

**Supplementary Material:**  
**Supportive governance for city-scale low carbon building**  
**retrofits: A case study from Shanghai**

**S1. Location of energy efficiency retrofitting cases in Changning, Shanghai**

The locations of the retrofit projects were pinned. There were 31 retrofit projects in Changning and 13 retrofit projects in other districts in Shanghai.

The map of Shanghai city refers to Wikipedia ([https://en.wikipedia.org/wiki/Changning\\_District](https://en.wikipedia.org/wiki/Changning_District)). The map of Changning district refers to Shanghai Statistics Bureau (<http://tjj.sh.gov.cn/xzqhmap/index.html>).

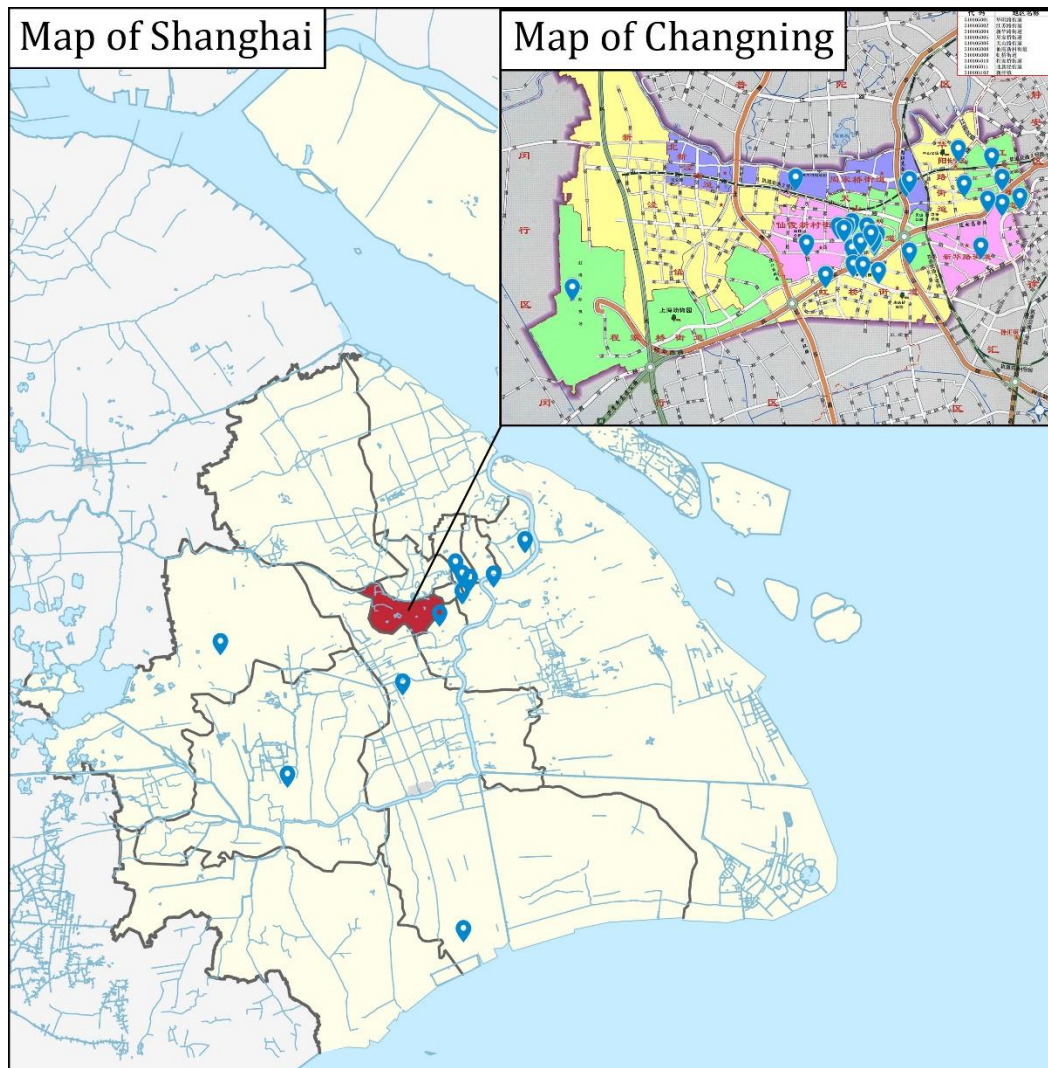


Fig. S1 Location of retrofit projects in CHangning, Shanghai

## S2. Revised subsidy of the sub-projects

World Bank (2019) only includes subsidies from Changning District. Some of the sub-projects were supported by both Shanghai and Changning subsidies, thus we aggregated the subsidy from both sources. The raw data in Table S2, except the Shanghai Subsidy, came from World Bank (2019). The Shanghai Subsidy was calculated based on the information disclosure from the Shanghai State Office Building and Large Public Building Energy Monitoring Centre (available at: <http://www.shzjn.org/#/remouldshowcases>) where the names of the sub-projects that received the Shanghai Subsidy were listed. According to the Special Subsidy for Building Energy Efficiency Projects in Shanghai (Number 311), we calculated the Shanghai Subsidy by multiplying the floor area and the standard subsidy rate (CNY 40 per square metre) with a constraint that the amount of subsidy does not exceed half of the total investment. Then monetary value in CNY is changed into USD with an exchange rate of 6.5795 CNY/USD.

Table S3 Revised subsidy of the sub-projects

Sub-project name	No.	District	Building type	Activity type	Floor area (m <sup>2</sup> )	Investment (\$million)	Changning Subsidy (\$million)	Shanghai Subsidy (\$million)
Shanghai Shen Ya Financial Building	1	Changning	Office	EE retrofit	23,697	0.67	0.16	0.14
Millennium Hongqiao Hotel Shanghai	2	Changning	Hotel	EE retrofit	44,798	1.01	0.25	0.27
XingHua Hotel	3	Changning	Hotel	EE retrofit	20,700	0.47	0.14	
Shanghai Sky Mall	4	Minhang	Other	EE retrofit	287,124	3.60		1.75
Shanghai Lingang Industry Area	5	New Pudong	Industrial	DG	40,000	3.74		

Sub-project name	No.	District	Building type	Activity type	Floor area (m <sup>2</sup> )	Investment (\$million)	Changning Subsidy (\$million)	Shanghai Subsidy (\$million)
Shanghai Qingpu Industrial Park	6	Qingpu	Industrial	DG	462,000	28.88		
Disneyland International Tourism and Resorts Zone Energy Station	7	New Pudong	Other	DG	19,748	88.15		
Hongqiao Airport Terminal 1	8	Changning	Other	EE retrofit	126,000	19.85		
Shanghai Tower Energy Station	9	New Pudong	Other	DG	576,000	5.60		
Huayu Building	10	Baoshan	Office	EE new	102,000	6.79		
Nan Zheng Building	11	Huangpu	Office	EE retrofit	110,715	1.80		0.67
Golden Bell Plaza	12	Huangpu	Office	EE retrofit	4,500	0.17		
340 Wujiaochang Town	13	Huangpu	Office	EE new	89,109	2.93		
Network Audio-Visual Industry Base	14	Minhang	Industrial	EE new	223,126	10.13		

Sub-project name	No.	District	Building type	Activity type	Floor area (m <sup>2</sup> )	Investment (\$million)	Changning Subsidy (\$million)	Shanghai Subsidy (\$million)
Shanghai International Medical Central - Technology Center	15	Minhang	School & Hospital	EE new	89,137	2.65		
Huada Semiconductors Headquarters	16	Minhang	Office	EE new	91,394	6.95		
Lai Bao Plaza	17	Minhang	Other	EE new	55,284	0.48		
Hongqiao Business District North Zone No. 8	18	Minhang	Office	EE new	74,508	5.43		
Xinjiangwancheng F3 Area Office Building	19	Yangpu	Office	EE new	276,366	5.94		
Qiantan Plot 24-01 30-01	20	New Pudong	Other	EE new	126,865	24.96		
Hongqiao Silver City Building	21	Changning	Office	EE retrofit	30,840	1.09	0.17	
Shanghai Yitai Building	22	Changning	Office	EE retrofit	31,803	1.19	0.30	
Longemont Shanghai Hotel	23	Changning	Hotel	EE retrofit	110,600	3.41	0.53	0.67

Sub-project name	No.	District	Building type	Activity type	Floor area (m <sup>2</sup> )	Investment (\$million)	Changning Subsidy (\$million)	Shanghai Subsidy (\$million)
Far East International Plaza	24	Changning	Office	EE retrofit	103,355	1.64	0.33	
Songjiang District Central Hospital	25	Songjiang	School & Hospital	EE retrofit	50,587	0.65		0.31
HSBC Building, the Bund	26	Huangpu	Office	EE retrofit	28,000	0.76		
Shanghai Municipal Building	27	Yangpu	Office	EE retrofit	73,766	1.13		0.45
Pacific Hotel	28	Huangpu	Hotel	EE retrofit	17,677	0.47		0.11
Ruijin Hospital, Outpatient Building	29	Huangpu	School & Hospital	EE retrofit	73,271	1.23		0.45
Huamin Empire Plaza	30	Changning	Office	EE retrofit	144,241	1.79	0.38	
Youth Center	31	Jing'an	Other	EE retrofit	60,000	0.63		
Chemical Park Lighting Renovation	32	Fengxian	Industrial	EE retrofit	20,000	0.36		

Sub-project name	No.	District	Building type	Activity type	Floor area (m <sup>2</sup> )	Investment (\$million)	Changning Subsidy (\$million)	Shanghai Subsidy (\$million)
Jianguo Hotel	33	Xuhui	Hotel	EE retrofit	43,000	1.53		
Zhanzhuang Business District 16A01A North	34	Minhang	Other	EE new	80,366	7.59		
Rehabilitation Institute No. 2	35	Yangpu	School & Hospital	EE retrofit	27,682	0.44		
Crowne Plaza Shanghai Xiayang Lake	36	Qingpu	Hotel	EE retrofit	45,000	0.63		
Zhanzhuang Business District Lot 19A-03A	37	Minhang	Other	EE new	62,728	3.73		
Shanghai Yuchu Industrial Co., Ltd.	38	Jinshan	Industrial	Combined	63,000	0.45		
Shanghai Luodian Middle School	39	Baoshan	School & Hospital	Combined	6,300	0.58		
Junhua Financial Plaza	40	New Pudong	Other	EE new	105,798	18.83		
Changfeng Sector No. 10 South Block Project	41	Putuo	Office	EE new	356,949	46.36		

Sub-project name	No.	District	Building type	Activity type	Floor area (m <sup>2</sup> )	Investment (\$million)	Changning Subsidy (\$million)	Shanghai Subsidy (\$million)
Zhaofeng World Trade Center	42	Changning	Office	EE retrofit	48,838	0.96	0.08	0.30
Kaqi Tower	43	Changning	Office	EE retrofit	24,911	0.31	0.08	
Oasis Tower	44	Changning	Hotel	EE retrofit	22,000	0.71	0.05	
Changfeng Tower	45	Changning	Office	EE retrofit	53,990	0.70	0.26	0.33
Shanghai Mart	46	Changning	Other	EE retrofit	282,140	2.88	0.38	
Renaissance Shanghai Yangtze Hotel	47	Changning	Hotel	EE retrofit	60,605	2.14	0.38	0.37
Changning Police Station	48	Changning	Office	EE retrofit	25,659	0.54	0.36	
Gubei International Fortune Center Phase II	49	Changning	Office	EE retrofit	101,800	0.73	0.11	0.37
East Century Building	50	Changning	Office	EE retrofit	26,884	0.78	0.16	

Sub-project name	No.	District	Building type	Activity type	Floor area (m <sup>2</sup> )	Investment (\$million)	Changning Subsidy (\$million)	Shanghai Subsidy (\$million)
Hongqiao Jin Jiang Hotel Shanghai	51	Changning	Hotel	EE retrofit	68,133	1.76	0.38	
Hongqiao State Guest Hotel	52	Changning	Hotel	EE retrofit	65,930	1.76	0.38	
Shanghai International Trade Center	53	Changning	Office	EE retrofit	92,518	1.73	0.36	
Sheng Gao International Building	54	Changning	Office	EE retrofit	41,759	0.67	0.11	
Wenguang Tower	55	Changning	Office	EE retrofit	42,229	0.81	0.21	
New Hongqiao Tower	56	Changning	Office	EE retrofit	27,119	0.48	0.11	
Radisson Blu Hotel Shanghai	57	Changning	Hotel	EE retrofit	59,643	1.43	0.36	
Mercure Shanghai Royalton	58	Changning	Hotel	EE retrofit	22,779	0.37	0.09	
Maxdo Centre	59	Changning	Office	EE retrofit	117,561	0.86	0.22	



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Xiada Tower	60	Changning	Office	EE retrofit	34,267	0.88	0.22	
Changning Library	61	Changning	Office	EE retrofit	16,932	0.46	0.27	
District Government Building	62	Changning	Office	EE retrofit	49,118	0.66	0.66	
Gubei Tower Phase 1	63	Changning	Office	EE retrofit	38,881	0.49	0.05	
Minghu Research Center Building D	64	Changning	Office	EE new	25,903	0.55	0.46	
Minghu Research Center Building ABC	65	Changning	Office	EE new	108,445	2.08	0.46	
Qianyuan Science and Technology Park	66	Changning	Office	EE new	32,507	0.68	0.46	
Hongqiao State Guest Hotel Building 9	67	Changning	Hotel	Net-zero	3,064	1.12	0.51	

Reference:

World Bank, 2019. China - Green Energy for Low-carbon City in Shanghai Project. Available at: <http://documents.worldbank.org/curated/en/998261563296152552/China-Green-Energy-for-Low-carbon-City-in-Shanghai-Project>.