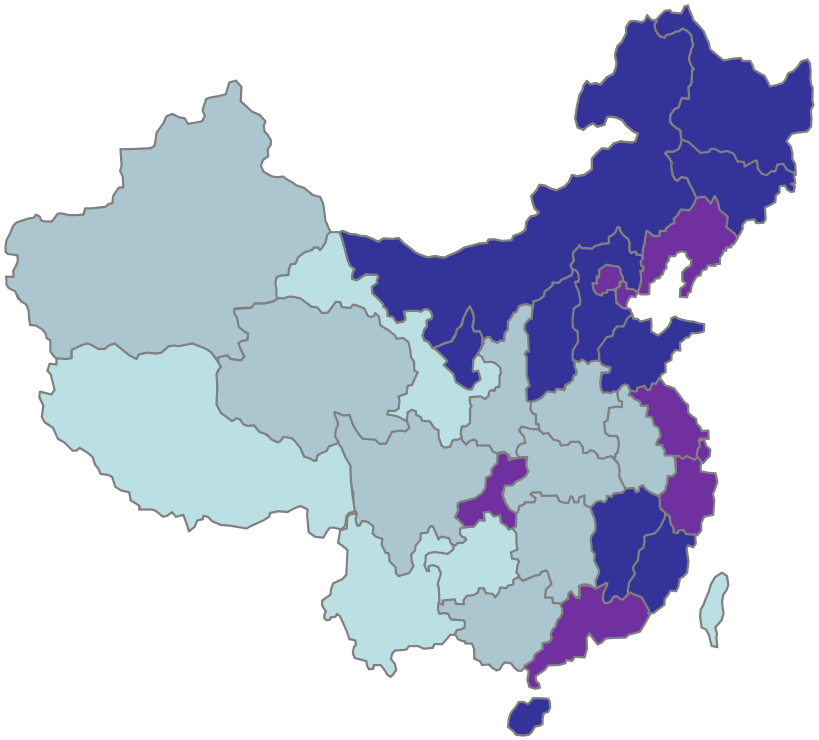
China’s SSL Development

Ling Wu

Secretary General of Chinese SSL Alliance (CSA)

President of International SSL Alliance (ISA)

China Perspectives



Urbanization rate (2015)

Estimated GDP of ~€5 trillion in 2015

Urbanization rate of 50%+ in 2015,10m/per year

•2 billion square meters of new buildings per year

10% middle-class households now, 40% in 2020

Over 10% of population aged 65+ 2015

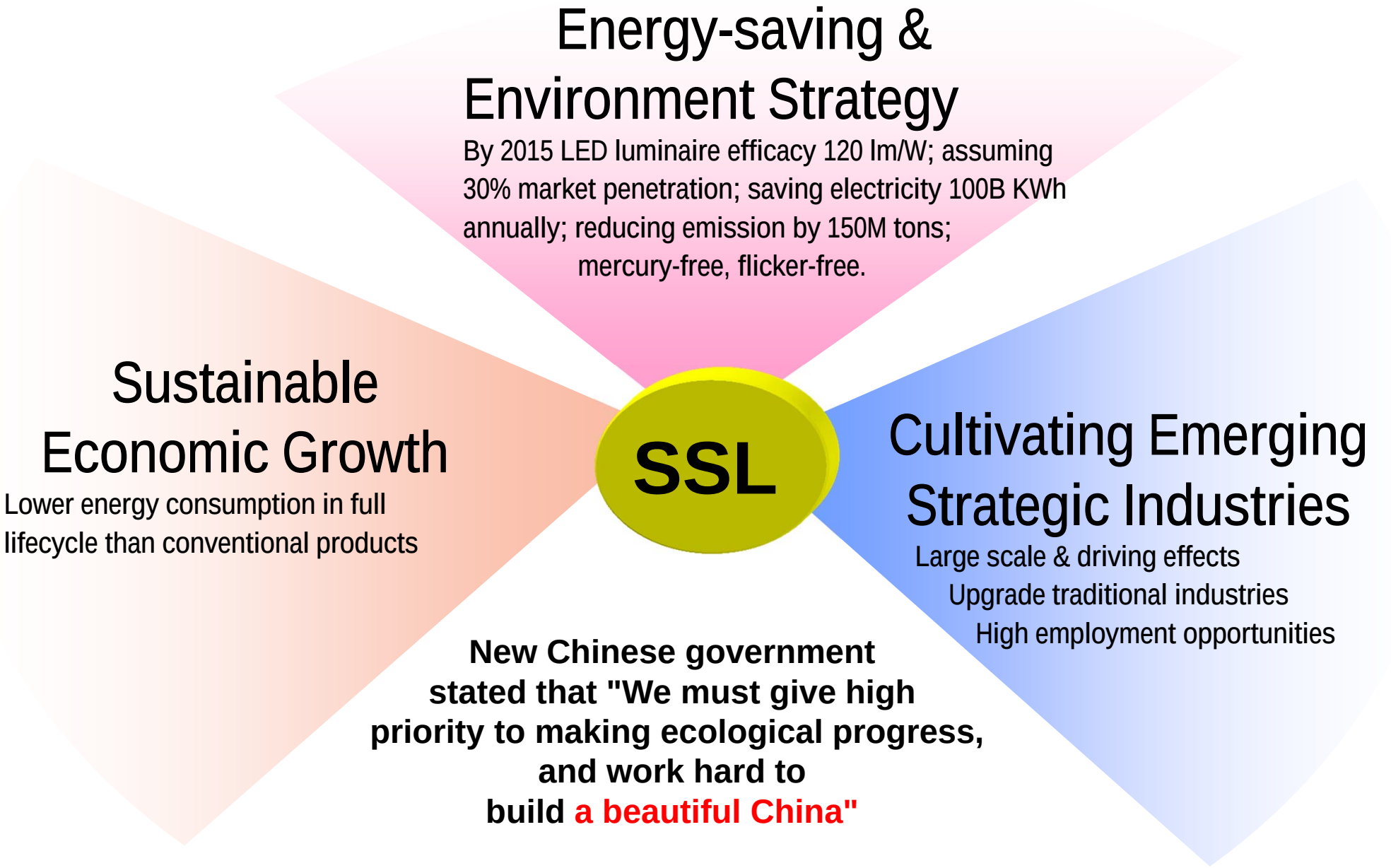
•Quickly aging society, will reach 16%+ by 2030

More than 50% global infrastructure projects

•2009, 70 railway project started, 2000km
•By 2015, tram/metro reach >2000 km

- **Reduction of energy consumption per GDP;**
- **Substantial reduction of pollutions;**
- **Food security;**
- Climate changes;
- Resource (Energy/water/food/material) scarcity;
- Pandemics;

Importance of SSL for China



Industrial Output

192 B RMB in 2012, growth rate about 24%

Epi&chip	Output value 6.5 B RMB, growth rate 30%
Packaging	Output value 28.5 B RMB, growth rate 14%
Applications	output value121B RMB, growth rate 34%
Number of companies	above 6000

	2006	2007	2008	2009	2010	2011	2012
Upstream	10	15	19	23	50	65	80
Mi-stream	146	168	185	204	250	285	320
Downstream	200	300	450	600	900	1210	1520
Growth Rate		35.67%	35.40%	26.45%	45.10%	30.00%	23.08%

Source：《China LED Industry Development Report Focusing on General Lighting Market 2012》,CSA

Source: CSA Consulting

Complete SSL industry chain

SSL industry has long industrial chain, broad applications and diversified development.

More than illumination

Indicator

Backlight

Lighting

Substrate, Wafer, Chip

Package, Module

Application, system

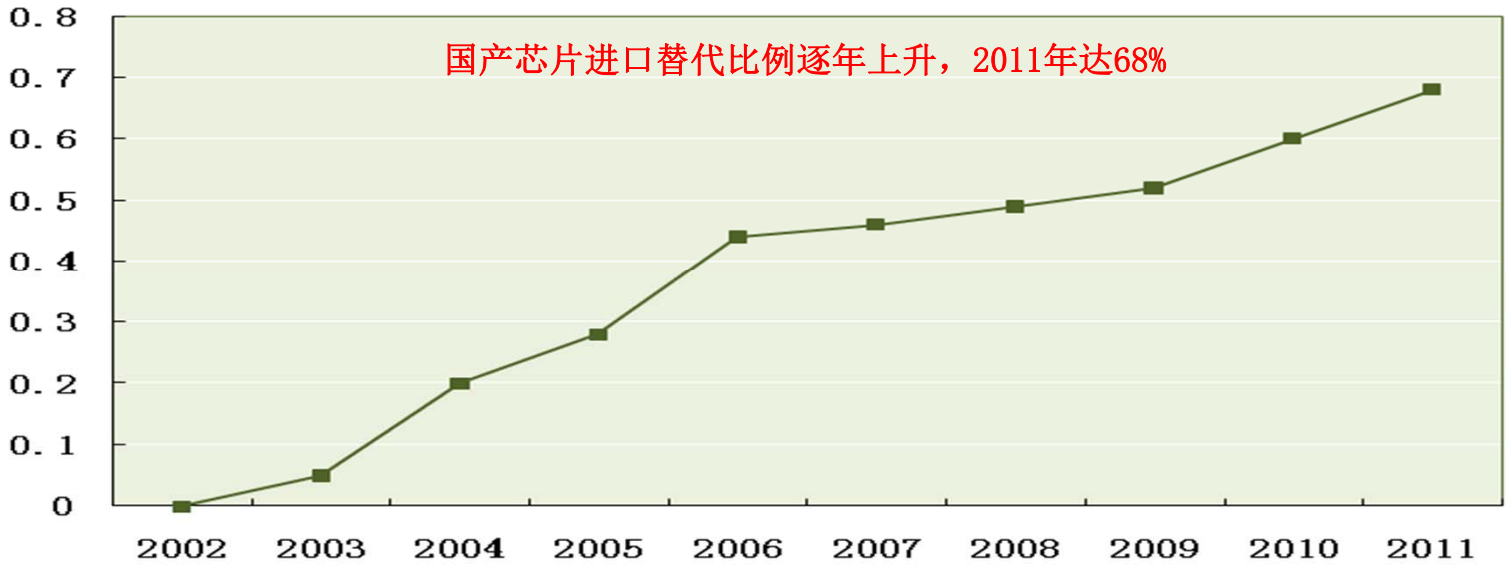
- Domestic LED chip companies are over 60 until 2011
- Over 900 MOCVD are maintained in China Mainland
- The first 48-piece 2-inch type industrial MOCVD prototype
- Still a tech gap compared to international advanced level

- A large number of packaging companies, with the largest manufacturing and export capacity
- Products are moving to SMD, mid and highpower LED package
- Companies' business are extending to cover downstream

- A large number of enterprises
- Low barrier, low focus, and lack of brand
- Advantages on part of functional lighting applications
- Innovative applications, such as agriculture and medical, are booming

Technology progress

- Efficacy of HP chip in mass production > 120 lm/W
- Si substrate GaN chip > 100 lm/W
- Some of applications are leading
- White LED package level efficacy > 130 lm/W
- OLED > higher than 40 lm/W
- Prototype of home-made 48 wafer MOCVD

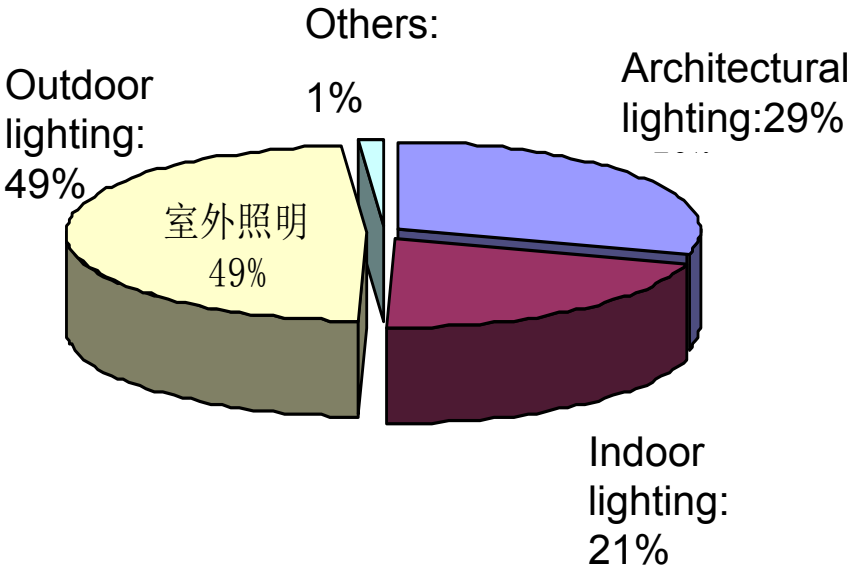


Source: CSA Consulting

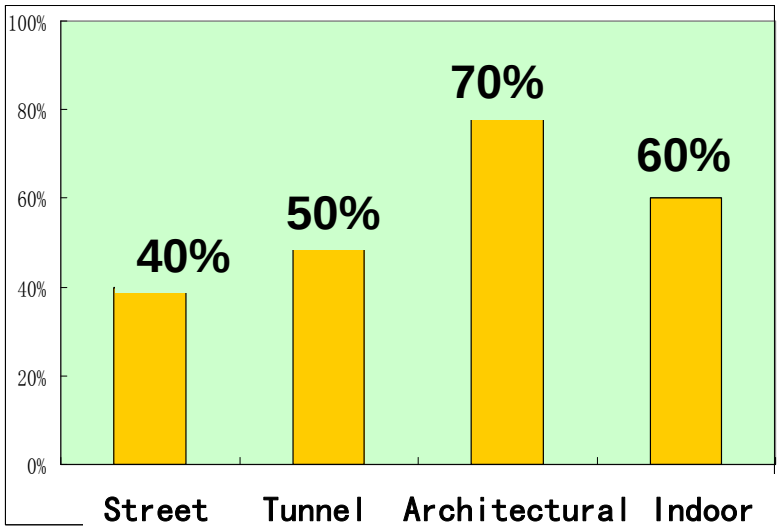
National showcase: “10k and 10 cities”

Goals

- To cultivate SSL market and increase social awareness
- To enhance system integration, identify bottlenecks and weak links on entire industrial chain
- To establish the public platform on testing, standardization and certification
- To explore new business models: EMC (Energy Management Contract) & others



Showcases

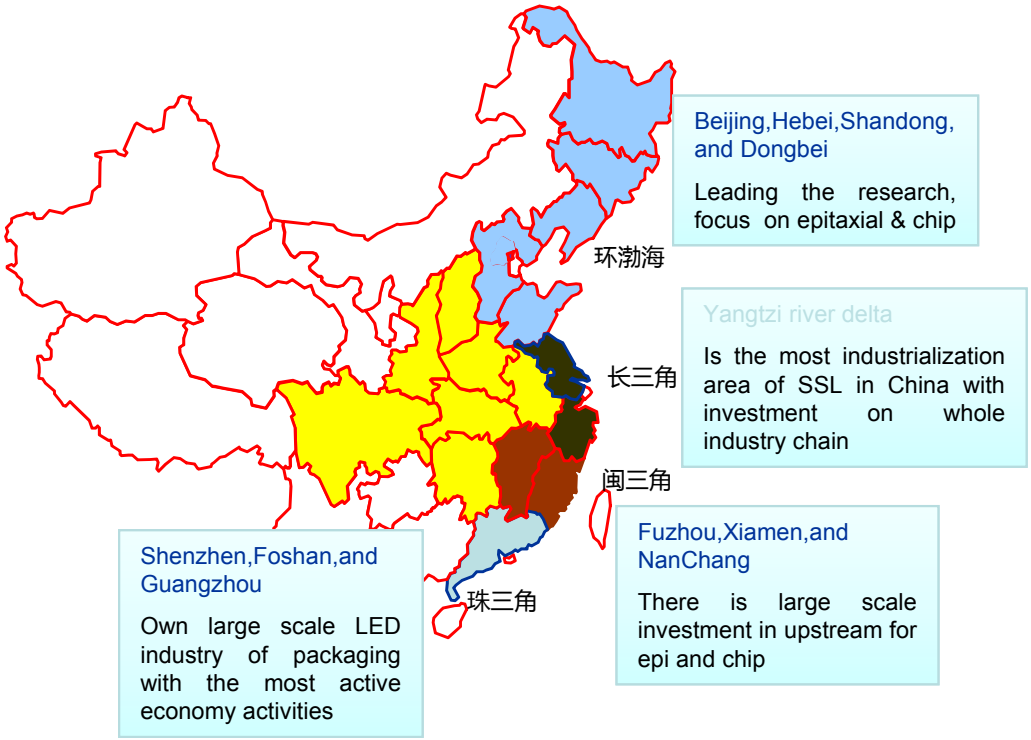


Energy saving of different applications

Large scale industrial eco-system

14 industrial bases——

Xiamen, Shanghai, Dalian, Nanchang, Shenzhen, Yangzhou, Shijiazhuang and etc.



Beijing,Hebei,Shandong, and Dongbei

Leading the research, focus on epitaxial & chip

Yangtzi river delta

Is the most industrialization area of SSL in China with investment on whole industry chain

Fuzhou,Xiamen,and NanChang

There is large scale investment in upstream for epi and chip

Shenzhen,Foshan,and Guangzhou

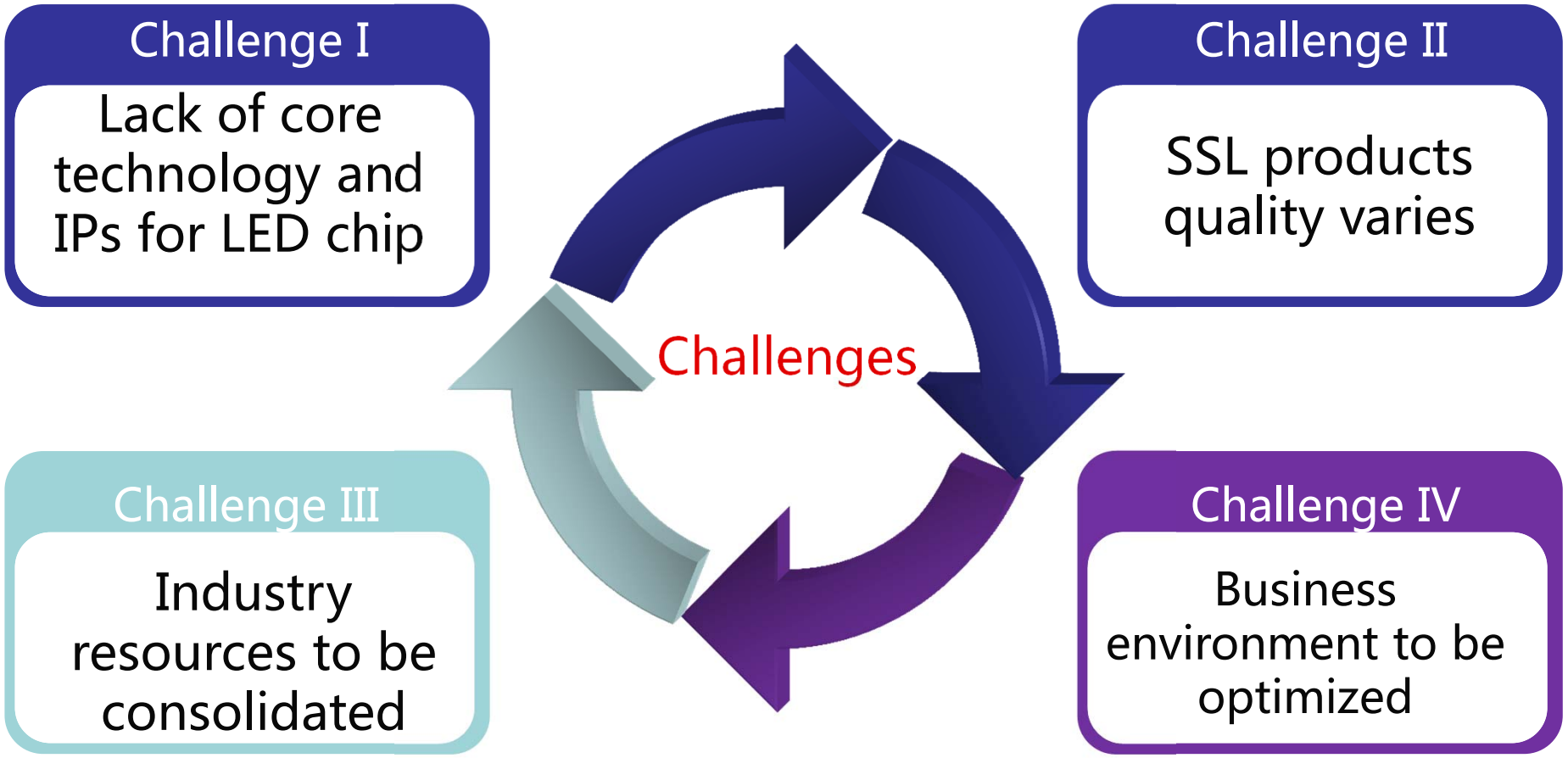
Own large scale LED industry of packaging with the most active economy activities

4 industrial regions——

More than 85% SSL enterprises have gathered in :

- **Pearl River Delta**
- **Yangtze River Delta**
- **Area of annulus Bohai Sea**
- **Jiangxi and Fujian**

SSL development challenges



Enhance innovation chain

National Key Technology R&D Program

application products development, system integration and innovation

863 Plan

LED fabrication key breakthrough

"I-A-R" Collaboration

Support sustainable SSL Industry dev.

Basic Research

Core Tech Research

Product Development

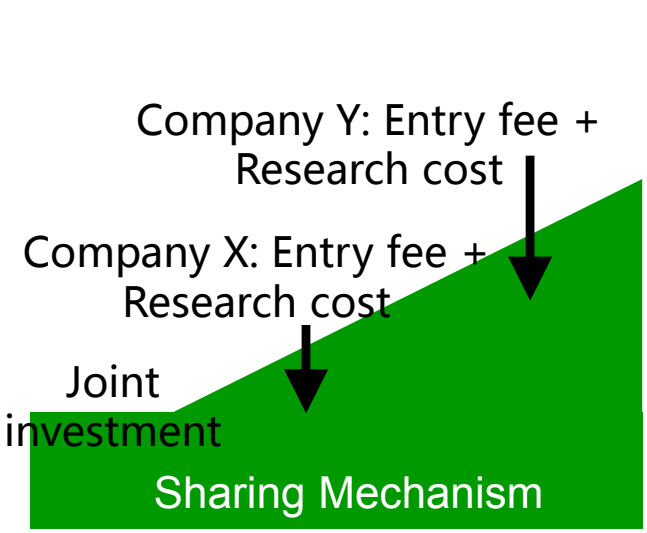
Industrialization

973 Plan

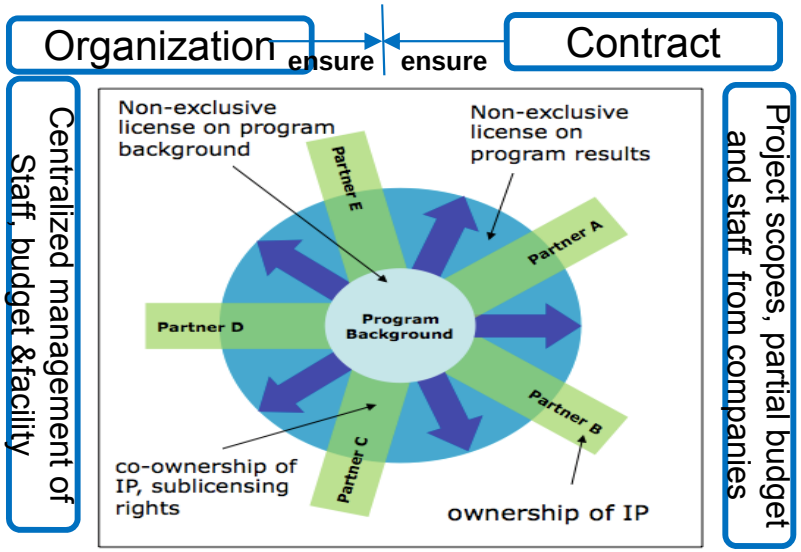
SSL Basic Research (Next Generation)

Standardization & Development

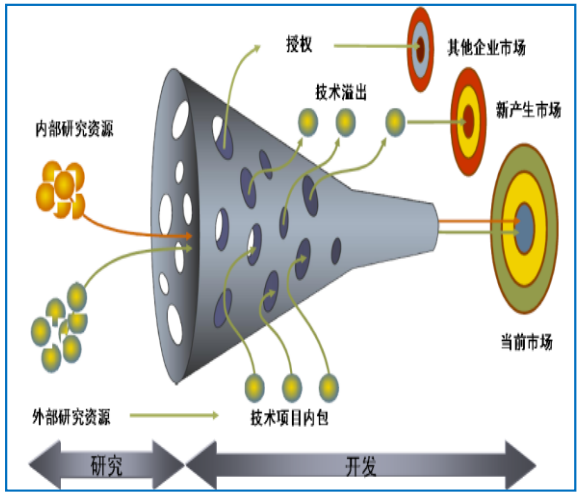
International Open Innovation Center for SSL
- State Key Lab for SSL (SKL-SSL)



Open



Share



Sustainability

Objective:

Build a globally open and sustainable SSL innovation platform for

- Key technologies
- Specifications and standards
- Top talents development
- Industrialization and valorization

by collaborating with world-wide leading industries and academia covering the whole SSL value chain, to solve both middle and long term technologic challenges.

Optimise value chain

- Avoid low end overheating
- Broaden application path to address wide society needs
- Explore new business models

Strengthen service chain

- Standards and testing methods
- Quality control via CSA channel management
- Market surveillance
- New government regulations
- Public awareness and media

Global opportunity
Global challenge
Global & joint effort

Thanks for your attention!