

Review on the LCT Planning of Banda Aceh

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Findings on the LCT Planning of Banda Aceh (1)

Characteristics of the town:

- ✓ *The target area of the town is a mixed use community of residential, commercial and educational , with the residential being the broadest.*
- ✓ *Population: 249,499 (2014)*
 - *Expected growth of population is 3-4% in 5 years*
- ✓ *Size of town: 61,359 ha*
- ✓ *On December 26, 2004, the city was hit by a “tsunami” caused by the 9.2 Richter scale earthquake in the Indonesian Ocean, which caused casualties of hundreds of thousands of people and destroyed over 60% of city’s buildings.*

[Source: Nomination Sheet and Wikipedia]

Findings on the LCT Planning of Banda Aceh (2)

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

- ✓ *“Rencana Tata Kota dan Wilayah (RTKW)” (City and Regional Spatial Plan) for 2009-2029*
- ✓ *BRT Transkutaraaja*
- ✓ *Consolidated Urban Development Plan(CUDP) for Krueng Aceh River*
- ✓ *“Green City”*

[Source: Nomination Sheet]

Findings on the LCT Planning of Banda Aceh (3)

Itemized efforts towards “low-carbon town” by the city

- ✓ *The recovery of methane from solid waste landfill*
- ✓ *The conversion of organic waste into fertilizer*
- ✓ *The introduction of PV for street lighting and traffic lights*
- ✓ *The development of BRT network*
- ✓ *Green building regulations*
- ✓ *Green waste management*
- ✓ *Monitoring and management of energy use in government buildings and public service facilities*

[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 | All of the indicators in this section have been misunderstood. Other indicators should be selected, and could be discussed during the Symposium. |
| | | 2. Land Use | |
| | 3. TOD | | |
| | Buildings | 1. Energy Saving Construction | While the scores in this section are low, efforts towards green building are described in the nomination sheets, and the execution of the plans are expected. |
| | | 2. Green Construction | |
| | Transportation | 1. Promotion of Public Transportation | 1. Promotion of Public Transportation |
| 2. Improvement in Traffic Flow | | | The efforts of grade separation of roads are also remarkable. |
| 3. Promotion of Efficient Use | | | The “smart driving concept” is valuable among developing economies, and its deployment is highly expected. |

Feedback on the Self-Evaluation (2)

| Tier 1 | Tier 2 | Tier 3 | Comments |
|--------|---------------------|------------------|---|
| Supply | Area Energy System | Area Energy | Area energy systems should be planned along with the urban development and infrastructure plans in high-density areas. |
| | Untapped Energy | Untapped Energy | The collection of methane from solid waste landfill is remarkable and advanced among developing economies. This should be expanded to other areas of the economy. |
| | Renewable Energy | Renewable Energy | PVs have been introduced to traffic lights and street lighting. Further introduction of PV to public buildings and houses is encouraged. The possibility of other RE such as wind, sea tide, and compact hydraulic should be examined. |
| | Multi-Energy System | Multi-Energy | The combined supply of electricity and heat does not necessarily create benefits in tropical areas. |

Feedback on the Self-Evaluation (3)

| Tier 1 | Tier 2 | Tier 3 | Comments |
|---------------------------|-------------------|---------------------------------------|--|
| Demand and Supply | Energy Management | Energy Management of Building / Areas | Energy management systems, such as area energy management systems and smart grids, are needed only when the use of unstable renewable energy becomes remarkable and the fluctuation of energy demand becomes significant. The fluctuation of energy demand should be carefully monitored including the future forecast. |
| Environment and Resources | Greenery | Securing Green Space | The efforts to expand greenery including mangrove area in the coastal areas should be maintained for both purposes of shading and disaster risk mitigation. |
| | Water Management | Water Resources | The model of blackwater treatment in Gampong Jawa should be extended to other areas. |

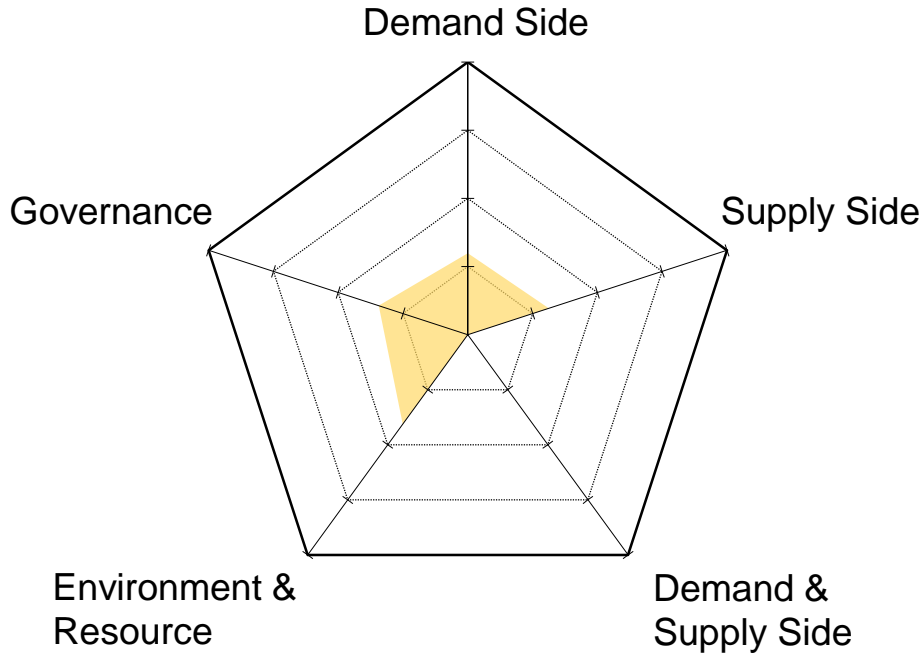
Feedback on the Self-Evaluation (4)

| Tier 1 | Tier 2 | Tier 3 | Comments |
|---------------------------|------------------|---|---|
| Environment and Resources | Waste Management | Waste Products | Regardless of current status, the efforts to reduce and reuse solid waste and to collect waste in the separated ways are under way, and are expected to be accelerated and expanded. |
| | Pollution | <ol style="list-style-type: none"> 1. Air 2. Water Quality 3. Soil | <p>Plans have already been made and efforts of executions are under way.</p> <p>The efforts are expected to be continued and expanded towards upper grade of quality.</p> |
| Governance | Policy Framework | 1. Efforts toward a Low-Carbon Town | As indicated in the nomination sheet, plans on higher levels such as greenhouse gas reduction 2013-2018 and “Green City” program have been enacted and the low-carbon efforts are in line with these plans. |
| | | 2. Efforts toward Sustainability | For Banda Aceh, which experienced the tsunami disaster, the focus of sustainability should be on the resilience and disaster risk mitigation, as well as adaptation to the climate change. |

Feedback on the Self-Evaluation (5)

| Tier 1 | Tier 2 | Tier 3 | Comments |
|-----------------|-----------------------------------|-----------------------|--|
| Govern- ance | Education & Manage- ment | Life Cycle Management | The cooperation between the city government and communities of residents is recognized, but dormant activities are also found, which should be revived for further activities. |

Feedback on the Self-Evaluation



The scores at Tier 1 shows fairly well-balanced pattern except “Demand & Supply Side”, which is represented by energy management systems and smart grids, which are applicable to areas with advanced energy sources and demand fluctuations.

| | ★ | ★★ | ★★★ | ★★★★ | ★★★★★ |
|-----------------------------------|----------------|----|-----|------|-------|
| Demand Side | ★ | ★★ | ★★★ | ★★★★ | ★★★★★ |
| 1. Town Structure | [Progress bar] | | | | |
| 2. Buildings | [Progress bar] | | | | |
| 3. Transportation | [Progress bar] | | | | |
| Total(average) | [Progress bar] | | | | |
| Supply Side | ★ | ★★ | ★★★ | ★★★★ | ★★★★★ |
| 4. Area Energy System | [Progress bar] | | | | |
| 5. Untapped Energy | [Progress bar] | | | | |
| 6. Renewable Energy | [Progress bar] | | | | |
| 7. Multi Energy System | [Progress bar] | | | | |
| Total(average) | [Progress bar] | | | | |
| Demand & Supply | ★ | ★★ | ★★★ | ★★★★ | ★★★★★ |
| 8. Energy Management | [Progress bar] | | | | |
| Total(average) | [Progress bar] | | | | |
| Environment & Resource | ★ | ★★ | ★★★ | ★★★★ | ★★★★★ |
| 9. Greenery | [Progress bar] | | | | |
| 10. Water Management | [Progress bar] | | | | |
| 11. Waste Management | [Progress bar] | | | | |
| 12. Pollution | [Progress bar] | | | | |
| Total(average) | [Progress bar] | | | | |
| Governance | ★ | ★★ | ★★★ | ★★★★ | ★★★★★ |
| 13. Policy Frame Work | [Progress bar] | | | | |
| 14. Education & | [Progress bar] | | | | |
| Total(average) | [Progress bar] | | | | |

Needs acceleration

Needs re-assessment

Fairly well-balanced

For the Improvement

| | Tier 1 | Tier 2 (No. of Tier 3 indicators) |
|--------------------|-------------------------|--|
| Directly Related | Demand | 1. Town Structure (3) 2. Buildings (4) 3. Transportation (6) |
| | Supply | 4. Area Energy System (1) 5. Untapped Energy (1) 6. Renewable Energy (1) 7. Multi Energy System (1) |
| | Demand & Supply | 8. Energy Management System (3) |
| Indirectly Related | Environment & Resources | 9. Greenery (2) 10. Water Management (3) 11. Waste Management (2) 12. Pollution (3) |
| | Governance | 13. Policy Framework (4) 14. Education & Management (2) |

1. Since green building guideline has been established at the national level, it should be applied to the town, and expand the applications from public buildings to private sector.
2. BRT has been employed, but its coverage is limited, and acceleration of BRT network development and introduction of other low-carbon transportation measures is needed.
3. Untapped energy (methane from landfill) and PV are being employed, and other renewable energy should be studied the resilience of the city.

Ideas for the LCT Development

Proposed roadmap of LCT development

Demand Side

- Promotion of green building guideline
- Expansion of BRT network & use of other green transportation measures

- Monitoring of fluctuation of energy demand

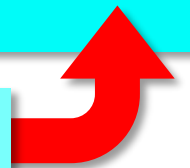
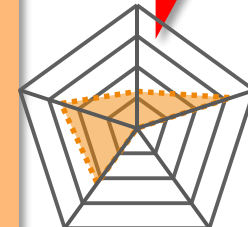
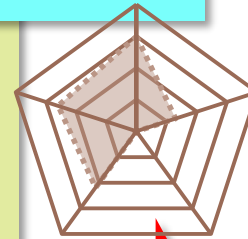
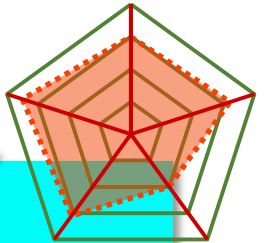
- ✓ Environmental (Waste management)
- ✓ Governance (Education & PDCA)

Supply Side

- Further implementation of PVs for city life
- Investigation into the use of other renewables
- Use of multiple power sources for resilience

- Implementation of energy management systems
- Improved resilience and disaster risk mitigation by different energy sources

- Residents engagement



Current Score

Comments for the Improvement of LCT-I System (1)

◆ Structural problems of LCT-I System:

1. Tier 1 categories have different number of Tier 2 items, which creates **unintended weighting** on Tier 2 scores onto Tier 1 result, and same problems exist between Tier 2 and Tier 3.
2. In some indicators, **qualitative** evaluation and **quantitative** evaluation are placed in line on the same 1-5 star scale.
3. Some indicators can be applied only in advanced economies, where urban development and administration regulations are mature.

◆ Proposals of LCT-I Improvement:

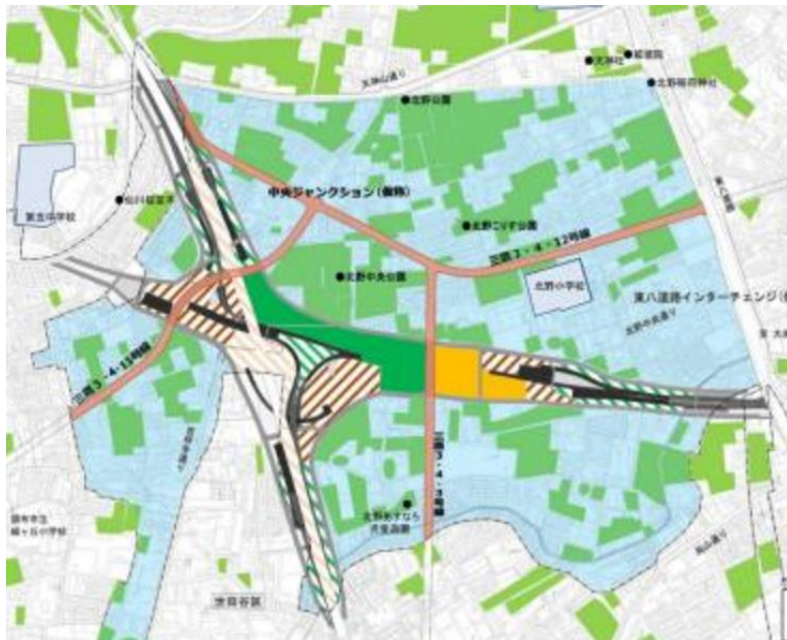
1. To increase indicators of Tier 2 and 3 to make them equally affect to Tier 1 and 2 respectively, as well as to enable economy to select indicator to fit their data sets.
2. Employ generally accepted **maturity model** of 5 steps to 1-5 star scale, and separate qualitative and quantitative indicators.

[Indicators users might misunderstand]

Comments for the Improvement of LCT-I System (2)

◆ “Residential Use and Non-residential Use”

[An example]



| | |
|----------------------------------|----------------|
| Tier 1 | Tier 2 |
| Demand | Town Structure |
| Tier 3 | |
| Adjacent Workplace and Residence | |

- ✓ This indicator evaluates how close the residential areas and non-residential areas are located in the town (the area to be studied).
- ✓ The closeness of these areas reflects less travel of residents to their workplaces, which reduces the use of vehicles for commuting.

$$\text{Indicator value} = \frac{\text{Total floor area of residential areas}}{\text{Total floor area of non-residential areas}} \times 100 (\%)$$

/ Numerator

\ Denominator

Legend

- Residential areas → Floor area (*)
- Non-residential areas (Commercial, Industrial) → Floor Area (*)

(*) Floor area: Total floor areas in case of multi-story buildings

Alternatives:

- Percentage of residents in working age, who commute to and from their workplaces on foot or by bicycles
- The ratio of the number of employees to the population of residents in working age

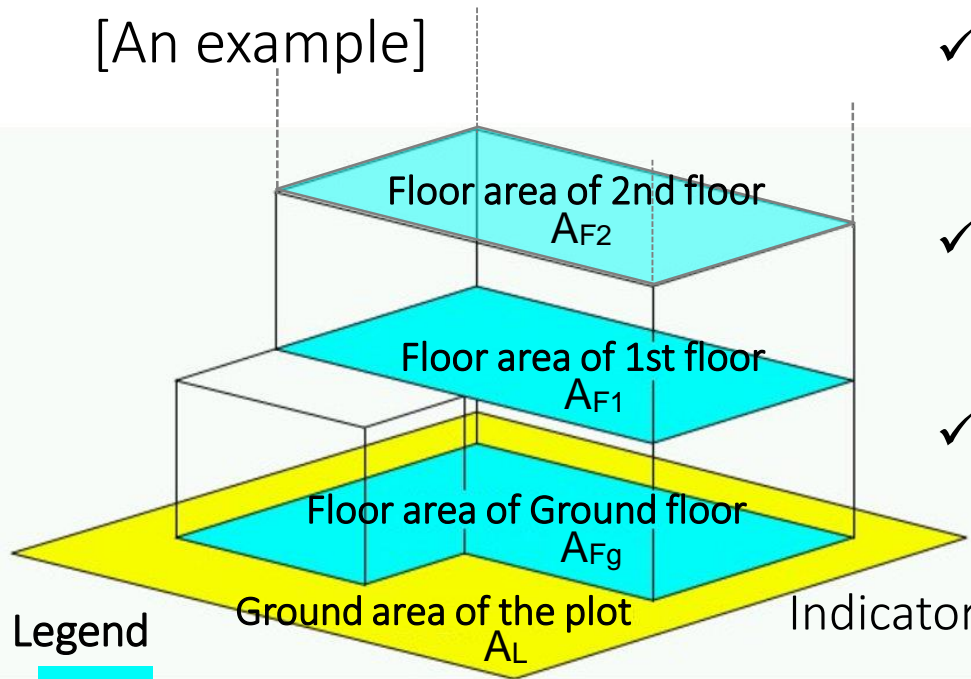
[Indicators users might misunderstand]

Comments for the Improvement of LCT-I System (3)

◆ “Floor Area Ratio”

| Tier 1 | Tier 2 | Tier 3 |
|--------|----------------|----------|
| Demand | Town Structure | Land Use |

[An example]



- ✓ The “Floor Area Ratio” is the ratio of the total floor area of a building to the total ground area of the plot, where the building stands.
- ✓ The “Floor Area Ratio” is generally regulated by local governments based on the intended use of land, which is regarded as “standard (authorized) floor area ratio” in LCT-I.
- ✓ The indicator evaluates how much of the “standard floor area ratio” has already been filled by actual construction.

$$\text{Indicator value} = \frac{[\text{Actual floor area ratio in current situation}]}{[\text{“Standard” floor area ration planned for the area}]} \times 100 (\%)$$

(Authorized)

(*) In the emerging economies, the “standard floor area ratio” tends to be held down to eliminate overdevelopment beyond the capacity of infrastructure.

$$\text{Floor Area Ratio} = \frac{A_{Fg} + A_{F1} + A_{F2} + \dots}{A_L} \times 100 (\%)$$

Alternatives proposed:

➤ Remove this indicator from LCT-I

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