

20 Oct 2014

44th Meeting of APEC-EGEE&C

China Academy of Building Research, Beijing, China

## EWG 03-2013A

# Nearly (Net) Zero Energy Building

**Project Contact: Mr ZHANG Shicong**

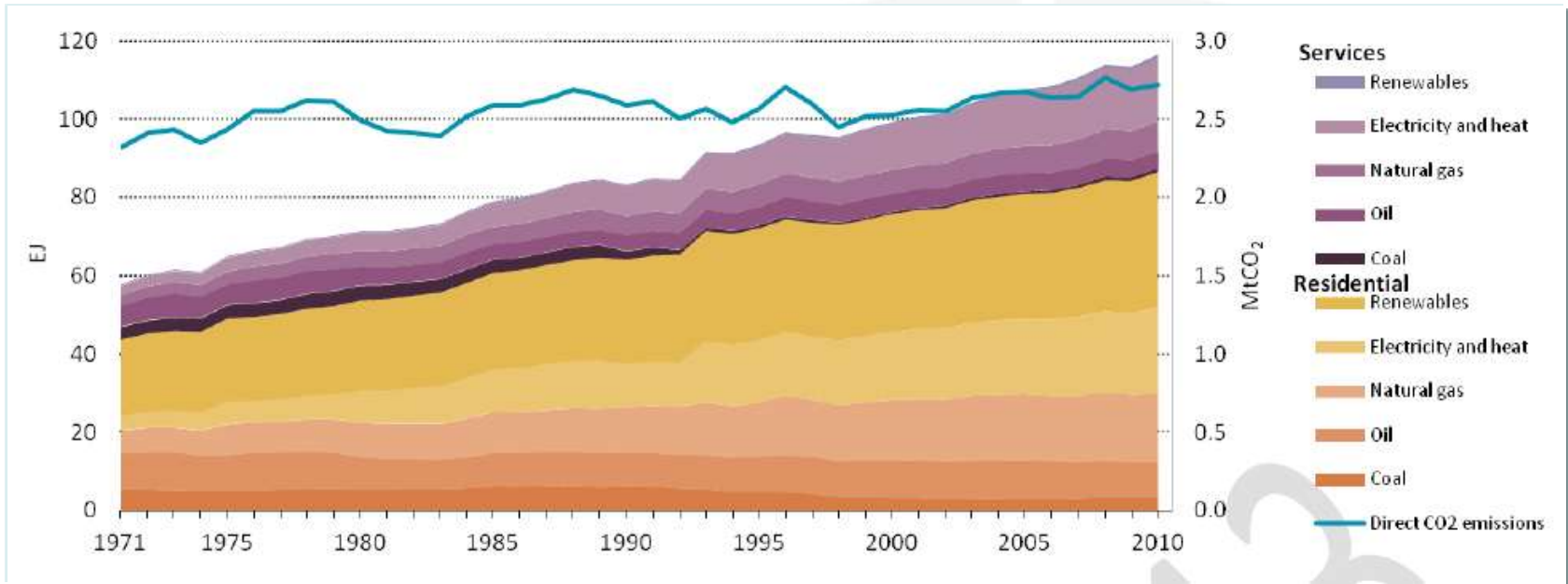
**Institute of Building Environment and Energy**

**China Academy of Building Research**



## APEC Program-- Nearly (Net) Zero Energy Building

### Project Background



# APEC Program-- Nearly (Net) Zero Energy Building

## Project Background



Photo on the top of Empire State Building



Shanghai Wai tan (Bund)

# APEC Program-- Nearly (Net) Zero Energy Building

## Project Background

### (1) Policy: the federal government enacted the Executive Order 13514

- As of 2020, all planning for new Federal buildings requires design specifications that achieve Zero-Net-Energy use by 2030.
- Large government buildings have to start showing progress by 2015.

### (2) Networks: Smart Net Zero Energy Buildings Strategic Research Network

- Researchers
- Industry
- Government

### (3) Pilot Projects



## APEC Program--Nearly (Net) Zero Energy Building

### APEC- EWG – EGEEC - 41 XC



11-12 April 2013

North Star Continental Grand Hotel

Beijing, China

## APEC Program-- Nearly (Net) Zero Energy Building

**Proposing APEC economy: China**

**Co-sponsoring economies: Hong Kong-China, Singapore, Canada, Japan, Thailand, New Zealand, USA.**

**Start date: July 2013**

**Completion date: December 2014**

**Total Budget: 204,400 USD. APEC funding:120,000USD, Self-funding:84,400**

## APEC Program-- Nearly (Net) Zero Energy Building

Focus Area:

- Net Zero Energy Building Definition and Policy
- Research Program outcomes and Technology roadmap
- Pilot projects among APEC economies.
- Related associations and alliances

## APEC Program-- Nearly (Net) Zero Energy Building

.APEC-Net Zero Energy Building workshop (Oct 2013 Beijing, China)



APEC-Net Zero Energy  
Building Workshop  
Beijing, China.  
30-31, Oct, 2013



## APEC Program-- Nearly (Net) Zero Energy Building

.APEC-Net Zero Energy Building workshop (Oct 2013 Beijing. China)

### Section 1: Policy & Overview

- China
- IEA-SHC-Task40
- US
- Canada

### Section 2: Codes & Standard

- Japan
- Indonesia
- China

### Participating economies:

- Chile
- Mexico
- Peru
- HK-China
- Indonesia
- Malaysia
- Thailand

### Section 3: Technology Roadmap & Pilot project

- US
- Canada
- Korea
- China

## APEC Program-- - Nearly (Net) Zero Energy Building

### POLICY: APEC Economies Progress -- USA

- **US federal NZE, High Performance Green Buildings, Executive Order 13514**
  - -- At least 15% of existing federal buildings and leases meet Energy Efficiency Guiding Principles by 2015
  - A goal of 100% of all new federal buildings achieving NZE by 2030
  - As of 2020, all planning for new Federal buildings requires design specifications that achieve Zero-Net-Energy use by 2030.



President Obama issued on October 5, 2009

## APEC Program--Nearly (Net) Zero Energy Building

# POLICY: APEC Economies Progress – Korea – National Goal



## APEC Program--Nearly (Net) Zero Energy Building

# RESEARCH: APEC Economies Progress – Canada

NSERC Smart Net Zero Energy Buildings Strategic Research Network

### Theme 1

Integrated solar and HVAC systems for buildings

### Theme 2

Active building envelope systems and passive solar technologies

### Theme 3

Mid-to long-term thermal storage for buildings and communities

### Theme 4

Smart building operating strategies

### Theme 5

Technology transfer, design tools and input to national policy

- **15 Canadian Universities**
- **Partners: NRCan, utilities, CMHC, building industry, PV industry, controls**
- **Build partnerships across industry sectors and disciplines**

## APEC Program--Nearly (Net) Zero Energy Building

### BUILDING CODES: APEC Economies Progress – JAPAN

Japan-Energy Efficiency Standard for Residential Building :

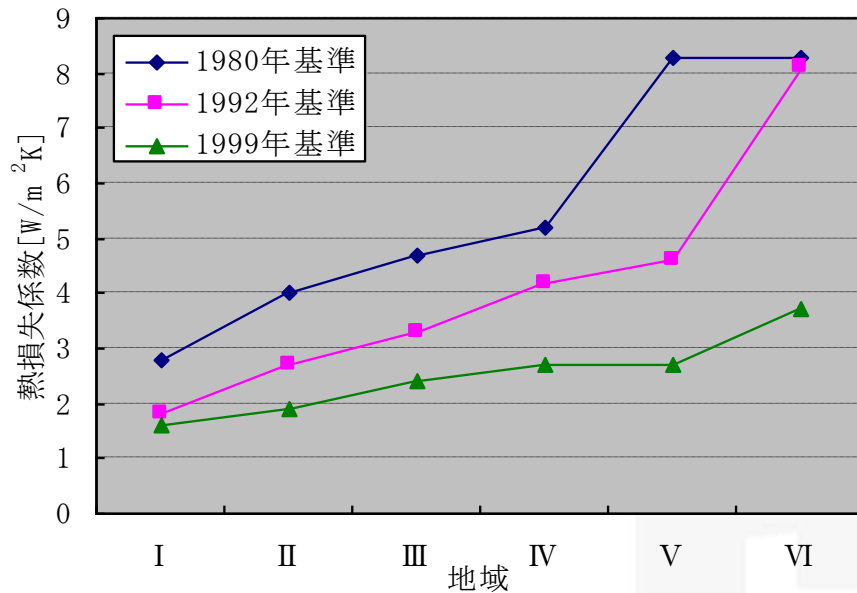
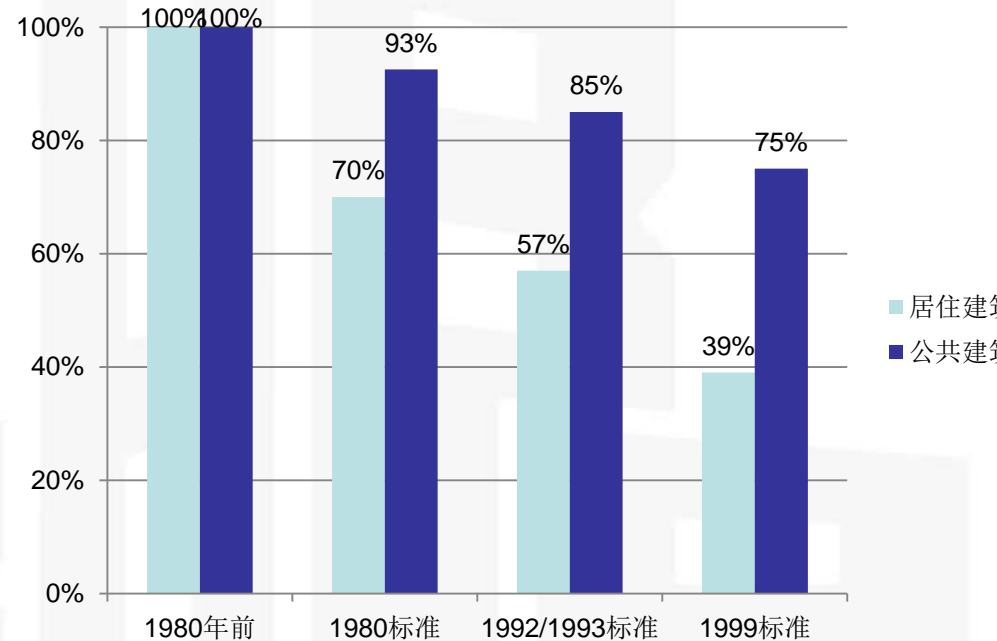


Fig. Standard value of heat loss coefficient for houses

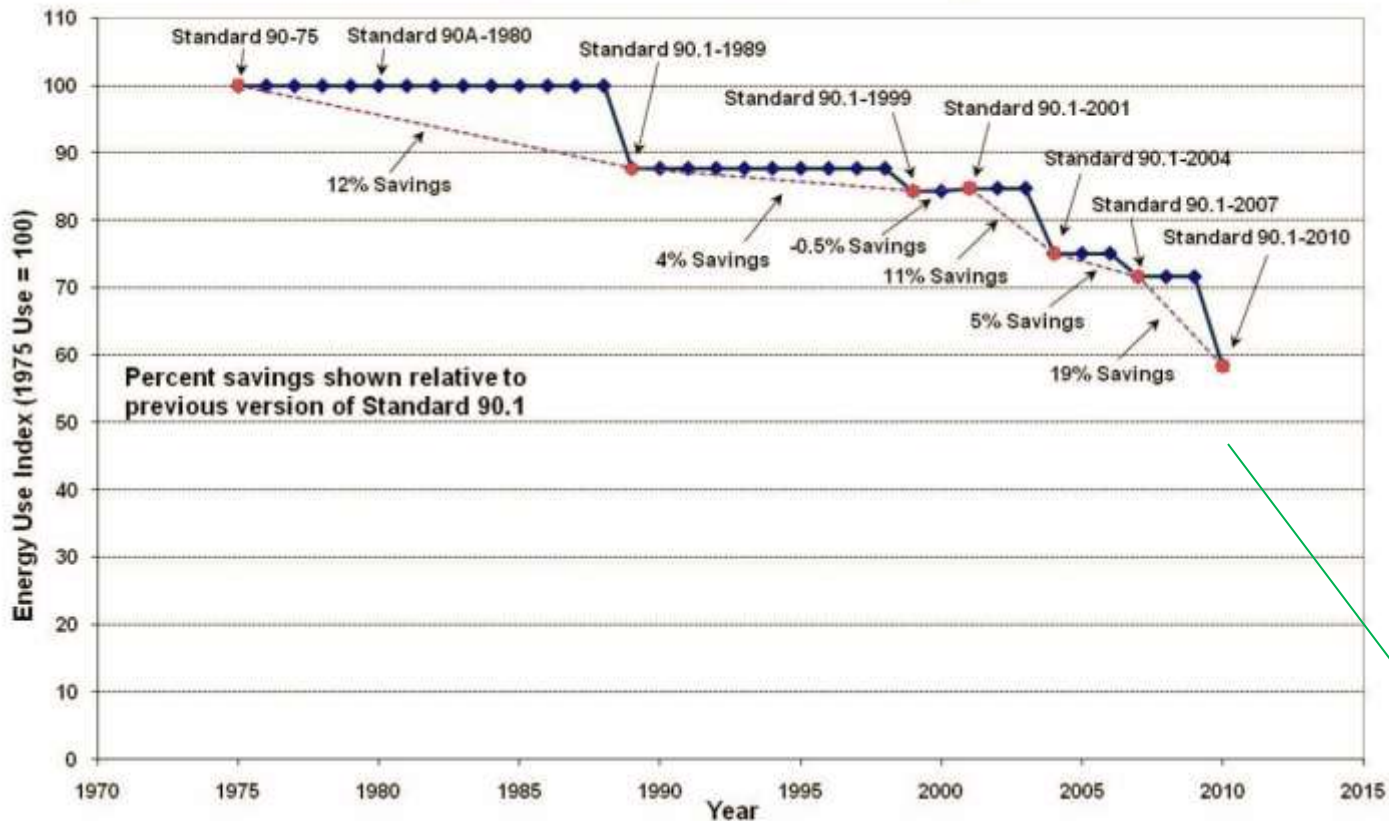




# APEC Program--Nearly (Net) Zero Energy Building

## BUILDING CODES: APEC Economies Progress – USA

New Commercial Construction Code Stringency 1975-2010  
(Relative to Standard 90-75=100)



NZE ?

# APEC Program--Nearly (Net) Zero Energy Building

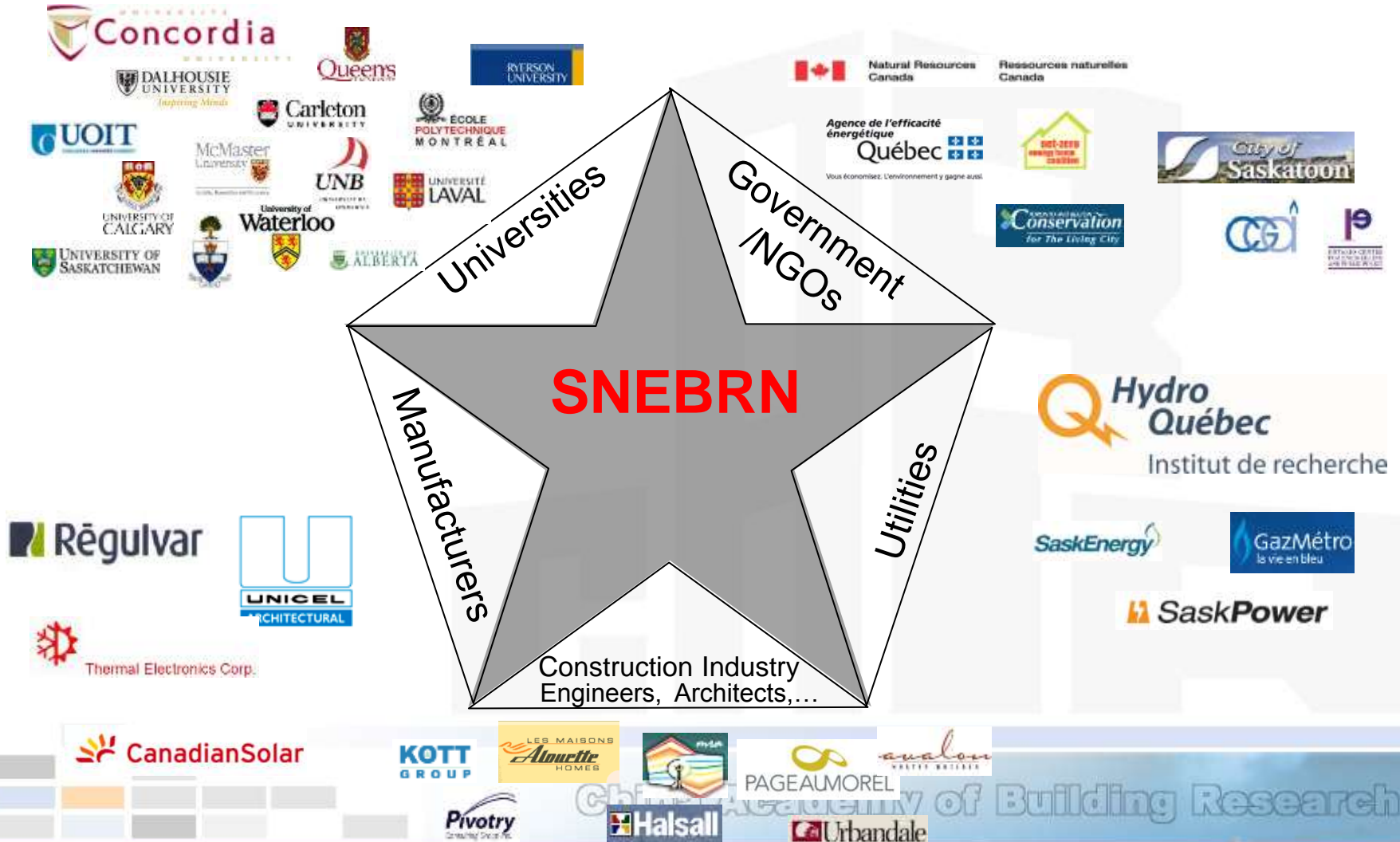
## NETWORK & ALLIANCES: APEC Economies Progress – China

### China Nearly Zero Energy Building Alliance

 <b>建研科技</b> <small>CABR TECH</small>	 <b>奥润顺达</b> <small>ORIENT SUNBAR</small>	 <b>建研爱康</b> <small>JIANYAN AIKANG</small>	 <b>瑞通北方</b> <small>LONGDHUA</small>	 <b>GEAREA</b> <small>葛瑞空调</small>	
 <b>PHILIPS</b>	 <b>SIEMENS</b>	 <b>LUTRON</b> <small>reimagined by Lighting Control</small>	 <b>GREENERGY</b> 绿能新风	 <b>风神集团</b> <small>FENGSHEN GROUP</small>	 <b>建研晖润</b> <small>JIAN YAN HUI RUN</small>
 <b>AKE</b> 艾科	 <b>Rbm</b> 瑞贝姆 <small>Partner for excellence</small>	 <b>CLIMATE MASTER</b>	 <b>祥明电机</b>	 <b>DAIKIN</b>	 <b>TICA</b> <small>天加中央空调</small>
 <b>KONDON</b> <small>金盾建设</small>	 <b>力诺瑞特</b>	 <b>VICOT</b> <small>奇威特</small>	 <b>ARMSTRONG</b>	 <b>GRUNDFOS</b>	 <b>SOLATUBE</b> <small>北京得德阳光</small>
 <b>YAZAKI</b>	 <b>CPIHEX</b> 斯普莱力	 <b>CLIMVENETA</b>	 <b>aldos</b> 法国爱迪士	 <b>Honeywell</b>	 <b>UNDERSANDING ACCELERATED</b>

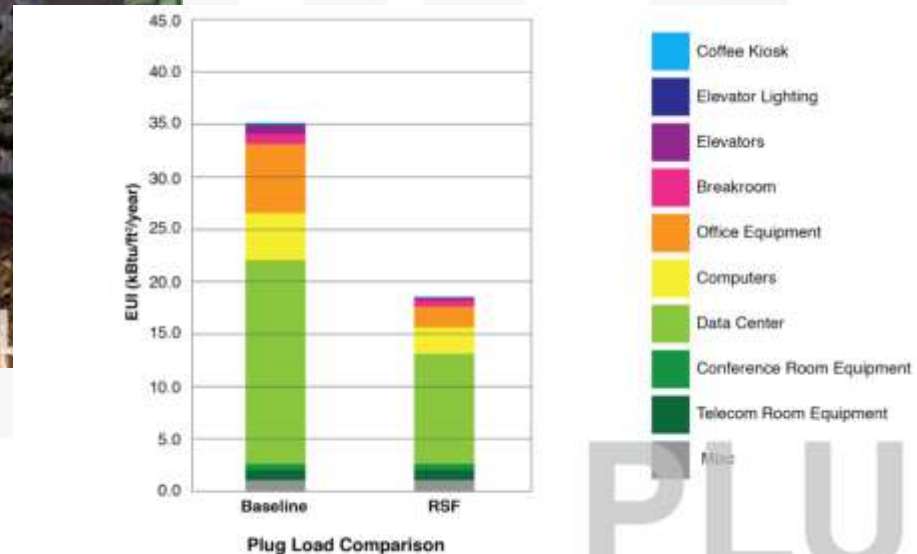
# APEC Program--Nearly (Net) Zero Energy Building

## NETWORK : APEC Economies Progress – Canada



# APEC Program--Nearly (Net) Zero Energy Building

## Pilot Buildings –USA- National Renewable Energy Laboratory





Vacuum Insulation Glazing



High Performance Window & Door System



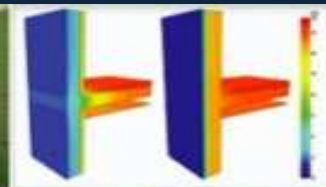
Vacuum Insulation Panel



External Insulation System



Heat Bridge Block System



Renewable Energy System



HAN Energy Management System



Zero Carbon Green Home





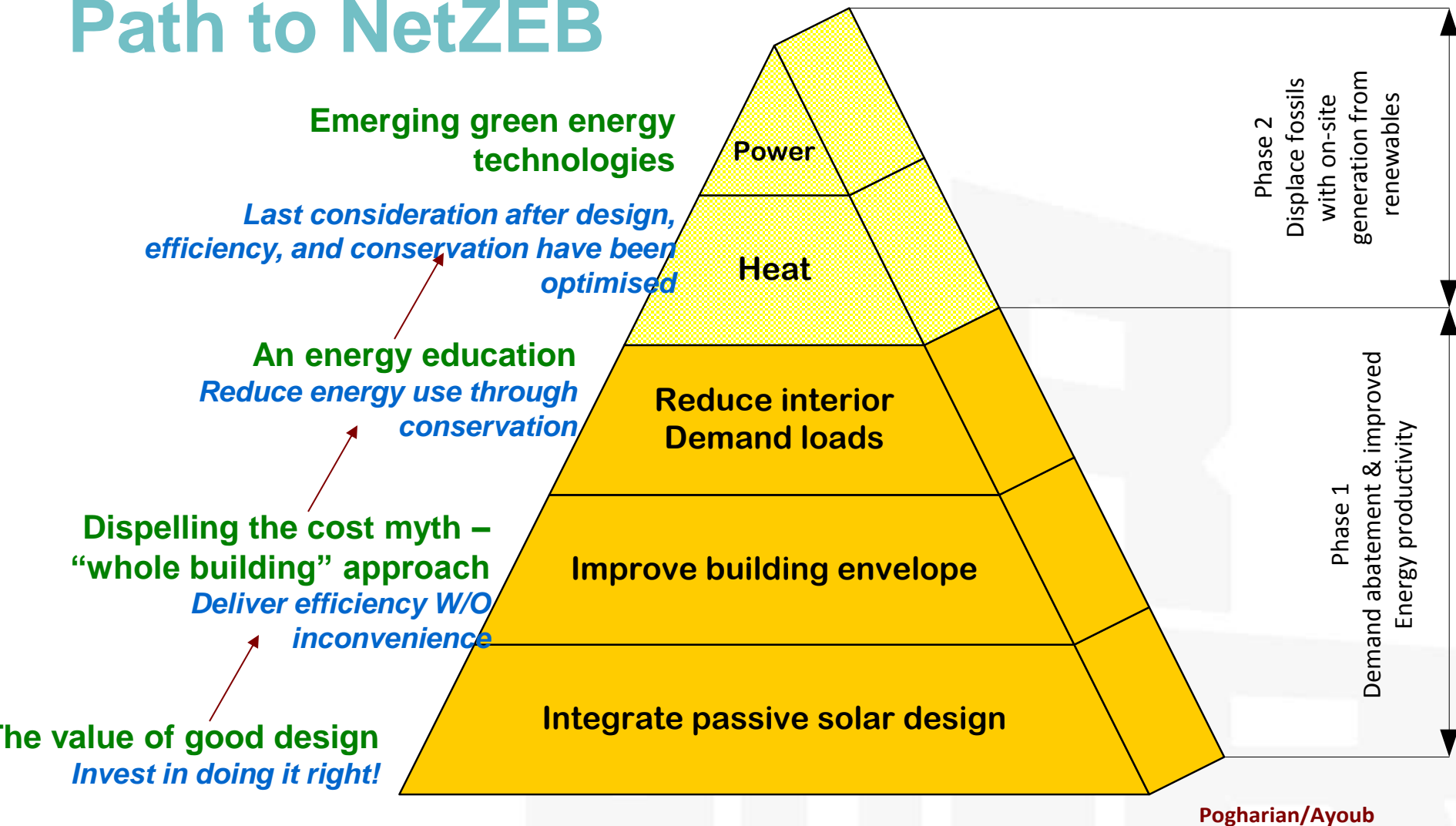
## Pilot Buildings – China –

### China Academy of Building Research Nearly Zero Energy Building



- No fossil fuel in winter
- 50% cooling energy reduction in summer
- 75% lighting reduction

# Path to NetZEB



## APEC Program--Nearly (Net) Zero Energy Building

### Draft Conclusion:

1. Some APEC economies had set the NZEB targets and long time goal, with the set up of national R&D&D team, several research programs are done successfully with concrete outcomes.
2. Technology roadmap are becoming clear, which including Performance Based Procurement, Predicting Energy Use, Passive Architecture and load reduction, Low energy active system, Integrated Renewable Energy, Zero Energy Operation.
3. Upgrading building energy codes and standards to achieve net zero is the most influence method, which needs to comply with the revision period of each economy.
4. More and more large nearly (net) zero energy buildings are demonstrated in research academies and national labs, more operation date will come in the future.

The best practices and monitoring results still needs to be studied in the future.

# APEC Program-- Nearly (Net) Zero Energy Building Future Plan

## (1) APEC-Net Zero Energy Building & Community Workshop.

- 22<sup>nd</sup> to 23<sup>rd</sup> Oct, 2014 in Beijing.
- 12 speakers from 5 economies.
- All EGEEC delegates are invited.

## (2) APEC-Nearly (Net) Zero Energy Report : November 2014.

- Canada, China, Japan, Korea, USA

## (3) Next Program Proposal Preparation

- Focus on the actual results collection and analysis of Pilot Projects
- Best Practices of NZEB in APEC regions

# Thank you

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