SIEMENS
Ingenuity for life

“Lead and Exceed”

Shenzhen Int’l Low-carbon City towards Sustainability

Siemens Cities Center of Competence Asia

“Lead and Exceed” – Shenzhen Int’l Low-carbon City towards Sustainability

Focusing on technology deployment and industry upgrading, SILC is highly capable of achieving the target of carbon emission intensity and carbon emission per capital, leading the low-carbon development of Chinese cities.

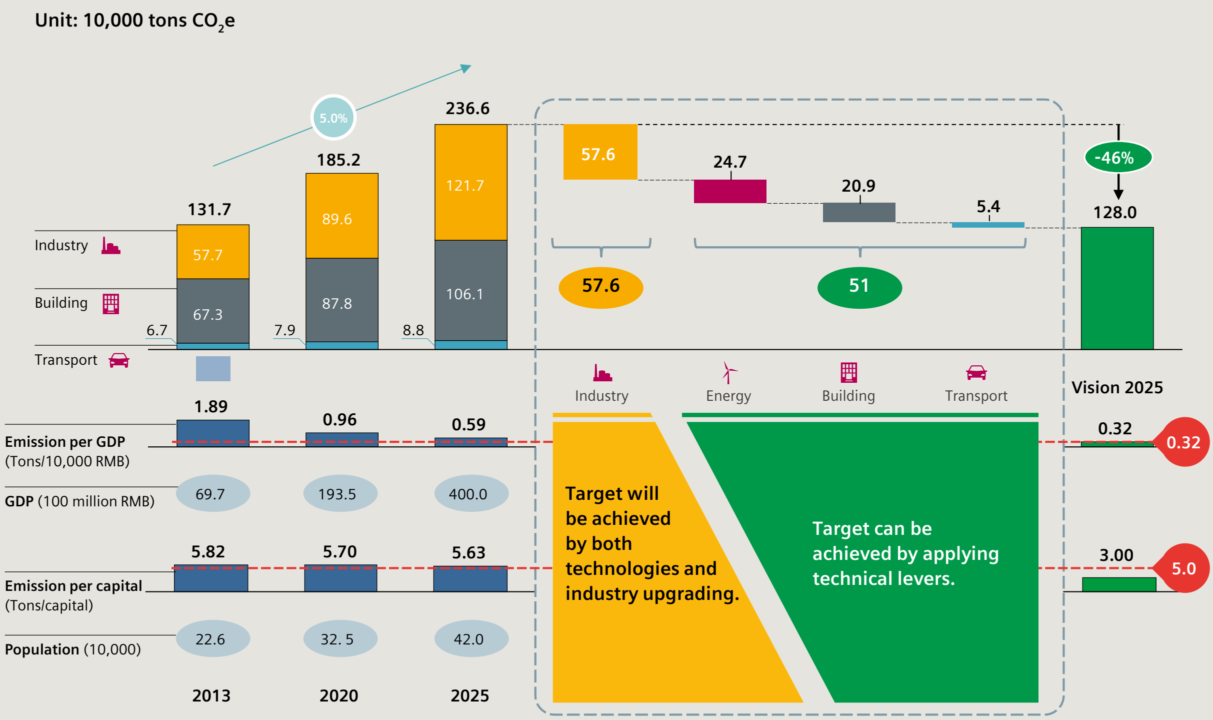


Figure 1: Low-carbon development roadmap for SILC

Action Plan

By applying the City Performance Tool developed by its global network, Siemens Cities CoC Asia supports Shenzhen International Low-carbon City (SILC) to further clarify the concrete implementation plan for its low-carbon development target. Focusing on technology deployment and industry upgrading, SILC is highly capable of achieving the target of carbon emission intensity (0.32 tons/10,000 RMB) and carbon emission per capital (5 tons/capital), leading the low-carbon development of Chinese cities.

- **Energy:** Develop efficient distributed energy network managed by micro grid;
- **Building:** Fully leverage available intelligent building and wall insulation technologies;
- **Transportation:** Accelerate development of public rail transit and e-car operation management;
- **Industry:** Improve energy efficiency in existing plants and industrial upgrading through defining clear investment criteria.

Background

Under the Business as Usual scenario, even though the GDP will be growing very significantly and considering future population growth and progress in technology deployment, it will be challenging for SILC to achieve its target of carbon emission intensity (0.32 tons/10,000 RMB) and carbon emission per capital (5 tons/capital). It is predicted that the GHG emission in SILC will reach 1.9 million tons in 2020 and further be increased to 2.4 million tons in 2025.

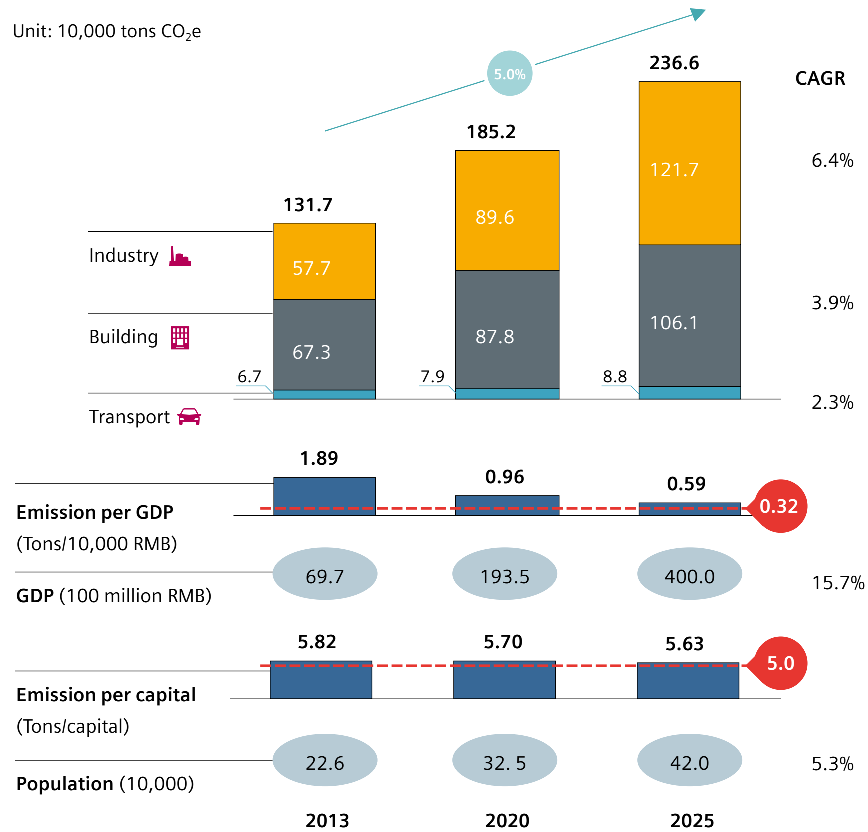


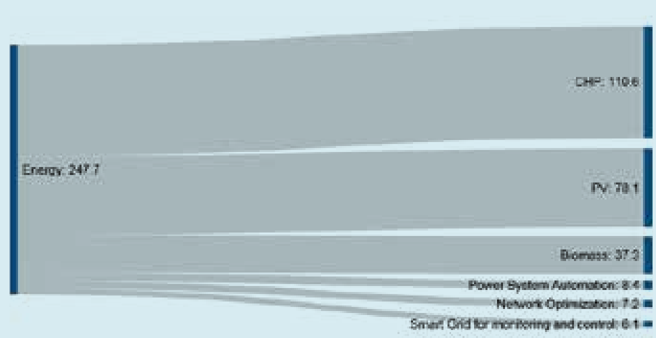
Figure 2: Forecast of GHG emission in BaU scenario

Key Findings

Energy

The planning and implementation of **district energy center (CHP)** will be highly important for SILC to reduce GHG emission in the future.

Overall 3,500KW capacity of **PV** installation and a 6,000KW **waste incineration plant** in SILC will also contribute to GHG emission reduction significantly. Above all, a **micro-grid** can be implemented to fully integrate clean and renewable energy and further enhance energy efficiency in district level.

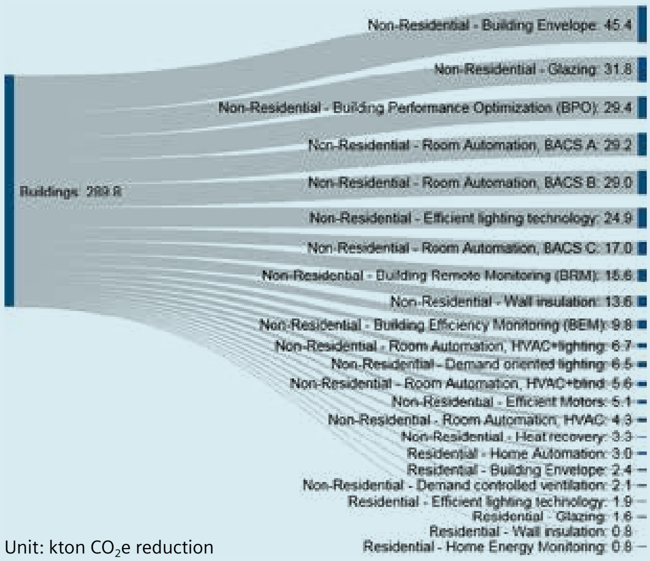


Unit: kton CO_2e reduction

Building

Building envelop and glazing in building sector has been proved as effective levers in reducing GHG emission. Meanwhile, enhancing the application of **building automation (BACS A, B and C), efficient lighting** and **building performance optimization** will also contribute to GHG emission reduction significantly.

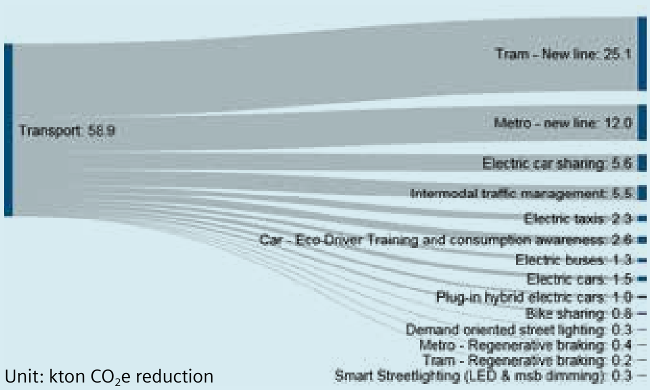
100% green building will be implemented from design stage. **Demand-oriented energy supply** can be further promoted with distributed energy in district level.



Transport

New tram lines and **new metro lines** are top performers in transport sector, providing the most significant impact in GHG emission reduction.

Other technical levers with large impact come from intelligent traffic management and e-vehicle, **including intermodal traffic management, e-car sharing, E-taxis and E-bus** etc.



Economics

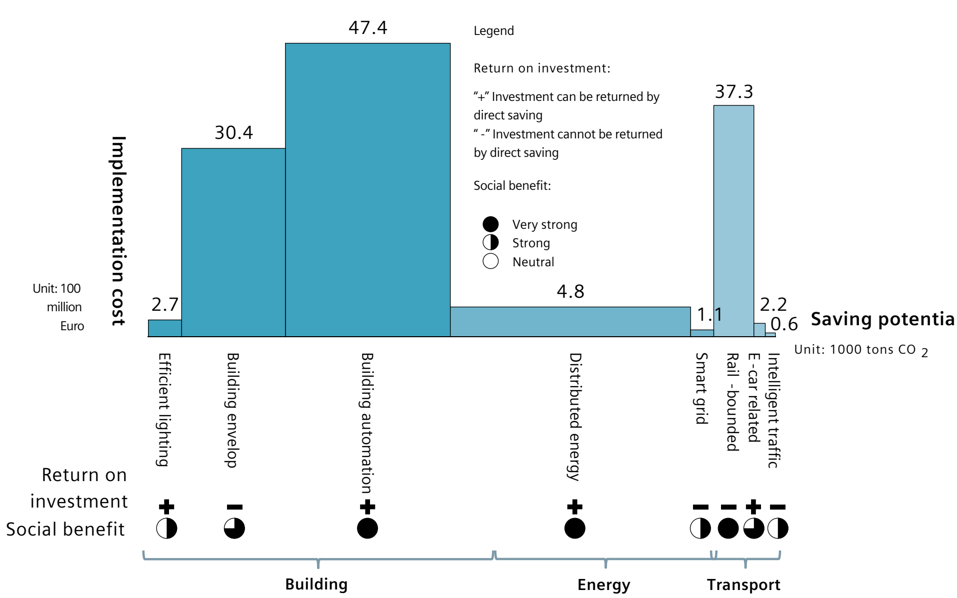


Figure 3: Economic analysis of technical levers

Implementation Rate

Technical levers	Implementation rate	
	2025	
CHP	20%	150MW CCHP energy center. 3.5MW PV installation capacity.
PV	6%	
Smart Grid for monitoring and control	100% of grid	
Power System Automation	100% of grid	
Smart metering	80% of user	
Residential - Wall insulation	3% stock/year	100% new buildings in SILC need to meet local green building standard. Applying building automation and efficient lighting to upgrade and retrofit existing public buildings (60,000 m^2 per year). 50% of new buildings in SILC will meet higher green building standard to fully incorporate passive and intelligent building technologies (800,000 m^2 per year).
Residential - Glazing	3% stock/year	
Residential - Efficient lighting	3% stock/year	
Non-Residential - Wall insulation	5% stock/year	
Non-Residential - Glazing	5% stock/year	
Non-Residential - Efficient lighting	5% stock/year	
Non-Residential - Demand oriented lighting	2% stock/year	
Non-Residential - Building Efficiency Monitoring (BEM)	2% stock/year	
Non-Residential - Building Performance Optimization (BPO)	2% stock/year	
Non-Residential - Demand controlled ventilation	2% stock/year	
Non-Residential - Heat recovery	2% stock/year	
Residential - Home Energy Monitoring	1% stock/year	
Residential - Home Automation	1% stock/year	
Residential - Building Envelope	3% stock/year	
Non-Residential - Building Envelope	5% stock/year	
Non-Residential - Room Automation, BACS C	2% stock/year	

Technical levers	Implementation rate	
	2025	
Non-Residential - Room Automation, BACS B	1.5% stock/year	
Non-Residential - Room Automation, BACS A	1% stock/year	
Non-Residential - Efficient Motors	2% stock/year	
Non-Residential - Room Automation, HVAC	2% stock/year	
Non-Residential - Room Automation, HVAC+lighting	1.5% stock/year	
Non-Residential - Room Automation, HVAC+lighting+blind	1% stock/year	
Non-Residential - Building Remote Monitoring (BRM)	2% stock/year	
Metro - new line	1line	Execute metro line 3 extension and 4 new tram lines in SILC. Encourage E-car sharing program and apply 400 e-cars in phase 1. Promote ITMS and intermodal traffic management.
Hybrid electric buses	60% replacement	
Electric taxis	50% replacement	
Bike sharing	10 / 1000	
Tram - New line	4 lines	
Intelligent traffic light management	100%	
Intermodal traffic management	100% of user	
LED Street lighting	100% replacement	
Demand oriented street lighting	50%	
Electric car sharing	1 / 1000	
Electric cars	10%	
Plug-in hybrid electric cars	10%	
Car - Eco-Driver Training and consumption awareness	50%	
Smart Street lighting (LED & msb dimming)	50%	

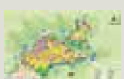
Shenzhen Int'l Low-carbon City

Shenzhen Int'l Low-carbon City is a leading project of the sustainable urbanization cooperation between China and EU, which is located in Shenzhen's Longgang District, Guangdong Province. Initiated in 2012 and with a planned area of 53 square kilometers, the 7-year project is designed to demonstrate China's achievements in low-carbon technology. In 2025, 400,000 people will be living and working in the city, and the GDP in SILC will achieve 40 billion RMB. Carbon emission intensity in SILC will be reduced to 0.32 tons/10,000 RMB and carbon emission per capital will be lower than 5 tons.

Introducing CyPT

The City Performance Tool is a dynamic simulation tool which studies a series of more than 70 technologies from Building, Transport and Energy Technologies – at different time periods and implementation rates. It is designed to reduce the environmental impact of everyday activities in your city. It covers GHG emission from buildings and transport, as well as air pollutants such as particulate matter (PM) and nitrogen oxides (NOx). The model is based on life cycle assessment methodology and builds upon Siemens' technology expertise and global databases of deep vertical process knowledge, calculates the environmental and economic impacts of individual technologies at different implementation levels.

Shenzhen Int'l Low-carbon City



Geographical Area

53.4 km²

Population

400,000

Energy (% of Electricity Mix)

Hardcoal	**79%**
Hydro	**8%**
Nuclear	**12%**
Wind	**1%**

Buildings (Area Per Capita)

28.8
(m^2/person)
Residential

34.9
(m^2/person)
Non-residential

Passenger Kilometer

10.2
(KM/person/day)

Xu Li

Business Developer, Cities Center of Competence Asia

Tel: +86 (0) 21 38892046
Email: xu_li@siemens.com
www.siemens.com