# China's Climate Transition Outlook 2023

## Expert Survey and Interviews

11/2023

CREA
Centre for Research on Energy and Clean Air

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INTERNATIONAL SOCIETY FOR ENERGY TRANSITION STUDIES

# China's Climate Transition Outlook 2023: Expert Survey and Interviews

Though optimistic about China reaching its peak carbon emissions by 2030, experts emphasize that achieving carbon neutrality before 2060 will demand substantial additional efforts.

**11/2023**


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# About CREA

The Centre for Research on Energy and Clean Air (CREA) is an independent research organisation focused on revealing the trends, causes, and health impacts, as well as the solutions to air pollution. CREA uses scientific data, research, and evidence to support the efforts of governments, companies, and campaigning organisations worldwide in their efforts to move towards clean energy and clean air, believing that effective research and communication are the keys to successful policies, investment decisions, and advocacy efforts. CREA was founded in Helsinki and has staff in several Asian and European countries.

www.energyandcleanair.org

# About ISETS

The International Society for Energy Transition Studies (ISETS) is an independent, non-profit, global organization headquartered in Sydney, Australia. ISETS aims to contribute to advance the global energy transition, drive knowledge sharing, foster dialogue among stakeholders, support sustainable development in various sectors, and promote collaborative actions towards a clean and sustainable energy future.

www.isets.org

# Key findings

This is the second year an expert survey was carried out as a part of the Centre for Research on Energy and Clean Air's (CREA) annual China Climate Transition Outlook report to measure insiders' views on whether China is on track with its climate commitments. With the contribution of the International Society for Energy Transition Studies (ISETS), this year the survey covered an expanded pool of 89 experts representing diverse specialisations in the field of climate and energy, a tripled number of participants compared with last year. The same questionnaire was used and we conducted a detailed comparison between the data from this survey and last year's data.

- The expert survey results suggest that China is on track to reach its carbon peak before 2030. However, limiting emissions increases during this decade remains a significant challenge. Overall, this year's expert survey exhibits a more optimistic outlook compared to last year's survey. Despite the impact of the post-pandemic economic situation on the energy transition process, experts recommend staying committed to the established goals. They also emphasise the need to make agile and adaptive adjustments in strategic planning and execution to facilitate the decarbonisation of the entire Chinese economy while ensuring energy supply security, fostering economic growth, and promoting social prosperity.
- Over half of the experts surveyed expressed optimism about China reaching its peak primary energy consumption before 2030. However, the findings are mixed for the country's coal consumption as it is closely linked to China's socio-economic developments. Some 30 experts, or 34% of those surveyed, are uncertain when the peak will be achieved.
- Experts remain divided in their opinion on when the emissions from the country's power sector would peak. While 27 predicted the peak only after 2030, five foresaw the peak in 2030, and 22 believed the peak to happen between 2026 and 2030.
- The steel sector is more optimistic, with nearly half of the experts surveyed predicting that carbon emissions will peak before 2025 - an increase of 12 percentage points from 2022.
- In the 2023 survey, nearly 60% of experts believe that carbon emissions from China's cement industry will peak before 2025, while 24% predict that the peak will not occur until after 2030. This reflects a shift from the 2022 data, where 38% anticipated a post-2030 peak. The decrease to 24% suggests a more optimistic view among experts regarding the progress of emissions reduction in the cement industry and the anticipated timing of its peak.

- Compared to 2022, the 2023 survey shows that more experts tend to believe that the peak of carbon emissions in the transportation sector will come earlier. Predictions for a peak before 2030 have significantly increased, while predictions between 2030 and 2035 and between 2035 and 2040 have correspondingly decreased.

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# Introduction

China has demonstrated its determination to tackle climate change by announcing a $CO_2$ emissions peak before 2030 and carbon neutrality before 2060 ("dual carbon goals")[1], as well as a series of policies to support these goals. In 2023, President Xi reaffirmed China's determination to realise the 2030/2060 goals and called for accelerating the green and low-carbon transformation of China's development model and accelerating the construction of a new electricity system[2].

As part of CREA's China Climate Transition Outlook annual reports, expert surveys have been conducted since 2022 to measure insiders' views on whether China is on track with its climate commitments.

As China enters the third year of its ambitious 'dual carbon' initiative, outstanding experts from various fields were invited to participate in a questionnaire survey on the progress and prospects of this significant undertaking. The same survey questionnaire was used in 2022 to facilitate a detailed comparison with last year's data. This is aimed to identify changes and trends since last year, especially to determine if significant changes have occurred in specific areas or issues.

In the questionnaire, the participants were asked to provide their views on when China will reach its peak in both $CO_2$ emissions and total energy consumption. They were also asked to provide their expectations regarding the $CO_2$ emissions trajectories across various emission-intensive sectors, including electricity, industry, construction, and transportation. Most of these experts specialise in energy, environmental economics, and climate change (refer to Figure 1). Their professional backgrounds are extensive and varied, spanning higher education, coal, electricity, renewable energy, and the oil and gas industries (refer to Figure 2). These professionals are affiliated with academic institutions, consulting firms, and the energy industry, such as the electricity, oil, and natural gas sectors (refer to Figure 3).

The survey, conducted between August 25, 2023 and September 15, 2023, received 89 valid responses. Of this, 64 were from domestic experts, and 25 were from overseas experts. In addition, virtual interviews were also conducted with select experts.

In contrast to conventional quantitative studies, which are predominantly based on mathematical modelling or normative analyses, the experts engaged in our survey leveraged their extensive professional expertise and hands-on experience to address the questions posed in the questionnaire. The survey

[1] UN News. (Sep 2020). 'Enhance solidarity' to fight COVID-19, Chinese President urges, also pledges carbon neutrality by 2060. https://news.un.org/en/story/2020/09/1073052. News article.

[2] Xinhua News. (July 2023). Xi Jinping emphasised at the National Conference on Ecological and Environmental Protection. https://www.gov.cn/yaowen/liebiao/202307/content_6892793.htm. News report.

participants include scholars from universities and research institutes and outstanding representatives from various fields, such as government agencies, industrial associations, domestic and international think tanks, state-owned companies, other energy companies, non-governmental organisations, and news media. Their viewpoints reflect the mainstream perspectives in their respective domains to a certain extent. Additionally, their diverse backgrounds ensure our survey results' broad representativeness and reliability.

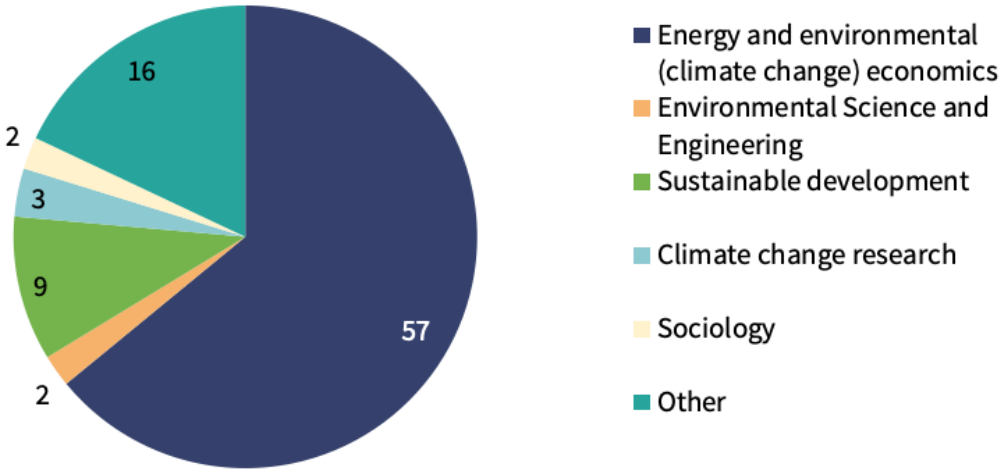


**Figure 1** | Expert fields of expertise (persons)

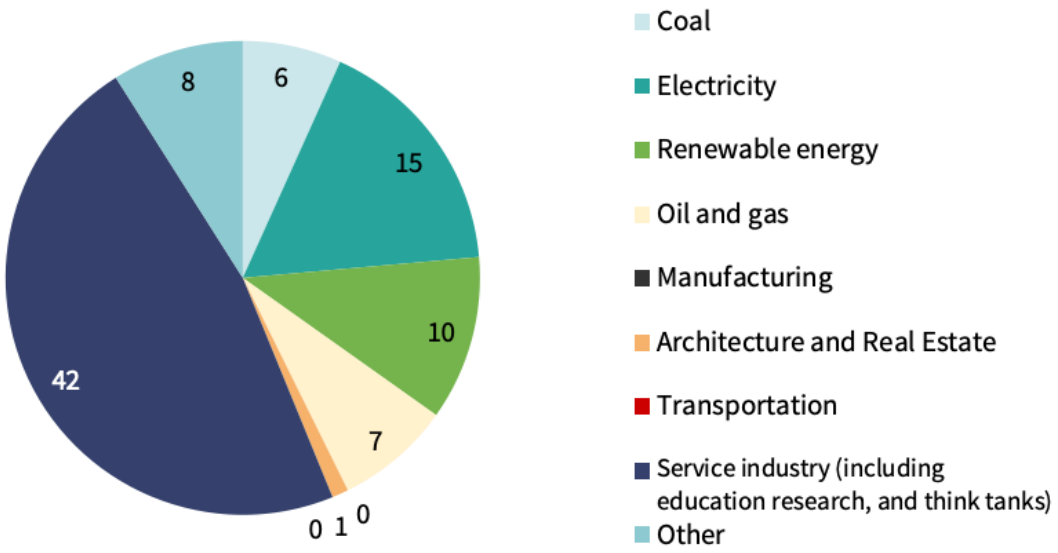


**Figure 2** | Expert industries (persons)

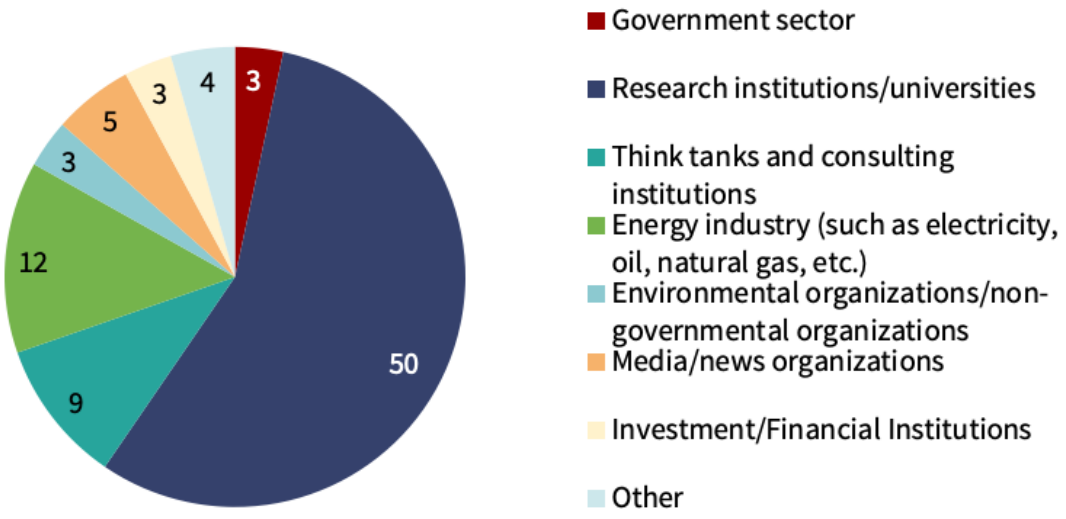


**Figure 3** | Status of affiliated institutes (persons)

# 1. Total emissions of carbon dioxide

More than 70% of the experts surveyed believe China can achieve its goal of peaking $CO_2$ emissions before 2030. Of these, two experts think that China's $CO_2$ emissions have already peaked. While 17 experts predict China will reach its carbon peak before 2025, 45 experts suggest it will occur between 2026 and 2030 (see Table 1).

**Table 1** | Survey results on China's carbon emission peaking year

| **When do you predict China's total carbon dioxide emissions will peak?** | | | **What would be the possible peak year if it peaks between 2026 and 2030?** | |
|---|---|---|---|---|
| Option | Number | Percentage (%) | Year | Number |
| A. Already peaked | 2 | 2% | 2026 | 2 |
| B. Before 2025 | 17 | 19% | 2027 | 3 |
| C. After 2030 | 25 | 28% | 2028 | 14 |
| D. Between 2026 and 2030 | 45 | 51% | 2029 | 10 |
| | | | 2030 | 13 |
| | | | Uncertain | 3 |

China's implementation of its transition policies has positively influenced expert views, with the proportion of experts believing the country will reach its peak carbon emission by 2025: which increased

from 15% in 2022 to 21% in 2023. Among them, two experts even believe China's $CO_2$ emissions may have already peaked. Correspondingly, the proportion of experts predicting that China's $CO_2$ emissions will peak after 2030 has decreased from 31% in 2022 to 28% in 2023. This change may reflect the experts' increased expectations for China to achieve its emission reduction goals and greater confidence in the Chinese government's efforts to strengthen emission reduction.

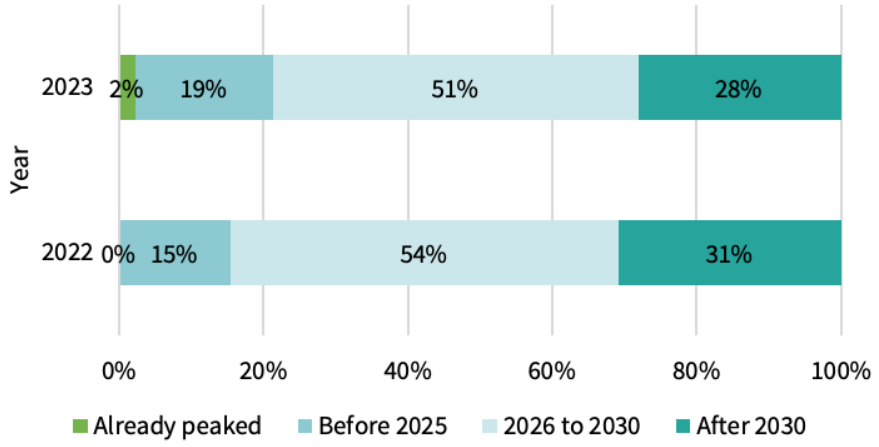


**Figure 4** | The peak year of China's carbon emissions

In the 2023 survey, most experts believe China is on track to peak its carbon emissions before 2030. Despite the positive outlook on the 'when', experts remain concerned about how high the peak emissions would reach compared to previous levels. Fifty out of 89 experts predict that the peak level will be at least 15% higher than China's carbon emissions in 2020 (see Figure 5).

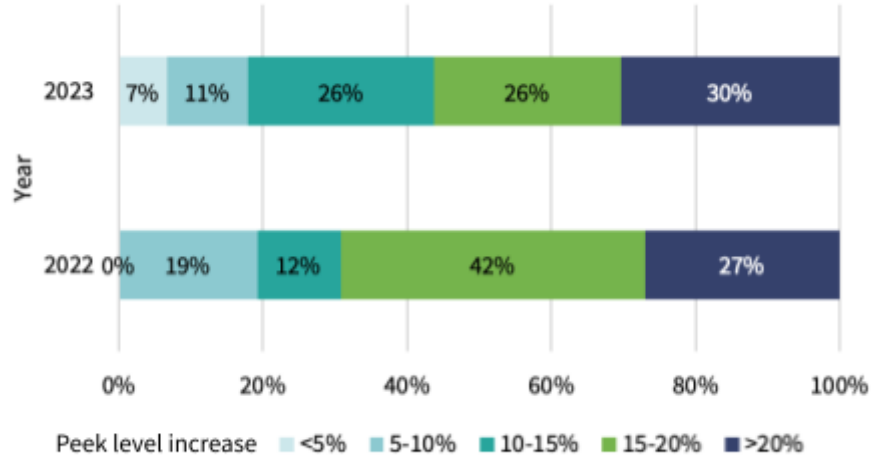


**Figure 5** | Carbon emission peak

# 2. Consumption of primary energy and coal

More than half of the experts (54 out of 89) believe that China's primary energy consumption will peak before 2030, probably reflecting their confidence in China's ability to control the growth of energy consumption. Furthermore, 13 experts predict that primary energy consumption will peak in 2035, reflecting their cautious attitude. Twenty-two experts believe that China's primary consumption will continue to increase beyond 2035, highlighting their conservative view that the country's energy demand will continue to increase along with its rapid and continuous economic growth.

**Table 2 |** Survey results on the year of peak primary energy consumption in China

| When do you think China's primary energy consumption will peak? | |
|---|---|
| A. Already peaked | 7 |
| B. By 2030 | 47 |
| C. By 2035 | 13 |
| D. After 2035 | 22 |

Regarding the timing of China's peak primary energy consumption, the 2023 survey results show a more positive trend than the previous year. Firstly, the proportion of experts who believe China's energy consumption has already peaked has doubled from 4% in 2022 to 8% in 2023. Secondly, 53% of the experts believe China will achieve a peak in primary energy consumption before 2030, up from 50% in the 2022 survey. Overall, the percentage of experts leaning towards the belief that China's total primary energy consumption will peak before 2030 has risen from 54% to 61%.

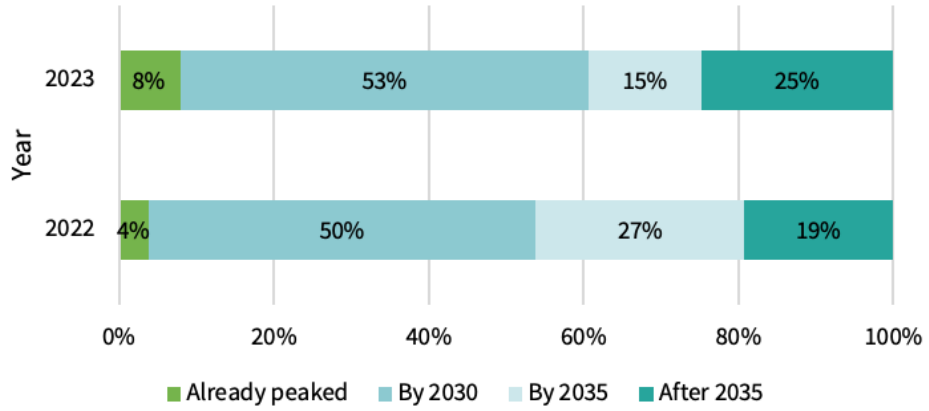


**Figure 6 |** Year of peak primary energy consumption in China

China announced In 2021 that it would strictly control the growth of coal consumption during the 14th Five-Year Plan period (2021-2025) and achieve a gradual reduction in coal consumption during the 15th

Five-Year Plan period (2026-2030), implying that China's coal consumption will peak around 2025[3]. Of the 89 experts we surveyed, 18 believe China's coal consumption has already peaked. However, nearly half (41 out of 89) believe otherwise. Furthermore, 30 experts responded with "Not Sure", as they consider the peaking of coal consumption to be closely related to China's political and economic situation in the coming years.

Twelve experts predict the peak to arrive by 2025, while four predict 2026. Of the 16 who believe coal consumption will peak after 2027, six chose 2028, five chose 2030, and 1 chose 2040. Overall, about one-third of the experts who chose “No” believe that China's coal consumption will peak in 2025. All surveyed experts emphasised that the peaking of coal consumption needs to consider the correlation between energy transition, the global and domestic economic situation in China, and the importance of energy security, sometimes even surpassing control of carbon emissions.

**Table 3 |** Survey results on the year of peak coal consumption in China

| **Do you think China's coal consumption has already peaked?** | | | **Peak year** | |
|---|---|---|---|---|
| Option | Number | Percentage (%) | Year | Number |
| A. Yes | 18 | 20% | 2025 | 12 |
| B. Not Sure | 30 | 34% | 2026 | 4 |
| C. No | 41 | 46% | 2027 | 2 |
| | | | 2028 | 6 |
| | | | 2030 | 5 |
| | | | 2035 | 1 |
| | | | 2038 | 1 |
| | | | 2040 | 1 |
| | | | Uncertain | 9 |

In the 2023 survey, the proportion of experts who believe coal consumption has already peaked increased by 5 points, reaching 20% (see Figure 7). On the other hand, the proportion of experts who believe that China's coal consumption has not yet peaked decreased from 73% in 2022 to 46% in 2023. The percentage of experts answering “not sure” increased significantly from 12% in 2022 to 34% in 2023. Among the experts who believe that the peak has not been reached, this year's survey shows more experts are inclined to think that coal consumption will peak by 2025 (see Table 3 and Figure 8).

However, it's worth noting that the percentage of experts unsure about the year of coal peaking has

[3] Central Government of China. (October 2021). Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy. https://www.gov.cn/zhengce/2021-10/24/content_5644613.htm. Policy.

significantly increased. The 2022 survey results indicated that only 12% of experts were “not sure”, while 2023 saw a substantial increase to 34%. This may be due to increased uncertainty as a result of China's coal policies over the past year.

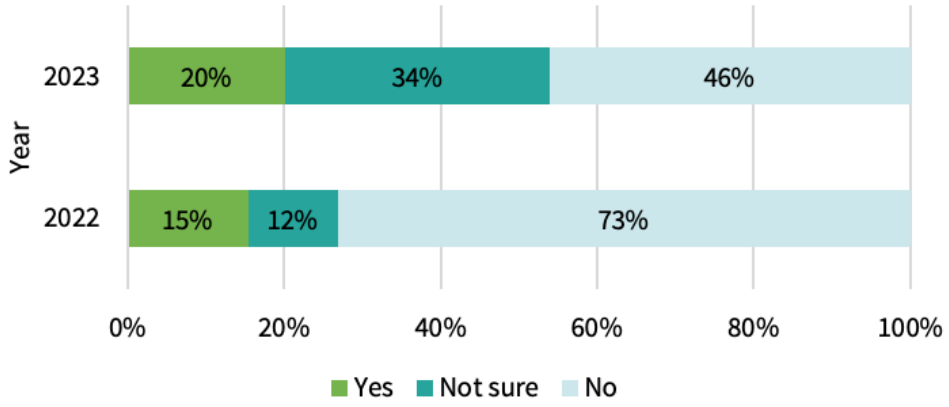


**Figure 7** | Has China's coal consumption peaked?

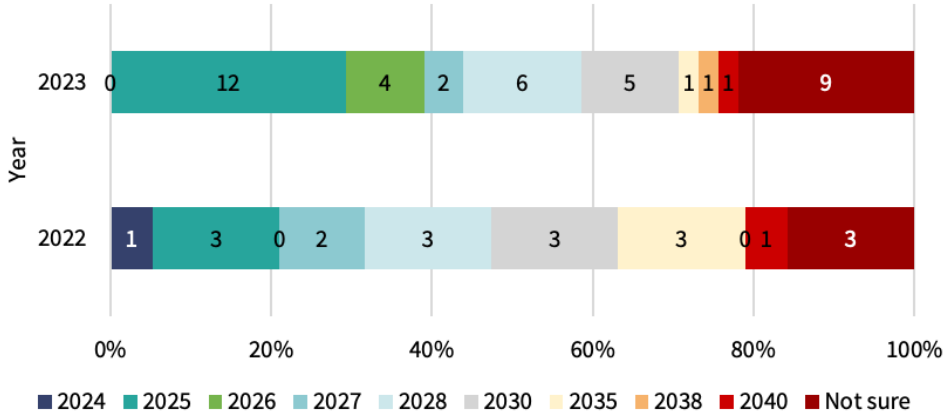


**Figure 8** | Number of responses for different years of coal consumption peaking

# 3. The power sector

The power sector, contributing to 40% of the country's total carbon emissions, plays a crucial role in China's efforts to decarbonise its industries. Yet, opinions vary on when the sector will reach its emissions peak. While 27 experts foresee this happening after 2030, 22 believe it will happen between 2026 and 2030.

Of these 22, 19 provided their predictions for specific years. Among them, seven predicted 2027, five predicted 2028, and another five predicted 2030 - the self-imposed deadline by the Chinese government. One expert predicted 2026, while another predicted 2029.

**Table 4** | Survey results on the peak year of carbon emissions in China's power sector

| **When do you predict China's power sector's carbon dioxide emissions will peak?** | | | **Which would be the possible peak year if it peaks between 2026 and 2030?** | |
|---|---|---|---|---|
| Option | Number | Percentage (%) | Year | Number |
| A. Already peaked | 5 | 6% | 2026 | 1 |
| B. Before 2025 | 35 | 39% | 2027 | 7 |
| C. After 2030 | 27 | 25% | 2028 | 5 |
| D. Between 2026 and 2030 | 22 | 30% | 2029 | 1 |
| | | | 2030 | 5 |
| | | | Uncertain | 3 |

The past two surveys reveal a growing divergence in expert opinions when it comes to peaking carbon emissions in China's power sector. The proportion of experts who believe that carbon emissions in the power sector have already peaked and those who believe the peak will occur after 2030 has increased. On a positive note, 6% of the experts in 2023 believe that China’s power sector has already peaked its carbon emissions, a view that was not held by any experts in 2022. On the other hand, the proportion of the experts in the 2023 survey who believe that China’s power sector will only peak its carbon emissions after 2030 has risen to 30%, up significantly from 19% in 2022. This may reflect a more pessimistic view of some experts regarding the future carbon emissions reduction in the power sector.

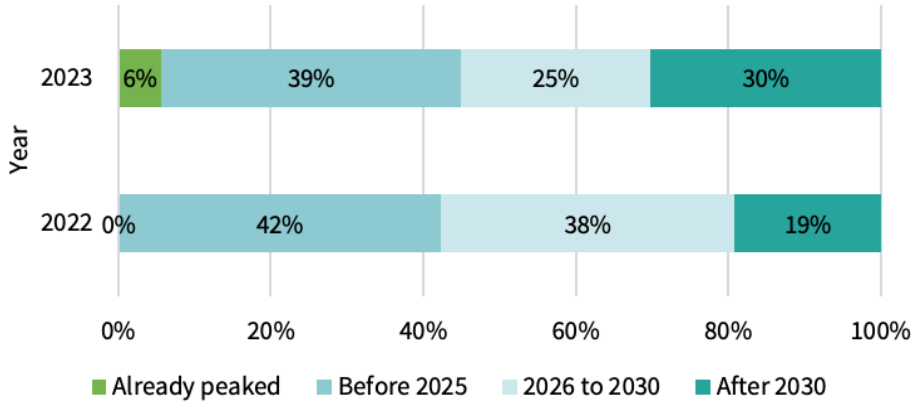


**Figure 9** | Peak year of carbon emissions in China's power sector

# 4. The industrial sectors

The steel industry is the second-largest source of carbon emissions in China. As shown in Table 5, there are varied opinions on when the steel sector would peak in its carbon emissions. Thirteen experts believe that emissions in this industry have already peaked, while 35 experts predict it will peak before 2025. Nearly half of the experts (48 out of 89) express a relatively optimistic view. In addition, 21 experts believe that carbon emissions in the steel industry will peak after 2030, while 20 experts place the peaking time frame between 2026 and 2030. This diversity of viewpoints reflects different expert perspectives on the carbon reduction prospects in the Chinese steel industry, highlighting the challenges and uncertainties this industry faces in emissions reduction.

Further investigation results regarding the experts predicting carbon emissions in the Chinese steel industry peaking between 2026 and 2030 show a certain distribution. Specifically, two experts predict emissions will peak in 2026, 3 experts believe the peak will occur in 2028, 5 experts predict 2029, and 4 experts anticipate carbon emissions will peak in 2030.

**Table 5** | Survey results on the peak year of carbon emissions in China's steel industry

| **When do you predict China's steel industry's carbon dioxide emissions will peak?** | | | **What would be the possible peak year if it peaks between 2026 and 2030?** | |
|---|---|---|---|---|
| Option | Number | Percentage (%) | Year | Number |
| A. Already peaked | 13 | 15 | 2026 | 2 |
| B. Before 2025 | 35 | 39 | 2027 | 0 |
| C. After 2030 | 21 | 24 | 2028 | 3 |
| D. Between 2026 and 2030 | 20 | 22 | 2029 | 5 |
| | | | 2030 | 4 |
| | | | Uncertain | 6 |

The 2023 survey suggested that the decarbonisation of the steel sector has a positive outlook as experts believe that its peak will occur earlier than previously anticipated. Around 15% of experts believe that carbon emissions in the steel industry have already peaked (Option A), compared to 8% the previous year. The 2023 survey revealed a significant increase in experts predicting the steel sector's peak to arrive before 2025, from 27% of those surveyed in 2022 to 39% in 2023. The increase is from those who initially estimated that the Chinese steel industry would peak in 2026-2030. In the 2023 survey results, 22% of experts believe that carbon emissions in the steel industry will peak between 2026 and 2030 (Option D), a significant decrease from 42% in 2022. This suggests that, over the two years, fewer experts hold the view that the peaking time will be delayed until 2026-2030. There is little change when it comes to those predicting the peak to occur after 2030 (Option C), from 23% in 2022 to 24% in 2023.

These results indicate that some experts are more optimistic about the steel industry's emission reduction achievements and the year of its peak. In particular, one-fifth of experts surveyed have brought forward the peaking year by 1-5 years.

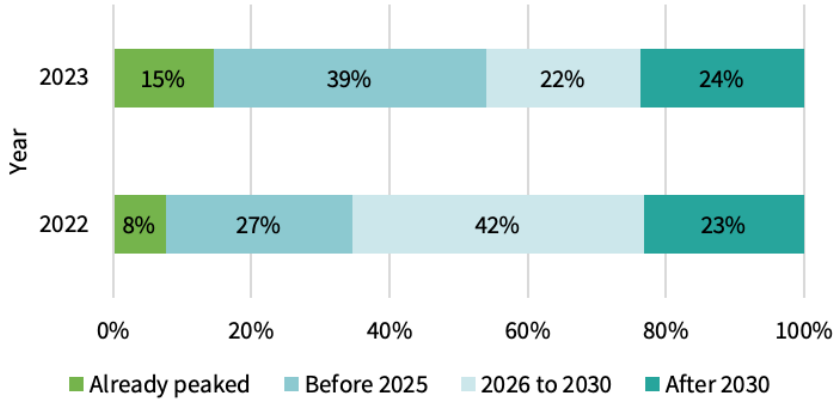


**Figure 10 |** Peak year of carbon emissions in China's steel industry

The cement industry is listed as China's third-largest source of carbon emissions. The 2023 survey results show that nearly 60% of experts believe that carbon dioxide emissions in China's cement industry will peak before 2025; approximately 21% of experts believe that carbon emissions in the cement industry have already peaked, and 38% of experts predict that the peak will occur before 2025. Among the remaining 40%, 17% of experts predict the peak will occur between 2026 and 2030, while 24% of experts believe the peak will occur after 2030.

Of the experts predicting the peak year between 2026 and 2030, none predict it to happen in 2026. However, two experts predict the peak year to be 2027, four experts anticipate 2028, and other two and three experts forecast 2029 and 2030, respectively. Four experts did not provide specific years (Table 6).

**Table 6** | Survey results on the peak year of carbon emissions in China's cement industry

| **When do you predict China's cement industry's carbon dioxide emissions will peak?** | | | **Which would be the possible peak year if it peaks between 2026 and 2030?** | |
|---|---|---|---|---|
| Option | Number | Percentage (%) | Year | Number |
| A. Already peaked | 19 | 21% | 2026 | 0 |
| B. Before 2025 | 34 | 38% | 2027 | 2 |
| C. After 2030 | 21 | 24% | 2028 | 4 |
| D. Between 2026 and 2030 | 15 | 17% | 2029 | 2 |
| | | | 2030 | 3 |
| | | | Uncertain | 4 |

This year's survey has shown increased optimism amongst experts, with 21% believing the cement industry has already peaked in its carbon emissions in 2023, up from 8% last year. Meanwhile, the proportion of experts who think the cement industry will not reach its peak until after 2030 has decreased from 38% in 2022 to 24% in 2023. As for the predictions of peaking before 2025 (Option B) and between 2026 and 2030 (Option C), the proportions of experts remain roughly the same.

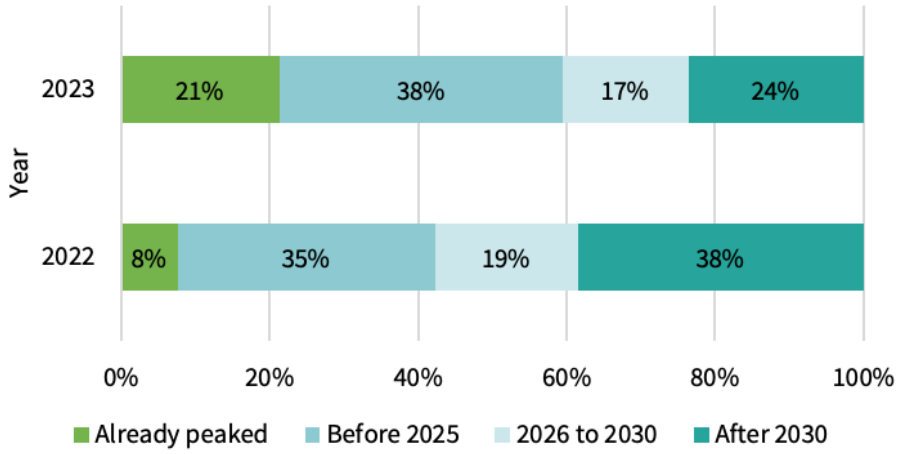


**Figure 11** | The peak year of carbon dioxide emissions in China's cement industry

# 5. The transportation sector

Since the 1980s, China's transportation sector has experienced a sharp increase in passenger and freight vehicles, leading to a significant rise in energy consumption and carbon dioxide emissions. Road transport, which primarily relies on petroleum, is this sector's largest carbon dioxide emissions source. Comprehensive measures need to be taken to reduce carbon dioxide emissions from the transportation sector.

As per the 2023 survey, 37% of the experts believe that the transport sector will reach peak carbon emissions before 2030 (Option A), while 43% predict it to happen between 2030 and 2035 (Option B). Some 15% anticipate peaking between 2035 and 2040 (Option C), while 5% predict after 2045 (Option D) (Table 7). Compared to previous predictions, these results indicate that experts have a more diversified view on the peaking time of carbon emissions in the Chinese transportation sector without a clear consensus, as seen in earlier studies.

**Table 7 |** Survey results on the peak year of carbon dioxide emissions in China's transportation sector

| **When do you predict China's transportation sector's carbon dioxide emissions will peak?** | |
|---|---|
| A. Before 2030 | 33 |
| B. 2030-2035 | 38 |
| C. 2035-2040 | 13 |
| D. 2045 and beyond | 5 |

The survey results in 2023 and 2022 indicate that more experts have brought forward the peak time of carbon dioxide emissions in China's transportation sector. The experts anticipating peaking before 2030 (Option A) significantly increased from 23% in 2022 to 37% in 2023. In contrast, the experts predicting the sector to peak between 2030 and 2035 (Option B) decreased from 50% in 2022 to 43% in the 2023 survey. Meanwhile, the experts forecasting the peaking time between 2035 and 2040 (Option C) also decreased from 19% in 2022 to 15% in the 2023 survey.

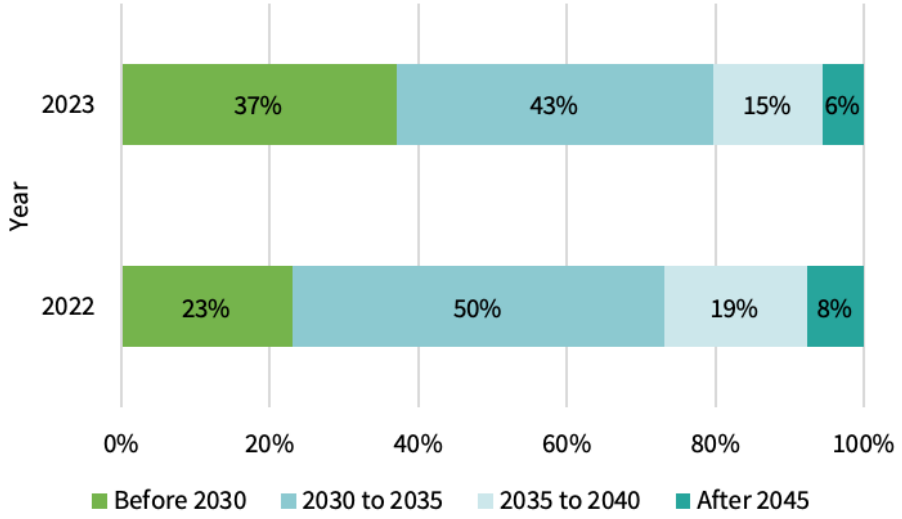


**Figure 12** | Peak years of carbon dioxide emissions in China's transportation sector

# 6. New dynamics

The COVID-19 pandemic has had multifaceted impacts on energy transition. On the one hand, the pandemic slowed economic activities, causing lower energy demand and reducing the capacity to invest in clean energy. On the other hand, government economic stimulus measures have created opportunities to develop clean energy technologies. Empirical research by Li et al. (2022) found that the COVID-19 pandemic increased low-carbon electricity generation and accelerated the transition to low-carbon energy sources. The IEA predicts that investment in clean energy technologies will be nearly twice that of fossil fuels by 2023. Considering the power shortages the country faced the last two years, we included two questions to understand expert opinions and recommendations for the energy transition.

Experts hold differing views on the impact of the post-pandemic economic situation in China on the energy transition process. Over half (51%) of the experts believe that the post-pandemic economic situation will accelerate the energy transition, possibly because some low-carbon trends, such as decreased carbon emissions and increased renewable energy adoption, emerged during the pandemic. However, 34% of experts are concerned that the current economic situation will slow the energy transition, possibly considering that economic development may be prioritised over low-carbon energy transition. Additionally, 9% of experts believe that the economic situation will not affect the energy transition, and 7% are unsure. This may reflect the high uncertainty level in China's current economic situation, making it difficult to accurately predict the specific impact on the future of the energy transition.

**Table 8 |** Survey results on the impact of China's post-pandemic economic situation on the energy transition process

| **How do you think the economic situation in China after the pandemic will affect the energy transition process?** | | |
|---|---|---|
| A. No impact | 8 | 9% |
| B. Accelerate the energy transition | 45 | 51% |
| C. Slow down the energy transition process. | 30 | 34% |
| D. Unclear | 6 | 7% |

Regarding the question of whether China's "dual carbon" strategy and goals need adjustment, The majority of the experts surveyed (65%) suggest adhering firmly to "dual carbon goals" while adapting implementation strategies and action plans to changing circumstances. Additionally, 9% of experts believe that the strategy and goals should be executed resolutely, unaffected by the economic conditions. Notably, 12% of the experts believe that goals could be moderately reduced to support economic development, probably reflecting their concern for economic growth. Moreover, 8% (7 experts) suggest that even more ambitious targets should be set.

**Table 9 |** Survey results on views or recommendations regarding China's "dual carbon" strategy and goals

| **"What are your thoughts or suggestions regarding China's "dual carbon" strategy and goals?** | | |
|---|---|---|
| A. Moderately lower the goals to promote economic development. | 11 | 12% |
| B. Keep commitment to the goals but be prepared to make adaptive adjustments in the implementation of strategies and action plans. | 58 | 65% |
| C. The strategy and objectives remain steadfast, and strategies and actions should not be swayed by economic conditions | 8 | 9% |
| D. Perhaps we can consider more ambitious goals | 7 | 8% |
| E. No suggestion | 5 | 6% |
| F. Other opinions | 0 | 0% |