



香港大學

THE UNIVERSITY OF HONG KONG



CENTRAL POLICY UNIT
The Government of the Hong Kong
Special Administrative Region



PPR Funding Scheme Sharing Forum

A Possible Zero Carbon Building Policy for Hong Kong: Opportunities, Risks and Recommendations

於香港制訂實施零碳建築政策的機遇·風險和建議

Dr. Wei Pan

Associate Professor
Department of Civil Engineering
The University of Hong Kong

10 May 2017



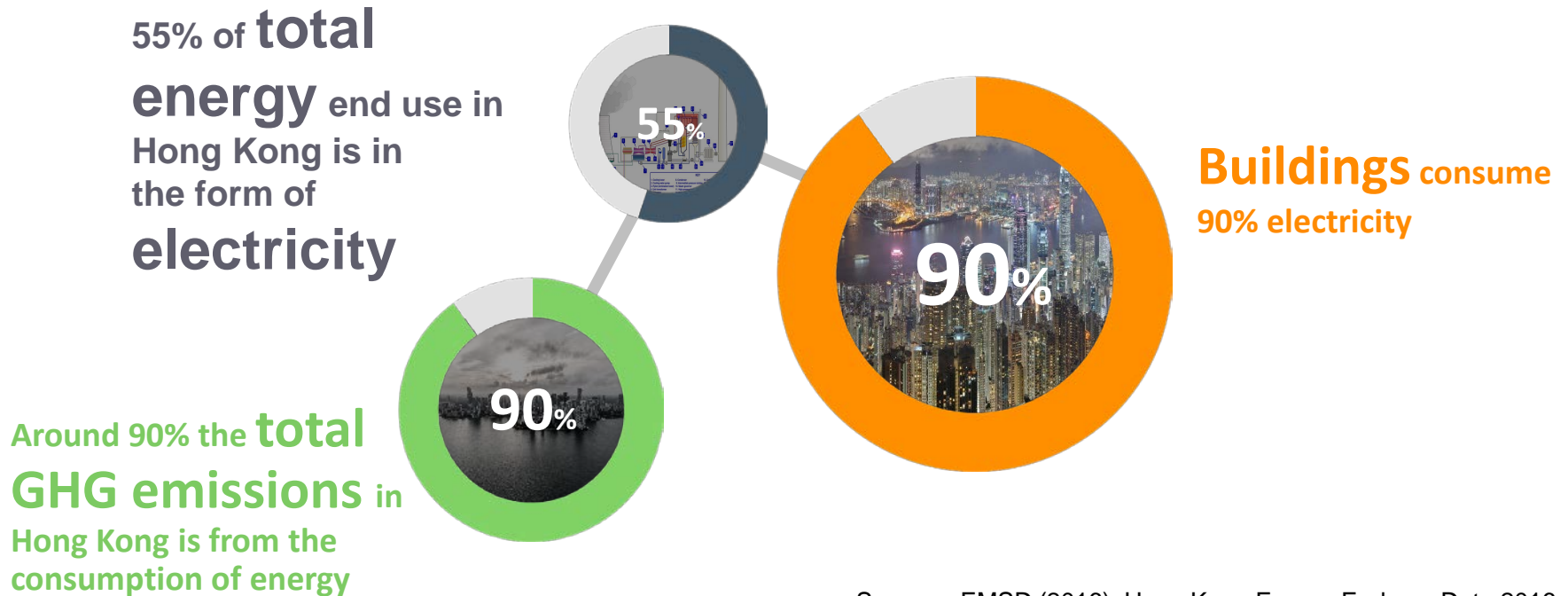
Contents

1. Introduction
2. Research Methodology
3. Results and Analysis
4. Discussion
5. Conclusions



Introduction

- The need to save energy and reduce carbon emissions in buildings is of great significance.



Source: EMSD (2016). Hong Kong Energy End-use Data 2016.



Paris Agreement

FCCC/CP/2015/L.9/Rev.1



Article 2

1. This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:
 - (a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;
 - (b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and **low greenhouse gas emissions development**, in a manner that does not threaten food production;
 - (c) Making finance flows consistent with a **pathway towards low greenhouse gas emissions and climate-resilient development**.



Paris Agreement

FCCC/CP/2015/L.9/Rev.1



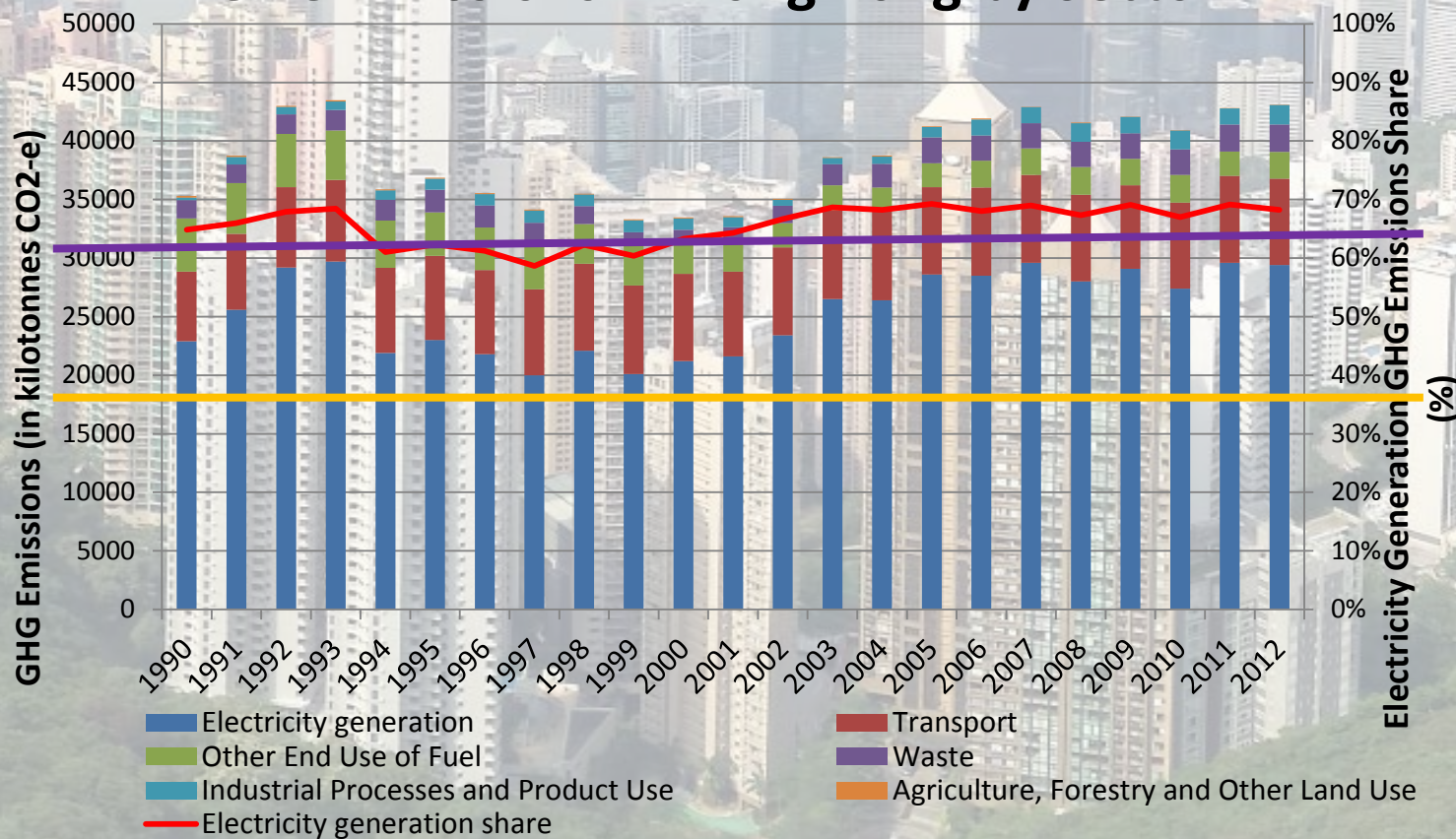
**175 parties signed on 22 April 2016
representing 49.67% of world's
emissions**

The Paris Agreement entered into force on 4 November 2016.

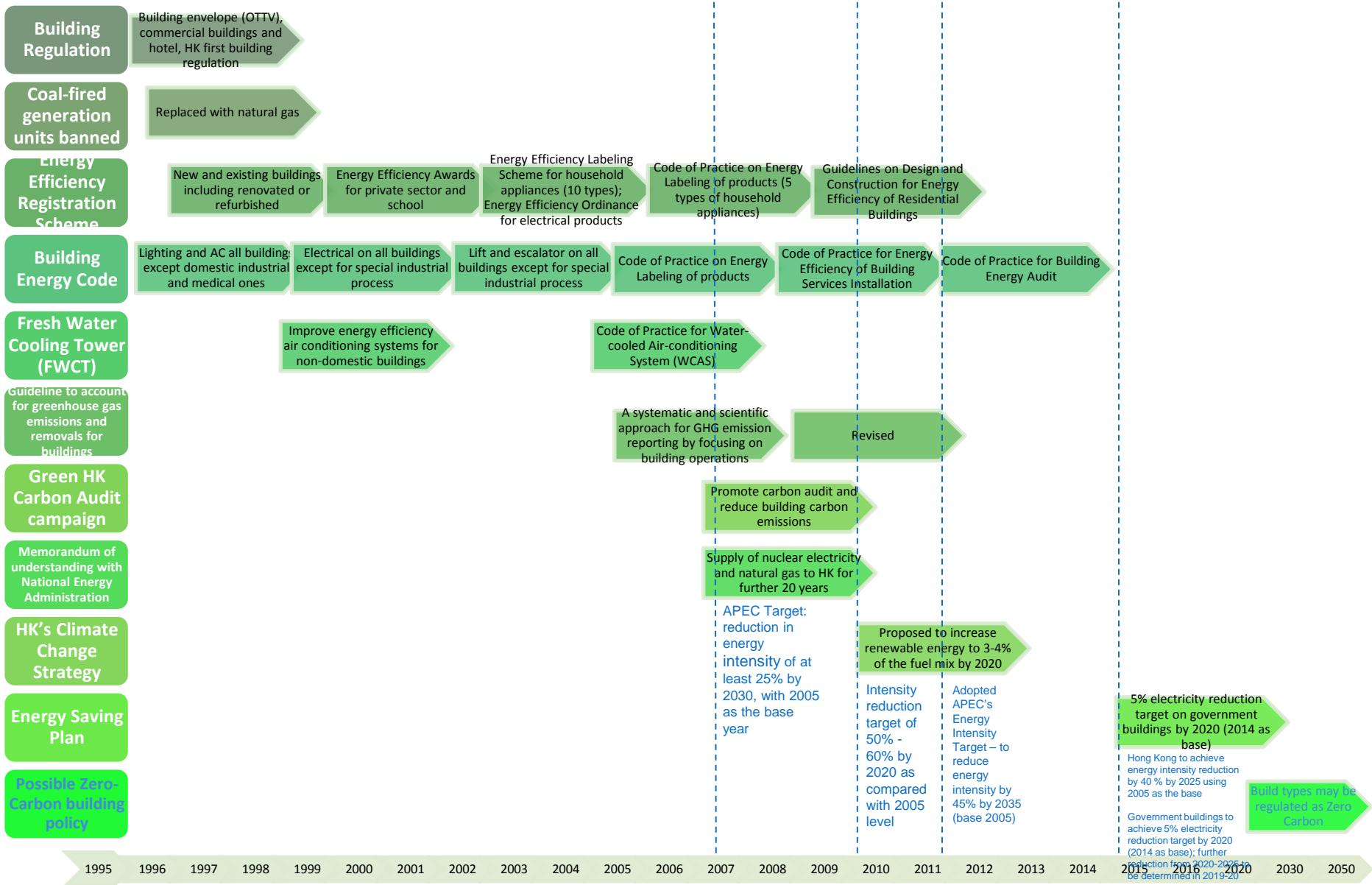
**As of April 2017, 195 parties have signed the
treaty, 144 of which have ratified it,
accounting for 55% of world's emissions**

High-rise, High-density, Hot-and-humid

GHG Emissions in Hong Kong by Sector



Building energy & carbon related codes, regulations and policies possible timeline to zero carbon



The Hong Kong Model

To Survive or To lead?



Introduction

Project aim

To inform the HKSAR Government on the formulation and implementation of a possible ZCB policy for Hong Kong.

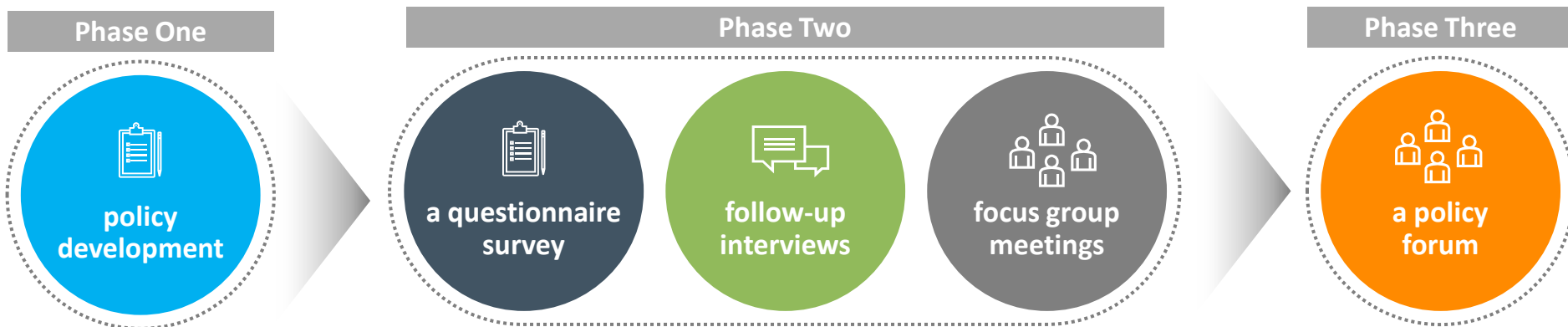
Project deliverables

- The proposal of a bespoke zero carbon building policy for Hong Kong based on the socio-technical systems framework;
- Identified opportunities and risks associated with the formulation and implementation of this policy;
- Recommendations for realising the identified opportunities and mitigating the identified risks for effective reductions of building energy consumption and carbon emissions in Hong Kong.



Research Methodology

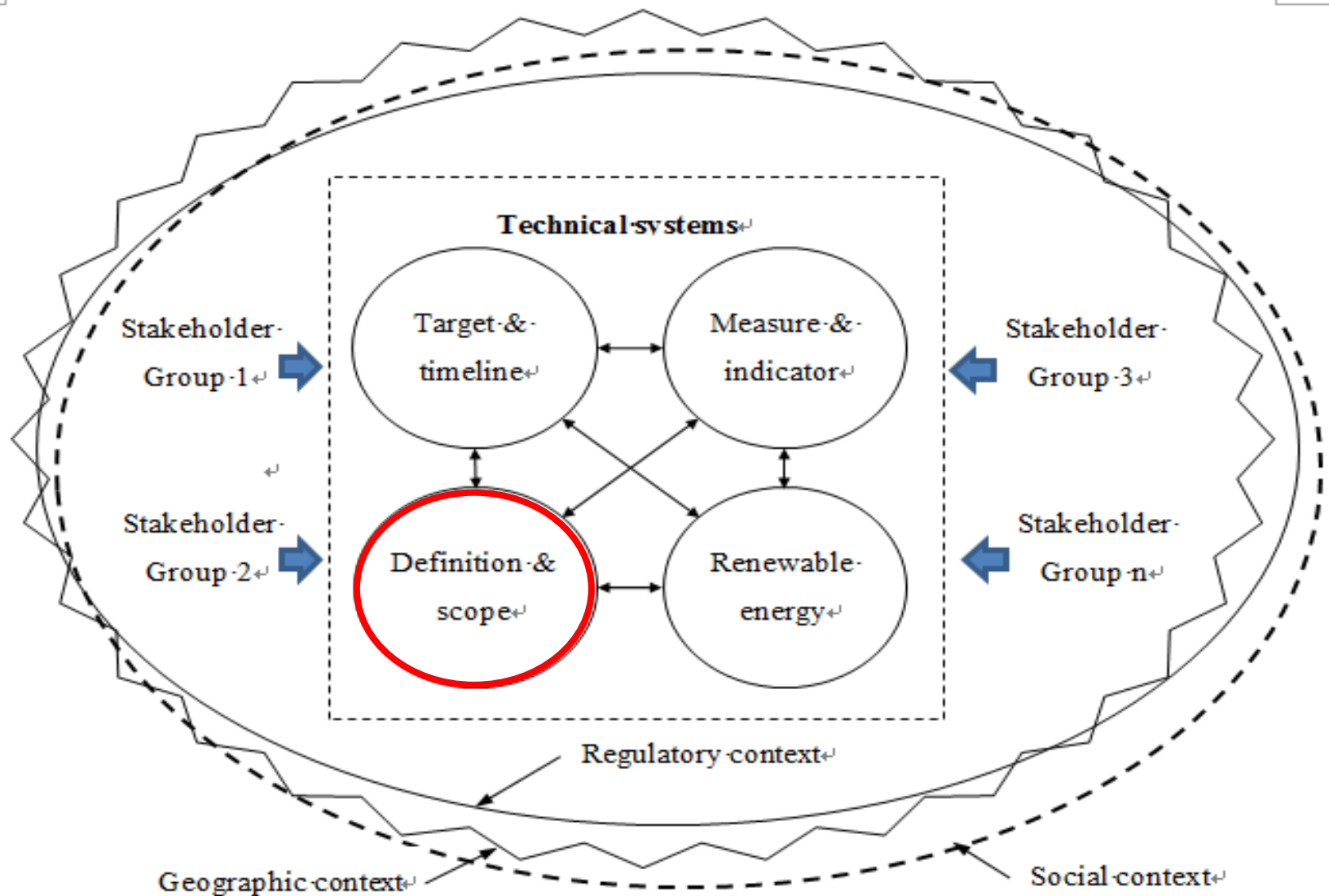
The research was conducted through the engagement with professionals and stakeholders in Hong Kong over a 15-month period.



Study Components and Number of Participants

Items	Questionnaire survey	Follow-up Interviews	Four Focus group meeting	Discussion forum
Number of participants	235	30	105	248

A Socio-Technical Systems Framework



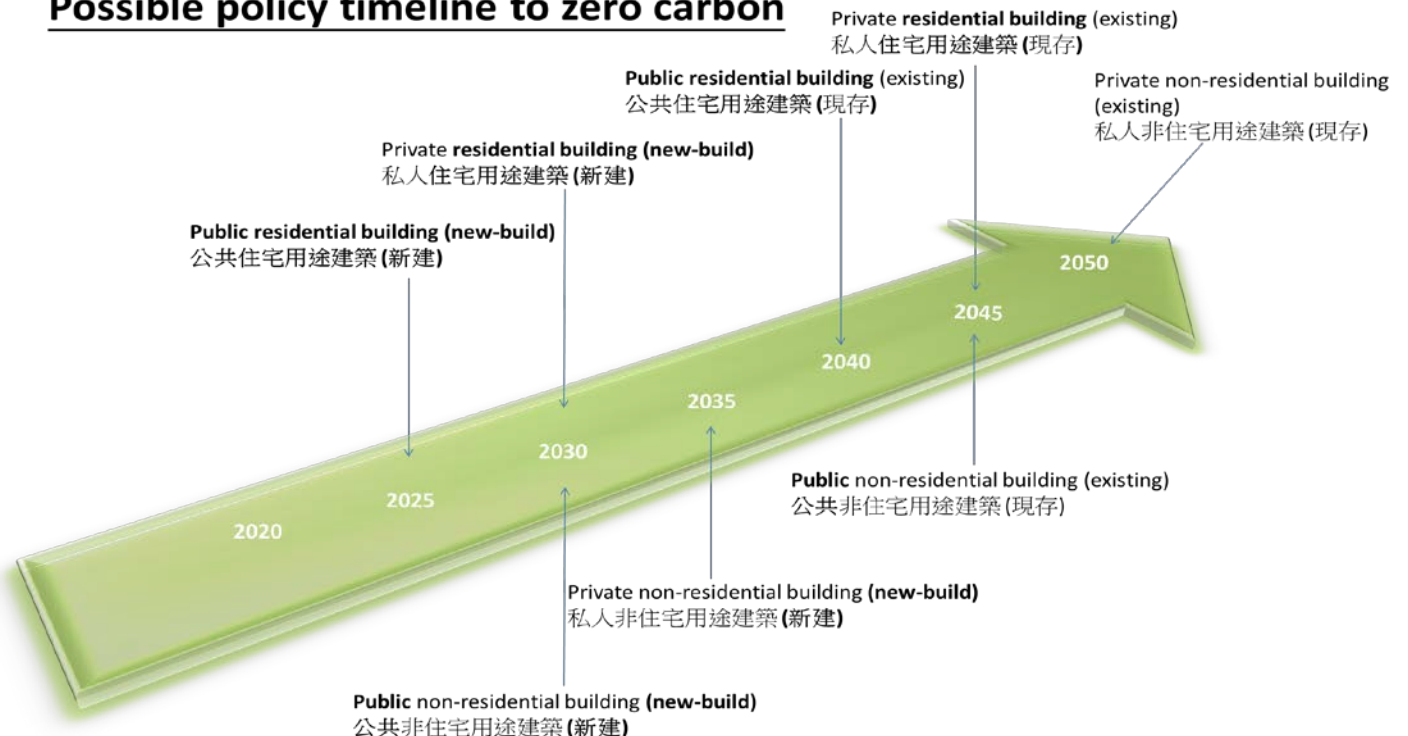
Results and Analysis — Policy Scenarios

Definition and Scope

The generic definition of a ZCB (or a LCB) is a building within its defined systems boundaries with net-zero (or very low) carbon emissions on an annual basis during the operational stage of the building.

Target and Timeline

Possible policy timeline to zero carbon



Results and Analysis — Policy Scenarios

Measures and indicators

carbon emission intensity (CEI): $\text{kgCO}_2\text{e/m}^2\text{/year}$
energy use intensity (EUI): $\text{kWh/m}^2\text{/year}$

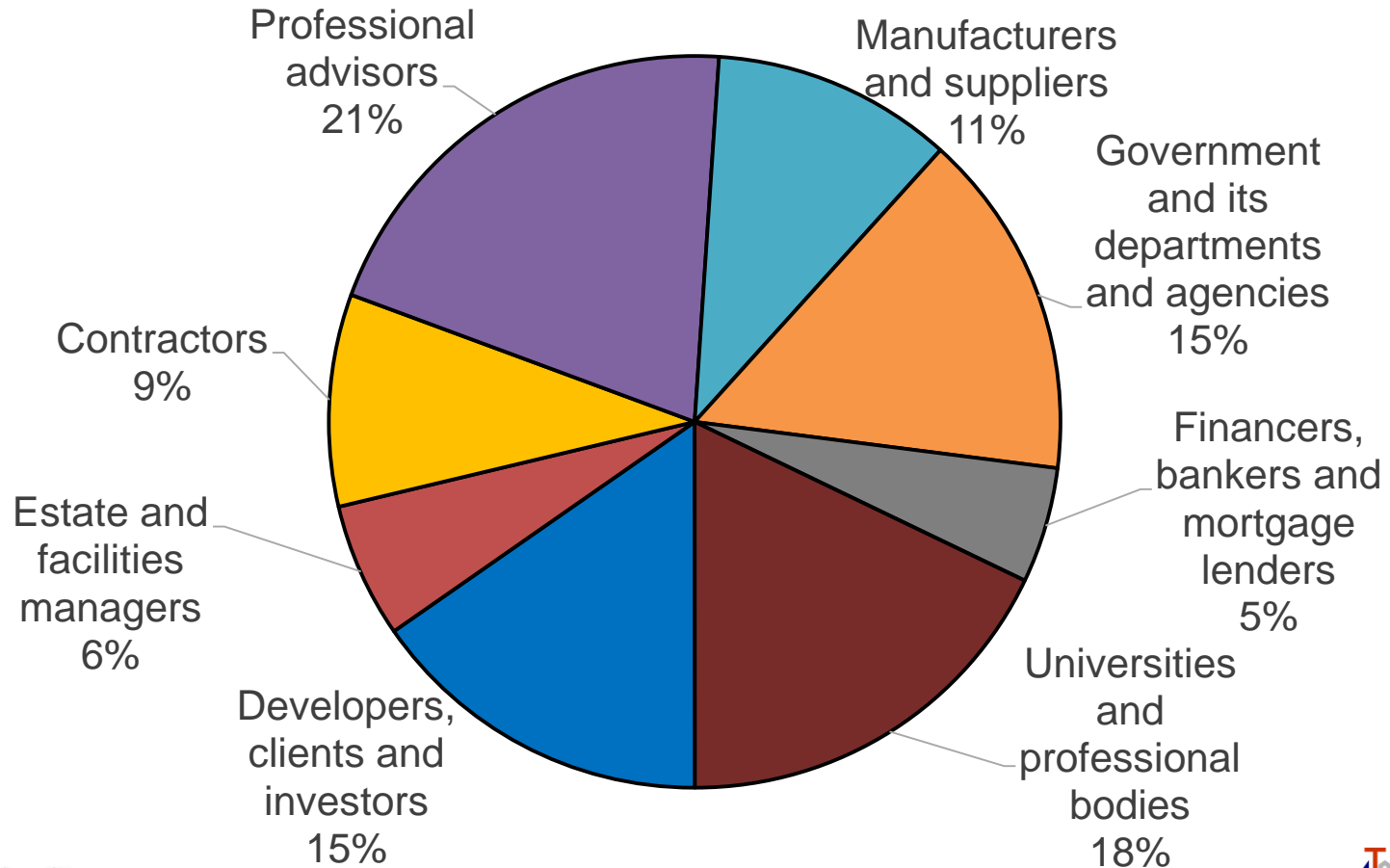
Use of Renewable Energy

on- or off-site and directly connected with the building
and/or
off-site and indirectly connected with the building



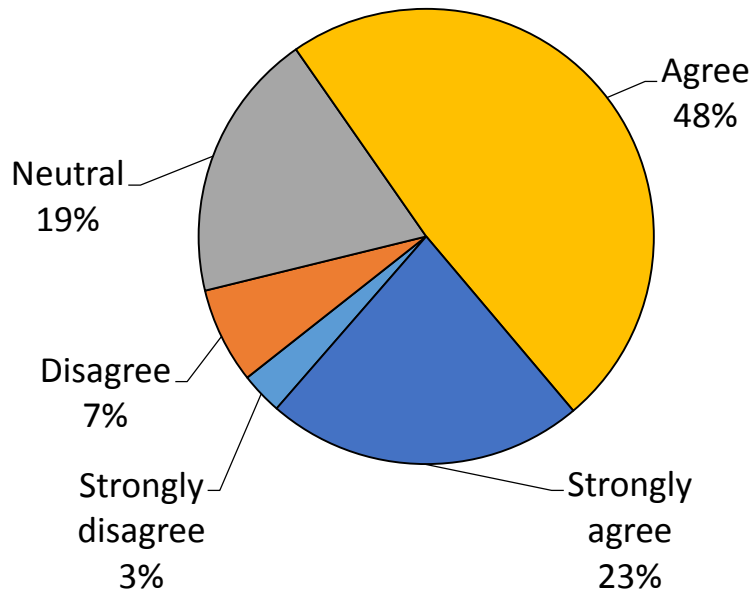
Results and Analysis

Participants (235/1000)

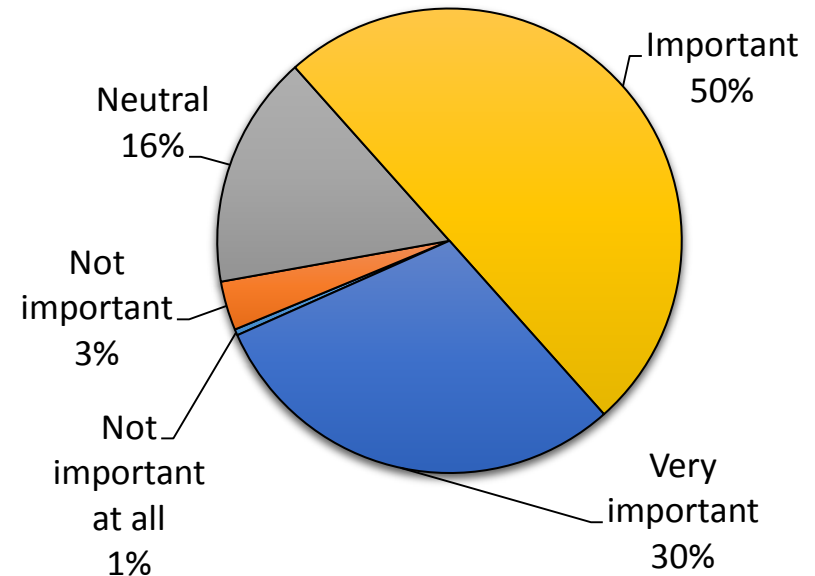


Results and Analysis — Perceptions

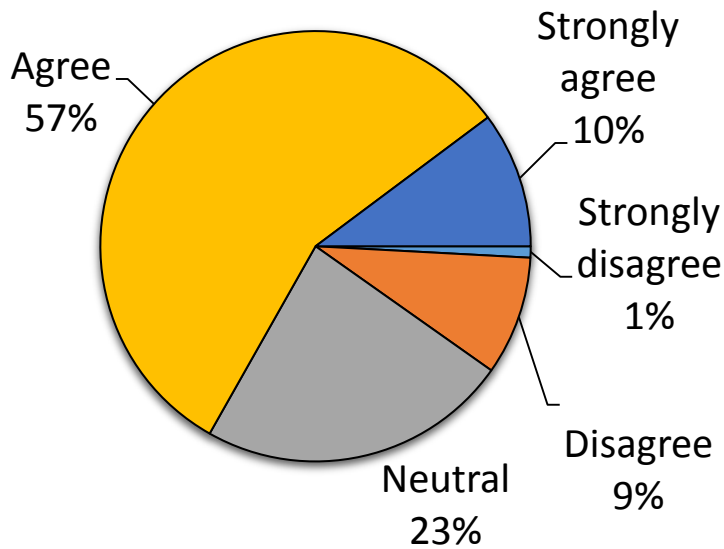
Q: How would you appraise the statement: “Hong Kong is lacking a strategic policy leading to zero carbon”? (n=235)



Q: How important do you view the need for a zero carbon building (ZCB) policy for Hong Kong? (n=235)

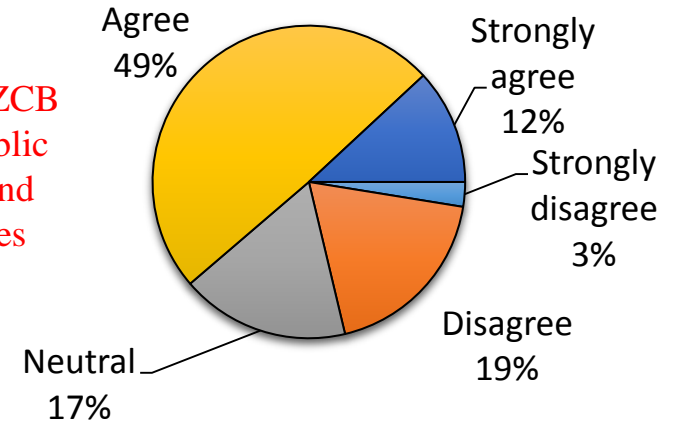


Results and Analysis — Perceptions

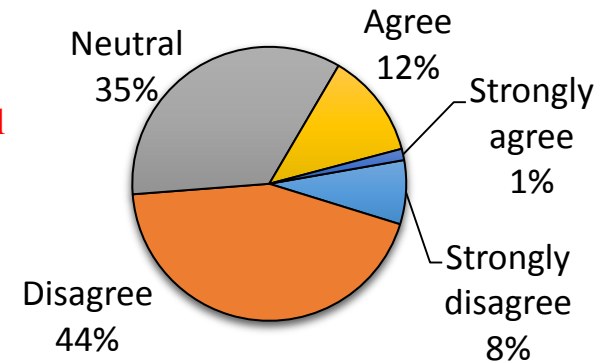


Appraisal of the proposed ZCB definition (n=235)

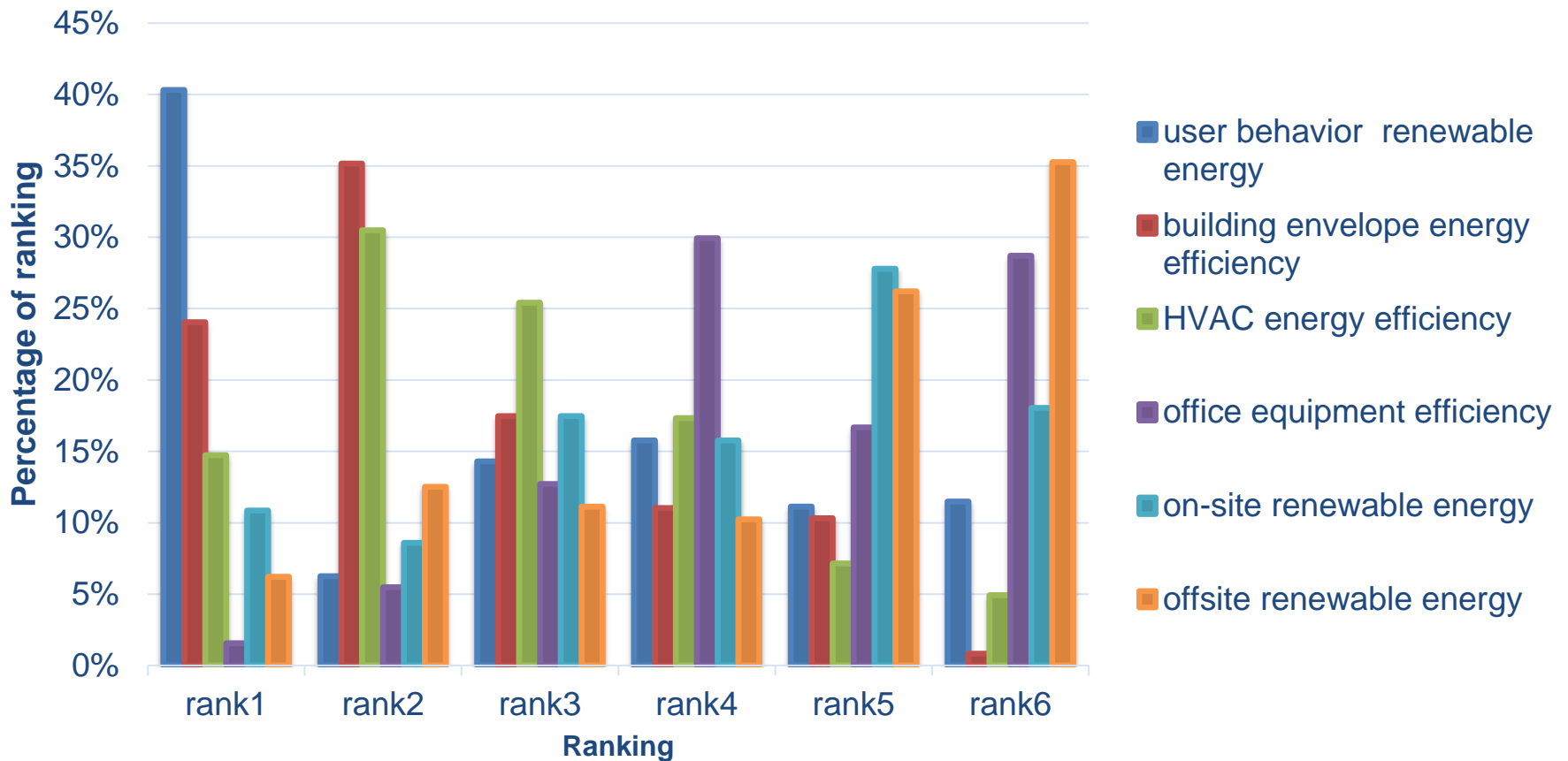
Appraisal of the ZCB policy target: public buildings first and then private ones (n=235)



Appraisal of the ZCB policy target: residential buildings first and then non-residential ones (n=225)



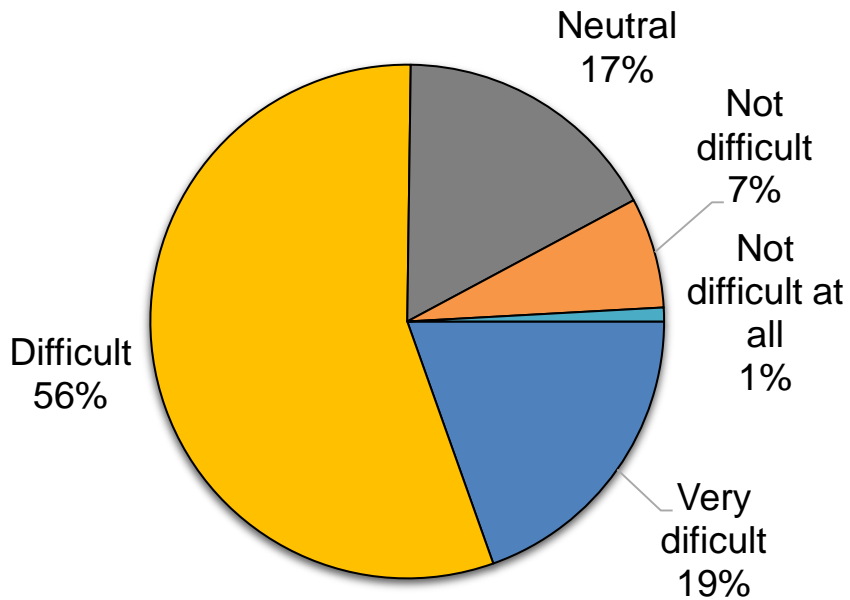
Q: How would you rank the following strategies for achieving net zero carbon in the ZCB policy for Hong Kong?



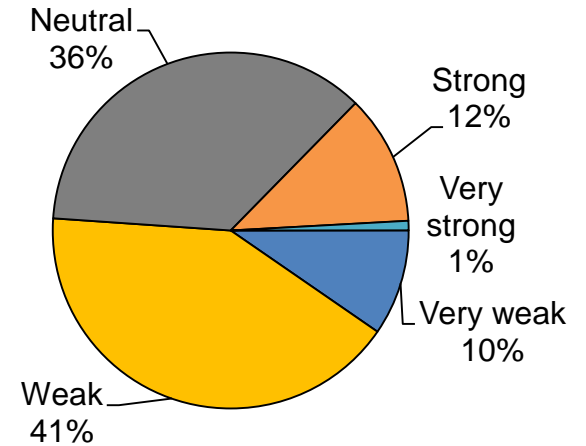
Some other proposed strategies:

- Carbon trading
- Demand-side control
- Incentives
- Construction and maintenance
- Smart metering & monitoring
- Legislation
- Zero carbon competition between landlord

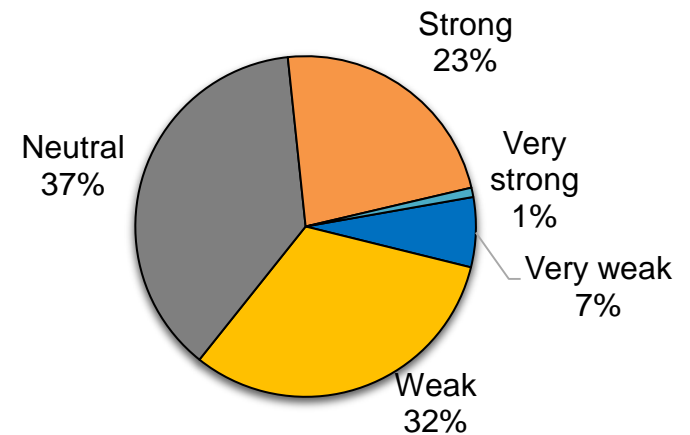
Q: How would you evaluate the difficulty with implementing the proposed ZCB policy in Hong Kong”?



Q: How would you describe the willingness of the building industry in Hong Kong to support the ZCB policy?

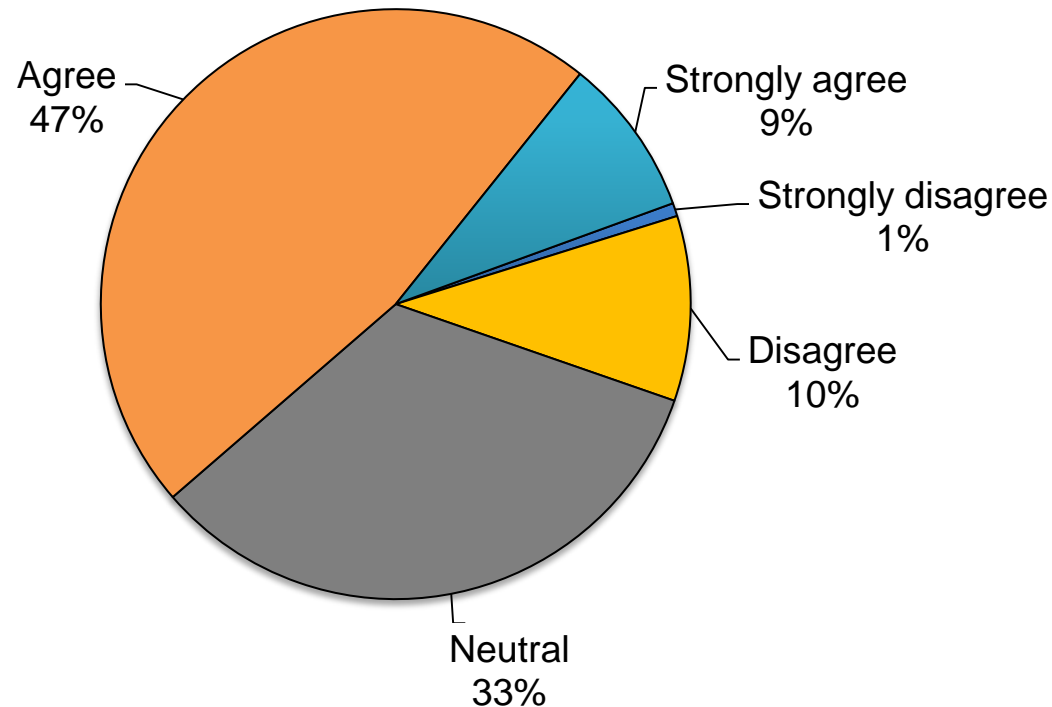


Q: How would you describe the willingness of the public in Hong Kong to support the ZCB policy?



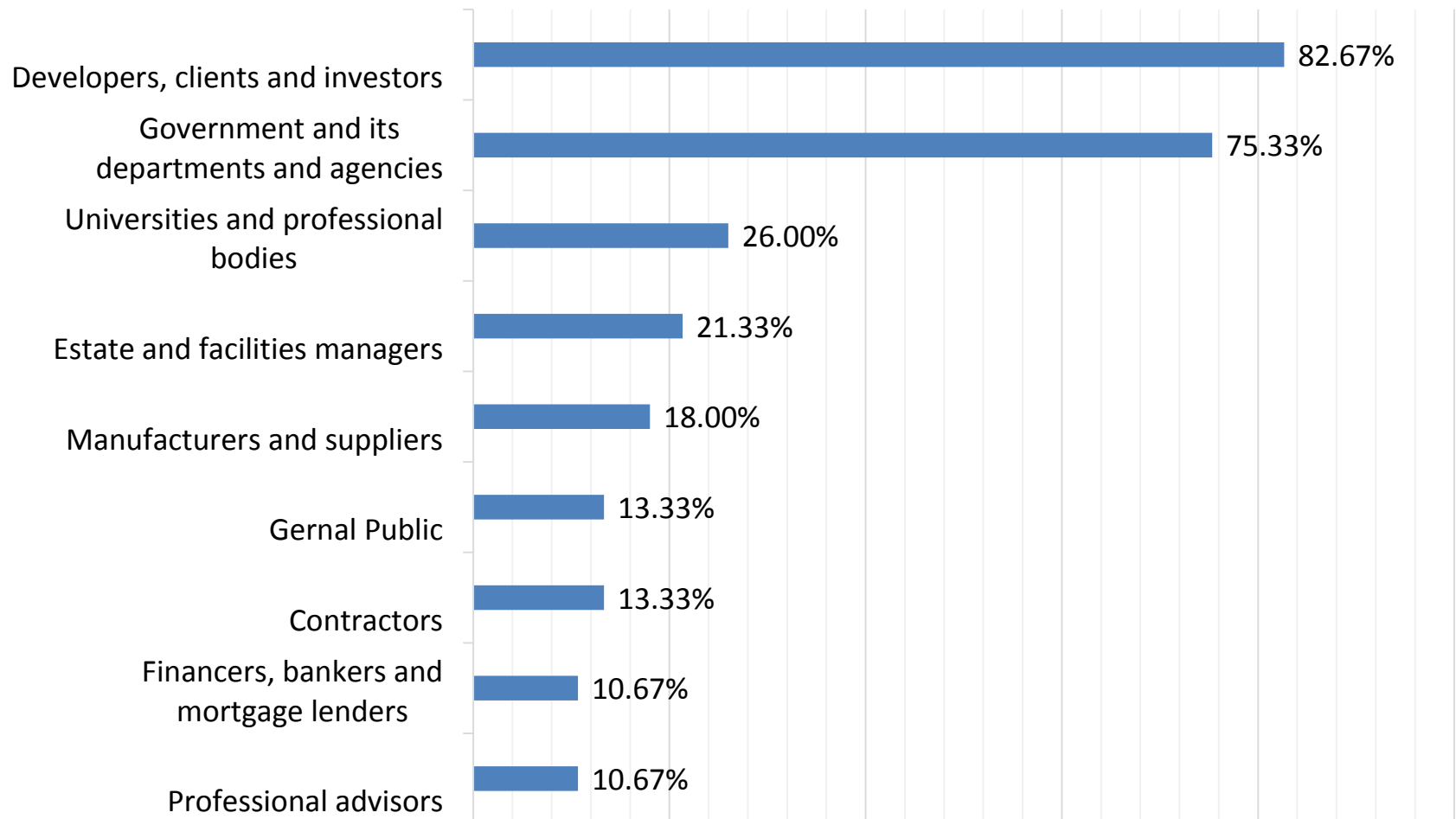
Results and Analysis — Opportunities vs. risks

“The opportunities from formulating and implementing the ZCB policy outperform the risks”



Results and Analysis — Recommendations

Q: Who would you think are the key stakeholders to mitigate the possible risks?



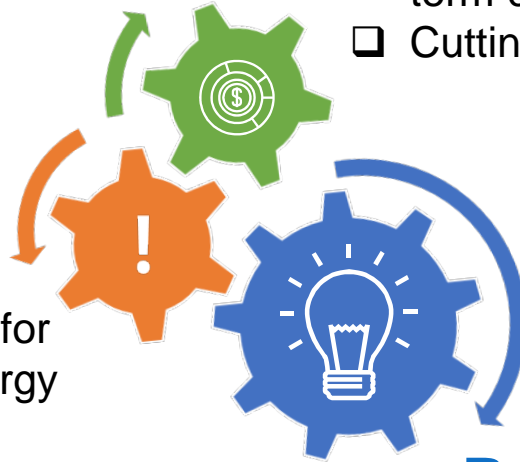
Results and Analysis — Opportunities, risks and recommendations

Opportunities

- ❑ Raising public awareness of sustainable living
- ❑ Promoting strategic urban planning for long-term city development
- ❑ Cutting down building energy consumption

Risks

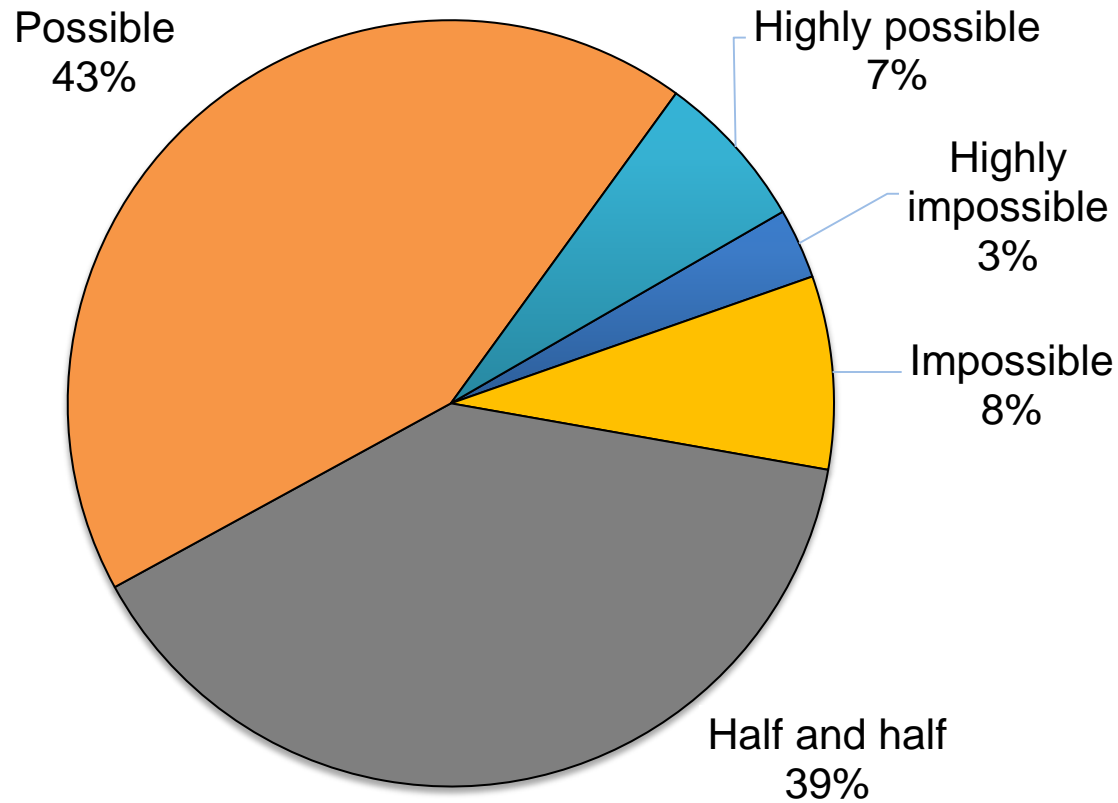
- ❑ Geographical difficulties for domestic renewable energy generation
- ❑ Heavy reliance on fossil fuels
- ❑ Resistance of practitioners to support the policy due to uncertain benefits



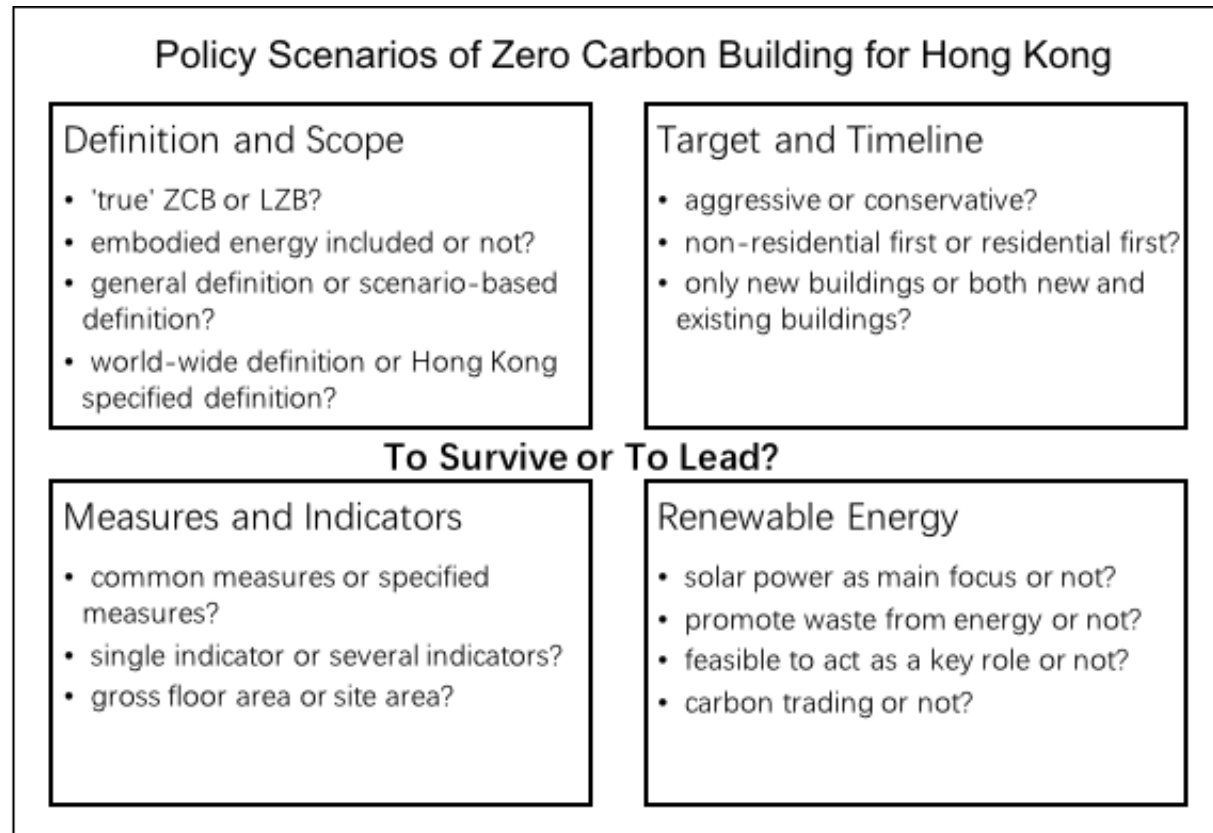
Recommendations

- ❑ Encouraging energy and carbon reduction through urban planning
- ❑ Demonstrating life cycle economies and cost benefits of ZCB
- ❑ Setting zero carbon/energy targets in public project procurement

Q:How would you rate the overall feasibility to formulate and implement the proposed ZCB policy in Hong Kong?



Discussion



developers,
clients and
investors →

estate and
facilities
managers →

contractors →

professional
advisors →

← manufacturers
and suppliers

← government and
its departments
and agencies

← financiers,
bankers and
mortgage
lenders

← universities and
professional
bodies



Conclusions

- ❑ Possible ZCB Policy for Hong Kong is proposed as a **socio-technical system**.
- ❑ A L/ZCB policy is widely recognized as a **necessity** for Hong Kong.
- ❑ Debates exist on details of policy **scenarios** of ZCB for Hong Kong.
- ❑ Strengthening the **partnership** between different stakeholders is crucial.





香港大學

THE UNIVERSITY OF HONG KONG



CENTRAL POLICY UNIT
The Government of the Hong Kong
Special Administrative Region



PPR Funding Scheme Sharing Forum

Thank you !

Dr. Wei Pan

wpan@hku.hk

2859 2671

Associate Professor

The University of Hong Kong

10 May 2017