CREIA

中外对话
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Green Power Purchasing Intention of Chinese Consumers

August 2016


Unlike conventional
power, green power
produces little or zero
harmful emissions.

INTRODUCTION

In recent years, China has been faced with increasingly serious environmental pollution, and in particular, issues arising from air pollution. Data showed that of the ten most polluted cities in the world, five were in China. In 2015, up to 265 (78.4%) of the 338 prefecture-level cities in China had air quality that breached standards.

Thermal power remains the largest source of power supply in China, and it is one major cause of air pollution. According to China's 2016 Power Industry Annual Development Report released by the China Electricity Council, in 2015 China generated 5,739.9 billion kWh of electric power, of which 73.7% was thermal power. A large proportion of thermal power plants are coal-fired.

According to statistics from the China National Coal Association, China's power sector consumed 1.939 billion tonnes of coal in 2015, accounting for 49% of the total coal consumed nationally. A joint study conducted by Tsinghua University and the Health Effects Institute revealed that about 40% of PM 2.5 comes from coal. Among all sources of air pollution, coal burning poses the most risk to human health. The American Cancer Society's studies indicate that the risk of developing lung cancer is 10% to 15% higher for residents in highly polluted areas than those living in clean cities. About 70% of people in China live in areas with an annual PM 2.5 concentration rate of higher than 35 $\mu g/m^3$.

In this report, *green power* refers to electricity generated from non-hydro renewable energy, including wind power, solar power and biomass power, among others. Unlike conventional power, green power produces little or zero harmful emissions. There has been a global consensus to boost renewable energy sources and use them to replace thermal power.

Despite China having more installed wind and solar capacity than any other country, green power (non-hydro renewable energy) generation accounts for less than 5% of its total power consumption. China's renewable energy sector struggles

to get hold of its share of small-scale government subsidies. In addition, wind and solar remains seriously curtailed within China; the renewable power capacity has not been fully tapped. In the first half of 2016, 32.2 billion kWh, accounting for 21% of wind power, was wasted.

China's electric power market consists of power generators, power distribution companies, and users. Power generators use a range of equipment to produce electricity, grid companies distribute electricity to users, and consumers (industrial and business users, and households) use electricity according to their own needs. Chinese consumers, however, are not currently given the option to choose the source of their power supply.

This research is commissioned by the Chinese Renewable Energy Industries Association (CREIA) and conducted by IPSOS. This report seeks to answer:

- ***How aware of environmental pollution is the public?***
- ***How aware and inclined are they to purchase green power?***

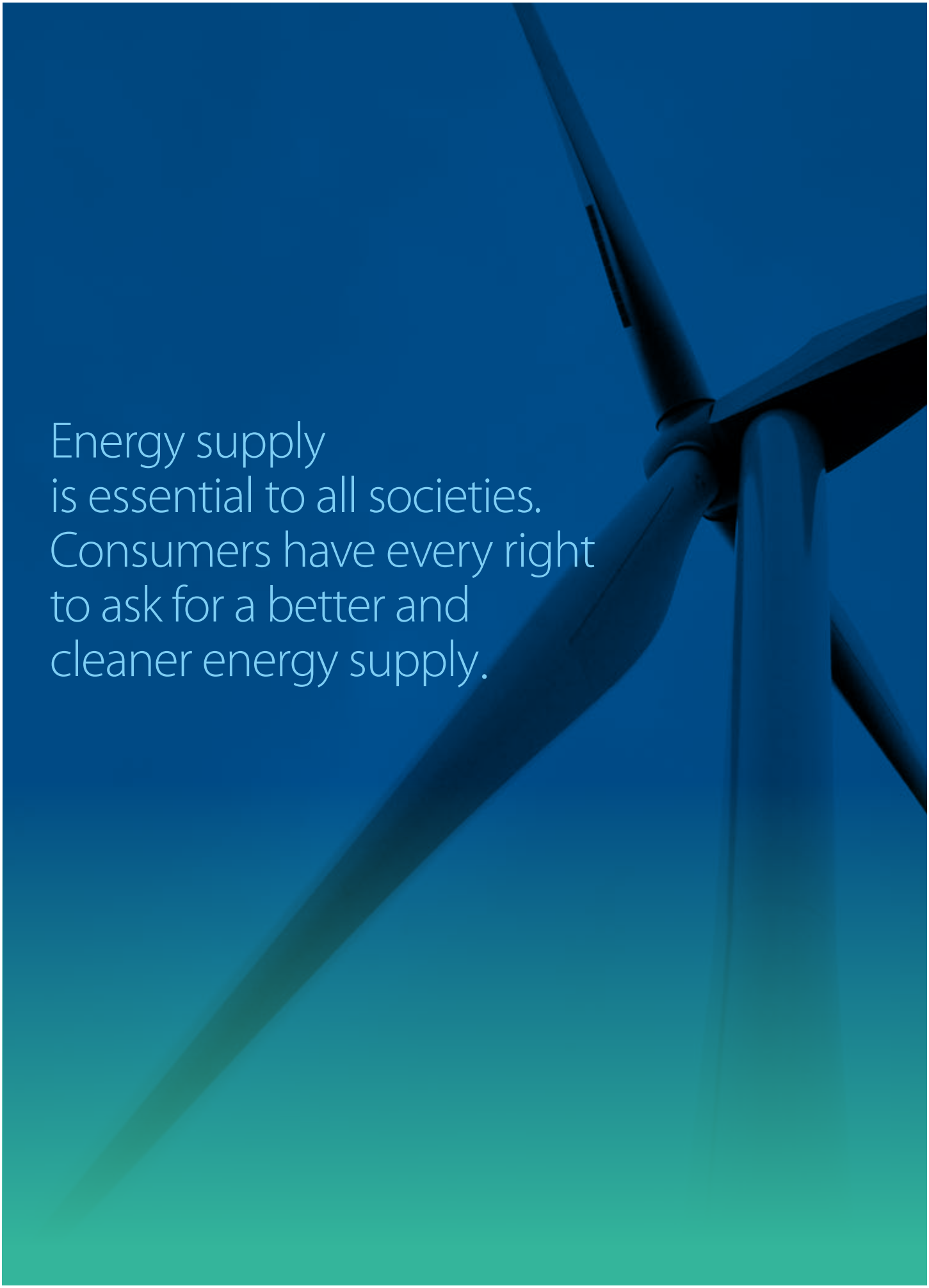
MAJOR FINDINGS

The public is concerned about environmental pollution, and in particular, air pollution.

- Over 95% of the respondents were aware of environmental pollution and nearly half were very concerned about this issue.
- For half of the respondents, air pollution was their biggest worry, followed by water pollution.
- The respondents believed that thermal power was the major cause of air pollution.

The public is very aware of green power and have a strong willingness to buy it.

- More than 80% of the respondents were aware of green power and thought it could reduce air pollution to some extent.
- 87.9% of the respondents said they would like to know the composition of their power supply.
- The majority of respondents (97.6%) expressed willingness to buy green power, and of these 40% said they would buy it, with those from Beijing indicating the highest intention to purchase.
- Of those willing to buy green power, most (over 90%) would be willing to pay more.


Energy supply
is essential to all societies.
Consumers have every right
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POLICY RECOMMENDATION

Energy supply is essential to all societies. Consumers have every right to ask for a better and cleaner energy supply.

This research shows that many urban residents are fully aware that green power can reduce air pollution, and are even willing to pay more for it. However, currently they do not have the option to purchase green power. Therefore, we suggest power companies should indicate the sources of consumers' power supply on their bills (e.g. thermal power, hydro power, renewable power and nuclear power), provide the option for households to buy green power, and allow consumers independent choice over their power supply sources.

How can Chinese households gain access to green power in the future?

(1) Purchase a green power certificate: The National Energy Administration will issue green power certificates for renewable electricity. It will be mandatory for thermal power companies to produce a certain share of green power, allowing end consumers to have the right to buy and consume green power. In this way, companies and individuals can purchase green power certificates to complete compulsory targets, and fulfill their intention of using green power. Meanwhile, renewable power companies can increase revenue by selling certificates. Issuing certificates based on the volume of green power generated could also increase the production of renewable energy and the percentage of green power usage.

(2) Distributed power generation projects: In China, companies and individuals can consume green power from distributed solar power generation projects. Companies and households can get direct access to electricity generated from local equipment, often installed on roofs, in factories, on land, or through investment. This follows the operation model of self-generation, self-consumption, feeding surplus electricity into the grid and making adjustments via the grid.

(3) Purchase green power directly from power companies: Power companies should provide support and make options available for the purchase of green power. Consumers should be allowed to choose from various power supply sources. We call on power companies to provide bill options for households and companies, and allow users to meet their demands by buying green power directly from power companies.

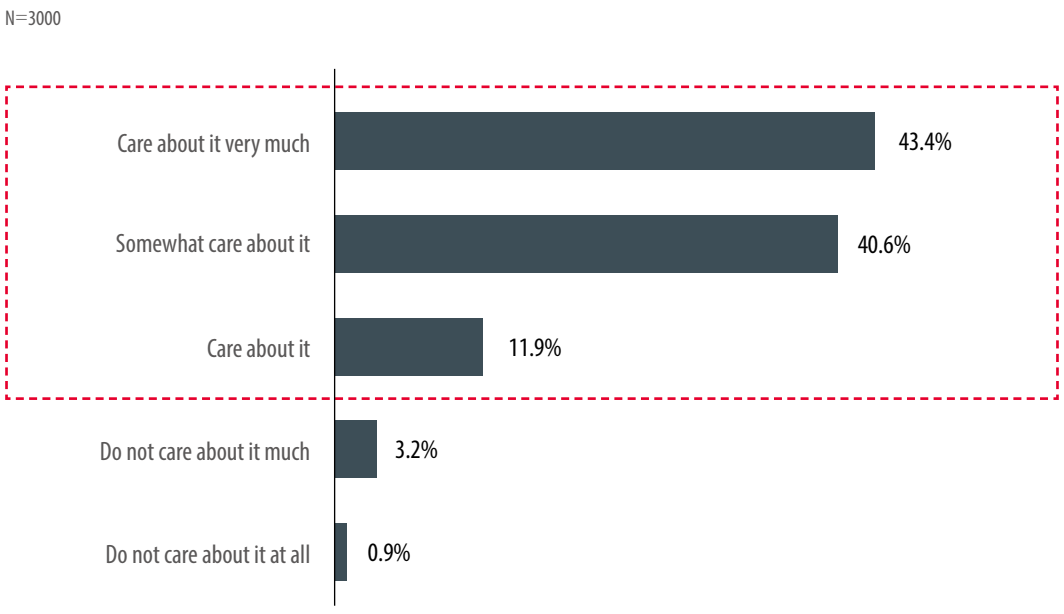
DETAILED FINDINGS

- Environmental awareness
- Green power awareness
- Green power purchasing intention

Environmental awareness

- Public concern about environmental pollution in China

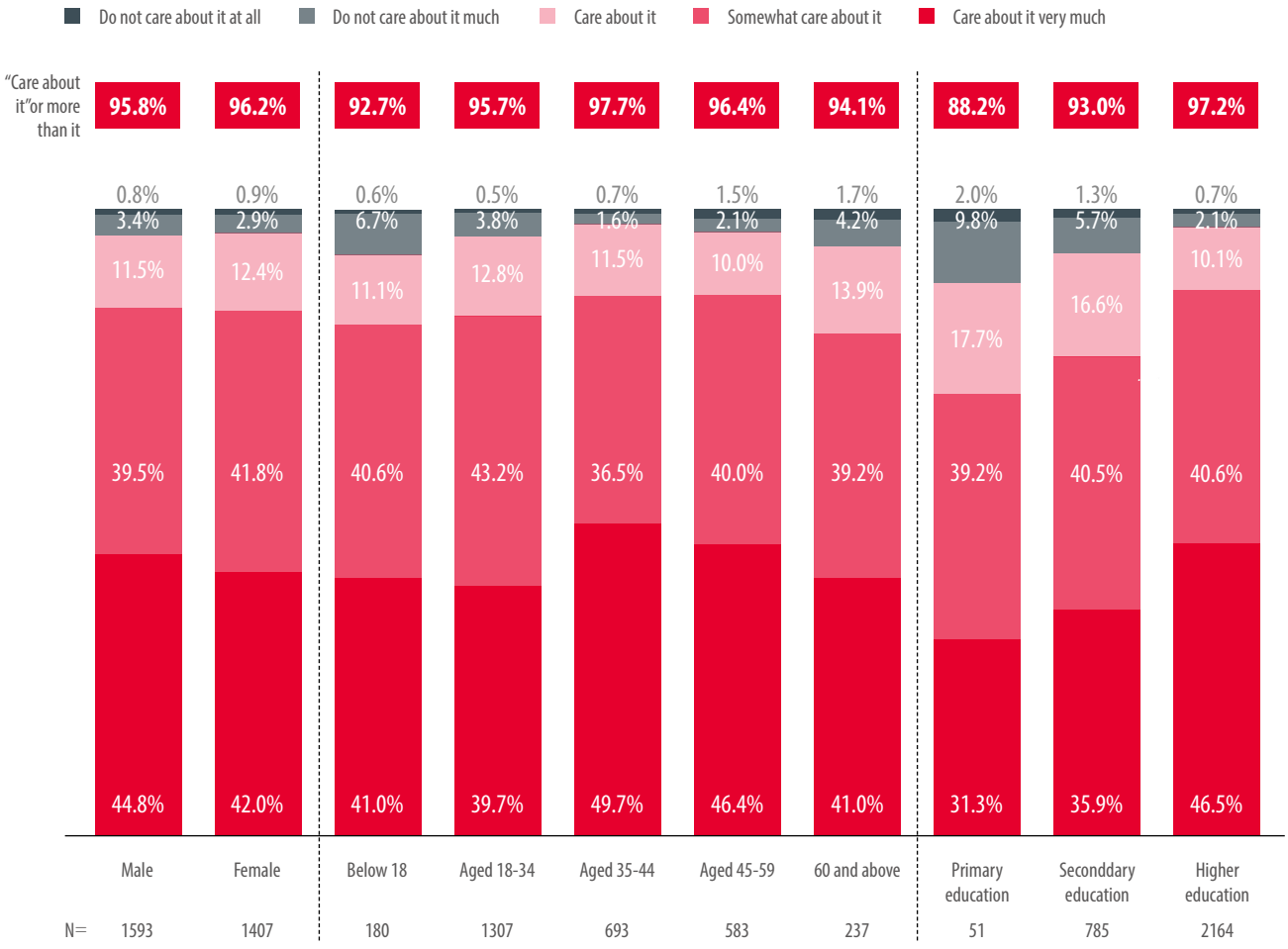
The vast majority of the respondents (95.9%) were worried about current domestic pollution issues, of which nearly half (43.4%) showed great concern.



? How concerned are you about environmental pollution problems in China at the moment?

Environmental awareness

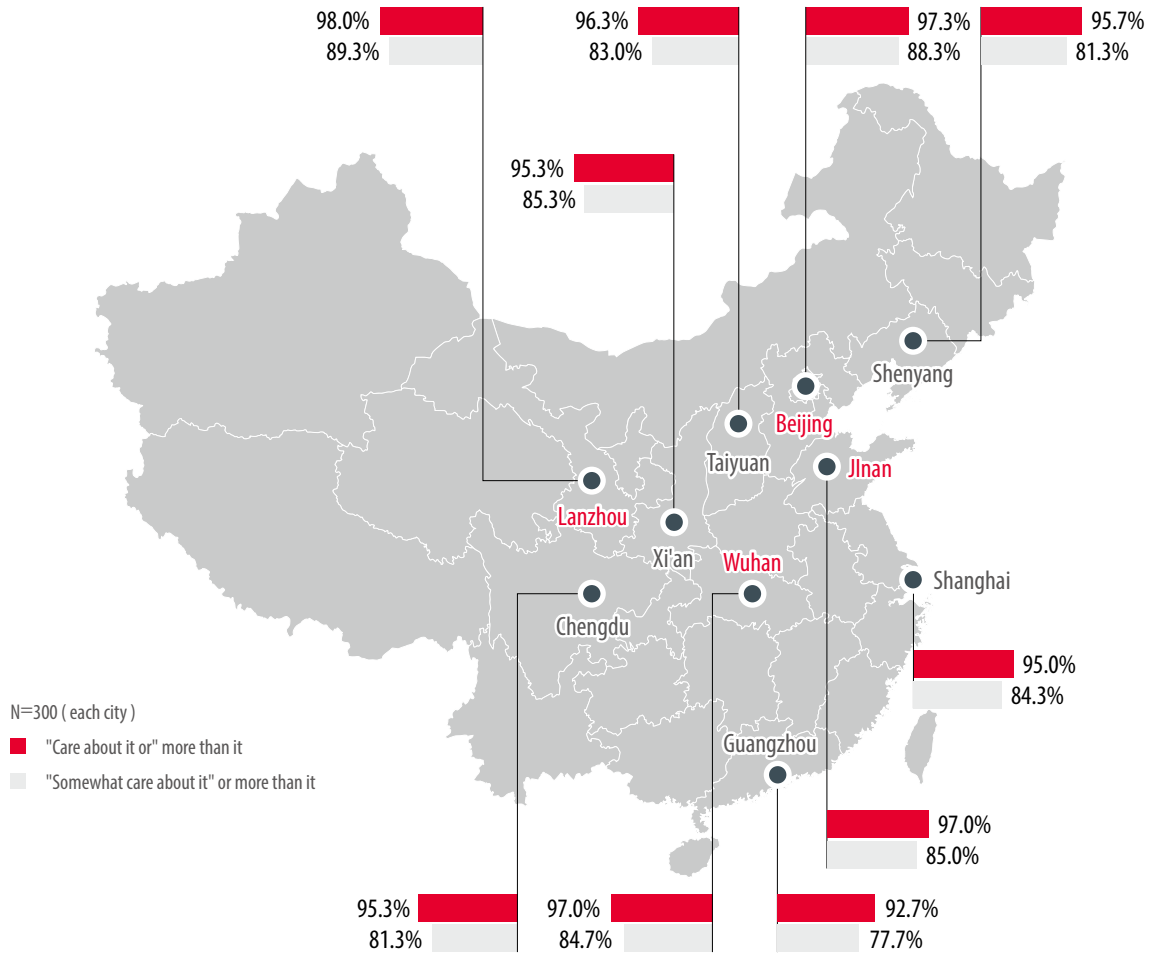
- Public concern about environmental pollution in China – by groups of people
  - There was no significant difference in terms of gender;
  - People aged 35 to 44 were most concerned;
  - The more educated people were, the more concerned they were about environmental pollution.



How concerned are you about environmental pollution problems in China at the moment?

Environmental awareness

- Public concern about environmental pollution in China – by region
  - The vast majority of respondents (over 90%) from all cities surveyed indicated concern;
  - Of all the cities surveyed, respondents from Guangzhou indicated the least concern.

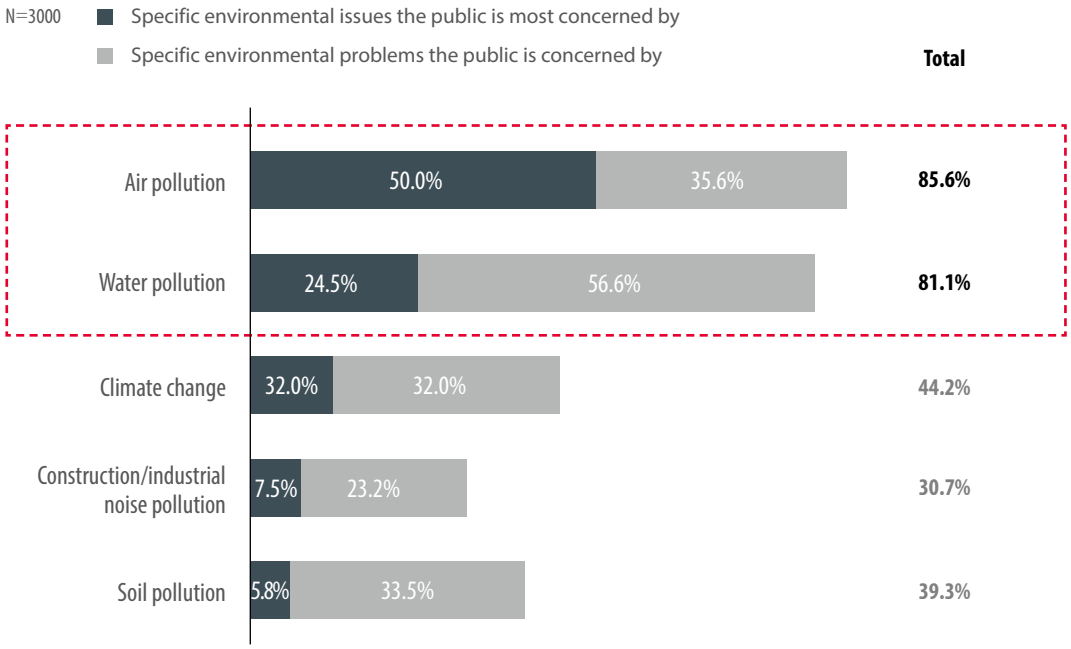


? How concerned are you about environmental pollution problems in China at the moment?

Environmental awareness

- Specific environmental issues of public concern

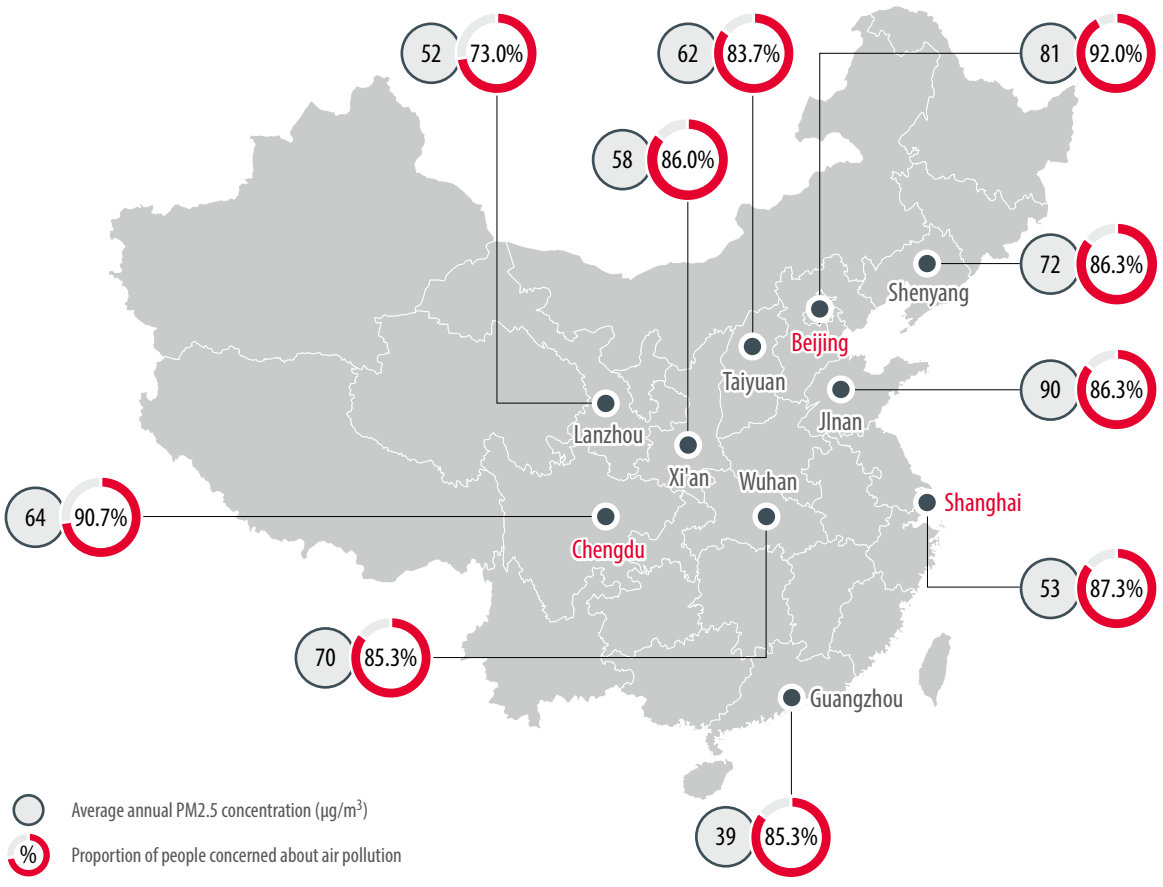
Of all the environmental issues, the public was most concerned about air pollution with half of the respondents saying it was their biggest concern, and up to 85% expressing concern. This was followed by water pollution, over which 80% expressed concern. Both of these issues received substantially more attention than other forms of pollution.



? For the following specific environmental issues, please choose the one you are most concerned about. Are there any others? Please choose a maximum of two.

Environmental awareness

- Specific environmental issues of public concern – air pollution
  - 92% of Beijing respondents were concerned about air pollution, a much higher percentage than for other cities. Lanzhou respondents were the least concerned, with only 73% expressing concern about air pollution.
  - According to the "Report on the State of Environment in China in 2015" released by the Ministry of Environmental Protection, the annual average concentration of PM2.5 in Beijing and Jinan exceeded 80 μg/m^3. However, concern was much higher in Beijing

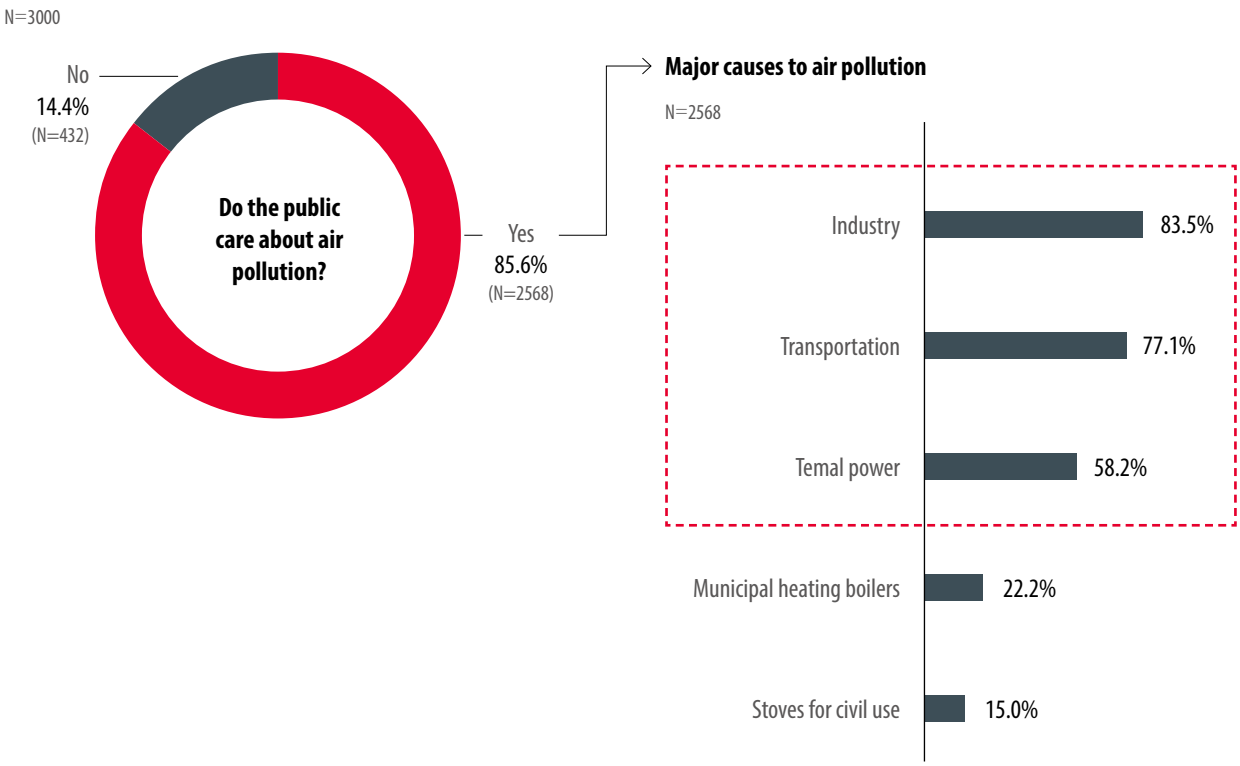


? For the following specific environmental issues, please choose the one you are most concerned about. Are there any others? Please choose a maximum of two.

Environmental awareness

- Major causes to air pollution

Industry (83.5%), transportation (77.1%), and thermal power (58.2%) were considered to be the three major causes to air pollution.



? Which do you think are the major causes to air pollution? Please choose a maximum of three

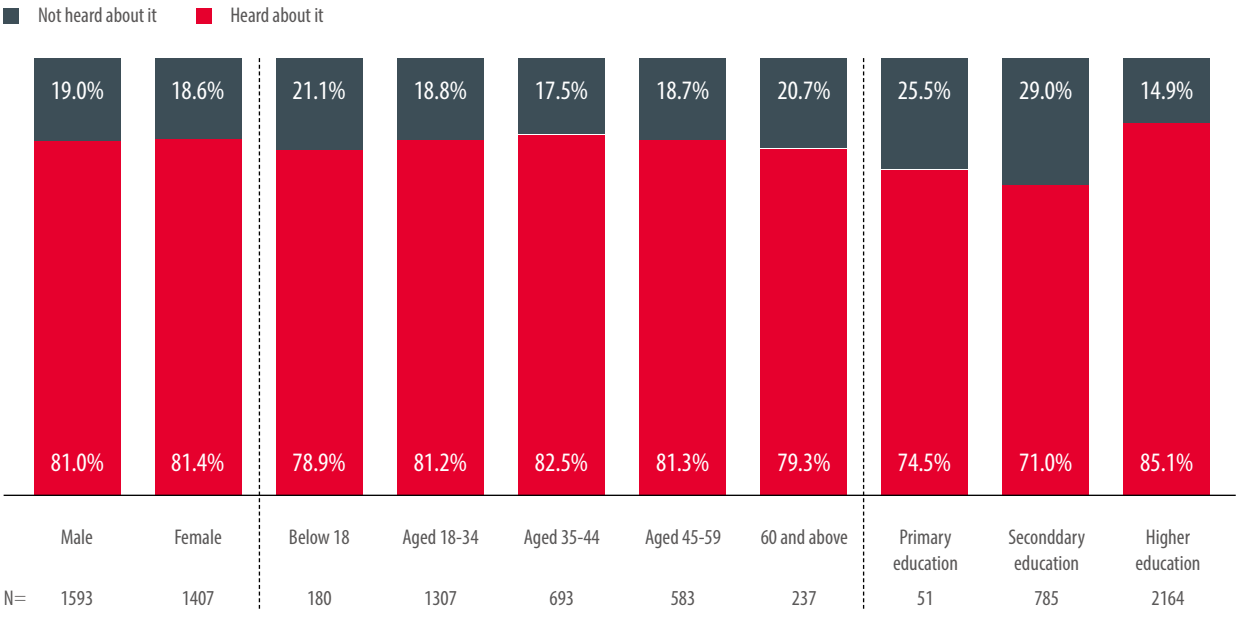
Green power awareness

- "Green power" awareness
  - Most of the respondents (81.2%) knew about “green power”;
  - There was no significant difference in terms of gender;
  - People aged 18 to 59 showed more awareness of green power;
  - People with higher education had a better awareness of green power.

“Green power” awareness

N=3000

“Green power”awareness

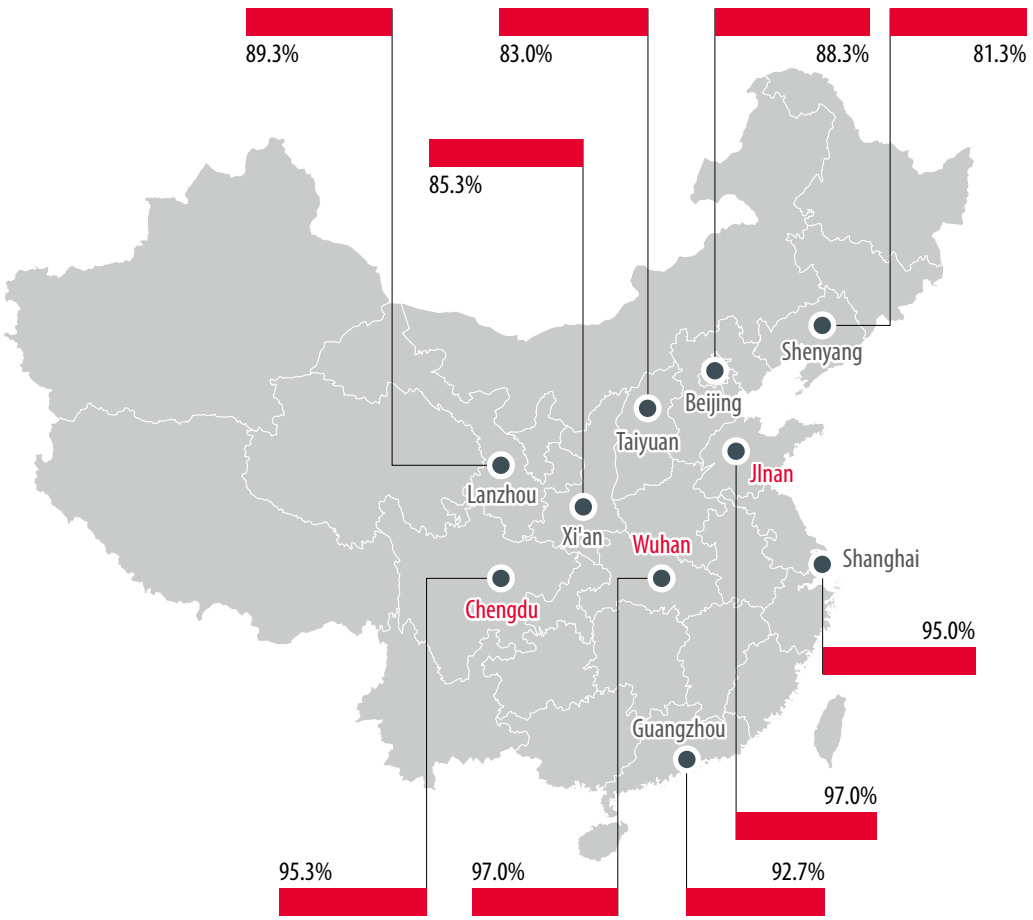


? Have you ever heard about “green power” or “renewable power”?

Green power awareness

- "Green power" awareness – by region

  Awareness of "green power" varied between cities: it was highest in Beijing, Shanghai and Xi'an (about 85%), and relatively low in Shenyang and Guangzhou.

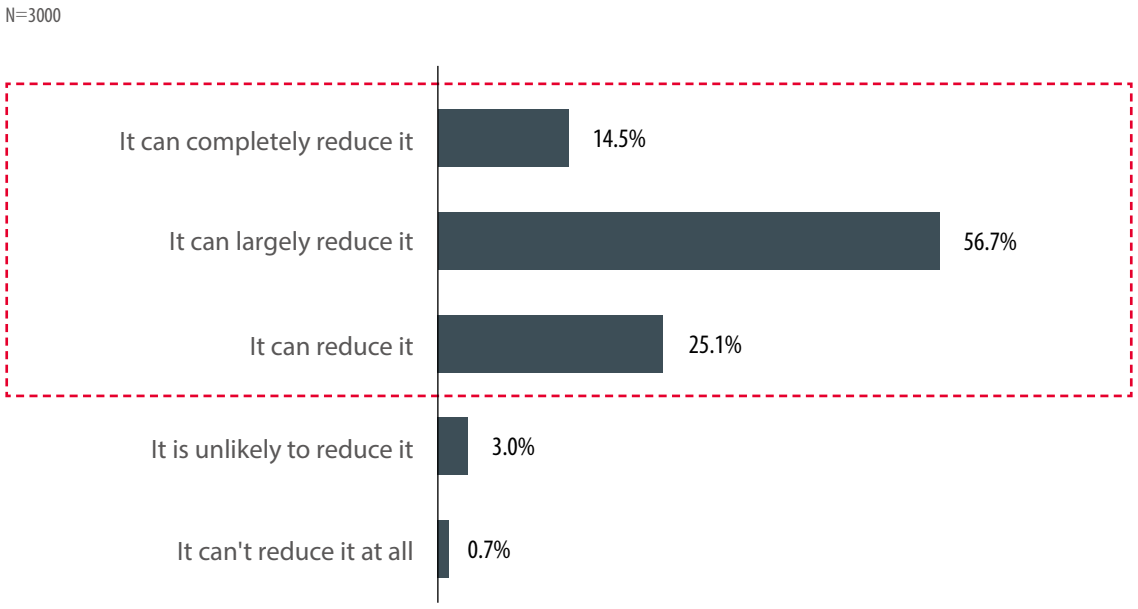


? Have you ever heard about "green power" or "renewable power"?

Green power awareness

- The role of "green power" in reducing air pollution

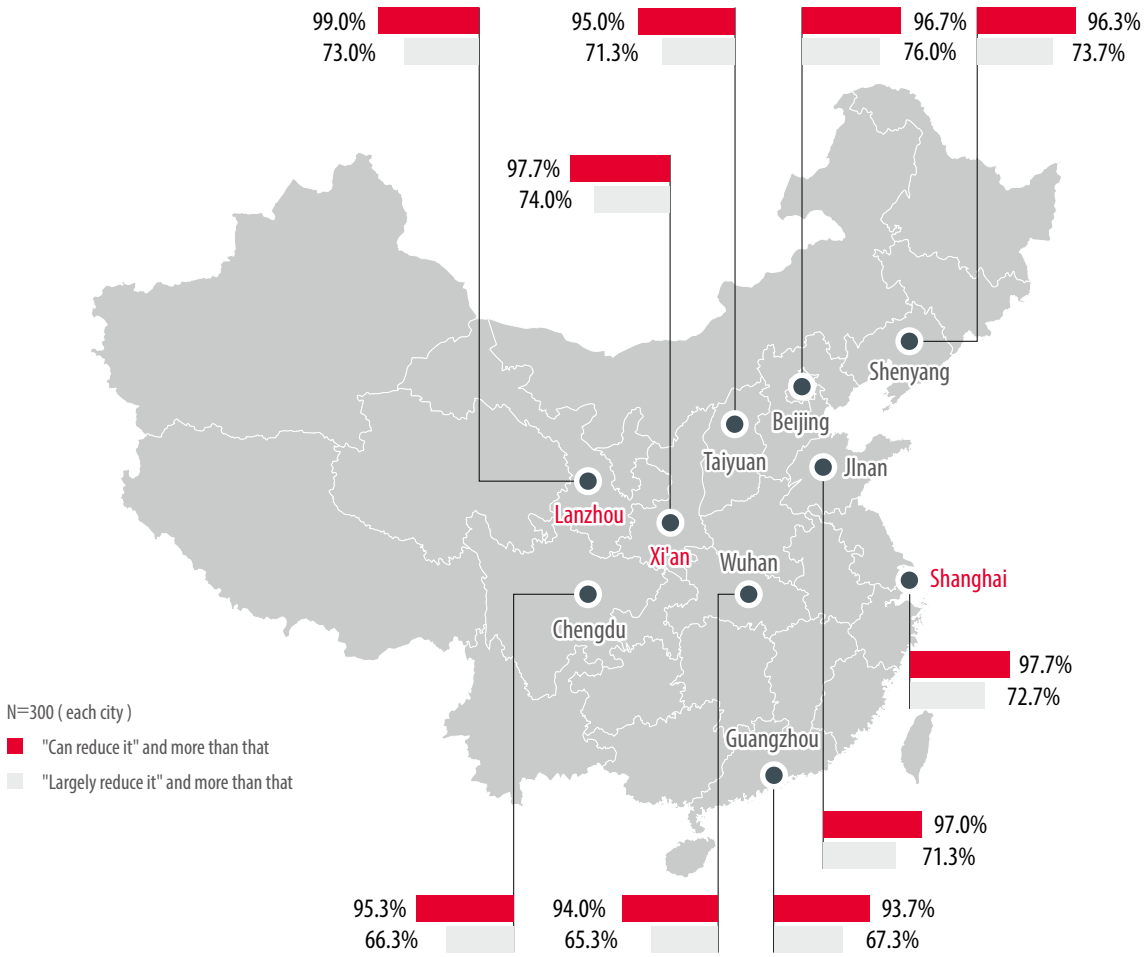
The vast majority of respondents (96.3%) thought that "green power" could reduce air pollution, and of these more than half (56.7%) stated that "green power" could largely reduce air pollution, while 14.5% were fully confident of its role in reducing air pollution.



? How do you think the role of "green power" in reducing air pollution?

Green power awareness

- The role of "green power" in reducing air pollution – by region
  - The vast majority (90%) of respondents from all cities believed that "green power" could reduce air pollution;
  - Meanwhile, people from Beijing and other cities in north China displayed a greater confidence than those in the south of the role of "green power" to (largely or completely) reduce air pollution.



How do you think the role of "green power" in reducing air pollution?

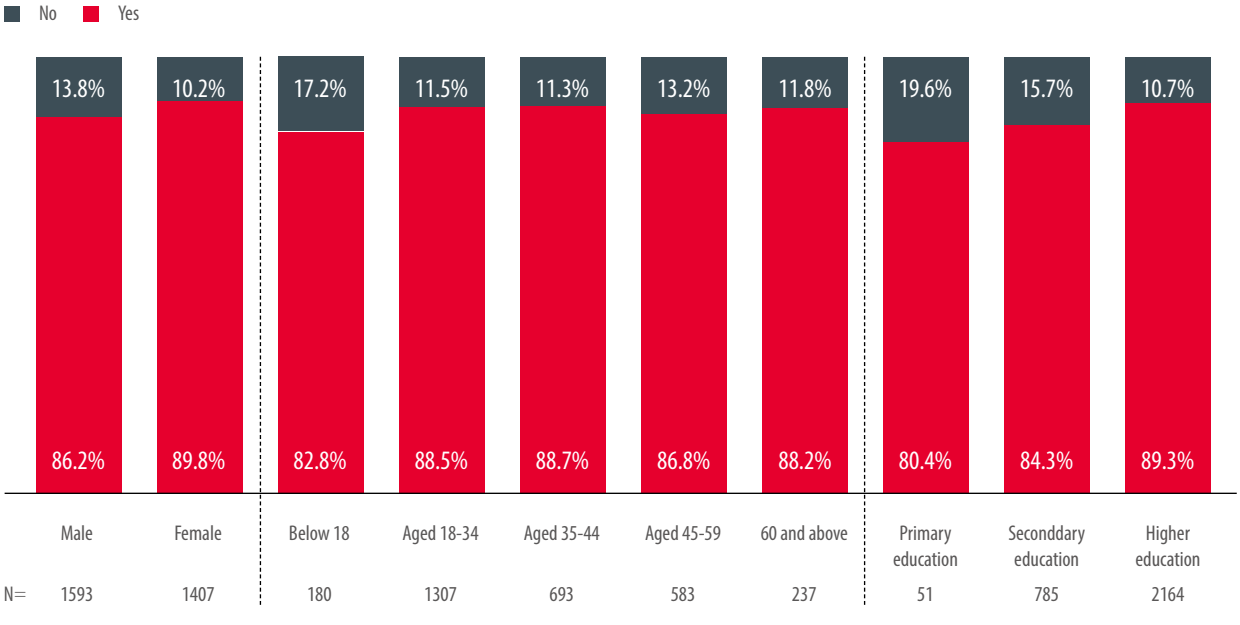
Green power purchasing intention

- Desire to learn about the composition of electric power
  - 87.9% of respondents wanted to know where their power came from;
  - Females were more willing to learn about the composition of power supply than males;
  - People aged 18 to 44 expressed more intention to learn about the composition of power supply;
  - Intention also increased proportionally to education background.

Do you want to know about the composition of the power supply you purchase?

N=3000

Do you want to know about the composition of the power supply you purchase?

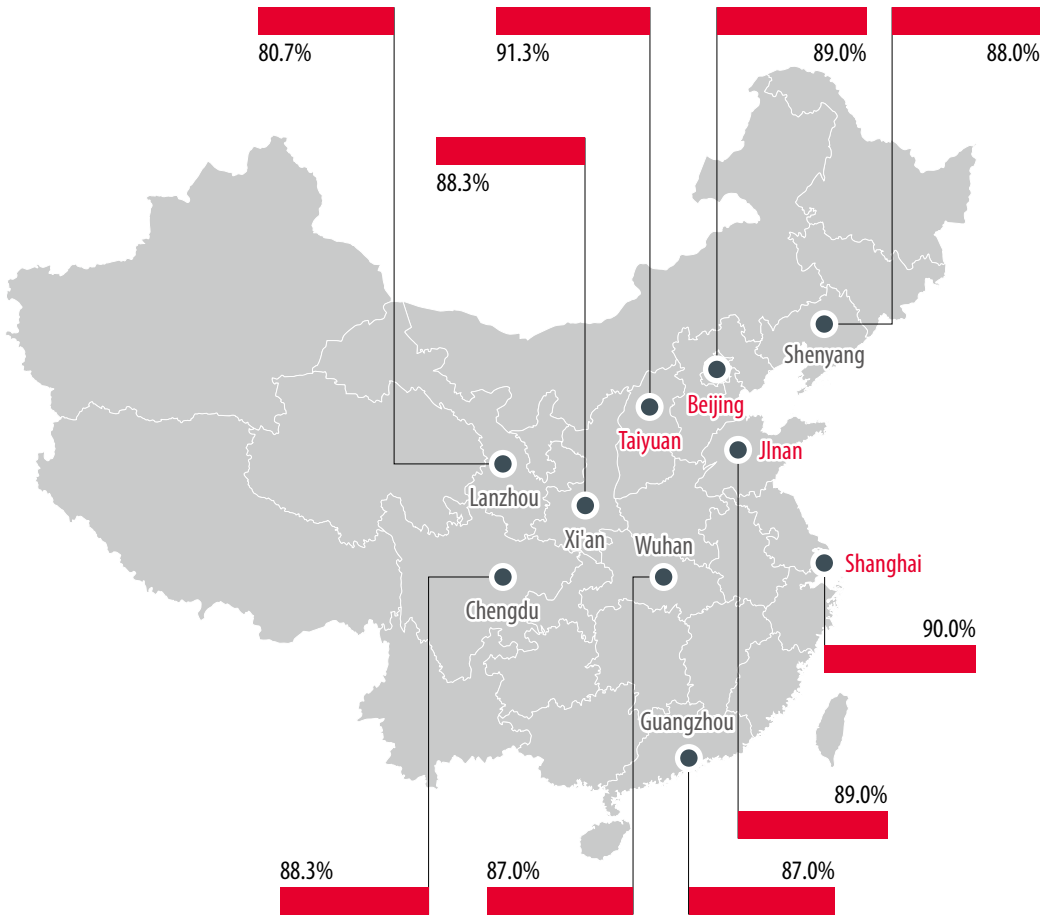


? Do you want to know about the composition of the power supply you purchase, such as whether it comes from thermal power, hydropower, renewable power, or nuclear power?

Green power purchasing intention

- Desire to learn about the composition of electric power – by region

  Over 85% of respondents from all cities – with the exception of Lanzhou – wanted to know the composition of their power supply, and in Taiyuan and Shanghai this exceeded 90%.

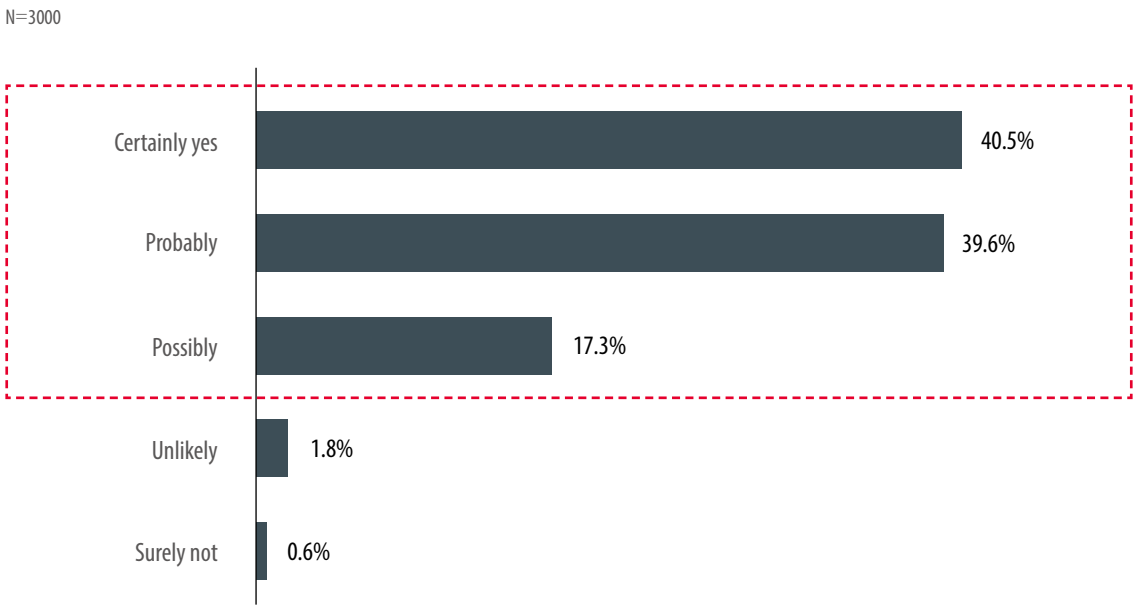


Do you want to know about the composition of the power supply you purchase, such as whether it comes from thermal power, hydropower, renewable power, or nuclear power?

Green power purchasing intention

- Green power purchase intention

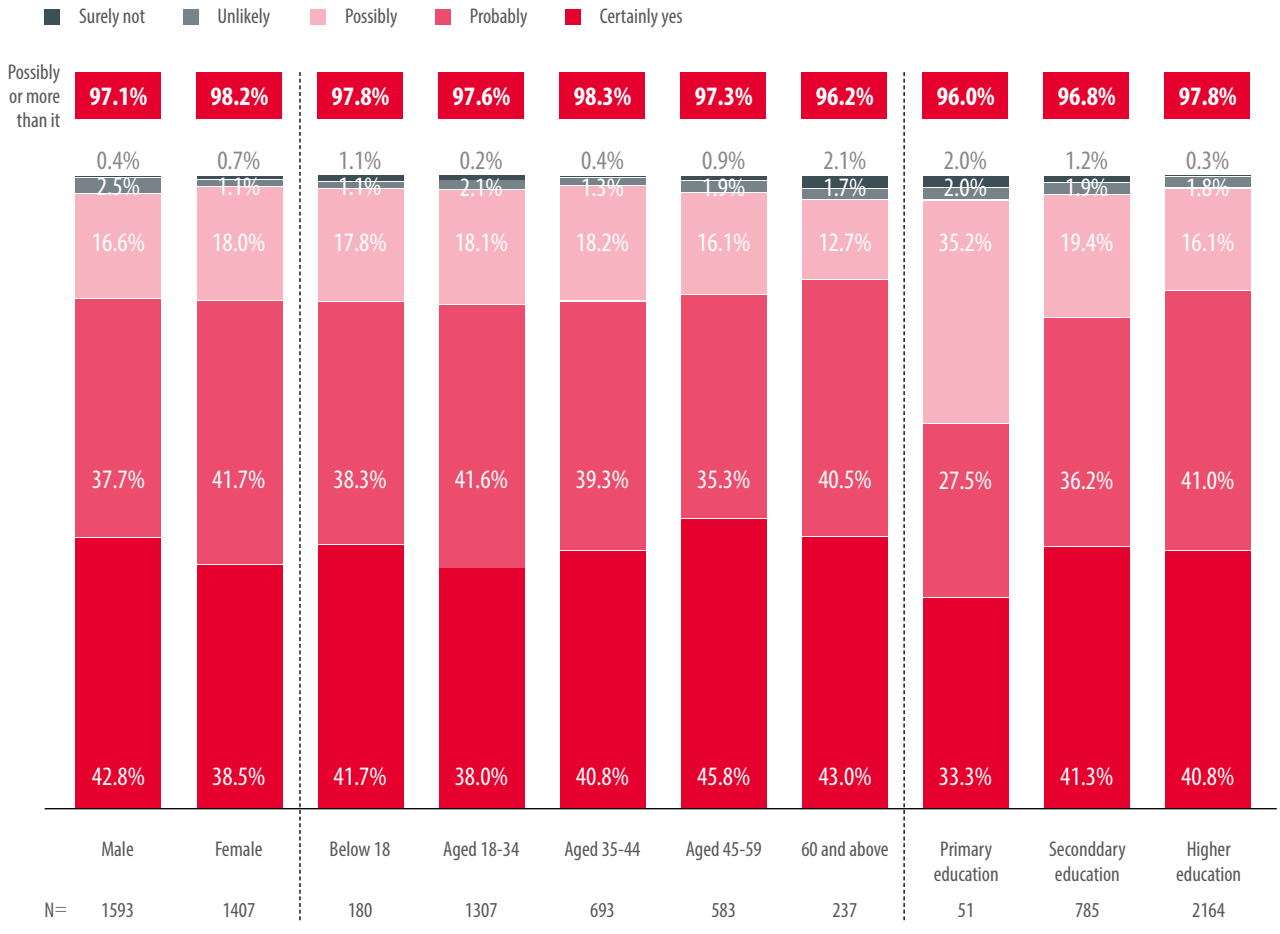
The majority of respondents (97.6%) were willing to buy "green power," and over 40% said they would definitely buy it.



? Currently consumers are unable to choose the source of the power supply they purchase. If in the future as a consumer you were free to choose either "green power" or "thermal power," would you choose "green power"?

Green power purchasing intention

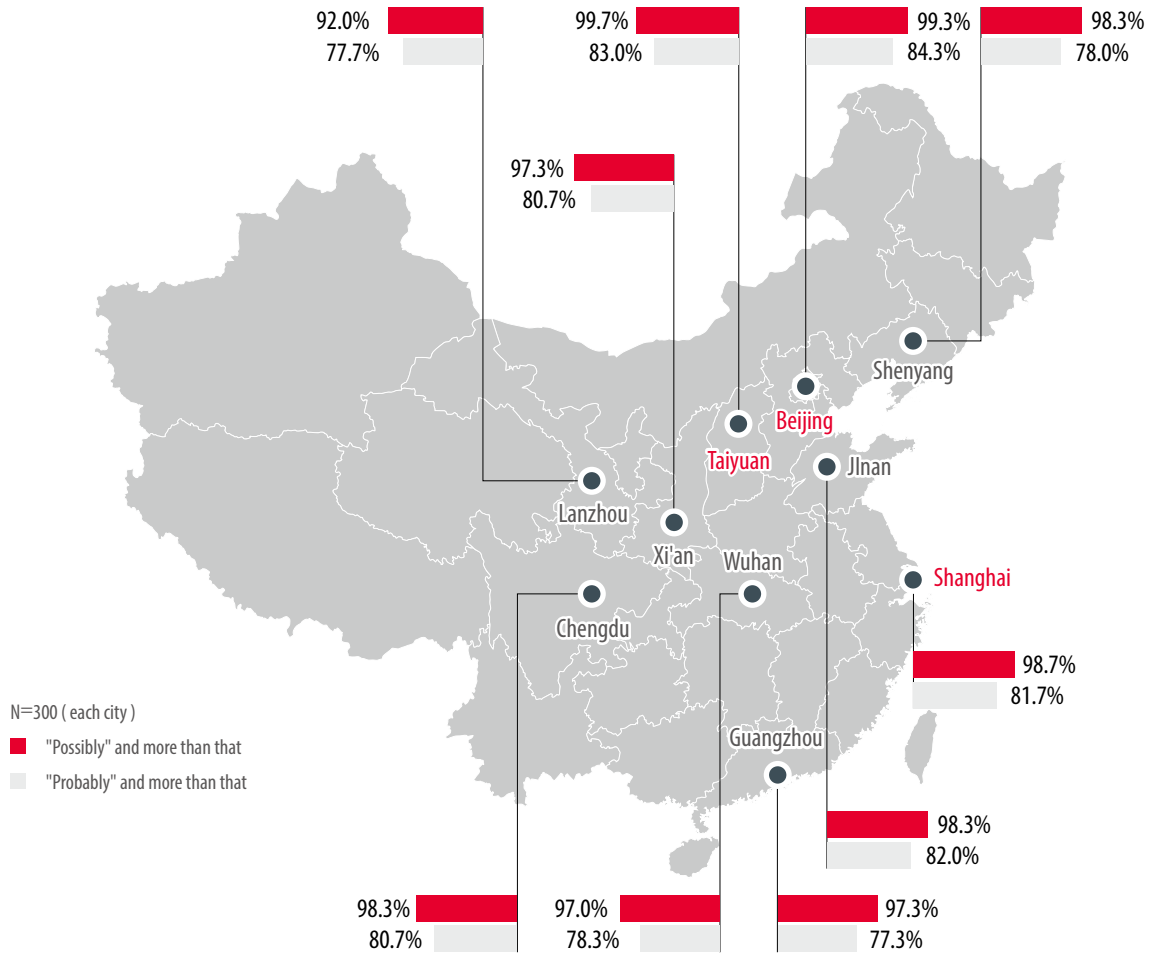
- Green power purchase intention – by groups of people
  - The purchasing intention was lower in males than females, but more male respondents said they would definitely buy green power;
  - People aged 45 to 59 displayed the strongest purchasing intention towards green power;
  - This purchasing intention also increased along with education.



? Currently consumers are unable to choose the source of the power supply they purchase. If in the future as a consumer you were free to choose either "green power" or "thermal power," would you choose "green power"?

Green power purchasing intention

- Green power purchase intention – by region
  - The vast majority of respondents (90%) in all the cities surveyed said that they would buy "green power";
  - Beijing had the largest number of respondents saying that they would "probably or definitely buy it".

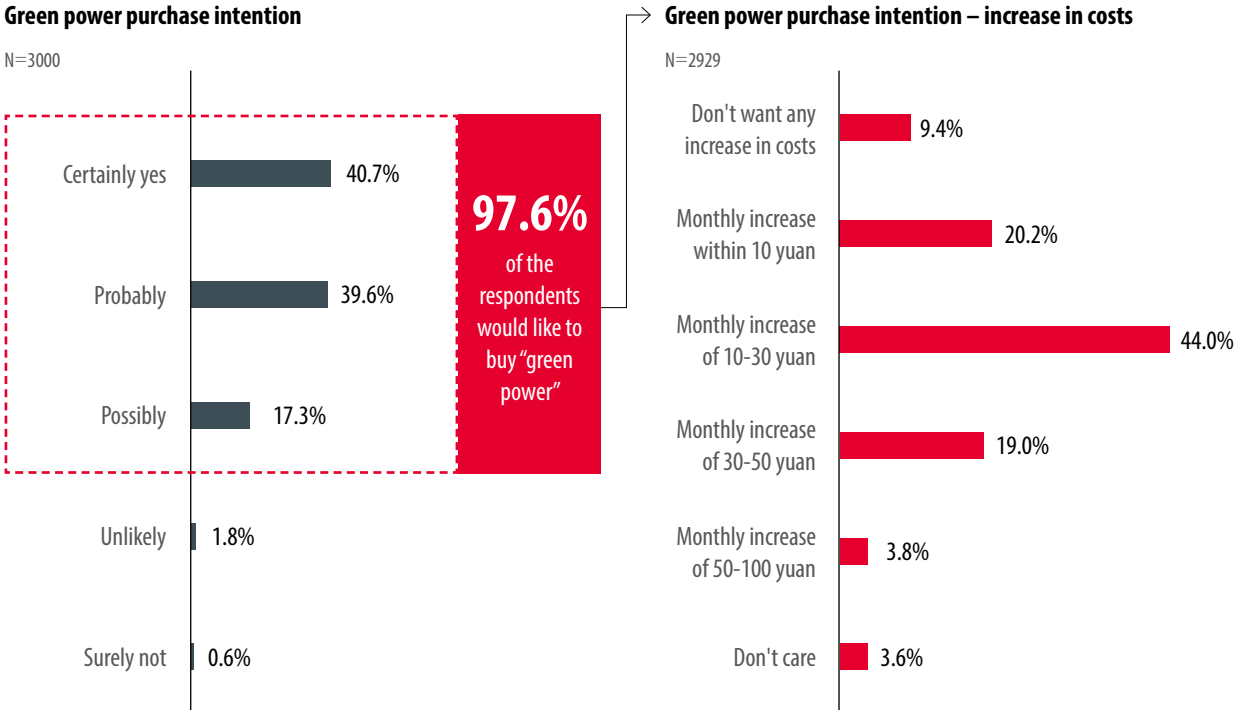


Currently consumers are unable to choose the source of the power supply they purchase. If in the future as a consumer you were free to choose either "green power" or "thermal power," would you choose "green power"?

Green power purchasing intention

- Green power purchase intention – increase in costs

  Of those willing to buy green power, 90.6% would accept a certain increase in costs, and up to 44% would accept a monthly increase of 10 to 30 yuan (US$ 1.50 to US$4.50).



Currently consumers can not choose the source of power supply when purchasing power. If in the future consumers are allowed to freely choose "green power or "thermal power," would you like to choose "green power"?

According to statistics, the average cost of electricity consumption is currently around 100 yuan (US$ 15) per month per household. If electricity tariffs for "green power" were to increase in the future, what increase on the current basis would you accept?

Green power purchasing intention

- Green power purchase intention – increase in costs

Respondents from all cities expressed willingness to pay an increased cost of 10 to 30 yuan, and it was over 50% in Beijing.

Region	City	no increase	Within 10 yuan	10-30 yuan	30-50 yuan	50-100 yuan	Don't care
Northwest	Xi'an	5.5%	22.3%	**45.9%**	19.9%	3.1%	3.4%
Northwest	Lanzhou	6.9%	19.9%	**43.5%**	18.8%	2.9%	8.0%
Southwest	Chengdu	8.5%	18.3%	**46.4%**	18.6%	4.4%	3.7%
Central	Wuhan	8.3%	19.9%	**41.6%**	25.4%	3.1%	1.7%
South	Guangzhou	13.7%	18.5%	**39.0%**	19.5%	5.8%	3.4%
North	Beijing	8.7%	18.1%	**51.3%**	16.8%	3.0%	2.0%
North	Taiyuan	13.7%	18.4%	**43.8%**	16.1%	2.7%	5.4%
North	Jinan	10.5%	23.1%	**39.7%**	19.3%	5.1%	2.4%
East	Shanghai	9.1%	19.3%	**45.3%**	19.3%	4.1%	3.0%
Northeast	Shenyang	8.5%	24.4%	**44.8%**	15.9%	3.4%	3.1%

? According to statistics, the average cost of electricity consumption is currently around 100 yuan (US$ 15) per month per household. If electricity tariffs for "green power" were to increase in the future, what increase on the current basis would you accept?

Green power purchasing intention

Region	North China			East China	Northeast China	Northwest China		Southwest China	Central China	South China
City	Beijing	Taiyuan	Jinan	Shanghai	Shenyang	Xi'an	Lanzhou	Chengdu	Wuhan	Guangzhou
Reference price per kilowatt (yuan/kWh)	0.49	0.48	0.55	0.62	0.5	0.5	0.51	0.48	0.56	0.61
Proportion of people choosing "a monthly increase within 10 yuan"	18.1%	18.4%	23.1%	19.3%	24.4%	22.3%	19.9%	18.3%	19.9%	18.5%
Increase to unit price (yuan/kWh)	0~0.05	0~0.05	0~0.05	0~0.06	0~0.05	0~0.05	0~0.05	0~0.05	0~0.06	0~0.06
Proportion of people choosing "a monthly increase of 10 to 30 yuan"	**51.3%**	**43.8%**	**39.7%**	**45.3%**	**44.8%**	**45.9%**	**43.5%**	**46.4%**	**41.6%**	**39.0%**
Increase to unit price (yuan/kWh)	**0.05 ~0.15**	**0.05 ~0.14**	**0.05 ~0.16**	**0.06 ~0.19**	**0.05 ~0.15**	**0.05 ~0.15**	**0.05 ~0.15**	**0.05 ~0.14**	**0.06 ~0.17**	**0.06 ~0.18**
Proportion of people choosing "a monthly increase of 30 to 50 yuan"	16.8%	16.1%	19.3%	19.3%	15.9%	19.9%	18.8%	18.6%	25.4%	19.5%
Increase to unit price (yuan/kWh)	0.05 ~0.24	0.14 ~0.24	0.16 ~0.27	0.19 ~0.31	0.15 ~0.25	0.15 ~0.25	0.15 ~0.26	0.14 ~0.24	0.17 ~0.28	0.18 ~0.31

Source of unit price of electricity tariff: State Grid branches in all provinces and cities, and the unit price is reference price of each city

? According to statistics, the average cost of electricity consumption is currently around 100 yuan (US$ 15) per month per household. If electricity tariffs for "green power" were to increase in the future, what increase on the current basis would you accept?

RESEARCH DESIGN

Research design

- **Methodology:** CATI and online survey
- **Respondents:** Members of the general public
- **Duration:** July 21 to August 10, 2016

Region	City	CATI	Online	Total
North China	Beijing	50	250	300
	Taiyuan	50	250	300
	Jinan	50	250	300
East China	Shanghai	50	250	300
Northeast china	Shenyang	50	250	300
Northwest China	Xi'an	50	250	300
	Lanzhou	50	250	300
Southwest China	Chengdu	50	250	300
Central China	Wuhan	50	250	300
South China	Guangzhou	50	250	300
Total		500	2500	3000

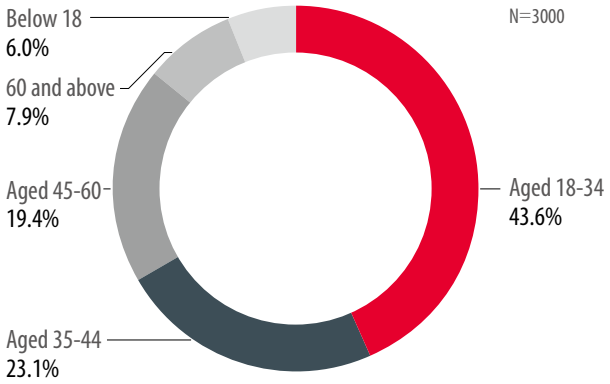
Research content

Survey Topics	Specific Question Areas
Environmental pollution awareness	Public concern of current environmental pollution in China
	Specific environmental problems of public concern
	Major causes of air pollution
Green power awareness	Awareness of the terms "green power" and "renewable power"
	The role of "green power" in reducing air pollution
Green power purchase intention	Whether there is a desire to know the composition of power when purchasing it
	Whether they would buy "green power" in the future when given free choice between "green power" or "thermal power"
	Increase in cost of current power rate that the public would accept when buying green power

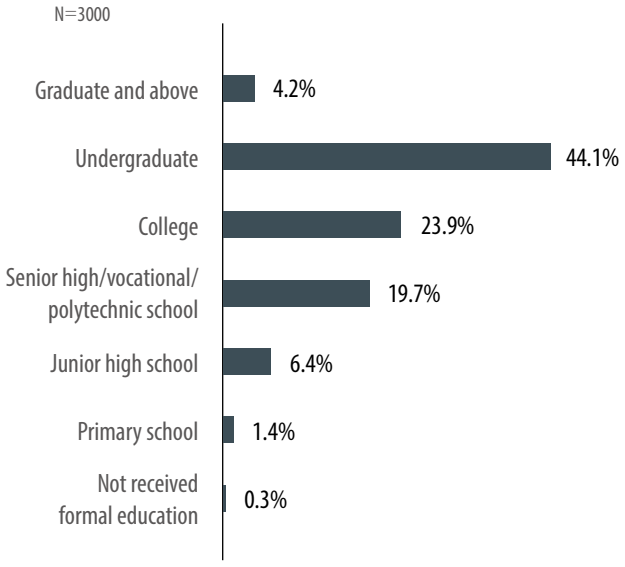
Actual composition of survey sample

Gender

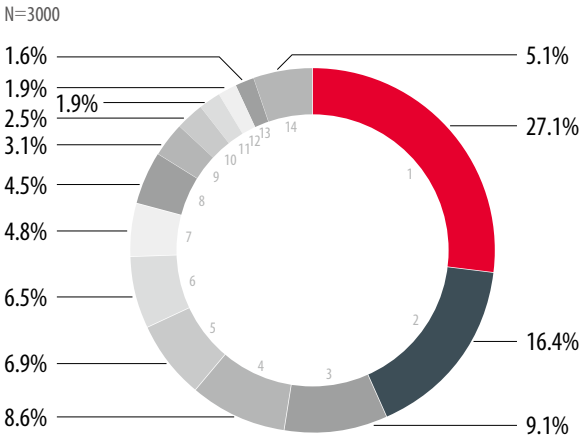
Age



Education



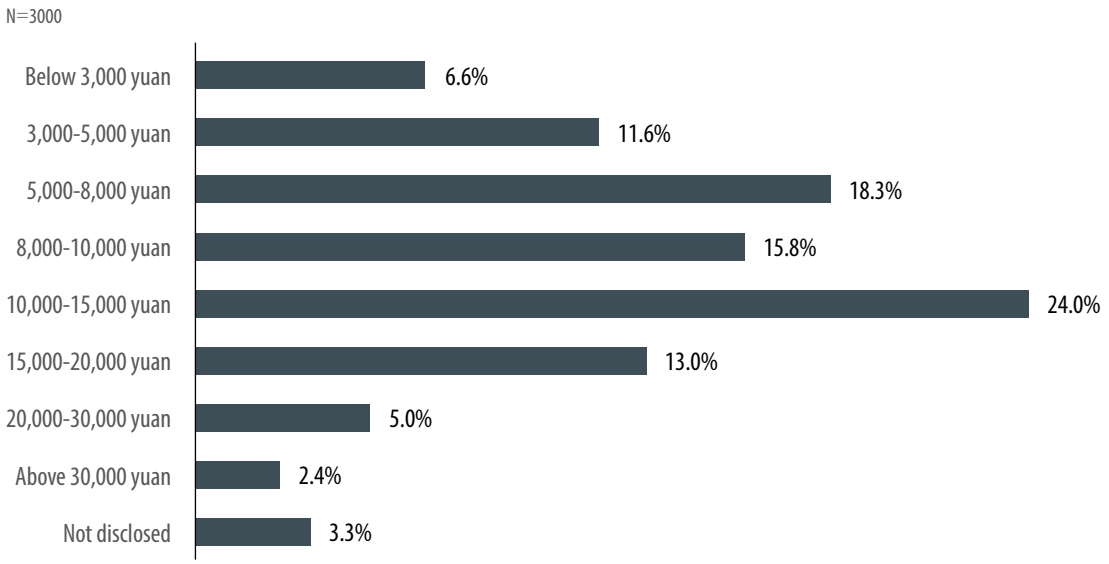
Occupation



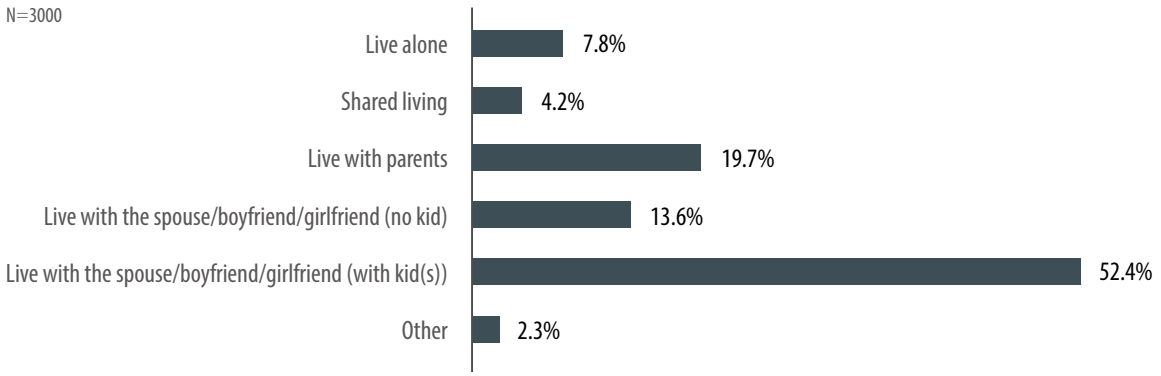
1. Enterprise employee; 2. Corporate middle or senior management;
3. Professional (lawyer, doctor, professor, teacher, etc.); 4. Student; 5. Freelancer;
6. Self-employed(owners of small shops or restaurants);
7. Worker/blue-collar or manual worker; 8. Government department/institution staff;
9. Private entrepreneur/business partner;
10. Government department/institution middle or senior cadre; 11. Housewife;
12. Blue-collar staff from service industry (restaurants, shops, etc.); 13. Farmer; 14. Other

Actual composition of survey sample

- **Monthly household income**



- **Living situation**



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