CSRP
‘Project to Enhance SUTI in Colombo Metropolitan Region (CMR)’
Colombo Suburban Railway Project – ADB Funded

Develop Sri Lanka Railways to cater demand in the next twenty years by following applicable guidelines (SL and ADB) and by utilising the available funds effectively.
Project Interventions

- All interventions will be focused towards **Railway Electrification**
- But, following interventions will be undertaken, to make Railway Electrification sustainable.
  - Track Rehabilitation to make SLR tracks complying with accepted standard and to operate trains at the speed of 100 km/hr.
  - New Track Construction to avoid existing bottlenecks and to cater future demand.
  - Replacement of Railway/Road Bridges to facilitate clearance for Electrification
  - Access Electric Multiple Units (Six Car Train Sets ; Two coupled to carry 2200 passengers ( 6 persons in one sq. meter)
  - Signalling and Telecommunication to achieve Safety and Minimum possible Headway
  - Station Development to facilitate, accessibility, park & ride, multi modal operation (with Bus, LRT etc.)
  - Grade Separation at Level Crossings
  - Electrification
## Cost of Operation – Electric vs Diesel (DMU)

<table>
<thead>
<tr>
<th>Electric Operation Cost in LKR per Train-km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel / Electricity Cost</td>
</tr>
<tr>
<td><em>Fuel Consumption</em>: 2.5 lit/km</td>
</tr>
<tr>
<td><em>Electricity Consumption</em>: 5.5 kWh/km</td>
</tr>
<tr>
<td>40% less than Diesel (DMU)</td>
</tr>
<tr>
<td>Lubricants</td>
</tr>
<tr>
<td>20% less than Diesel</td>
</tr>
<tr>
<td>Maintenance</td>
</tr>
<tr>
<td>35 % less that Diesel</td>
</tr>
<tr>
<td>Maintenance Operation and other Misc. Cost</td>
</tr>
<tr>
<td>30 % less then Diesel</td>
</tr>
<tr>
<td>Overhead Equipment maintenance Cost</td>
</tr>
<tr>
<td>To be Considered</td>
</tr>
</tbody>
</table>

**Source:**
IESL Report for Railway Electrification, June 2008
Railway Electrification from Veyangoda to Kaluthara by Prof. Bandara, January 2012
Railway Electrification and its Economics by Dr. Siyambalapitiya, July 2009
Statistics in 2016

• Total Revenue : LKR 6,623.37 Million
• Revenue from Passenger Operation : 85%
• Total Passenger – km : 7,413.12 Million
  • 3 rd Class : 90 %   2 nd Clsss : 8 %   1 st Classs : 2 %
• Number of Passengers : 136.05 Million
• Total Recurrent Expenditure : LKR 15,510.30 Million
  ( including Cost of Materials for Rolling Stock )
• Total Train – km by DMUs : 5,290,222
• Number of DMUs needed for Daily Operation : 80
Situation by end of 2016

<table>
<thead>
<tr>
<th>Zone</th>
<th>Rates per km</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st Class</td>
<td>2nd Class</td>
<td>3rd Class</td>
</tr>
<tr>
<td>From January 2008</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zone 0 - 0 to 09 km</td>
<td>3.60</td>
<td>2.00</td>
<td>1.10</td>
</tr>
<tr>
<td>Zone 1 - 10 to 49 km</td>
<td>3.30</td>
<td>1.80</td>
<td>1.00</td>
</tr>
<tr>
<td>Zone 2 - 50 to 99 km</td>
<td>2.80</td>
<td>1.50</td>
<td>0.85</td>
</tr>
<tr>
<td>Zone 3 - 100 to 199 km</td>
<td>2.10</td>
<td>1.20</td>
<td>0.65</td>
</tr>
<tr>
<td>Zone 4 - 200 and Above</td>
<td>1.60</td>
<td>0.90</td>
<td>0.50</td>
</tr>
<tr>
<td>Average Rate per km</td>
<td>2.68</td>
<td>1.48</td>
<td>0.82</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contribution per Passenger - km</th>
<th>1st Class</th>
<th>2nd Class</th>
<th>3rd Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Situation at December 2016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zone 0 - 0 to 09 km</td>
<td>1.51</td>
<td>-0.09</td>
<td>-0.99</td>
</tr>
<tr>
<td>Zone 1 - 10 to 49 km</td>
<td>1.21</td>
<td>-0.29</td>
<td>-1.09</td>
</tr>
<tr>
<td>Zone 2 - 50 to 99 km</td>
<td>0.71</td>
<td>-0.59</td>
<td>-1.24</td>
</tr>
<tr>
<td>Zone 3 - 100 to 199 km</td>
<td>0.01</td>
<td>-0.89</td>
<td>-1.44</td>
</tr>
<tr>
<td>Zone 4 - 200 and Above</td>
<td>-0.49</td>
<td>-1.19</td>
<td>-1.59</td>
</tr>
<tr>
<td>Average Contribution</td>
<td>0.59</td>
<td>-0.61</td>
<td>-1.27</td>
</tr>
</tbody>
</table>
## Situation, if DMUs replaced by EMUs

### Rates per km

<table>
<thead>
<tr>
<th>Zone</th>
<th>1st Class</th>
<th>2nd Class</th>
<th>3rd Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>From January 2008</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Zone 0 - 0 to 09 km</td>
<td>3.60</td>
<td>2.00</td>
<td>1.10</td>
</tr>
<tr>
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<td>3.30</td>
<td>1.80</td>
<td>1.00</td>
</tr>
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<td>Zone 2 - 50 to 99 km</td>
<td>2.80</td>
<td>1.50</td>
<td>0.85</td>
</tr>
<tr>
<td>Zone 3 - 100 to 199 km</td>
<td>2.10</td>
<td>1.20</td>
<td>0.65</td>
</tr>
<tr>
<td>Zone 4 - 200 and Above</td>
<td>1.60</td>
<td>0.90</td>
<td>0.50</td>
</tr>
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<td>Average Rate per km</td>
<td>2.68</td>
<td>1.48</td>
<td>0.82</td>
</tr>
</tbody>
</table>

### Contribution per Passenger - km

<table>
<thead>
<tr>
<th>Zone</th>
<th>1st Class</th>
<th>2nd Class</th>
<th>3rd Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>All DMU replaced by EMU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zone 0 - 0 to 09 km</td>
<td>1.82</td>
<td>0.22</td>
<td>-0.68</td>
</tr>
<tr>
<td>Zone 1 - 10 to 49 km</td>
<td>1.52</td>
<td>0.02</td>
<td>-0.78</td>
</tr>
<tr>
<td>Zone 2 - 50 to 99 km</td>
<td>1.02</td>
<td>-0.28</td>
<td>-0.93</td>
</tr>
<tr>
<td>Zone 3 - 100 to 199 km</td>
<td>0.32</td>
<td>-0.58</td>
<td>-1.13</td>
</tr>
<tr>
<td>Zone 4 - 200 and Above</td>
<td>-0.18</td>
<td>-0.88</td>
<td>-1.28</td>
</tr>
<tr>
<td>Average Contribution</td>
<td>0.90</td>
<td>-0.30</td>
<td>-0.96</td>
</tr>
</tbody>
</table>
Other Economic Benefits

- Travel Time Reduction (Design Speed: 100 km/h and Commercial Speed: 70 to 80 km/h)
- Increased Revenue from
  - Modal Shift from Bus to Rail
  - Modal Shift from Private Vans/Cars to Rail
  - Ticket Fare Increase by considering increased facility (AC Trains, Less Travel Time, Comfort etc.) to passengers
- Reduction of Revenue leakages through New Ticketing System
Social Benefits

• Travel Time Reduction
• Transport Cost saving
• Added Comfort
• Increased Safety
• Accessibility Improvement
• Railway Station facilities
• Multimodal Opportunity
Safety — Adding intelligence to Train System and Signalling System

Accidents – Very less in SLR System but minimum cost, approximately 80 Million
Environmental Benefits
## Environmental Benefits

### Table 1 - Line-Haul Emission Factors (g/bhp-hr)

<table>
<thead>
<tr>
<th></th>
<th>$\text{PM}_{10}$</th>
<th>$\text{HC}$</th>
<th>$\text{NO}_x$</th>
<th>$\text{CO}$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNCONTROLLED</strong></td>
<td>0.32</td>
<td>0.48</td>
<td>13.00</td>
<td>1.28</td>
</tr>
<tr>
<td><strong>TIER 0</strong></td>
<td>0.32</td>
<td>0.48</td>
<td>8.60</td>
<td>1.28</td>
</tr>
<tr>
<td><strong>TIER 0+</strong></td>
<td>0.20</td>
<td>0.30</td>
<td>7.20</td>
<td>1.28</td>
</tr>
<tr>
<td><strong>TIER 1</strong></td>
<td>0.32</td>
<td>0.47</td>
<td>6.70</td>
<td>1.28</td>
</tr>
<tr>
<td><strong>TIER 1+</strong></td>
<td>0.20</td>
<td>0.29</td>
<td>6.70</td>
<td>1.28</td>
</tr>
<tr>
<td><strong>TIER 2</strong></td>
<td>0.18</td>
<td>0.26</td>
<td>4.95</td>
<td>1.28</td>
</tr>
<tr>
<td><strong>TIER 2+ &amp; TIER 3</strong></td>
<td>0.08</td>
<td>0.13</td>
<td>4.95</td>
<td>1.28</td>
</tr>
<tr>
<td><strong>TIER 4</strong></td>
<td>0.015</td>
<td>0.04</td>
<td>1.00</td>
<td>1.28</td>
</tr>
</tbody>
</table>

+ INDICATES THAT THESE ARE THE REVISED STANDARDS IN 40 CFR PART 1033
# Emission Comparison

<table>
<thead>
<tr>
<th></th>
<th>Diesel Operation</th>
<th>Electric Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air Quality</strong></td>
<td>367 microne CO/air m³/hr is emitted</td>
<td>Zero Emission, if the source of electricity generation is not considered. Even if the electricity generation has emission, 20-30% less emission than diesel</td>
</tr>
<tr>
<td><strong>Co 2 Emission</strong></td>
<td>More</td>
<td>Less or Zero (if Co 2 emission in Generation Plant is not considered) However, Carbon emission per passenger mile is 35% less</td>
</tr>
<tr>
<td><strong>Diesel Particulate Matter (DPM) Ultra-Fine Particles (UFP)</strong></td>
<td>Emitted DPM and UFP, harmful to human health</td>
<td>Not Emitted</td>
</tr>
</tbody>
</table>
Section Length – 160 km
Trains operate at 100 km/h
Reconstruction Project Competed in 2015

Section Length – 110 km
Trains Operate at 100 km/h
Reconstruction Project got completed in 2014

The Area under ADB Funded “Colombo Suburban Railway” Project
Existing Speed – 80 km/h
Will be rehabilitated for 100 km/h operation
105 km additional tracks will be laid to increase capacity
Electrification – 105 km
Project commenced in 2016

Section Length – 120 km
Existing Speed – 50 km/h
Will be Rehabilitated for 100 km/h operation
In the procurement stage

Section Length – 40 km
Existing Speed – 60 km/h
Will be Rehabilitated for 100 km/h operation
In the procurement stage

The Area under ADB Funded “Colombo Suburban Railway” Project
EoI Called for – (1) Pre Feasibility from Rambukkana to Kadugannawa, (2) Feasibility and Detailed Design from Kadugannawa to Matale (with Double Track from Kadugannawa to Katugastota)
EoI Called

Section Length – 105 km
Trains operate at 90 km/h
Rehabilitation Project Competed in 2012
Ragama–Veyangoda Section
Existing – 2 lines
Future – 3 Lines

Ragama - Negambo Section
Existing – 2 lines
Future – 2 Lines & rehabilitated

Colombo – Ragama Section
Existing – 3 lines
Future – 4 Lines

Colombo - Panadura Section
Existing – 2 lines
Future – 3 Lines

Colombo - Padukka Section
Existing – 1 line
Future – 2 Lines

Padukka - Avissawella Section
Existing – 1 line
Future – 1 Line
Rehabilitated

Paadura - Kaluthara Section
Existing – 2 lines
Future – 2 Lines & Rehabilitated

Veyangoda – Rambukkana Section
Existing – 2 lines
Future – 2 Lines Rehabilitated to 100 km/h

FS RESULTS
Task 1: Pre-Feasibility of CSRP
Draft Final Report submitted, Other Studies being done

Task 2: Feasibility & Design for CSRP
Consultancy Procurement at Final Stage

Task 3: Design and Bid Doc. for SLR Telecom System
Consultancy is on-going

Task 4: Design and Bid Doc. for SLR Ticketing System
Consultant Selected

Task 5: Design for New Lines MDA-MGW
Cabinet Approval Granted to give Design Consultancy for RDA, Consultancy Commenced

Task 6: Design for SLR OP. HQ and CTCC
Documents being prepared to call for Design Consultancy

Task 7: Railway Master Plan
Consultants will be mobilized in January 2018

Task 8: Feasibility & Design for KSRP EoICalled & in Evaluation Stage

Task 9: Consultancy for Social Survey: KV Line upto HMA
Survey is Competed

Task 10: Consultancy for Social Survey: Beyond HMA
Cabinet Approval given

Task 11: Consultancy for Social Survey: Main Line
Cabinet Approval given

Task 12: Dev. of SLGRTTC

Task 13: Land Survey: Main Line, Coast Line and KV Line (170 km)
Tenders Called
Task 1: Pre-Feasibility of CSRP Draft Final Report submitted, Other Studies being done

Task 2: Feasibility & Design for CSRP Consultancy Procurement at Final Stage

Task 3: Design and Bid Doc. for SLR Telecom System Consultancy is on-going

Task 4: Design and Bid Doc. for SLR Ticketing System Consultants Selected

Task 5: Design for New Lines MDA-MGW Cabinet Approval Granted to give Design Consultancy for RDA, commenced

Task 6: Design for SLR OP. HQ and CTCC Documents being prepared to call for Design Consultancy

Task 7: Railway Master Plan Consultants will be mobilized in January 2018

Task 8: Feasibility & Design for Kandy Suburban Railway EoI Called & in Evaluation Stage

Task 9: Consultancy for Social Survey: KV Line upto HMA Survey is Competed

Task 10: Consultancy for Social Survey: Beyond HMA Cabinet Approval given

Task 11: Consultancy for Social Survey: Main Line Cabinet Approval given

Task 12: Dev. of SLGRTTC

Task 13: Land Survey: Main Line, Coast Line and KV Line (170 km) Tenders Called
Democratic Socialist Republic of Sri Lanka
Ministry of Transport and Civil Aviation
Colombo Suburban Railway Project
Project Preparatory Technical Assistance

Final Report
Panadura – Veyangoda
Initial Feasibility
Volume 2 - Drawings

October 2017
ADB Financing: Loan No SRI-3425

Project Preparatory Technical Assistance (CSRP) –

- G: USD 1 Mn
- L: USD 10 Mn
- G: USD 1.5 Mn
- L: USD 100 Mn
- L: USD 300 Mn
- L: USD 300 Mn
Social Safeguards: Expected change through the project
Socio – Economic Survey (Population) – Kelani Velley Line

Legend
Population Density (per ha)
- 5.0
- 5.1 - 24
- 25 - 33
- 34 - 40
- 41 - 54
- 55 - 67
- 68 - 88
- 89 - 130
- 140 - 220
- 230 - 350

Maradana
Narahenpita
Nugegoda
Maharagama
Kottawa
Homagama

Social
## Socio – Economic Survey: No of affected parties

### Section on KV Line from Maradana to Homagama: 35 km Section

<table>
<thead>
<tr>
<th>Location</th>
<th>Residential</th>
<th>Residential &amp; Commercial</th>
<th>Commercial</th>
<th>Institutional</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maradana - Castle</td>
<td>610</td>
<td>25</td>
<td>22</td>
<td>4</td>
<td>661</td>
</tr>
<tr>
<td>Kastle - Kolombage Mw</td>
<td>489</td>
<td>21</td>
<td>12</td>
<td>5</td>
<td>527</td>
</tr>
<tr>
<td>Kolambage Mw - Nawinna</td>
<td>495</td>
<td>21</td>
<td>234</td>
<td>10</td>
<td>760</td>
</tr>
<tr>
<td>Nawinna - Homagama</td>
<td>292</td>
<td>35</td>
<td>381</td>
<td>5</td>
<td>713</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1886</strong></td>
<td><strong>102</strong></td>
<td><strong>649</strong></td>
<td><strong>24</strong></td>
<td><strong>2661</strong></td>
</tr>
</tbody>
</table>

Total length of the KV section: 35 km
SSRP : Expected change

3D view of UDA Housing Unit
• Thank You