on the Concept.**

2. **Feasibility Study for a Case Town**

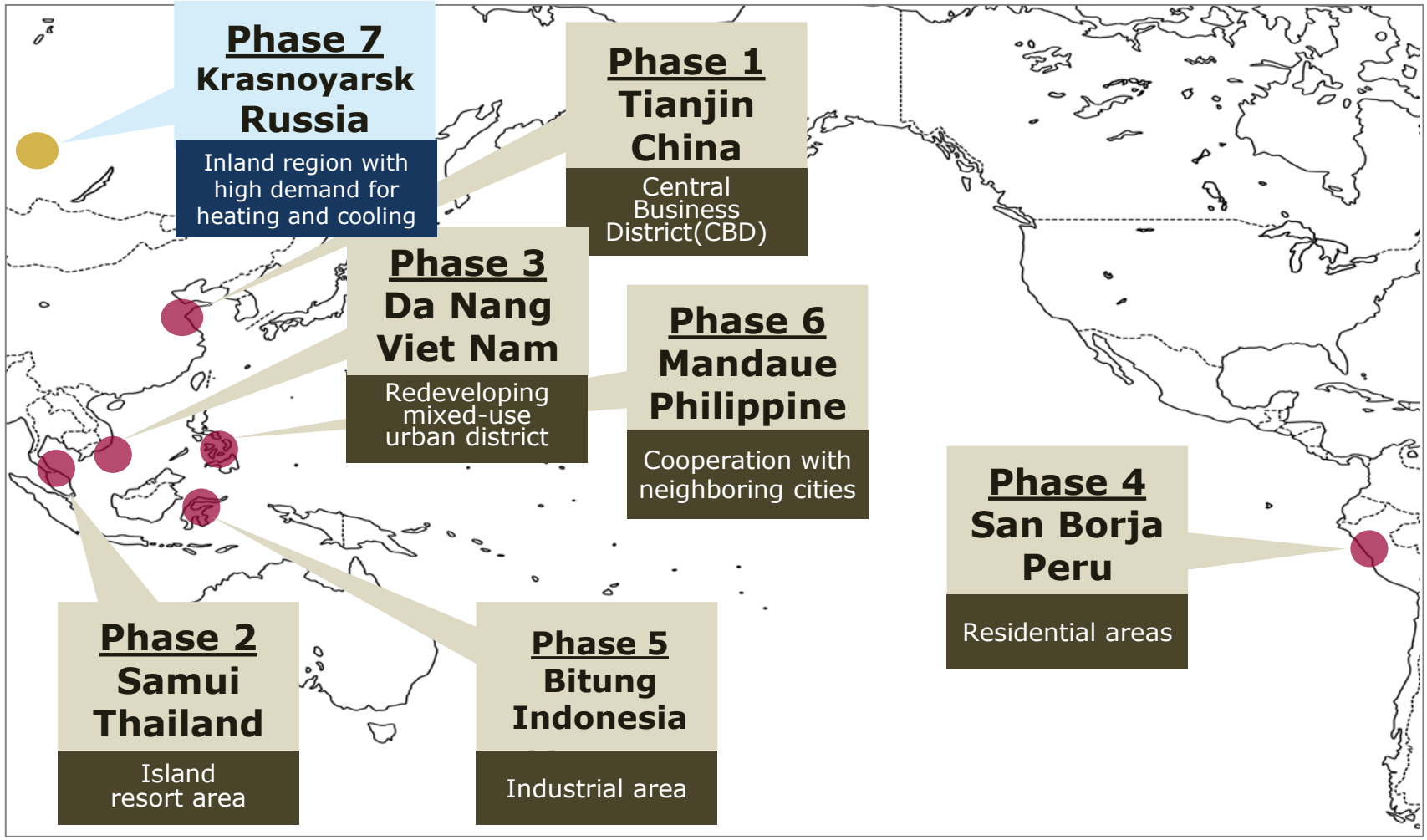
3. **Policy Review for a Case Town**

# Preliminary Research for the LCT-I System

| | Concept: Cities Surveyed in Phase 1- 6 | Feasibility Study / Policy Review: Case Towns in Phase 1- 6 |
|---|---|---|
| **Phase 1** | **Da Nang**, Viet Nam; **Surabaya**, Indonesia; **Cebu**, The Philippines; **Putrajaya**, Malaysia; and **Tianjin**, China | **Yujiapu, Tianjin**, China<br>Greenfield development of central business districts (CBD) of a large city |
| **Phase 2** | **Samui Island**, Thailand; **Penghu Island**, Chinese Taipei; and **Da Nang**, Viet Nam | **Samui Island**, Thailand<br>Development on an island resort |
| **Phase 3** | **Portland**, The US and **San Borja**, Peru | **Da Nang**, Viet Nam<br>Redevelopment of an existing city |
| **Phase 4** | **Vancouver**, **Calgary**, and **Toronto** in Canada; and **Philadelphia**, The US | **San Borja**, Peru<br>Residential area in a city |
| **Phase 5** | **Adelaide** and **Melbourne** in Australia; **Auckland** and **Palmerston North** in New Zealand; and **Santiago**, Chile | **Bitung**, Indonesia<br>Industrial area in a city |
| **Phase 6** | **Yongin** and **Jincheon** in Korea; **Krasnoyarsk**, Russia; and **Yokohama** and **Kashiwa** in Japan | **Mandaue**, The Philippines<br>Low-carbon development plans in cooperation with neighbouring cities |

Development of LCT-I System

# Case Towns of Feasibility Study and Policy Review



# Sixth Edition of the Concept

The Concept aims to promote the development of LCT in the APEC region by providing a basic principle that can assist the central and local government officials in planning effective low-carbon policies and in formulating an appropriate combination of low-carbon measures while taking socio-economic conditions and city-specific characteristics into consideration.

**The Sixth Edition of the Concept* consists of:**

1. **Executive Summary** (3 pages)
2. **Volume I: Main Chapter** (72 pages)
3. **Volume II: Low-Carbon Measures** (81 pages)

- **The 1st-6th Editions of the Concept are available at:**

  **http://aperc.ieej.or.jp/publications/reports/lcmt.html**

- **The Sixth Edition is the final.**

# Volume I: Main Chapter

- **Chapters in Volume I**

| | |
|---|---|
| 1 | Background and Achievement to Date |
| 2 | APEC Low-Carbon Town and its Concept |
| 3 | Basic Approach to Develop the Low-Carbon Town |
| 4 | Characterisation of Towns and Low-Carbon Measures |
| 5 | Measures Applicable to the Development of Low-Carbon Town |
| 6 | Evaluating the Effect of Low-Carbon Measures |

# Volume II: Low-Carbon Measures

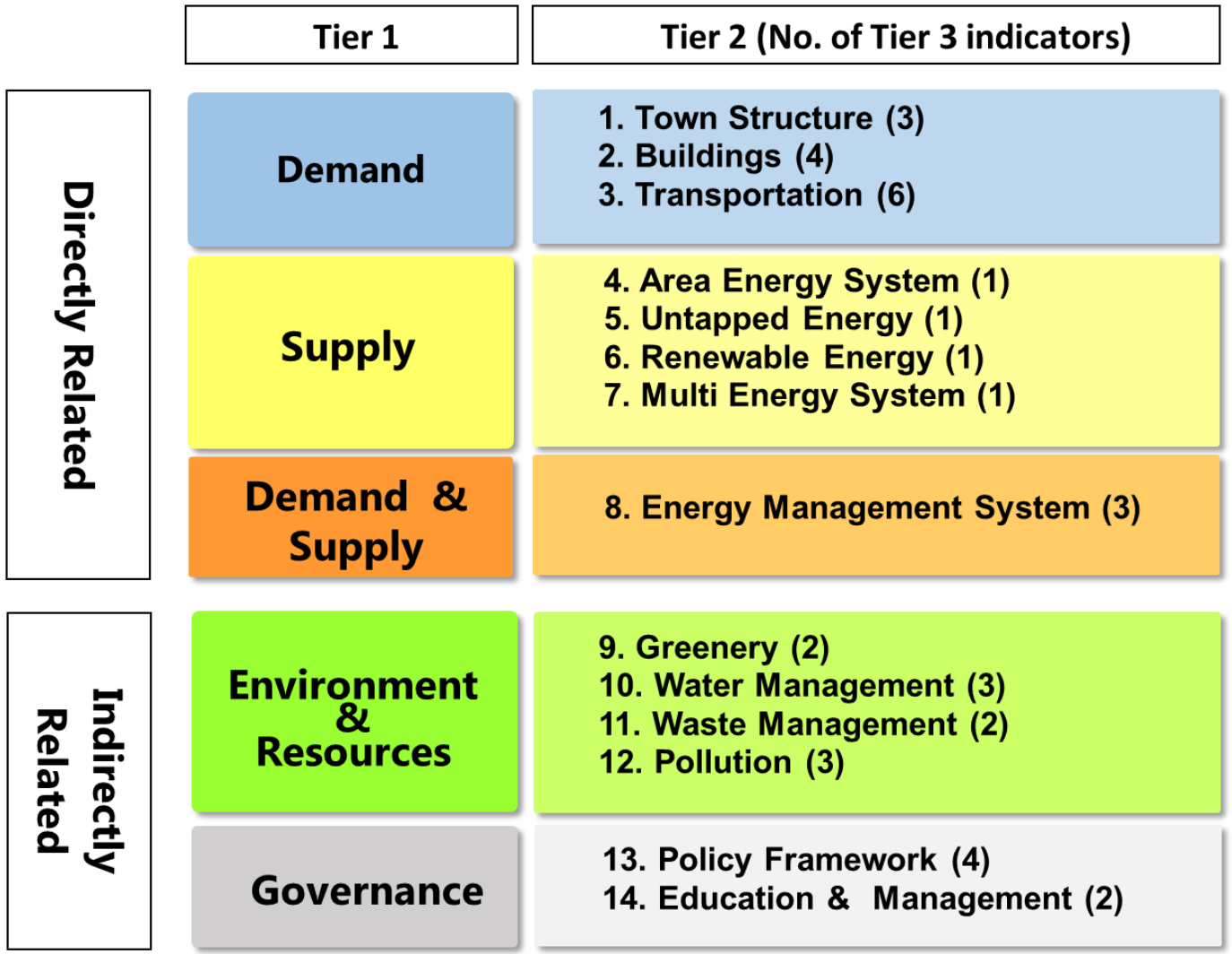
- **Volume II includes:**
  - **Low-Carbon Measures and Their Applicability**
  - **Low-Carbon Measures with Case Examples**

| | | |
|---|---|---|
| (1) Cogeneration System/Combined Heat and Power/Trigeneration | (11) Hydroelectric Power Generation | (21) Electrically Driven Vehicle |
| (2) Using Sea/River Water | (12) Waste Heat from Incineration Plants | (22) Infrastructure for Electrically Driven Vehicle |
| (3) District Heating and Cooling (DHC) | (13) Solar Power Generation | (23) Community Cycle Sharing |
| (4) Sunlight Reflection, Shading and Thermal Insulation | (14) Solar Heating & Cooling | (24) Smart Grid |
| (5) Façade Engineering | (15) Biomass Power Generation | (25) Community Energy Management System |
| (6) Natural Ventilation | (16) Geothermal Power Generation | (26) Home Energy Management System |
| (7) Daylight Use plus Lighting System | (17) Wind Power Generation | (27) Factory Energy Management System |
| (8) Hybrid of Natural Ventilation plus Air Conditioning | (18) Fuel Cell | (28) EV Charging Management Solution |
| (9) High-efficient Heat or Cooling Source plus Thermal Storage | (19) Transportation (Establishment of Public Transportation Network) | (29) Demand Side Management |
| (10) Waste Heat from Sewage Treatment Plant | (20) Local Transportation System (Bus, LRT, etc.) | (30) Simulation Results for CO2 Emission Reduction (Central TOKYO 7 Wards Area) |

# Characteristics of LCT-I System

- **A self-assessment tool to assess and monitor the progress of each LCT development project (not for comparison).**
- **It is supposed to be used by central and local government officials.**
- **Designed to be as simple as possible with user-friendliness in mind.**
- **Users can carry out an assessment with the attached LCT-I evaluation sheet.**
- **The assessment areas of the LCT-I System are comprehensive and uses a five point scale evaluation in principle.**
- **APEC's liaison officer had attended meetings of ISO/TC268 on Sustainable Cities and Communities since February 2015 to maintain the LCT-I System relevant to global standards developed by ISO.**

# Assessment Framework of LCT-I System



# Indicators of LCT-I System: Demand

| Tier 1 | Tier 2 | Tier 3 |
|---|---|---|
| Demand | Town Structure | ➢ **Adjacent Workplace and Residence**<br>➢ **Land use**<br>➢ **Transit Oriented Development (TOD)** |
| | Buildings | ➢ **Energy Saving Construction**<br>➢ **Green Construction** |
| | Transportation | ➢ **Promotion of Public Transportation**<br>• Easy-to-Use Public Transportation<br>• Comprehensive Transportation Measures<br>➢ **Improvement in Traffic Flow**<br>• Transportation Demand Management (TDM)<br>• Transportation Infrastructure Planning<br>➢ **Introduction of low carbon vehicles**<br>➢ **Promotion of Efficient Use**<br>• Support for Eco-driving |

# Indicators of LCT-I System: Supply, Demand & Supply

| Tier 1 | Tier 2 | Tier 3 |
|---|---|---|
| Supply | Area Energy System | ➢ Area Energy System |
| | Untapped Energy | ➢ Untapped Energy |
| | Renewable Energy | ➢ Renewable Energy |
| | Multi-Energy System | ➢ Multi-Energy System |
| Demand & Supply | Energy Management System | ➢ Energy Management of Buildings/Area<br>• Energy Management System (EMS)<br>• Area Energy Management System (AEMS)<br>• Smart Micro-Grid |

# Indicators of LCT-I System: Environment & Resources

| Tier 1 | Tier 2 | Tier 3 |
|---|---|---|
| Environ-ment & Resources | **Greenery** | ➢ **Securing Green Space**<br>• Formation of Green Shade<br>• Formation of Greening |
| | **Water Management** | ➢ **Water Resources**<br>• Water Usage<br>• Water Reuse<br>- Rainwater Use<br>- Recycled Wastewater Use |
| | **Waste Management** | ➢ **Waste Products**<br>• Reduction of Waste Products<br>• Reuse of Waste Products |
| | **Pollution** | ➢ **Air Pollution**<br>➢ **Water Pollution**<br>➢ **Soil Pollution** |

# Indicators of LCT-I System: Governance

| Tier 1 | Tier 2 | Tier 3 |
|---|---|---|
| Gover-nance | **Policy Framework** | ➢ **Efforts toward a Low-Carbon Town**<br>• Policies/Business Plans to Create Low-Carbon Town<br>• Budget for Policies/Business Plans to Create Low-Carbon Town<br>➢ **Efforts toward sustainability**<br>• Business Continuity Plan (BCP)/Life Continuity Plan (LCP)<br>• Developments with Less Impact on Natural Environment |
| | **Education & Management** | ➢ **Life Cycle Management**<br>➢ **Area Management toward Energy-Saving and Low-Carbon Town** |

# Sample of Qualitative Indicator

8. Energy Management

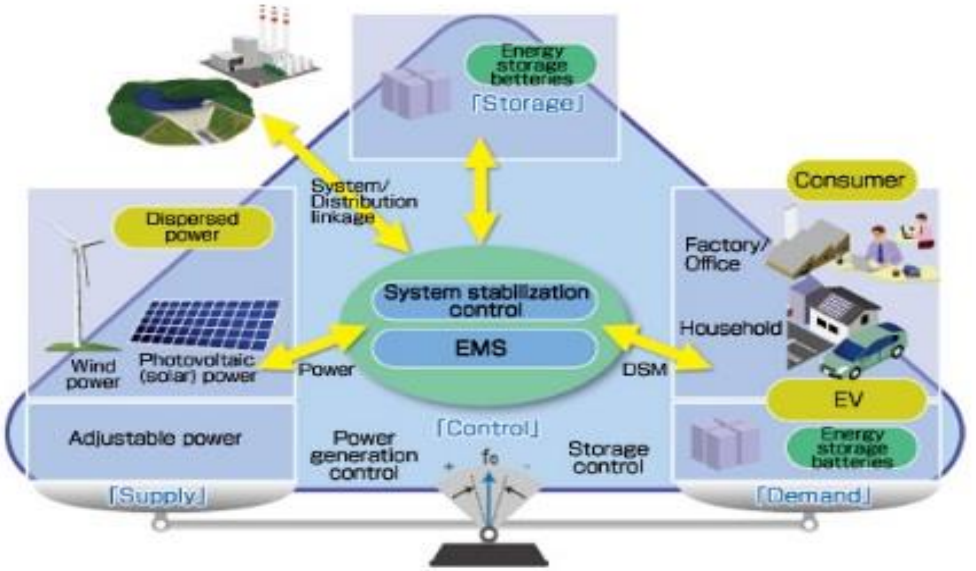
8.1. Energy Management of Buildings/Area

8.1.1. Energy Management of Buildings/Area

| | |
|---|---|
| ★★★★★ | |
| ★ | There are no plans for introduction in place. However, a system for introduction has been established. |
| ★★ | There are no plans for introduction in place. However, a system for introduction has been established and prospects for their introduction are clear. |
| ★★★ | There are plans for introduction in place. |
| ★★★★ | There are introduction plans which have been implemented. |
| ★★★★★ | There are introduction plans which have been implemented. In addition, a subsidy system, etc. for expansion of implementation has been established. |

Assess the presence or absence of EMS introduction plans.

EMS refers to systems or technologies that enable energy conservation through visualising energy consumption, controlling and monitoring of building and equipment operations, as well as optimising the use of renewable energy.



# Sample of Quantitative Indicators

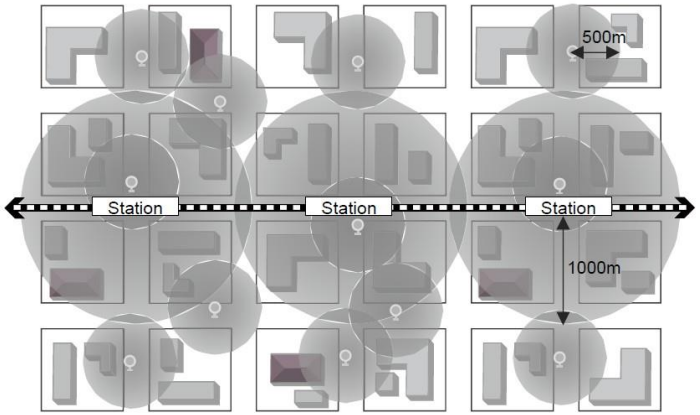
## 3. Transportation

### 3.1. Promotion of Public Transportation

#### 3.1.1. Easy-to-Use Public Transportation

| | |
|---|---|
| ★★★★★ | |
| ★ | 30% or less of the target area is covered. |
| ★★ | 30% to 50% of the target area is covered. |
| ★★★ | 50% to 70% of the target area is covered. |
| ★★★★ | 70% to 90% of the target area is covered. |
| ★★★★★ | 90% or more of the target area is covered. |

Image of Walking Distance from Stations and Bus Stops



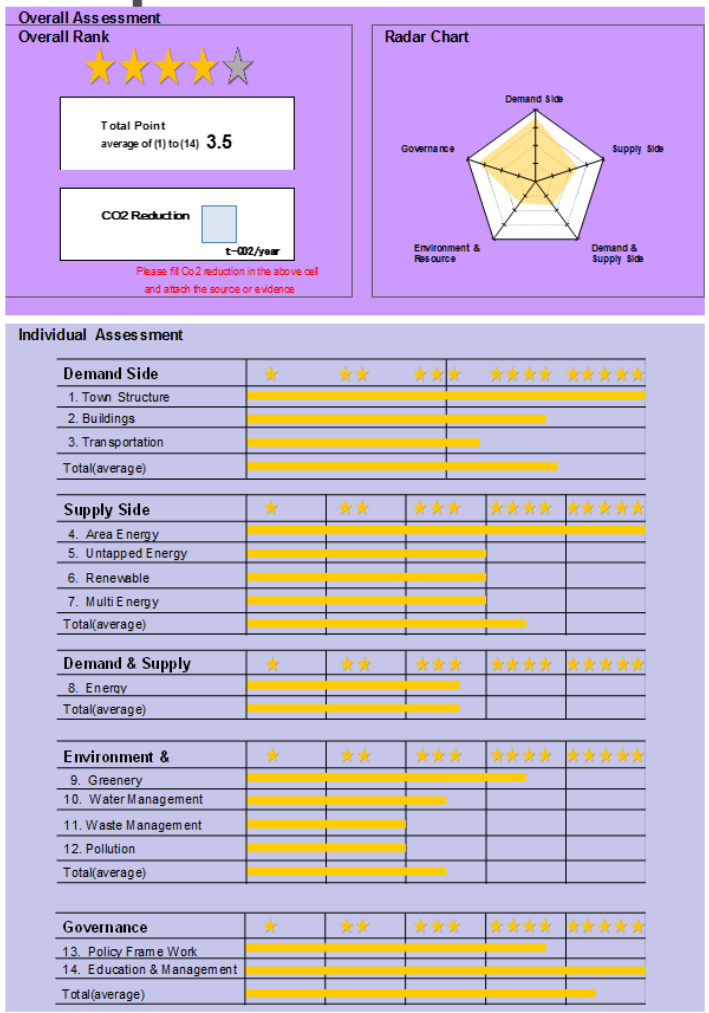

Assess the coverage ratio of the areas of walking distance from the train stations and bus stops to the target area.

Coverage ratio refers to the proportion of range (area of a circle) with a radius of 500m-1000m, centering on train stations and bus stops, to the entire range (assessment target area).

- Train station: radius of 1000m
- Bus stop: radius of 500m
- The range of walking distances (500m or1000m) were referenced from CASBEE(CASBEE for Urban Development –3.1.1.1 Development of traffic facilities)

# Image of Evaluation Results

## Output Sheet 1




## Output Sheet 2

| evaluation sheet | | | | |
|---|---|---|---|---|
| | | ★★★ | | 3.5 |
| **Demand Side** | | ★★★★ | | 4.6 |
| **1. Town Structure** | - | | | |
| 1.1. Adjacent Workplace and Residence | - | | | |
| 1. Residential Use and Non-residential Use | ★★★★★ | | 5 | |
| 1.2. Land Use | - | ★★★★★ | | 5.0 |
| 1. Efficient Land Use | ★★★★★ | | 5 | |
| 1.3. TOD (Transit Oriented Development) | - | | | |
| 1. City Development Centered on Public Transportation | ★★★★★ | | 5 | |
| **2. Buildings** | - | | | |
| 2.1. Energy Saving Construction | - | | | |
| 1. Thermal Insulation Performance | ★★★★★ | | 5 | |
| 2. Energy Saving Equipment Performance | ★★★★★ | ★★★★ | 5 | 4.5 |
| 3. Natural Energy | ★★★★ | | 4 | |
| 2.2. Green Construction | - | | | |
| 1. Green Construction Guidelines | ★★★★ | | 4 | |
| **3. Transportation** | - | | | |
| 3.1. Promotion of Public Transportation | - | | | |
| 1. Easy-to-Use Public Transportation | ★★★★★ | | 5 | |
| 2. Comprehensive Transportation Measures | ★★★★★ | | 5 | |
| 3.2. Improvement in Traffic Flow | - | | | |
| 1. TDM(Transportation Demand Management) | ★★★★★ | ★★★★ | 5 | 4.2 |
| 2. Transportation Infrastructure Planning | ★★★★★ | | 5 | |
| 3.3. Introduction of Low Carbon Vehicles | - | | | |
| 1. Introduction of Low Carbon Vehicles | ★★★★★ | | 5 | |
| 3.4. Promotion of Efficient Use | - | | | |
| 1. Support for eco-driving | - | | 0 | |
| **Supply Side** | | ★★★ | | 3.5 |
| **4. Area Energy System** | - | | | |
| 4.1. Area Energy | - | ★★★★★ | | 5.0 |
| 1. Introduction of Area Energy | ★★★★★ | | 5 | |
| **5. Untapped Energy** | - | | | |
| 5.1. Untapped Energy | - | ★★★ | | 3.0 |
| 1. Introduction of Renewable Energy | ★★★ | | 3 | |
| **6. Renewable Energy** | - | | | |
| 6.1. Renewable Energy | - | ★★★ | | 3.0 |
| 1. Introduction of Renewable Energy | ★★★ | | 3 | |
| **7. Multi Energy System** | - | | | |
| 7.1. Multi Energy | - | ★★★ | | 3.0 |
| 1. Introduction of a Multi Energy system | ★★★ | | 3 | |
| **Demand & Supply Side** | | ★★ | | 2.7 |
| **8. Energy Management** | - | | | |
| 8.1. Energy Management of Buildings/Area | - | | | |
| 1. Energy Management of Buildings/Area | ★★★★ | ★★ | 4 | 2.7 |
| 2. AEMS (Area Energy Management System) | ★★★★ | | 4 | |
| 3. Smart Micro Grid | - | | 0 | |

# Resources for CO2 emissions calculation

The calculation method is according to the calculation criteria of each economy, but for economies that do not have a regulated calculation method, the following guideline can be used as an example.

- Intergovernmental Panel on Climate Change (IPCC)

  http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

- 'ISO14064' regulated by International Organization for Standardization (ISO) about estimate, report and verification of greenhouse gas (GHG) emissions and reductions.

  http://www.iso.org/iso/catalogue_detail?csnumber=38381

  *no need to do verification process (ISO 14064-3)

- Simplified method is also explained with a quote from CASBEE for Cities in the LCT-I System Guideline.



# Thank you for your kind attention

**The LCT-I System Guideline:**
***http://aperc.ieej.or.jp/publications/reports/lcmt/LCT-I_System_Guideline.pdf***
**Evaluation Sheet:**
***http://aperc.ieej.or.jp/publications/reports/lcmt/LCT-I_Evaluation_sheet_first_edition_rev2.xls***

APERC
Asia Pacific Energy Research Centre

# Davao City

IVAN C. CORTEZ, ENP

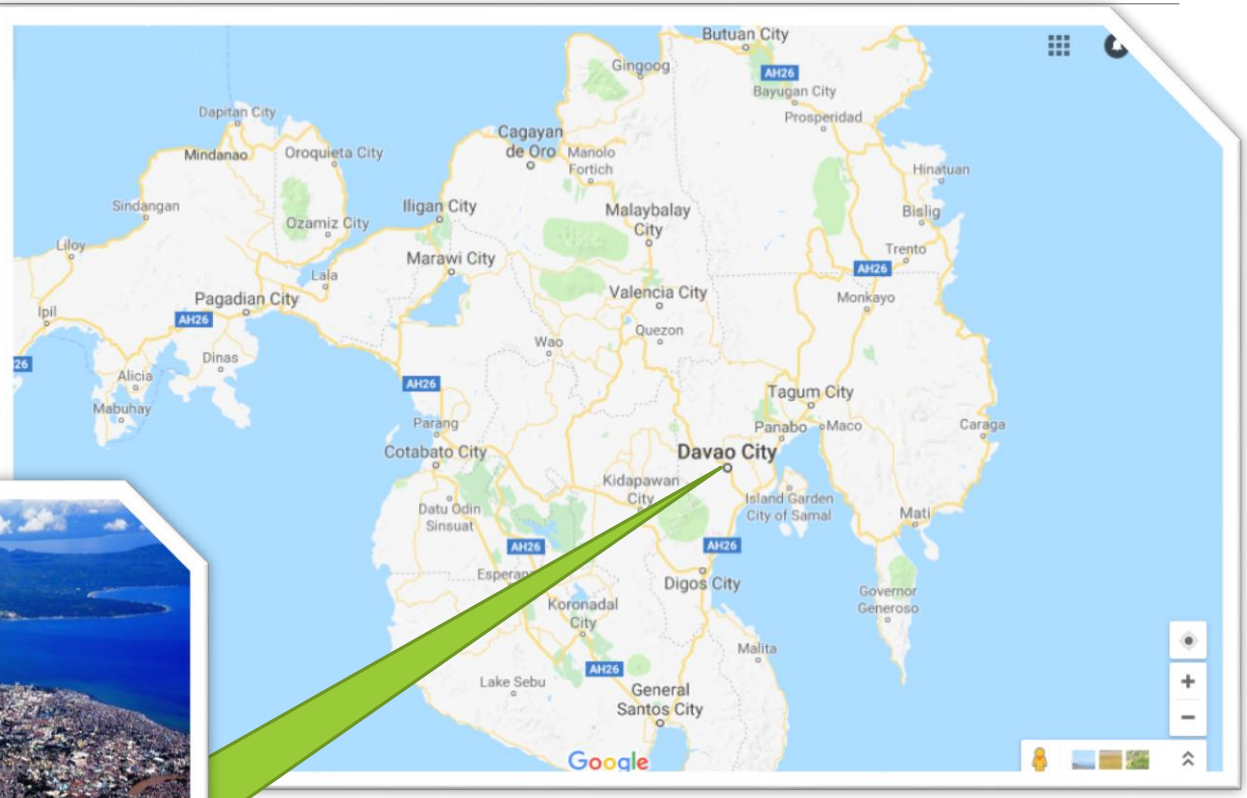
OFFICER-IN-CHARGE

OFFICE ON THE CITY PLANNING AND DEVELOPMENT COORDINATOR

The 2nd APEC Low-Carbon Model Town Symposium
20 September 2018

# Davao City Location

Located at the South-eastern portion of the island of Mindanao and the Southern part of the Philippine Archipelago, Located in the West Central area of Region XI,

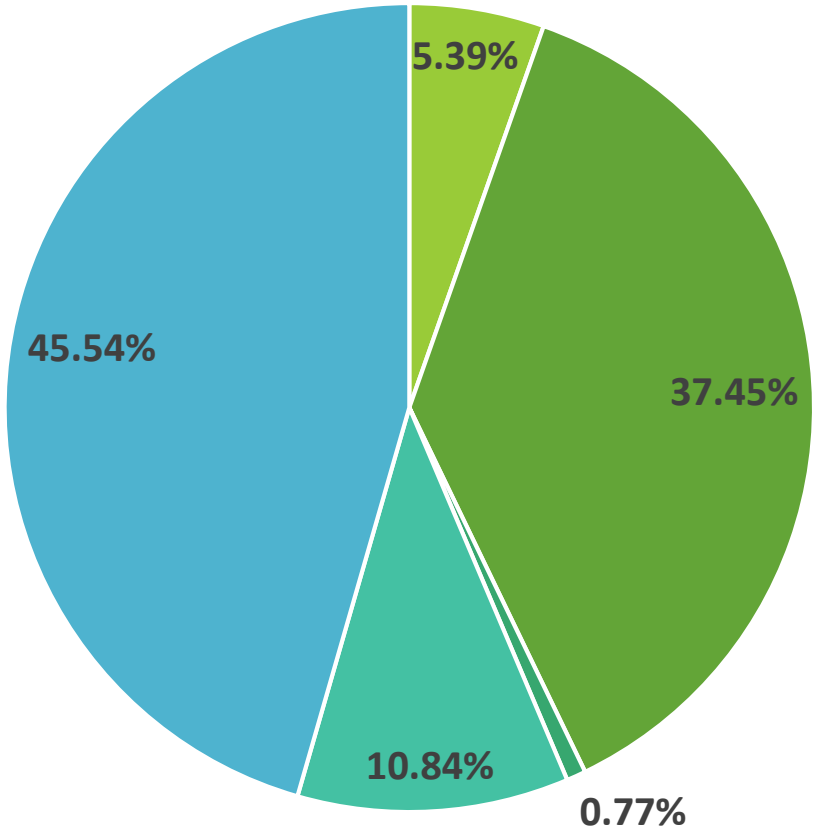





# Land and Water Uses

**LAND USE IN HECTARES**

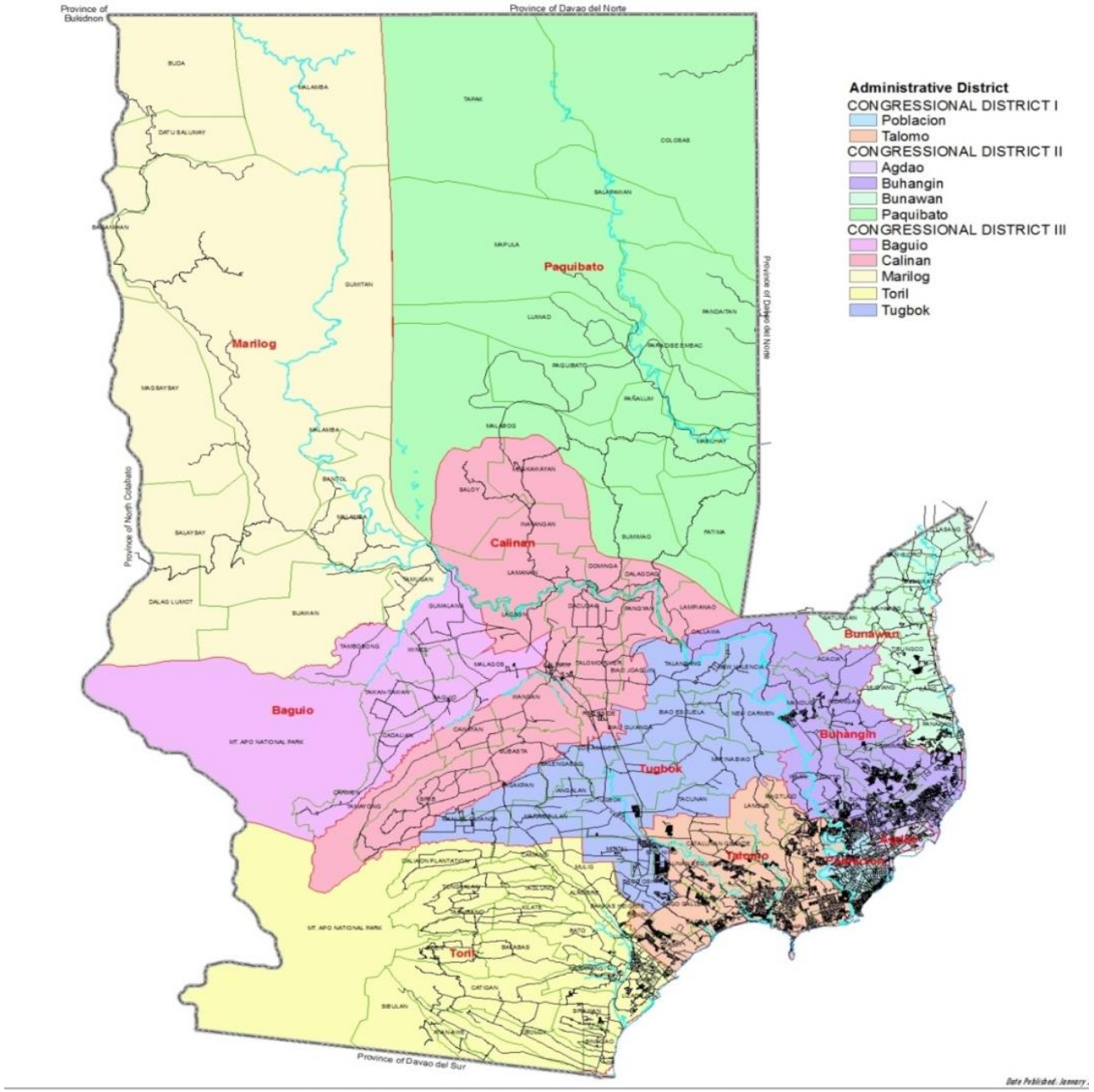
| | |
|---|---|
| Urban Use | 13,150 |
| Agriculture | 91,386 |
| Water Use | 1,890 |
| Forest | 26,454 |
| Grassland/Pasture | 111,120 |
| **Total** | **244,000** |



The city's land area is 244,000 hectares or 2,440 sq. km.

Divided in to 3 Congressional Districts and further subdivided to 11 Administrative Districts

Population Density:
7 persons/ ha or
669 persons/ sq. km.

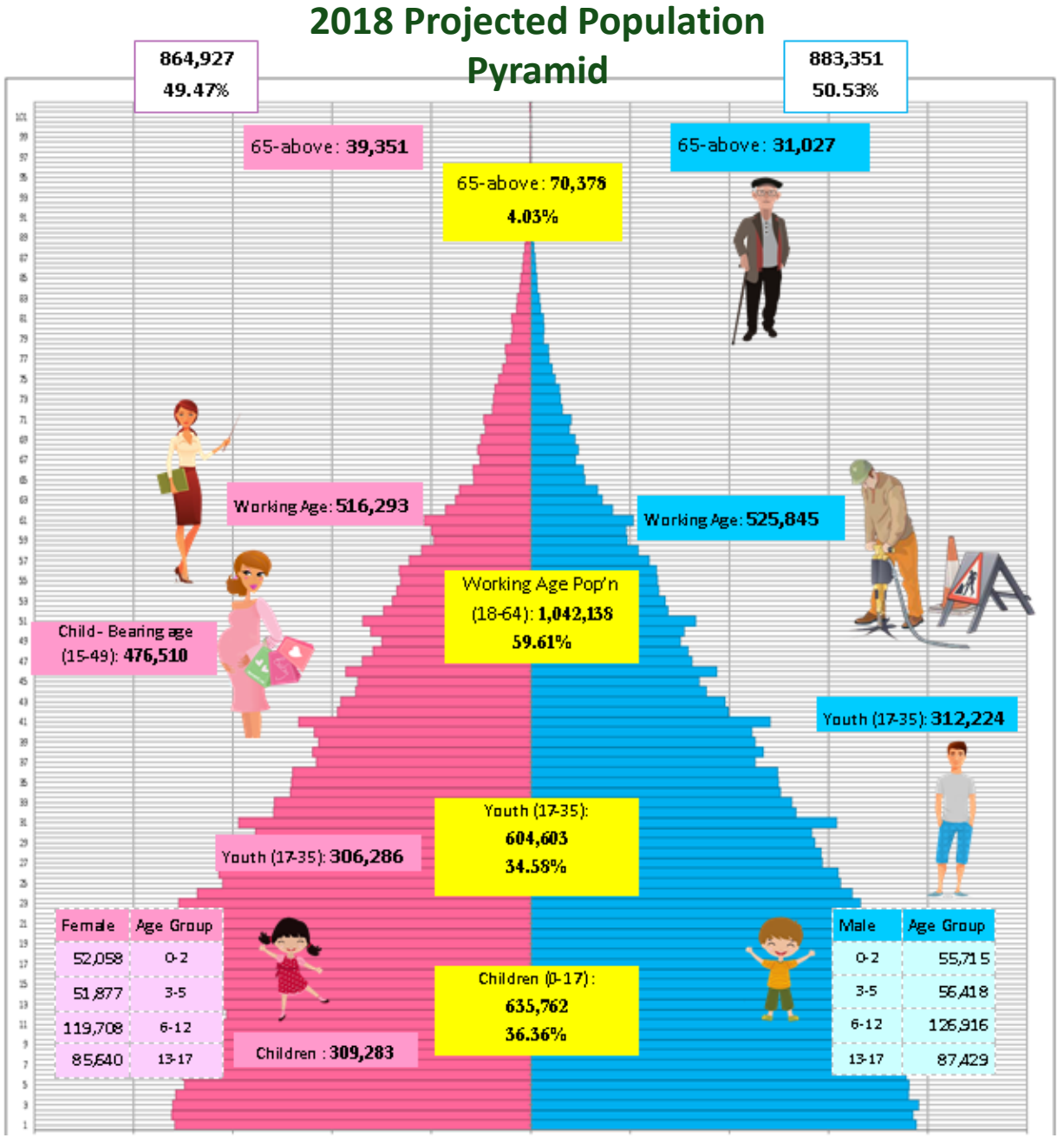


# Population

**2018 Total Projected Population 1,748,279**

**Doubling Time - 30.4**
**(in years)**

| **2015, Overall Dependency Ratio** (*per 100 persons*) | **64** |
|---|---|
| Young (0 to 17 years old. | **57** |
| Old ( 65 years old and over) | **7** |



# Major Economic Drivers

## AGRICULTURE / AGRO-PROCESSING

-Increase Farmer's Productivity and Profitability
-Expand Production Areas





## ECO and AGRI TOURISM



## INFORMATION & COMMUNICATION TECHNOLOGY



# Tourism Industry

| Tourist Arrivals | 2016 | 2017 | % Change |
|---|---|---|---|
| Foreign | 124,863 | 126,294 | 1.14 |
| Balikbayan/Overseas Filipinos | 23,256 | 48,020 | 106.48 |
| Local/Domestic | 1,716,224 | 1,838,311 | 7.11 |
| **Total** | **1,864,343** | **2,012,625** | 7.95 |
| Average Length of Stay (no. of days) | 4.0 | 3.6 | |
| Average Daily Expenditures (Php/day) | 3,964 | 4,270 | 7.72 |
| Estimated Tourist Receipts (Php Billion) | 29.56 | 30.94 | 4.66 |
| **Estimated Economic Benefits (Php Billion)** | **65.03** | **68.06** | 4.65 |

## Recent Awards

| Award Title | Year | Award Giving Body |
|---|---|---|
| ASEAN Clean Tourist City Standard | 2018 | ASEAN/Department of Tourism |

# Vital Health Statistics

| Indicator | 2016 | 2017 | % Change |
|---|---|---|---|
| % Deliveries by Skilled Births Attendance | 90 | 92.09 | 2.09 |
| % Fully Immunized Mothers (FIM) | 53 | 56 | 3.0 |
| % Contraceptive Prevalence Rate | 50.70 | 61.2 | 10.5 |
| Prevalence Rate of Malnourished Children (0-5years old) | 3.30 | 3.06 | 0.24 |
| % Households with access to potable water | 98.80 | 98.80 | - |
| % Households with sanitary toilets | 91.60 | 92.34 | 0.74 |

## Recent Awards

| Award Title | Year | Award Giving Body |
|---|---|---|
| Champion for Health Governance, Excellence in Government for Healthy Communities Awards | 2017 | Department of Health (DOH) |



# Peace and Order

| Indicator | 2016 | 2017 | % Change |
|---|---|---|---|
| **Crimes reported** | 10,269 | 7,576 | -26.22 |
| **% Crime Solution Efficiency** | 79.64 | 87.54 | 9.91 |
| **Monthly Crime Rate** / 100,000 pop'n | 52.74 | 39.00 | -26.05 |

## Recent Awards

| Award Title | Year | Award Giving Body |
|---|---|---|
| Special Recognition as Most Peaceful & Safest City in Southeast Asia | 2018 | Philippine Chamber of Commerce & Industry (PCCI)/ Numbeo |
| Best City Police Office | 2018 | Philippine National Police (PNP) Camp Crame |
| Philippine Top Model City - Safe Haven Award | 2018 | The Manila Times |

# 10 Key Priority Areas, 30 Doable Projects in 3 years

Poverty Alleviation | Infrastructure Development | Solid Waste Management | Health | Education | Agriculture | Tourism | Transportation Planning and Traffic Management | Peace and Order | Disaster Risk Reduction and Mitigation



BYAHENG DO30

# 1. POVERTY ALLEVIATION

- **Sustainable Livelihood Development Program**
- **Shelter Programs (Relocation Projects/Medium Size Socialized Housing)**
- **Standardization of Social Services and Residential Care Facilities**
- **Sustainable Reforestation Program for Upland Tribes**






# 2. INFRASTRUCTURE DEVELOPMENT

- **Construction of Major Road, Highways and Farm to Market roads**
- **Clean Surface Water as means of potable water supply**
- **Renewal Energy Development and Usage of Energy Saving Lighting Technology**
- **Underground Cabling and Piping of Utilities**
- **Drainage, Sewerage and Water Treatment System Development**
- **Modernization of Government Buildings and Facilities**






# 3. SOLID WASTE MANAGEMENT

- **Establishment of Waste to Energy facility**
- **Development of New Sanitary Landfill Sites and Solid Wastes Segregation**






# 4. HEALTH

- **Clean Air Davao Program**
- **Health Facility Enhancement Program**
- **Inclusive Health Programs/Projects/ Activities thru "Life-Cycle Approach"**
- **Promotion of Healthy Lifestyle**
- **Reproductive Health Care Program**










# 5. EDUCATION

- **Improvement of Industry-based competencies**
- **Sufficiency in Education Facilities and Learning Materials**
- **Education Scholarship Program**



# 6. AGRICULTURE

- **Development of Davao City as the " Chocolate Capital of the Philippines"**
- **Completion of the Agri-Pinoy Trading Center at Daliao**
- **Organic Farming and Containerized Gardening**










# 7. TOURISM

- **Tourism Promotion in the South East Asia Region**
- **Tourism Development Program**
- **Community Based Tourism Village**
- **Riverside Development**
- **Tourism Information Center**
- **Tourism Development within the context of environmental regulations**



# 8. TRANSPORTATION PLANNING AND TRAFFIC MANAGEMENT

- **Creation of the City Transportation and Traffic Management Office**

- **Develop Efficient Public Transportation System**











# 9. PEACE AND ORDER

- **Expansion of Central 911 Main Headquarter and Construction of Satellite Stations**

- **Intensify Campaign Against Illegal Drugs**










# 10. DISASTER RISK REDUCTION AND MITIGATION

- **Local Climate Change Action Plan**
- **Disaster Risk Reduction Management Plan**
- **Construction of Disaster Resilient Evacuation Centers**
- **Evacuation Management Plan**











# Low-Carbon Measures in Davao City

| | | |
|---|---|---|
| Demand | 1. Town Structure | • IM4 Davao Formulation<br>• Transit-Orientation Development Planning<br>• 10% Additional Greening/Greenspace<br>• UEE Implementation Rules & Regulations<br>• More Open Space Proposed<br>• Coastal Road |
| | 2. Buildings | • Green Building Ordinance<br>• Rain Water Harvesting Law |
| | 3. Transportation | • HPBS (High Priority Bus System)<br>• Railway System/Monorail<br>• Expressways (Bypass Road)<br>• Coastal Road<br>• Road Network Rationalizing Program |

# Low-Carbon Measures in Davao City

| | | |
|---|---|---|
| Supply | 4. Area Energy System | None |
| | 5. Untapped Energy | Waste To Energy (WTE) facility |
| | 6. Renewable Energy | Hydro Electric Power Plans, Talomo Hydro 1, Talomo Hydro 2, Talomo Hydro 3, HEDCOR Agus Iligan |
| | 7. Multi Energy System | Hydro Electric Power Plans, Talomo Hydro 1, Talomo Hydro 2, Talomo Hydro 3, HEDCOR Agus Iligan, Therma South |
| Demand & Supply | 8.1.1 Energy Management System | None; Present in Source Industry Facilities but Interested |
| | 8.1.2 Area Energy Management System (AEMS) | |
| | 8.1.3 Micro Grid | None but interested |

# Low-Carbon Measures in Davao City

| | | |
|---|---|---|
| **Environment & Resources** | 9. Greenery | • Park Maintenance (Botanical, Peoples Park, Islands, Quezon Park, Sta. Ana Park)/ Park Development (Brgy. 10)<br>• Tree Growing/Forest Rehab<br>• Mangrove Rehab<br>• Adopt a Watershed Program<br>• Riverbank Rehabilitation |
| | 10. Water Management | • Rainwater Harvesting Law<br>• Surface Water Development Project<br>• Community Water System Development<br>• Septage/Sewerage Treatment Plant |

# Low-Carbon Measures in Davao City

| | | |
|---|---|---|
| **Environment & Resources** | 11. Waste Management | • Updating of Solid Waste Management (SWM) Plan<br>• Biodiesel<br>• Waste to Energy (WTE) Project<br>• Establishment of Material Recovery facilities (MRF)<br>• Operation of Sanitary Land Field (SLF) |
| | 12. Pollution | • Green House Gas (GHG) Inventory Study with KITAKYUSKU<br>• Operationalization of Water Quality Management Areas<br>• Water Quality Monitoring Program<br>• Smoking Regulation Ordinance<br>• Anti-Smoke Belching Ordinance<br>• Establishment of Water Shed Multipartite Monitoring Team<br>• Coastal Clean-up<br>• Organic Farming Ordinance |

# Low-Carbon Measures in Davao City

| | | Ordinance Number | Ordinance Title |
|---|---|---|---|
| Governance | 13. Policy Framework | Ord. No. 999, s. 1974 | Prohibiting the construction of Houses/or buildings with in the 50-meter distance from the highest tide level along the seashore of talomo beach |
| | | Ord. No. 117-01, s. 2001 | Water Resource Management and Protection Code of Davao City |
| | | Ord. No. 0280-06, s. 2006 | The Anti-Smoke Belching Ordinance-Protection of the Air Quality of Davao City |

# Low-Carbon Measures in Davao City

| | | Ordinance Number | Ordinance Title |
|---|---|---|---|
| Governance | 13. Policy Framework | Ord. No. 0310-07, s. 2007 | Watershed Protection, Conservation and Management Ordinance hereinafter referred to as the Watershed Code |
| | | Ord. No. 0375, s. 2009 | Establishment and Management of Davao City Maritime Protected Areas |
| | | Ord. No. 0289-09, s. 2009 | Davao City Rainwater Ordinance of 2009 |
| | | Ord. No. 0361, s. 2010 | An ordinance providing for an Ecological Solid Waste Management prohibiting certain acts and providing penalties for violations, and for other purposes |

# Low-Carbon Measures in Davao City

| | | | |
|---|---|---|---|
| Governance | 13. Policy Framework | **Ordinance Number** | **Ordinance Title** |
| | | Ord. No. 0363-10/2849-10, s. 2010 | Septage and Sewerage Management Ordinance of Davao City |
| | | Ord. No. 0367-12, s. 2012 | The New Comprehensive Anti-Smoking Ordinance of Davao City |
| | | Ord. No. 0546-13, s. 2013 | The Zoning Ordinance of Davao City |
| | | Ord. No. 0325-15, s. 2015 | An Ordinance Closing off the City Davao to Mining |
| | | Ord. No. 044-02 | Creation of the Solid Waste Management Board |
| | | **Resolution Number** | **Resolution Title** |
| | | Res. No. 01163-08 | Adopting the 10-year Integrated Solid Waste Management Plan 2008-20017 of Davao City |

# Low-Carbon Measures in Davao City

| | | |
|---|---|---|
| Governance | 14. Education & Management | • IEC Program on Solidwaste Management<br>• Waste Disposal Management system Monitoring<br>• Biodegradable Waste of Public Market Processed for Greening Program of the City<br>• Issuance of Solid Waste Management Certificates relative to the issuance of business permits |

# Self-evaluation Results of Davao City

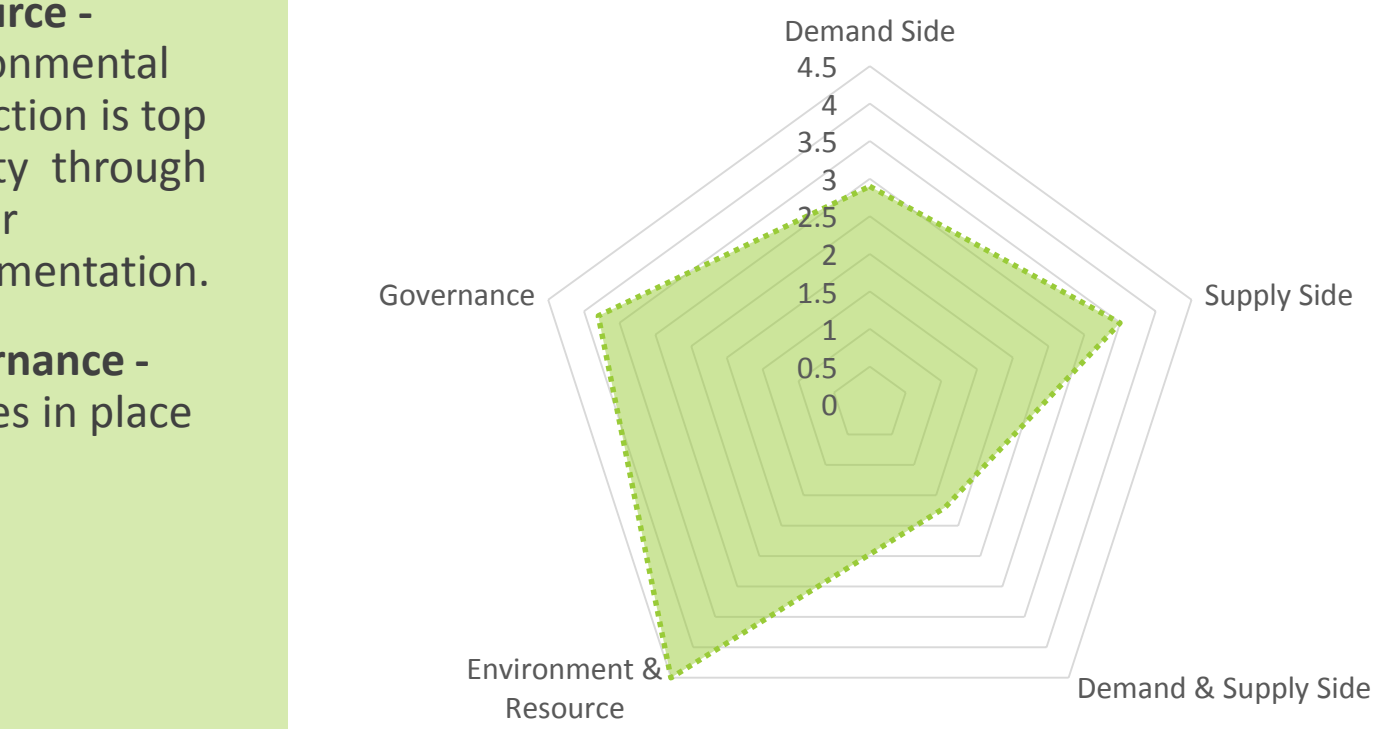
**Demand Side** - Development Planning focus must shift to address high energy use.

**Supply Side** - Need to enhance and tap other energy sources.

**Demand and Supply** - Need to monitor energy usage and manage/harmonize systems for optimal energy use.

**Environment & Resource** - Environmental Protection is top priority through proper implementation.

**Governance** - Policies in place



# Future Plans of Davao City

**Take initial steps in terms of measures, interventions and policy to achieve low carbon levels in the city of Davao**

- Sustainable Periodic Green House Gas Inventory
- Sustainable Urban Resources Management Initiatives
- Formulation of Local Climate Change Action Plan (LCCAP)

# Future Plans of Davao City

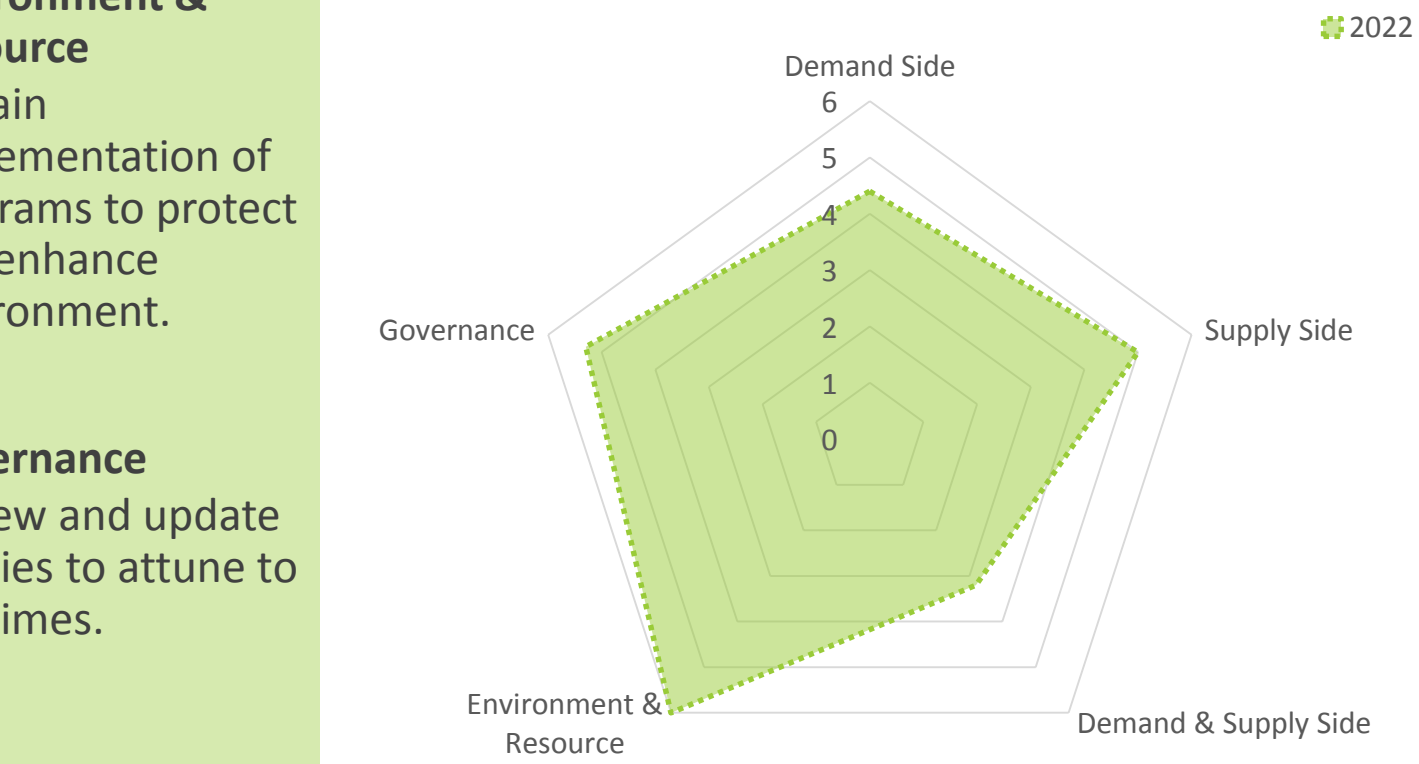
**Demand Side**
- Comprehensive Land Use Plan (CLUP)
- Transit Oriented Development (TOD)
- Implementation of Green Buildings (GB)
- Implement project in pipelines.

**Supply Side**
- Explore and research potentials in area energy.

**Demand and Supply**
- Establish/formulation/ Management System.

**Environment & Resource**
- Sustain implementation of programs to protect and enhance environment.

**Governance**
- Review and update policies to attune to the times.



# Feedback for LCT-I System

- Difficulties in the evaluation process.
  **Some description are hard to comprehend/measure/rank**

- Utilization of evaluation results.
  **Policy/Agenda intervention**
  **Formulation of programs & projects**

# Review on the LCT Planning of **Davao City**

Michinaga Kohno, President
Michi Creative City Designers Inc.

The 2nd APEC Low-Carbon Model Town Symposium
20 September 2018

# Findings on the LCT Planning of Davao City (1)

Characteristics of the town:

- ✓ *Davao City, located in Mindanao Island, is the third largest city of the Philippines after Metro Manila and Metro Cebu, and is the center of politics, economy and culture in Southern Philippines.*
- ✓ *Population: 1,633,000 (2015)*
  - ➢ *Average growth of population is 2.82% in 5 years (2010 – 2015)*
- ✓ *Size of town: 244,000 ha*
- ✓ *The priority industrial sectors in the coming years are:*
  - ➢ *Agriculture and Agro-industry*
  - ➢ *Information and communication technology*
  - ➢ *Tourism*

[Source: Nomination Sheet and Wikipedia]

# Findings on the LCT Planning of Davao City (2)

On-going projects related to “low-carbon town”:

- ✓ *Bayaheng Do30: Initiative for cleaner and healthier city*
- ✓ *IM4Davao 2045: Infrastructure and capacity building project*
- ✓ *Comprehensive Land Use Plan (CLUP) 2013-2022: Vision, mission and goals of the development sectors*
- ✓ *Disaster Risk Reduction Management Plan: City-wide commitment to reduce greenhouse gases and to increase resiliency*
- ✓ *Local Climate Change Action Plan: (Same as above)*

[Source: Nomination Sheet]

# Evaluation on the Application of the LCT- I System

| Question | Excellent | Good | Average | Below Average | Poor |
|---|---|---|---|---|---|
| Information of the LCT-I Volunteer Town | | ✓ | | | |
| Understanding of each LCT-I System indicators | | | ✓ | | |
| Explanation (evidence) provided for the self-evaluation | | | | ✓ | |
| Collection of data necessary for the evaluation | | | ✓ | | |
| Calculation of CO2 emissions | | ✓ | | | |

# Feedback on the Self-Evaluation (1)

| Tier 1 | Tier 2 | Tier 3 | Comments |
|---|---|---|---|
| Demand | Town Structure | 1. Adjacent Workplace<br>2. Land Use<br>3. TOD | The target area of the city is based on the mixed-use concept, while efficient land use is misunderstood. |
| | Buildings | 1. Energy Saving Construction<br>2. Green Construction | While the evaluations on thermal performance and natural energy are low, there should be efforts towards the green buildings and their constructions. |
| | Transpor-tation | 1. Promotion of Public Transportation | Plans and measures to promote the use of public transportation are referred to. |
| | | 2. Improvement in Traffic Flow | Varied measures are being taken to improve traffic flow, although the scorer misunderstood the definition of transportation demand management. |
| | | 3. Promotion of Efficient Use | It cannot be verified if the plans fit the concept of efficient use of vehicles of LCT-I. |

# Feedback on the Self-Evaluation (2)

| Tier 1 | Tier 2 | Tier 3 | Comments |
|---|---|---|---|
| Supply | Area Energy System | Area Energy | Area energy systems cannot be planned independent to urban planning and land use plans. |
| | Untapped Energy | Untapped Energy | Bio-diesel fuel is not one of untapped energy sources, and w2e concept should be introduced along with the plan of solid waste management. |
| | Renewable Energy | Renewable Energy | Half of current energy source is hydraulic. |
| | Multi-Energy System | Multi-Energy | Having multiple energy sources promotes the improvement in resilience of cities in tropical areas in such disasters as storms and earthquakes. |

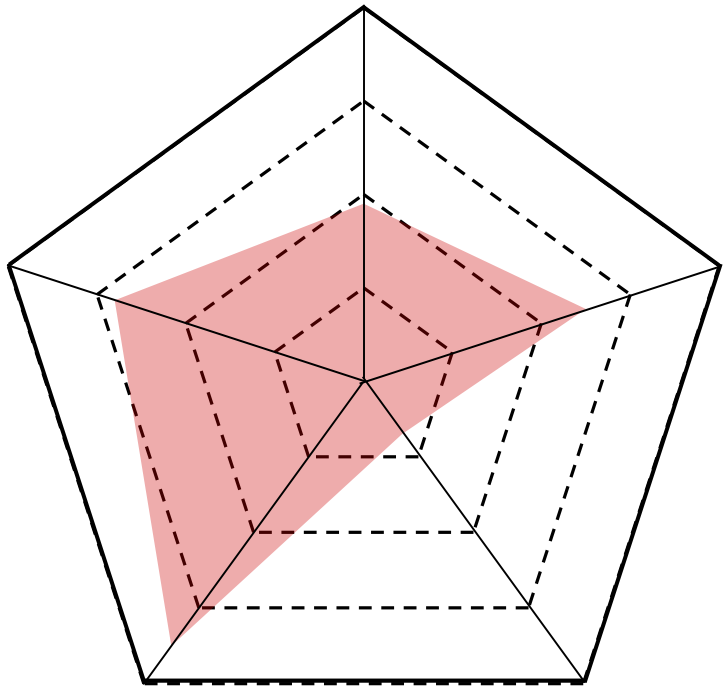
# Feedback on the Self-Evaluation (3)

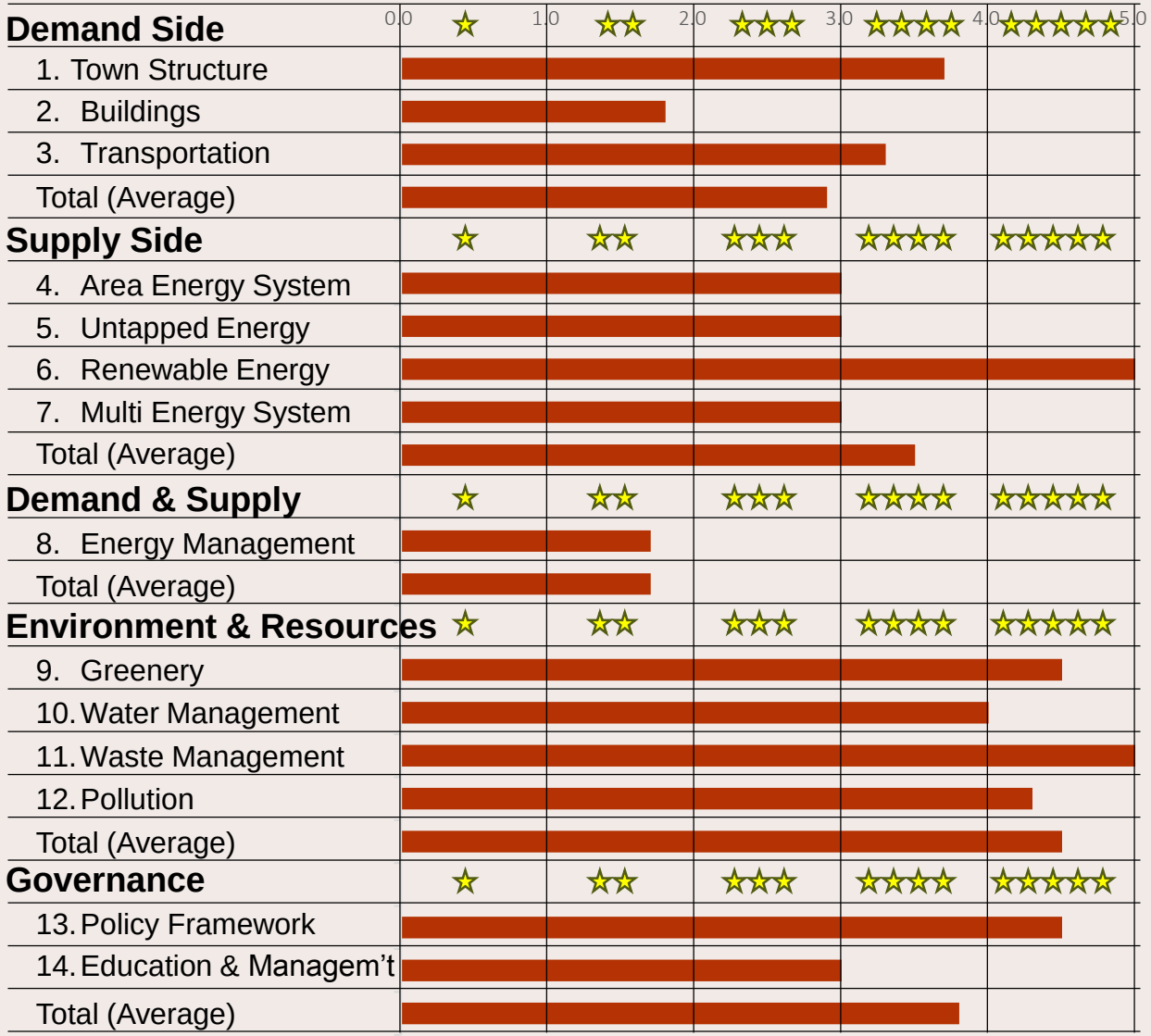
| Tier 1 | Tier 2 | Tier 3 | Comments |
|---|---|---|---|
| Demand and Supply | Energy Manage-ment | Energy Management of Building / Areas | These indicators are not suitable to evaluate current situations in developing economies, as the self-evaluation results of Davao clearly show. |
| Environ-ment and Resources | Greenery | Securing Green Space | The high scores in this section cannot be verified as no comments (evidences) are given. |
| | Water Manage-ment | Water Resources | This section is also unverifiable due to the lack of evidence. |

# Feedback on the Self-Evaluation (4)

| Tier 1 | Tier 2 | Tier 3 | Comments |
|---|---|---|---|
| Environ-ment and Resources | Waste Manage-ment | Waste Products | Although there are no comments (evidences) on waste management, it has been reported that w2e concept is being implemented, while the efforts in reduction of waste are not tangible. |
| | Pollution | 1. Air<br>2. Water Quality<br>3. Soil | Comments (evidences) should be given to prove the high scores of self-evaluation in these items. |
| Govern-ance | Policy Frame-work | 1. Efforts toward a Low-Carbon Town | Comments (evidences) should be given to prove the high scores of self-evaluation in these items. |
| | | 2. Efforts toward Sustainability | Comments (evidences) should be given to prove the high scores of self-evaluation in these items. |
| Govern-ance | Education & Manage-ment | Life Cycle Management | It seems rather awkward to see relatively low score in this section in contrast with the high scores in policy frameworks |

# Feedback on the Self-Evaluation

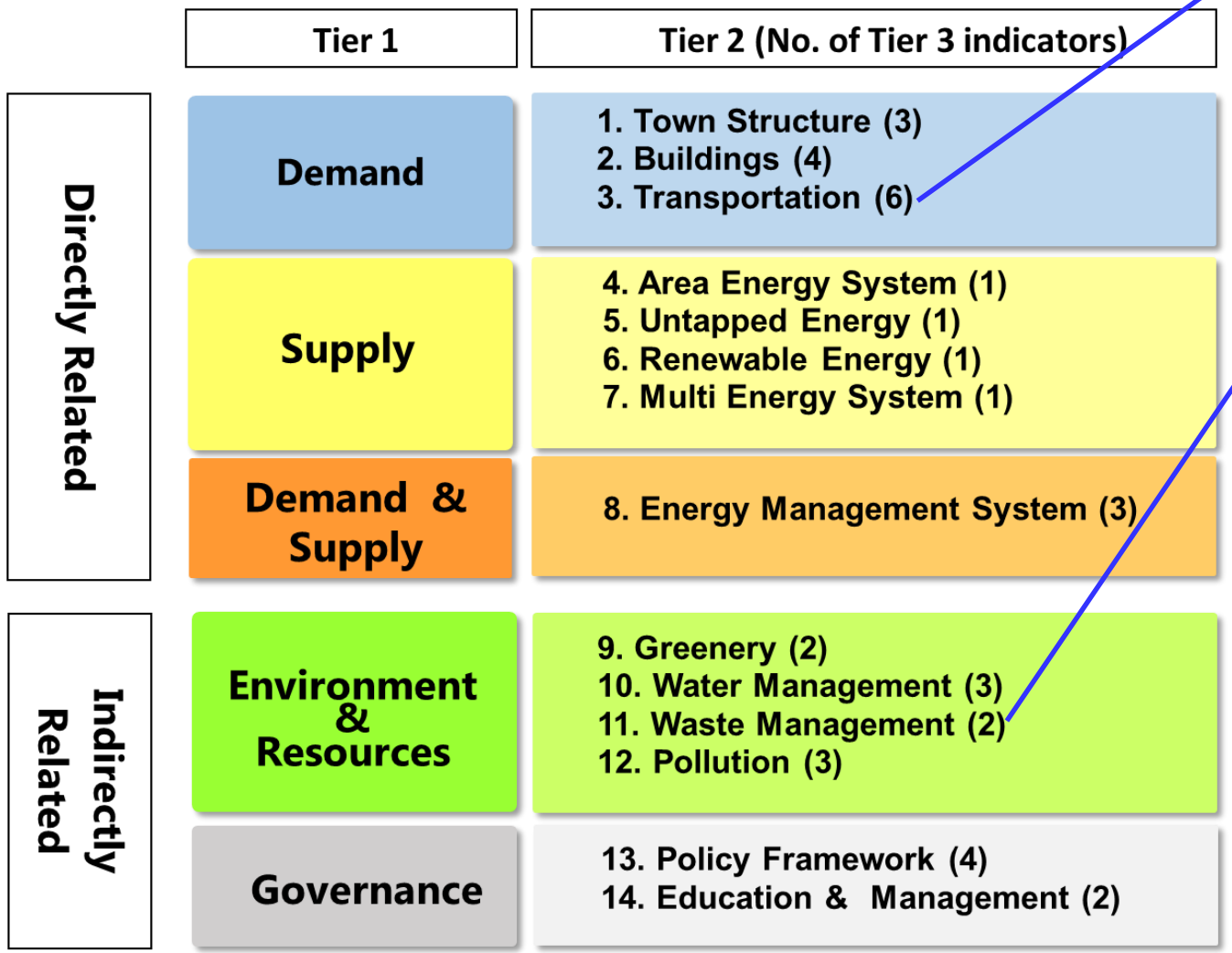





Although the scores of "Supply Side" are relatively high, there seems to be some rooms of improvement.

Demand & Supply is not suited for developing economies, which was also seen in last year's results.

# For the Improvement




1. Promotion of the use of public transportation should be focused under the forecast of population growth and current traffic congestions, based on IM4Davao report.

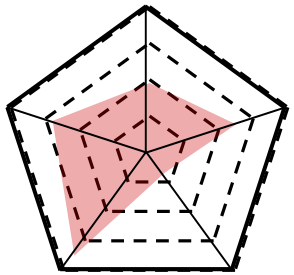
2. Davao has been in waste management under cooperation with Kita-Kyushu, Japan, and is on its way to introduce w2e (waste to energy) plants.

   ✓ The advanced implementation should be accelerated to make Davao as a model in this segment in ASEAN Smart City Network, in which Davao is one of pilot cities.

# Ideas for the LCT Development

## Demand Side

- Promotion of public transportation, including railways in mind



Current Score

- Transportation is a critical issue for big cities like Davao with expected growth of population.

## Supply Side

- Establishment of the status of “Lead Model of w2e in ASEAN”
  - Introduction of untapped energy as well as improvement of sanitary and independence from land fill practices

- Changes in lifestyles of travel and waste management
- Approaches to LCT from the aspects close to the people

# DA LAT
# to become a Low-Carbon City

**TRẦN NGỌC DUY QUANG**

HEAD OF DIVISION FOR NATURAL RESOURCES AND ENVIRONMENT MANGEMENT, DA LAT CITY

The 2nd APEC Low-Carbon Model Town Symposium
20 September 2018

# Presentation:

- **Overview**
- **Current quality of environment**
- **Environment management**
- **Target**
- **Approaches to low-carbon town solutions**

# Introduction

- Da Lat City – Viet Nam's famous tourist destination on highland region with magnificent landscapes and nice weather.
- Head of many rivers and streams in the area -> Makes Da Lat a key place to guarantee the quality of water supply.
- Clean environment thanks to the forest, photosynthesis process help stabilize carbon amount and reduce greenhouse gases.

# Natural, Economic and Social Conditions

- Natural area: 39.445ha (Forest: 20.827,37 ha),
- Average altitude: 1.500m from the sea level;
- A Class 1 City under Lam Dong Province (12 wards and 4 communes ),
- Two types of terrains: Mountain and high plain. The high plain area including city center are surrounded by mountains.;
- *Population* 226,978 (2017) people.
- Development direction: Services, tourism and hi-tech agriculture; Average temperature: 18,5$^0$C; Dry months' average wind speed is higher than rainy ones'; From October to February of the following year, average wind speed is  from 2.1 to 3.5m/s, 2,0 to 2,7m/s from June to September, 3,3m/s in August, and 1,4 to 1,8m/s in the others.

# Natural, Economic and Social Conditions

- The highest wind speed relates to affection caused by storms, tropical depression, strong Northeastern monsoon or even paroxysm of Southwestern monsoon.
- Wind speed becomes extreme when storms are around or in Northeastern monsoon season; It barely reaches annual maximum speed in other months of the year.
- Da Lat is located in tropical-monsoon climate zone, nevertheless, affacted by altitude and terrains' laws. Thus, Da Lat has cool climate, high amount of rain, short dry season, low evaporation. Barely suffer from direct storms
- Has advantages in developing tourism and manufacturing high-quality agricultural products.

# Hạ tầng và cảnh quan

- At its 125th anniversary of Establishment and Development, Da Lat is proud to well preserve many mansions with unique architectural features as well as historic and cultural relics.
- The city prioritizes preserving the forest, building green urban areas.
- Thành phố Đà Lạt rất chú trọng đến việc duy trì hiện trạng rừng và xây dựng mảng xanh nội thị. With 49,02% of city area covered by forest, Da Lat has well preserved the feature: "Forest within city – city within forest";
- Thanks to natural advantages of climate, terrains and landcapes, Da Lat has long become the country's famous tourist destination, named "the Flower City" or acknowledged by the Prime Minister as Viet Nam's City of Flower Festival
- 178 streets (239,760 km in length) within a hilly terrain, Da Lat is the only city has no traffic lights, which is also a unique feature. Recent boom of tourism, services, accommodation, resorts and new tourist destination have been significantly invested, including 1,251 hotels with 17,807 rooms, 20 tourist attraction. Turn of visitors increases annually (4.9 million visitors in 2018, increases by 18% compare to 2017)
- Da Lat has also many unique natural landscapes and rich ecosystem with over 3,000 kinds of species
- Da Lat is known as **"the City of Thousand Flowers"**

# Features of Da Lat





# Agriculture in Da Lat





# Terrace Fields



# Pinhatt Mount – Da Lat's southern highest point



# **Xuan Huong Lake –** A relaxing place along the stream





# Tuyen Lam Lake



# Da Lat’s many green hills





# The Cathedral



# The City within the forest – The forest within the City



# Current environmental condition

Many studies, tests and analyses show that the quality of air, water at surface and underground levels match Viet Nam's standard of environmental observation. However, observation results in recent years show an increasing in carbon emission

# Chart of compared environmental indexes

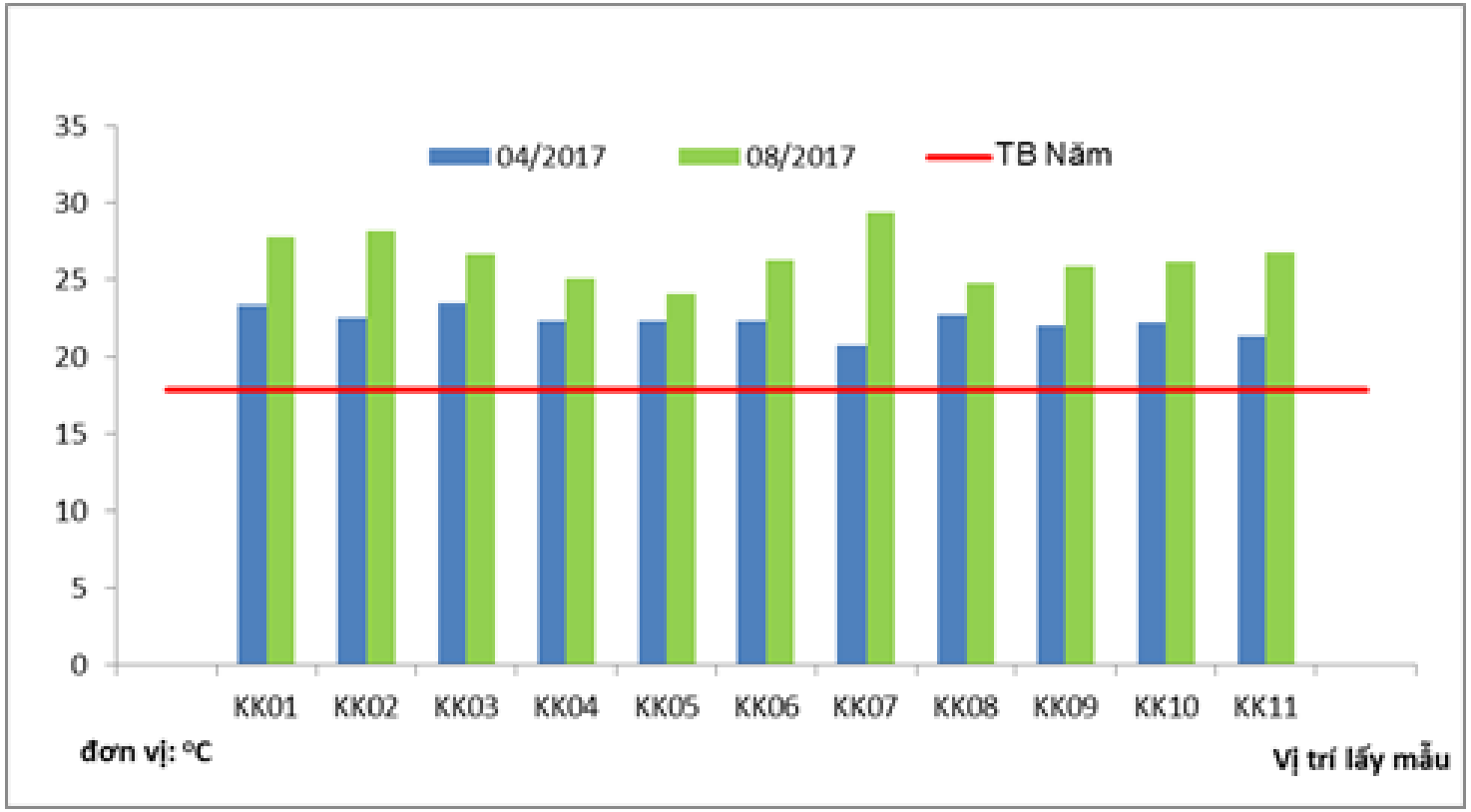
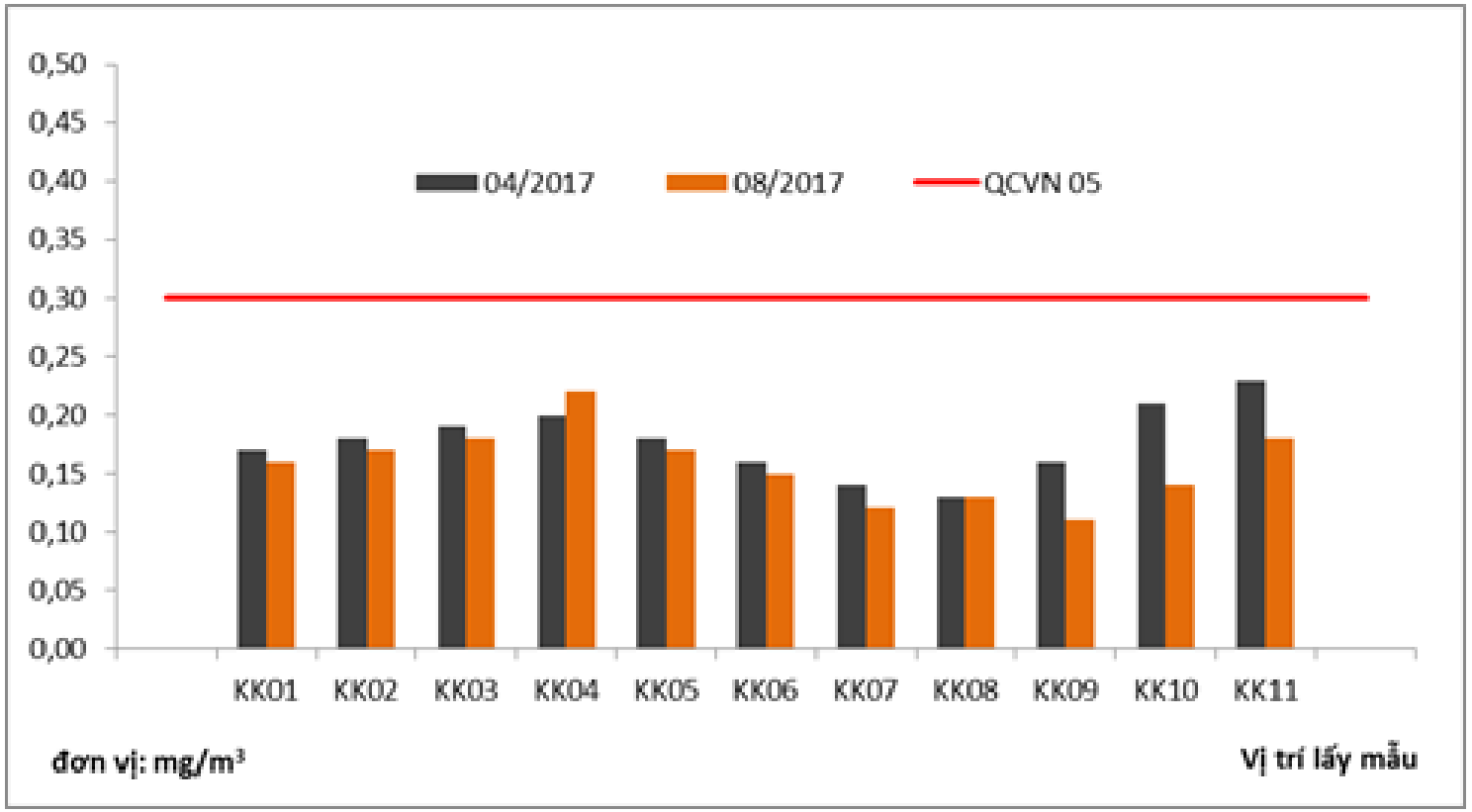



***Figure 1.1. Air temprature along observational points***

# Chart of compared environmental indexes




***Hình 2. Compared index of particulates***

# Chart of compared environmental indexes

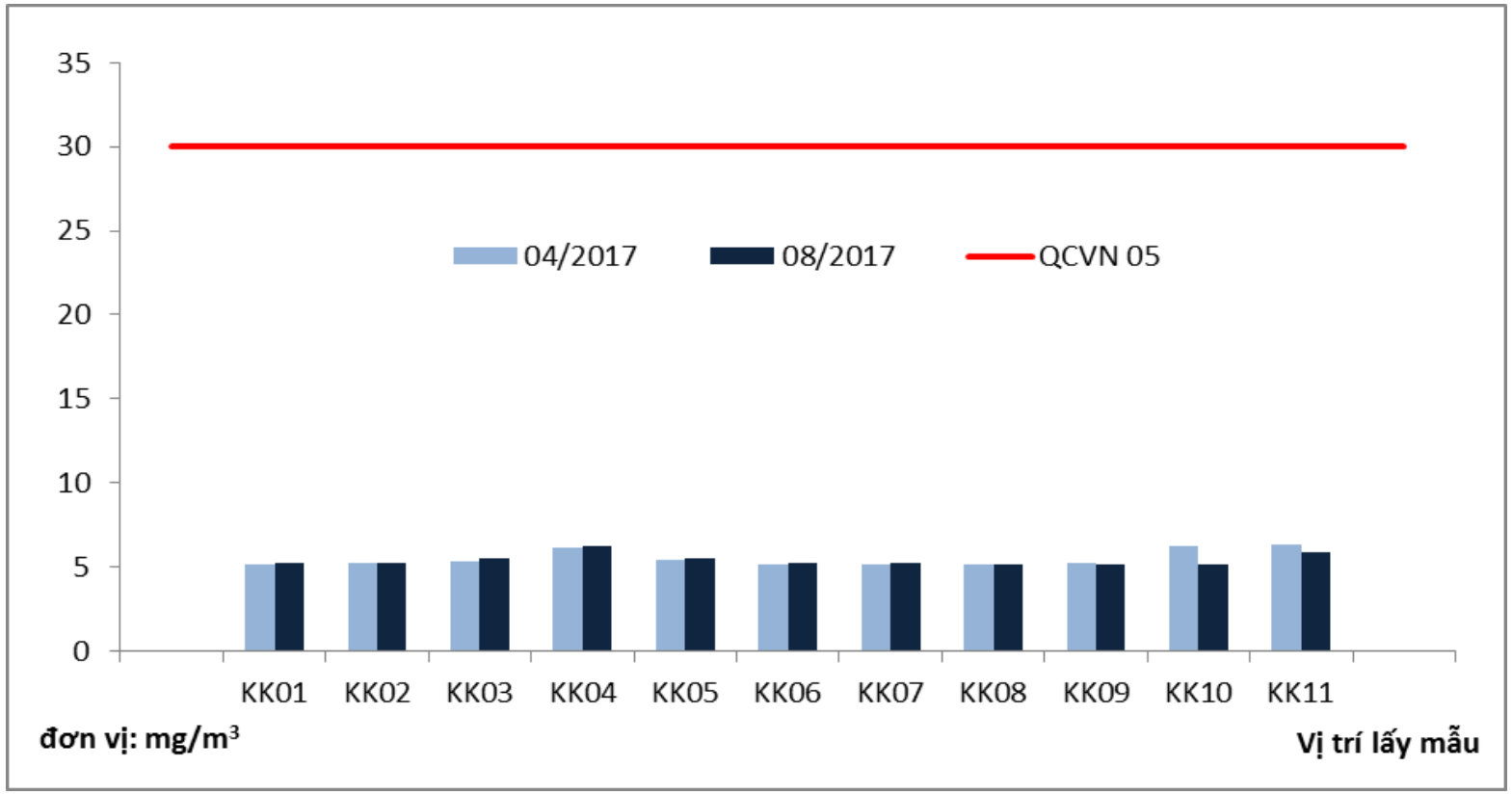



***Figure 3. Concentration of CO***

# Environment Protection Attempts

Environmental sustainably development direction: To develop long-term policies for environment and to invest new environment protection facilities.

To conduct many new projects for environment including: Collect and process pesticide containers, pay for forest environment protection services and many others attempts to reduce emissions.

According to Da Lat's master plan, It is comprised by resident areas, inner-city agricultural manufacturing areas, forest, lakes, rivers and streams. These make Da Lat unique features architecture, in which resident and hi-tech agricultural production are within natural landscape – the sustainable standard (aka. Green Urban Villages)

# Environment management

- Increasing afforestation (current forest cover: 49.0%)
- Encourage citizens to plant trees in urban and private spaces; to collect and process domestic wastes in all city areas (98.5%). 2017: total amount of domestic wastes was about 70,575 tons (193.36 ton per day).
- Collect and porcess 99% of medical wastes (about 86,4 ton per year)
- Organise the “Green Sunday” to encourage people to collect wastes and clean their living areas.
- Project for a centralised wasted water treatment facility to process 88.8% of waste water in 5 central wards
- Supervise the manufacturing facilities, projects, construction sites and promote environment protection attempts

# Future tasks

To maintain Da Lat's ecosystem and environmental sustainability, we need sustainable solutions based on proper use of natural resources. The solutions must be strategic to tackle current long-term requirments

**Environment planning**

**Socialize works of environment protection**

**Increase investment in environment**

**Promote international cooperation for environment matter**

# Urgent issues

Because of the quick growth of tourism and services, the city is facing new challenges of urbanization, population growth as well as high demand for houses, food, industrial production, energy use and increasing solid waste; carbon emission from personal transports will also negatively affect Da Lat’s nature, environment and climate

# Targets

**- Basically control sources of polluion:**

+ Guarantee that: All of newly established production match environment standard; 60-70 of commercial and services providers have Viet Nam-standard waste treatment facilities; Safe storage for hazardous waste which has proper waste collectors; All of manufactuers, industrial points, tourist attactions have centralised waste water treatment facilities

+ 70% of households (12 wards) connect waste water pipes to the city's centralised waste water treatment facility.

+ Collect and process 99% of solid wastes, industrial wastes, 85% of agriculture solid wastes and 100% of medical solid wastes.

+ 85 % of solid wastes are reused, recycled or re-collected for energy generation

# Targets

**- Recover polluted areas to improve people's living condition:**

+ Recover 50% of damaged natural ecosystem.

+ Recover

Đạt quy chuẩn đối với hàm lượng các chất độc hại trong không khí ở đô thị, khu dân cư.

**- Control natural degradation and biodiversity**

+ To guaranty rate of forest cover: 51% – 52%

# Targets

**- Enhance Adaptive Capacity and Resilience to Climate Change and control speed of greenhouse gases emissions:**

+ Reduce 3 – 4 % of greenhouse gases emission in each GDP unit.

To reach that targets, besides solutions to enhance rate forest cover (plant trees), Da Lat needs to enhance capacity of wastes collection and process and of the centralised waste water treatment facility (on-going).

# Overview of Low-Carbon City plan

- Control and reduce number of vehicles with high CO2 emission

- Eradicate old agriculture production affecting environment;

- Develop model and action plans of greenhouse gases control;

- Develop action plans for energy and climate change;

- Develop plans for energy reuse and saving from 2018 to 2023;

- Calculate amount of greenhouse emission in Da Lat, identify sources of emission to significantly redue carbon, seek new solutions

- Enhance government workers' capacity for carbon emission calculation and reduction..

# Specific actions

- Invest one wind farm in Xuân Trường Ward;

- Allocate area (25-30 hectares estimated) at city's entrances as parking areas for (commercial buses and trucks) to minimise carbon emission in city centre

# Approaches, Ideas for Low-carbon town

1) Electrical bikes combined with renewable energy;

2) Develop public traffic model using by renewable energy;

3) Widen pedestrial streets in Ward 1;

4) Develop tourist services powered by renewable energy.

# Essential factors to be a low-carbon city

- Group 1: Energy use-related solutions: demand, supply, and demand-supply relations.

- Grouops 2: Unexploited potential energy, renewable energy.


Thank you for listening

# Review on the LCT Planning of **Da Lat City**

*Hung-Wen Lin*

Green Energy and Environment Lab.

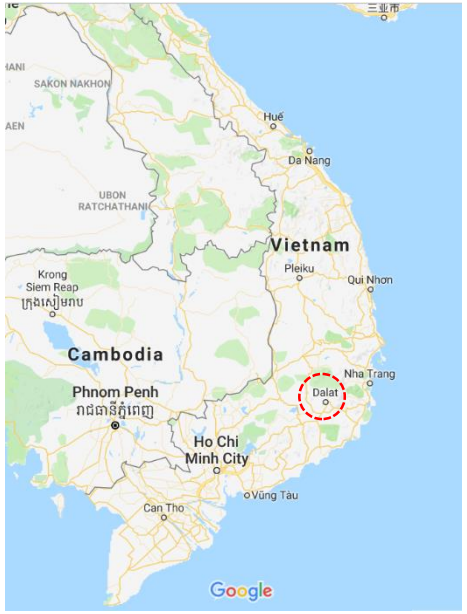
Industrial Technology Research Institute

The 2nd APEC Low-Carbon Model Town Symposium
20 September 2018

# Findings on the LCT Planning of Da Lat City

## ➢Characteristics of the town

- **Da Lat City** is the capital of Lam Dong Province in southern Vietnam's Central Highlands of 1,500m above sea level.
- **Population:** 226,978 in 2017, **Expected population growth is** 1.05% in 2017.
- **Size of town:** 394.64 $km^2$
- **Major function of town:** Development of Tourism services and high tech agriculture.
- **Climate conditions:** Wet, Windy, Cool/cold







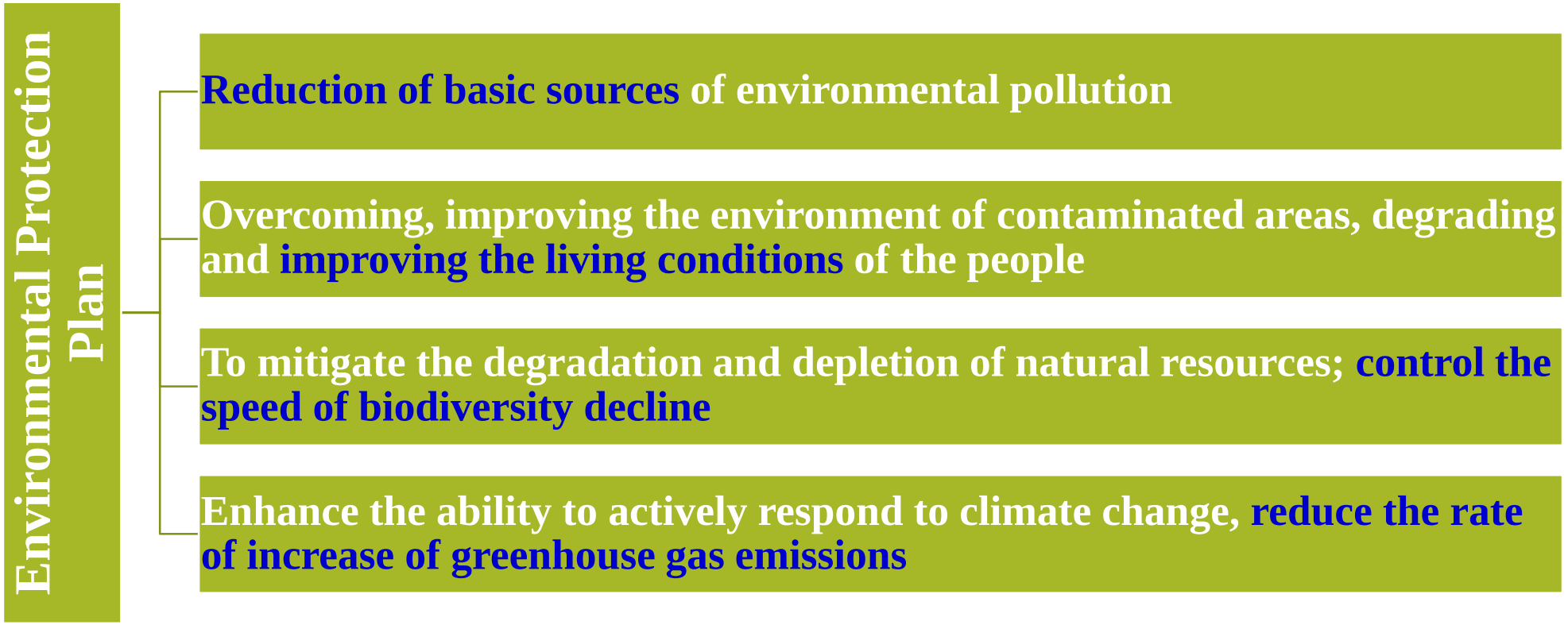
| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily mean °C | 15.8 | 16.7 | 17.8 | 18.9 | 19.3 | 19 | 18.6 | 18.5 | 18.4 | 18.1 | 17.3 | 16.2 |
| Average rainy days | 2 | 2 | 5 | 11 | 18 | 20 | 23 | 22 | 23 | 19 | 10 | 5 |
| Averagerelative humidity(%) | 82 | 78 | 77 | 84 | 87 | 88 | 90 | 91 | 90 | 89 | 85 | 84 |

Data from: Wikipedia

# Findings on the LCT Planning of Da Lat City (Cont'd)

## Low Carbon Objective

- Da Lat city's target is advancing to "**a beautiful green city**" in 2020.
- **Environmental Protection Plan for the period of 2016 – 2020** was approved by People's Committee of Da Lat City in 2017. Four targets to achieve in 2020:



# Findings on the LCT Planning of Da Lat City (Cont'd)

## ➢ Reduction of basic sources of environmental pollution

| | |
|---|---|
| **Environmental protection** | • Production & business establishments **meet the requirements of environmental protection**.<br>• Production, service & trade establishments in their respective localities shall **strictly and efficiently apply environmental protection measures** as already committed in their approved environmental dossiers.<br>• All communes meet **environmental sanitation criteria** under the new rural criteria.<br>• People in the city are disseminated about environmental protection. |
| **Waste water** | • To expand the construction and improvement of the city's concentrated **waste water collection and treatment system** by 2020, **70% of households** in the locality will **connect to the waste water treatment system.**<br>• Production establishments, industrial spots and tourist resorts have concentrated **waste water treatment systems** that meet Viet Nam's environmental standards. |
| **Solid waste** | • **Daily-life and industrial waste** shall be collected and handled by respective regulations.<br>• **Agricultural solid waste** is collected and treated as regulated.<br>• **Medical solid waste** shall be collected and treated according to concerned regulations.<br>• **Solid waste is reused, recycled or recovered**, **fertilizer production**. |

# Findings on the LCT Planning of Da Lat City (Cont'd)

- Overcoming, improving the environment of contaminated areas, degrading and **improving the living conditions** of the people
  - The 50% increase of the area of degraded natural ecosystems will be restored and regenerated.
  - To meet the standards on the content of harmful substances in the air in urban centers and population quarters.

- To mitigate the degradation and depletion of natural resources; control the speed of biodiversity decline
  - No increase compared to 2016: For indicators on the number of areas where water sources are exhausted due to excessive use of water; Number of precious and valuable gene sources lost; number of species and extent of invasive alien species invasive environment.
  - No number of precious and rare species is extinct.
  - Forest coverage ratio is about 51% - 52%.

# Findings on the LCT Planning of Da Lat City (Cont'd)

- Enhance the ability to actively respond to climate change, **reduce** the rate of increase of **greenhouse gas emissions**
  - 100% of the people have knowledge on adaptation and living with climate change.
  - Integrate and implement activities to reduce greenhouse gas emissions with the socio-economic development plan.
  - Greenhouse gas emissions reduction in the period 2016-2020 reached 156,220 tons $CO_2$.

**Total Energy Saving in the period 2016-2020**

**156,220 tons $CO_2$ = 62,992 kLOE = 295,871 kWh**

  - Total emission reduction in both energy sector and agriculture/forestry is 70.54% in 2020 compared to 2010.

# Evaluation on the Application of the LCT- I System

| Question | Excellent | Good | Average | Below Average | Poor |
|---|---|---|---|---|---|
| Information of the LCT-I Volunteer Town | | | | ✓ | |
| Understanding of each LCT-I System indicators | | | ✓ | | |
| Explanation (evidence) provided for the self-evaluation | | ✓ | | | |
| Collection of data necessary for the evaluation | | | ✓ | | |
| Calculation of $CO_2$ emissions | | | ✓ | | |

# Feedback on the Self-Evaluation at Demand Side

| Tier 1 | Tier 2 | Tier 3 | Comments |
|---|---|---|---|
| Demand | Town Structure | 1. Adjacent Workplace and Residence<br>2. Land Use<br>3. TOD (Transit Oriented Development) | • Land use efficiency is estimated at 30%<br>• Public transport is very low, people still use many personal vehicles.<br>• At present, Da Lat City has no specific plan so much attention needs of the higher level<br>• These three indication do not have detail description, but with high score (3★~5★) |
| | Buildings | 1. Energy Saving Construction<br>2. Green Construction | • **No system or criteria** in place.<br>• Enforce subsidized and incentive systems to accelerate the implementation, or have binding legal forces.<br>• The score should be adjust again, original with high score. (4★~5★) |
| | Transportation | 1. Promotion of Public Transportation<br>2. Improvement in Traffic Flow<br>3. Introduction of Low-Carbon Vehicles<br>4. Promotion of Efficient Use | • Planning is not available, public transport is very low, people still use many personal vehicles and the situation of personal vehicles is increasing,<br>• The score should be adjust again, original with high score. (3★~4★) |

# Feedback on the Self-Evaluation at Supply Side

| Tier 1 | Tier 2 | Tier 3 | Comments |
|---|---|---|---|
| Supply | Area Energy System | Area Energy | • The main energy resource is hydroelectric power.<br>• Area Energy system should be planed to develop an urban city. Like smart grid system. |
| | Untapped Energy | Untapped Energy | • The city has no specific plan, can not use untapped energy |
| | Renewable Energy | Renewable Energy | • Currently, the whole city is using hydroelectric power.<br>• The city has a project to build a **wind power plant** in Xuan Truong commune. |
| | Multi-Energy System | Multi-Energy | • As the city uses renewable energy such as hydroelectric power, wind power; But there are no plans to build a multi-energy system |

# Feedback on the Self-Evaluation at DSER

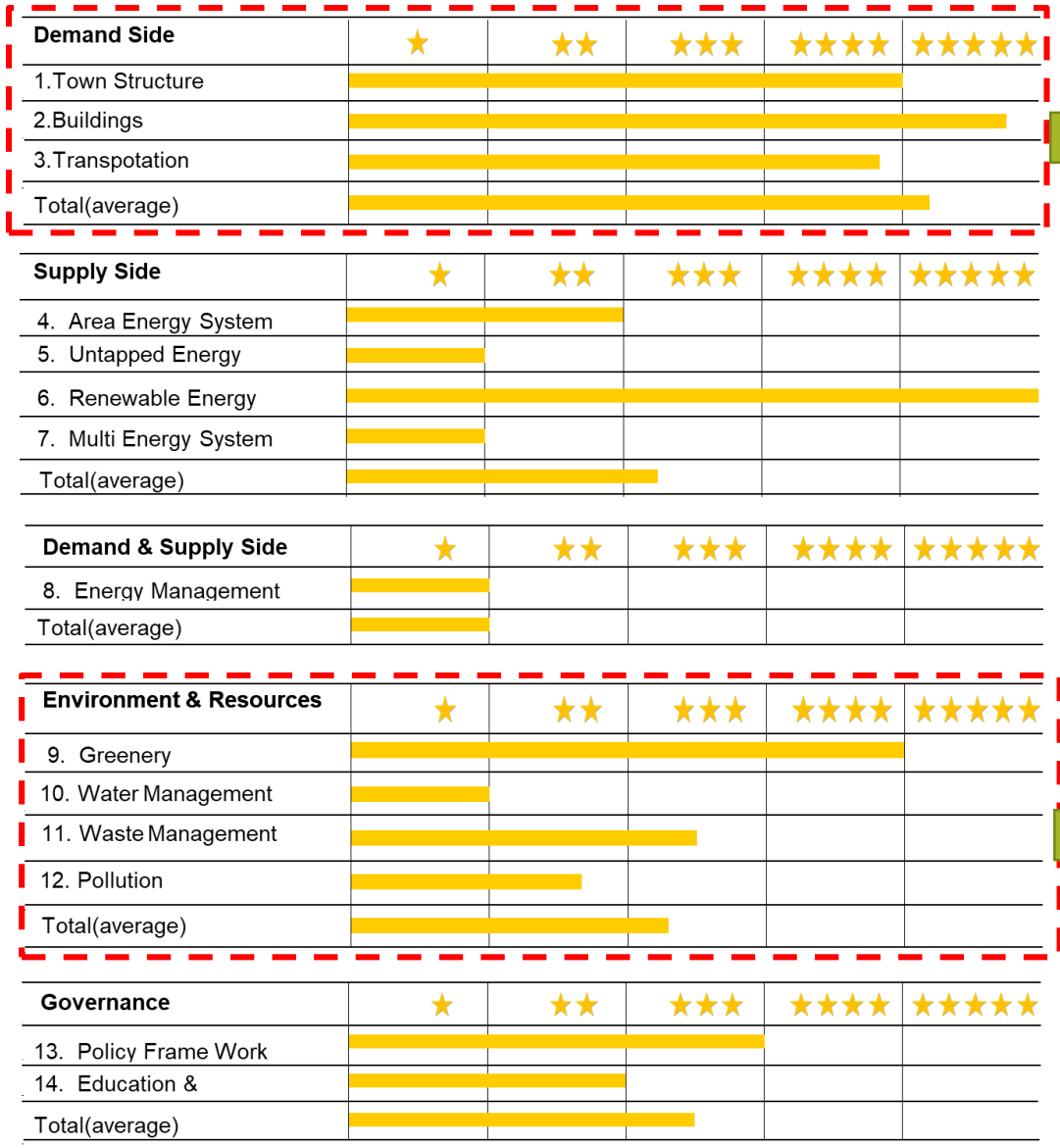
| Tier 1 | Tier 2 | Tier 3 | Comments |
|---|---|---|---|
| Demand & Supply | Energy Management | Energy Management of Buildings/Area | • Smart grid can expand to whole city and connect supply side to demand side for energy management and control. |
| Environment & Resource | Greenery | Securing Green Space | • The rate of trees per capita is about 4.4 $m^2$; the forest coverage rate was 49.02%.<br>• The Lam Dong Provincial People's Committee has promulgated a biodiversity conservation plan for the whole province. |
| | Water Management | 1.Water Resources<br>2.Water Reuse | • Surface water is abundant; groundwater is used for daily activities as well as for agriculture.<br>• Residents in some areas use rainwater for their livelihood activities. |
| | Waste Management | Waste Products | • Da Lat is conducting propaganda activities to limit waste emissions.<br>• Classify products from the beginning to reuse organic products to make fertilizer for the crop<br>• Reused or recycled for products such as metals, plastics, ... |
| | Pollution | 1.Air<br>2.Water Quality<br>3.Soil | • Water quality is quite good.<br>• there is no specific plan to enforce people control the pollution.<br>• Renewable energy vehicles, high-tech agriculture, non-smog industry activities will be good methods to reduce environmental pollution. |

# Feedback on the Self-Evaluation at Governance

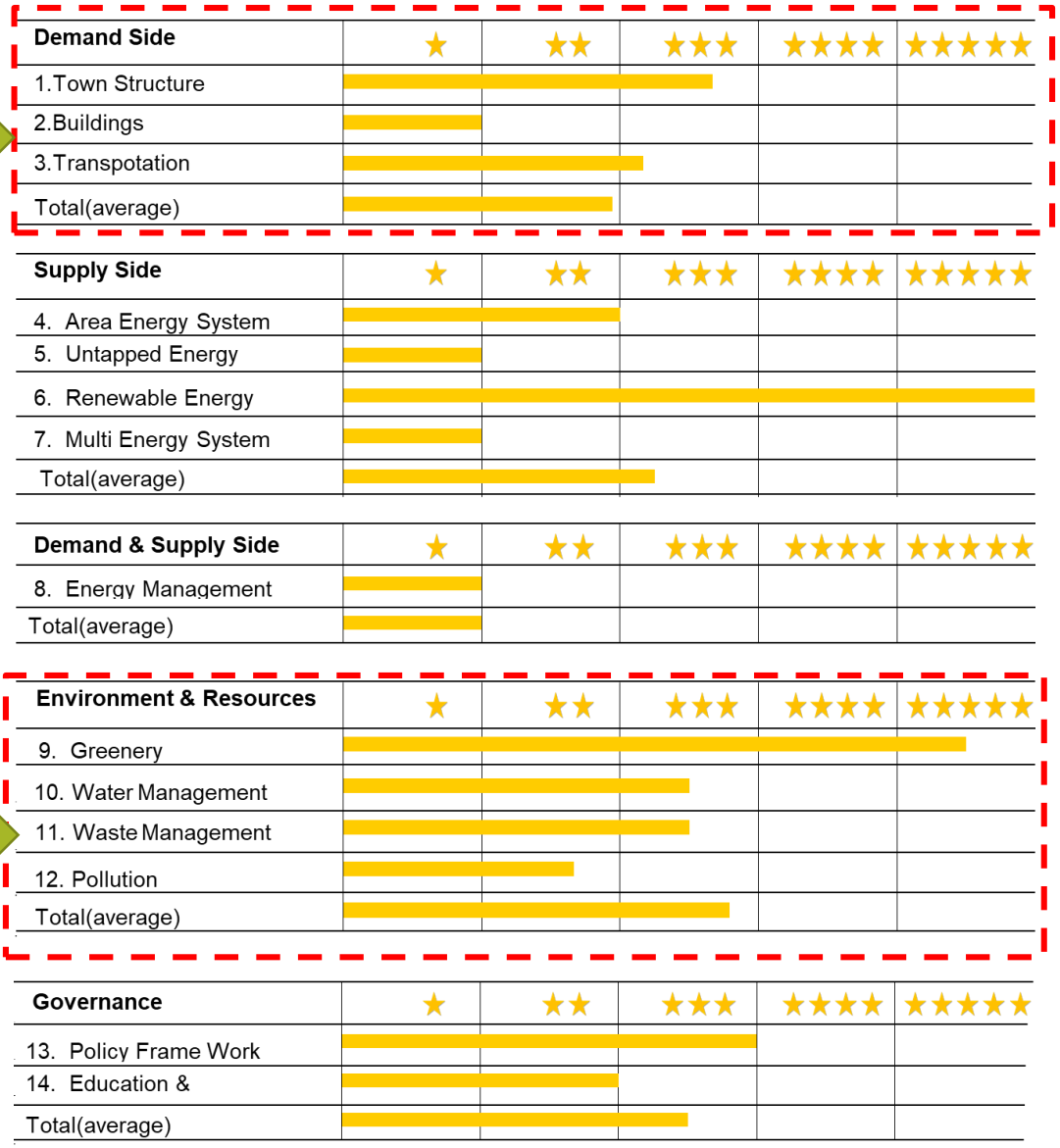
| Tier 1 | Tier 2 | Tier 3 | Comments |
|---|---|---|---|
| Governance | Policy Framework | 1. Efforts toward a Low-carbon Town<br>2. Efforts toward Sustainability | • Environmental protection plan for the period of 2016 – 2020 was approved by People's Committee of Da Lat city in 2017 |
| | Education & Management | Life Cycle Management | • Promote Enlightenment and Education for Energy-savings and a Low-carbon Town activities and prepare environment protection film to school for education. |

# Output on the Self-Evaluation

## Original Self-Evaluation

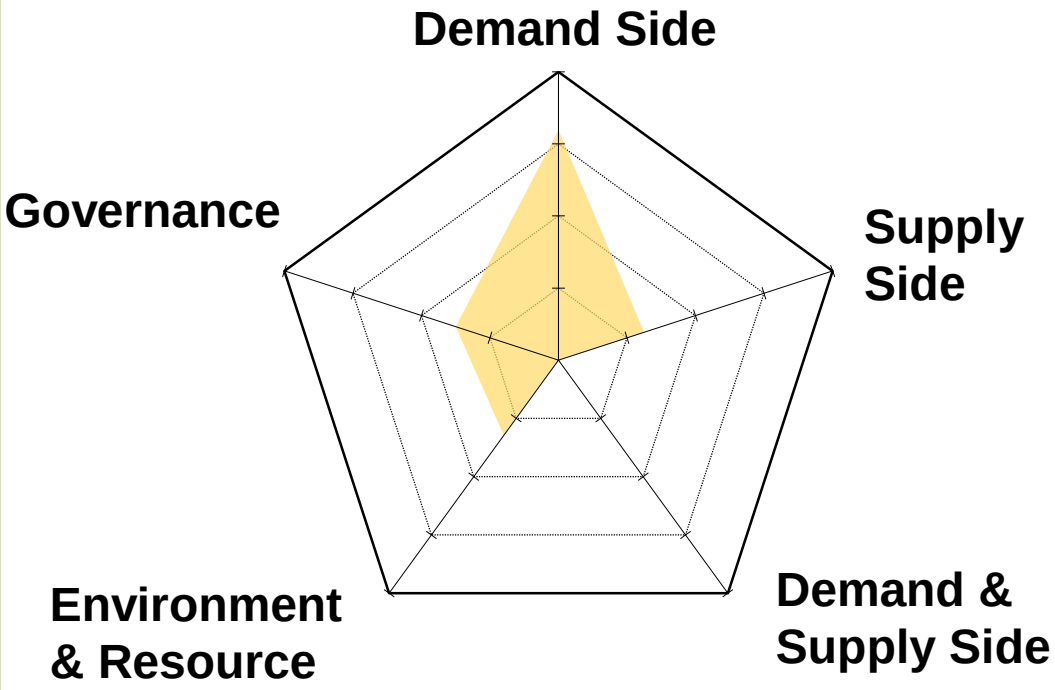



## Re-modify Self-Evaluation



# Output on the Self-Evaluation

## Original Self-Evaluation



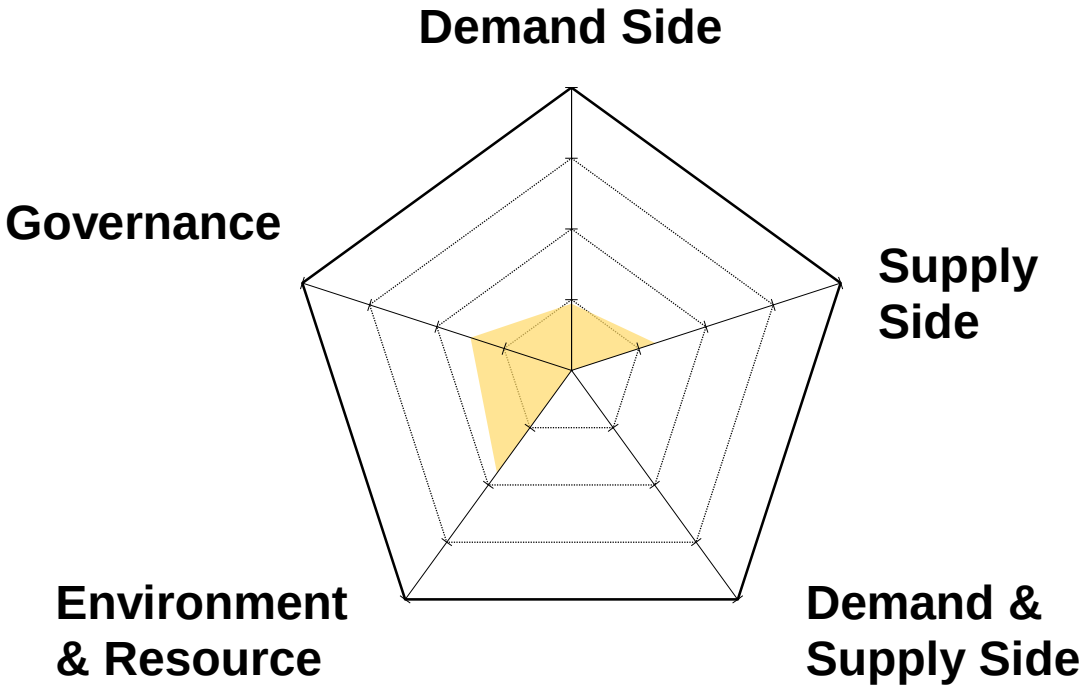

Overall Assessment

Overall Rank

★★★☆☆

Total Point
average of (1) to (14) **2.6**

## Re-modify Self-Evaluation



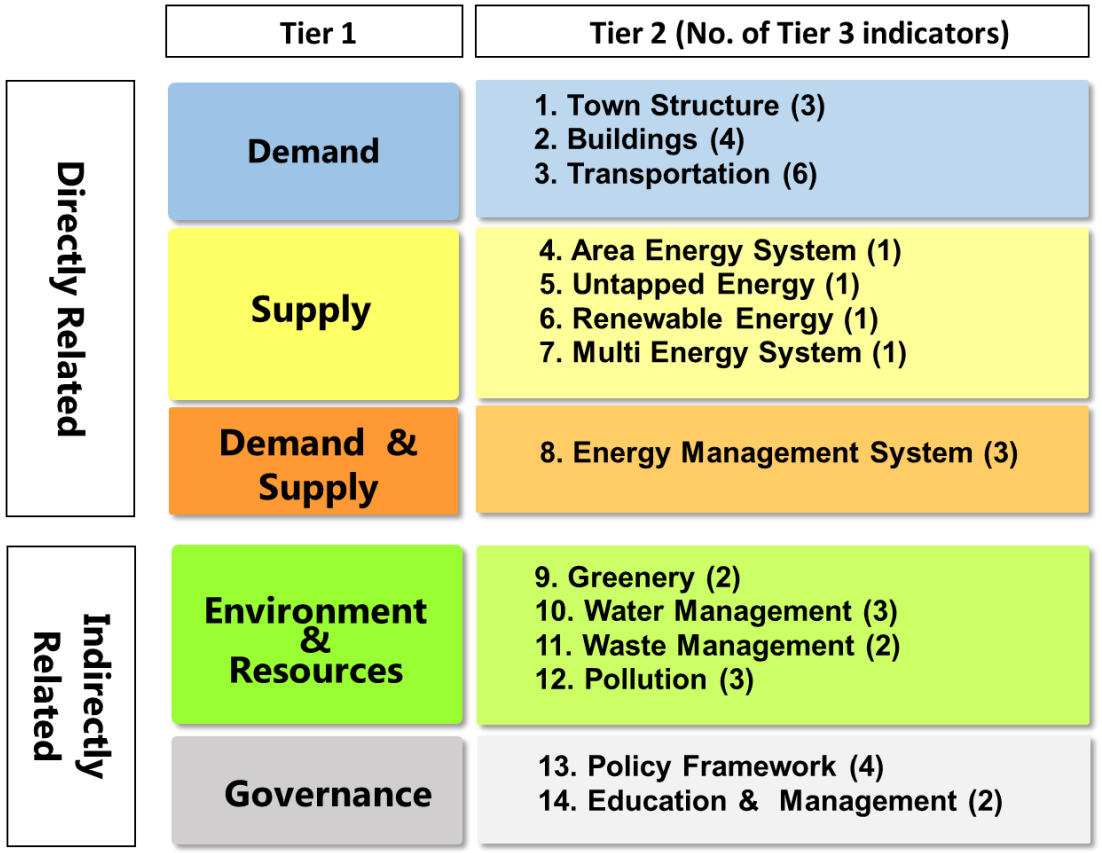

Overall Assessment

Overall Rank

★★★☆☆

Total Point
average of (1) to (14) **2.3**

# For the Improvement




- **Building:** Establish Green building rating system and MEPS to reduce energy consumption by Lam Dong Province
- **Transportation:** Develop the Transportation Demand Management, Intelligent Transportation system or TOD is good for Capital to reduce Carbon emission.

- **Multi Energy System:** implement district heating and cooling system, cogeneration system, energy storage system…

- **EMS:** AEMs/BEMs/HEMs would be implemented to monitor the energy consumption in Areas/buildings.

- **Water Management:** Wastewater treatment can be expanded to a watering plants or recycled for flushing toilets in developed world.

- **Policy Framework:** make performance measure standard and execute the performance verification regularly are good methods to maintain the low carbon city

# Ideas for the LCT Development



**Low Carbon Energy**
- Renewable Energy
- Energy Conservation
- Low Burden

**Low Carbon Transportation**
- Transportation Device
- Smart Mass-Transportation System



**Green Energy Industry**
- Rising Green Energy Industry Program
- Green EICT
- Employment in Green Energy Industry



**IoT**

**Bio-Environemnt**
- Ecological Environment
- Recyling





**Low Carbon Tour**
- Low Carbon Traveling
- Low Carbon Scene

**Low Carbon Consumption**
- New Consumption Environment
- Low Carbon Culture

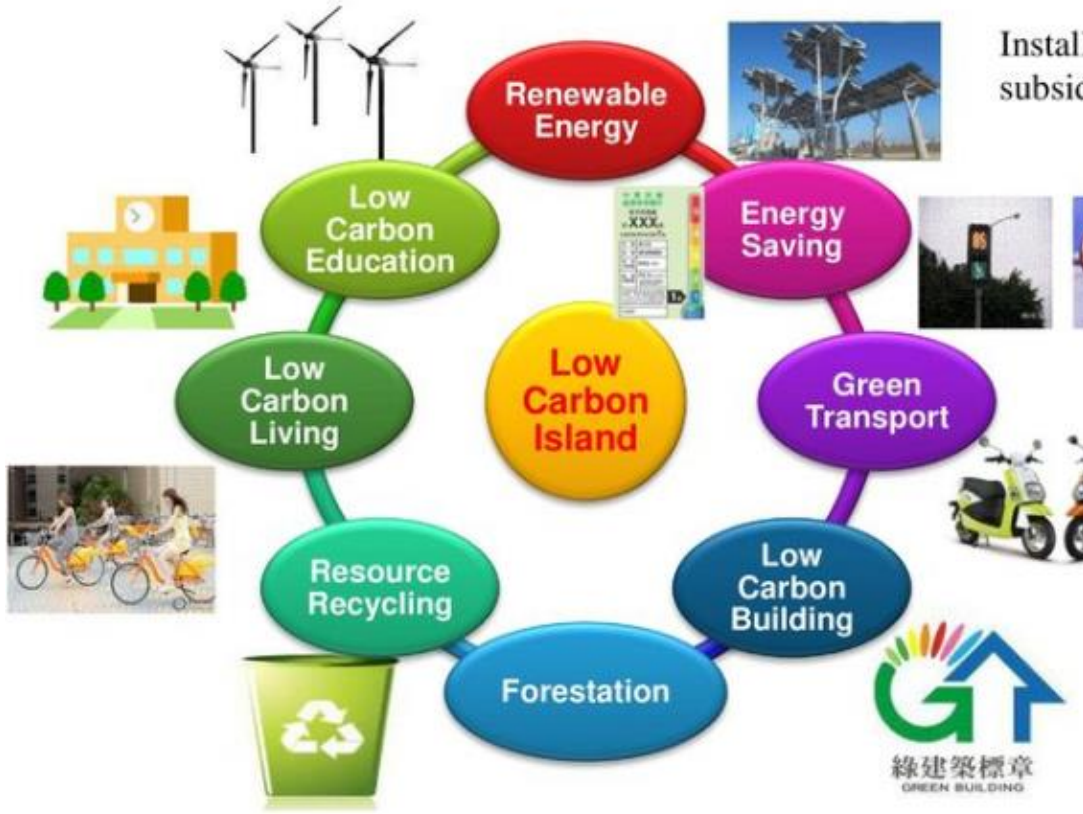


# Ideas for the LCT Development
# ITRI Green Campus



# Ideas for the LCT Development
# Peng-Hu Low Carbon Island

- A comprehensive demo project, **Peng-Hu Low Carbon Island**.
- Over **55%** of total energy supply are generated by renewable energy; GHG's emission reduces per capita by **62%**.
- Reduce CO2 emission from **5.4 tons/cap-yr** (2008) to **2.1 tons/cap-yr** (2015)




Installed 20 PV system (**1.56 MW**) and subsidized **1,893 m²** solar water

Established **5,309 LED** street lamps and subsidized **12,028 energy-saving appliances**

Established **612 charge stations** and subsidized **3,561 electric scooters**

All new public buildings and major private constructions should obtain **green building certification**

# Thank you
# 謝謝指教
# ありがとうございます
# Cảm ơn bạn

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