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INTERNATIONAL SOCIETY FOR ENERGY TRANSITION STUDIES

2024 China Climate Transition Outlook: Expert Survey

A report prepared for Centre for Research on
Energy and Clean Air (CREA)



1 Introduction

China's "dual carbon" goals have now entered their fourth year of implementation. To provide an in-depth analysis of China's current progress toward these goals and forecast future trends, we designed and conducted a comprehensive survey among leading experts. The primary objective of this survey is to compare relevant data from 2022, capturing significant changes in specific fields or issues to offer scientific insights and decision-making support for China's "dual carbon" strategy.

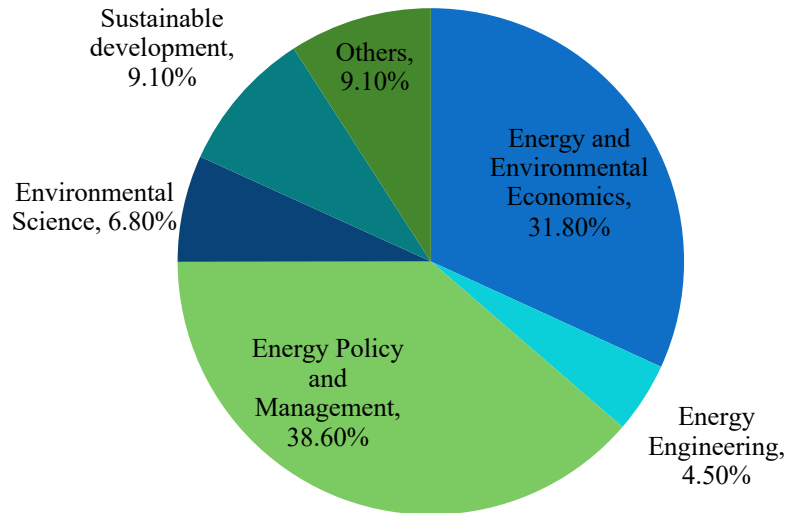
In this survey, we invited 78 distinguished experts and industry leaders from various fields who are actively engaged in the forefront of China's "dual carbon" initiatives, both domestically and internationally. The participants come from a diverse range of backgrounds, including universities, research institutions, government agencies, and executive roles in the energy and sustainable development sectors. This breadth ensures the survey results are both broadly representative and authoritative.

We used the same questionnaire as in 2023 and distributed it online to each invited expert. The survey covers a wide array of topics, including expectations for China's carbon dioxide emissions peak and total energy consumption, as well as projected carbon emissions across critical sectors such as power, industry, construction, and transportation.

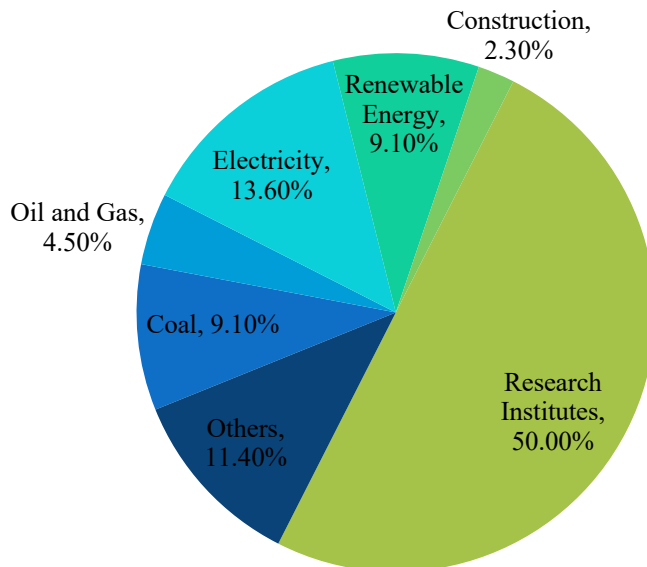
In total, 44 valid responses were received, with 33 from domestic experts and 11 from international experts. About one-third of these experts were involved in the previous surveys. The respondents are primarily specialists in the field of energy-environmental economics, with a diversity of professional backgrounds and a strong academic foundation. Notably, 38.6% of the respondents selected "Energy Policy and Management" as their primary area of expertise, reflecting the field's critical importance in advancing the "dual carbon" agenda (see Figure 1).

Additionally, the industry backgrounds of the surveyed experts are varied, covering higher education, coal, power, renewable energy, and oil and gas sectors. Half of the respondents come from the service sector (including education, research, and think tanks), the largest represented group. The respondents are affiliated with a range of institution types, including academic institutions, consulting firms, and energy industries (such as power, oil, and gas), with 50% from research institutions/universities representing the highest proportion.

Fields of expertise



Sector



Types of affiliation

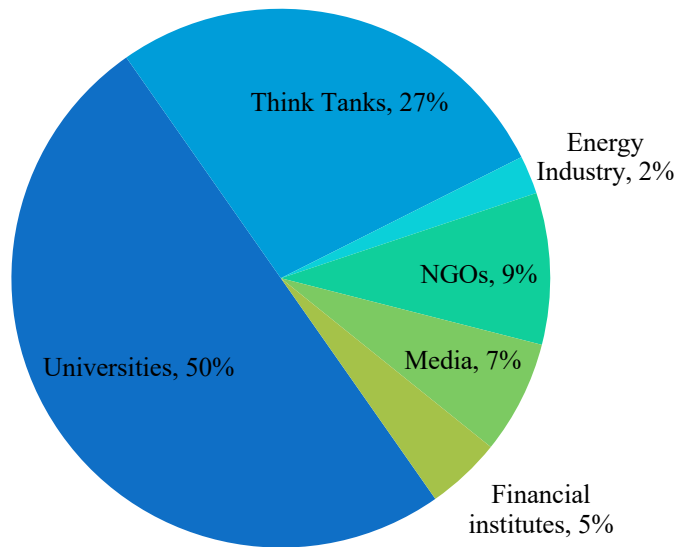


Figure 1 : Composition of participating experts

2 Total emissions of carbon dioxide

Among the experts surveyed in 2024, the vast majority (over 70%) expressed confidence that China can achieve its carbon peak target by 2030. Specifically, ten experts believe that China’s carbon emissions have already reached the Peak, while nine predict that China will reach its peak by 2025.

Notably, 14 experts (31.8% of total respondents, representing the highest proportion across options) selected "between 2026 and 2030" as their estimated timeframe for reaching the peak. This suggests that many respondents anticipate China will hit its emissions peak within this five-year window. Further analysis shows that among those choosing "between 2026 and 2030," most experts predict the peak will likely occur sometime between 2028 and 2030 (see Table 1 for details).

Table 1 China’s CO₂ Emissions Peaking Year: Survey Results

When do you predict China’s total CO ₂ emissions will peak			If the peak is expected to occur between 2026 and 2030, which specific year within this range do you consider most likely?		
Options	Number of experts		Peak year	Number of experts	
	2023	2024		2023	2024
A. Already at the peak	2	10	2026	2	0
B. Before 2025	17	9	2027	3	2
C. Between 2026 and 2030	45	14	2028	14	5
D. After 2030	25	11	2029	10	3
			2030	13	4
			Not sure	3	0

Compared to the survey results from the past two years, experts' perspectives and predictions regarding China’s CO₂ emissions show a continuous and positive shift. Specifically, the proportion of experts who believe that China’s CO₂ emissions will peak by 2025 has increased significantly, rising from 15% in 2022 to 21% in 2023 and reaching 44% in 2024. Notably, in the 2024 survey, 10 experts indicated that China’s CO₂ emissions may have already reached the Peak, a substantial increase from just 2 experts with this optimistic outlook in 2023 (see Figure 2).

Moreover, experts displayed a high level of confidence in China’s peaking timeline: 54.5% of respondents felt “somewhat confident,” while 18.2% were “very confident,” together making up over 70% of the responses. This reinforces the positive results of China’s "dual carbon" strategy and the broad endorsement

from experts. Only 2.3% of respondents indicated “no confidence,” highlighting the strong conviction among the majority of experts regarding China’s ability to achieve its emissions targets (see Figure 3).

On the other hand, the number of experts predicting that China’s CO₂ emissions will peak after 2030 has decreased, dropping from 31% in 2022 to 28% in 2023, and further to 25% in 2024. When combined with the increased confidence levels, this trend not only reflects growing expectations for China’s emissions targets but also signals stronger confidence in the government’s enhanced emissions reduction measures. In summary, the experts’ perspectives and predictions indicate that China is moving forward with greater clarity, optimism, and confidence in addressing the challenges of climate change.

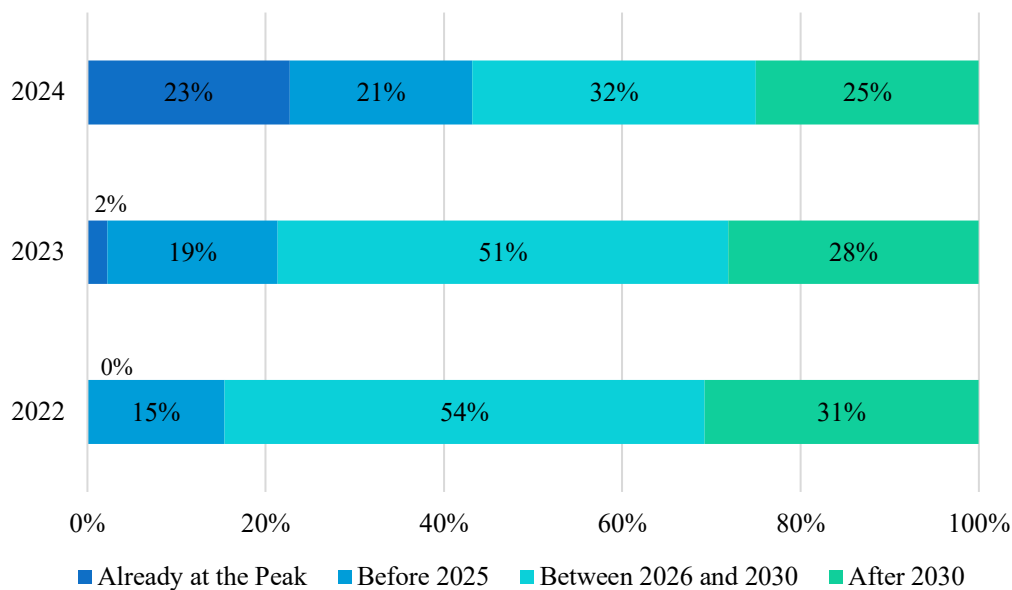


Figure 2 : The peak year of China’s carbon emissions

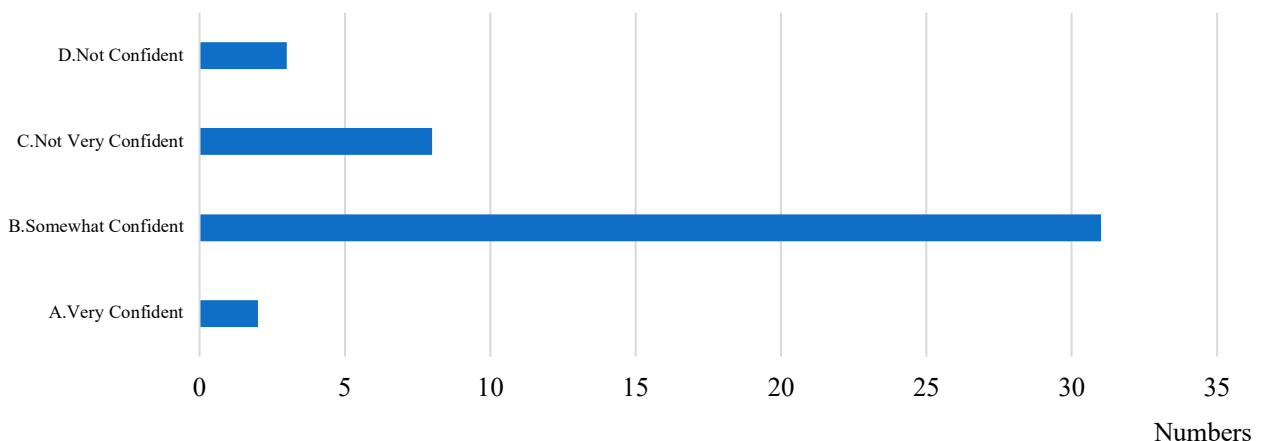


Figure 3 : Confidence in the predicted year for CO₂ emissions peaking

In the 2024 survey, the vast majority of experts (three-quarters) believe that it is feasible for China to achieve its carbon peak. Regarding the peak level of CO₂ emissions, 44% of experts predict that the peak level will exceed China’s 2020 CO₂ emission levels by more than 15%, a significant decrease from the percentages in 2023 and 2022 (see Figure 4). This indicates that more experts are optimistic about China’s prospects for controlling emission growth.

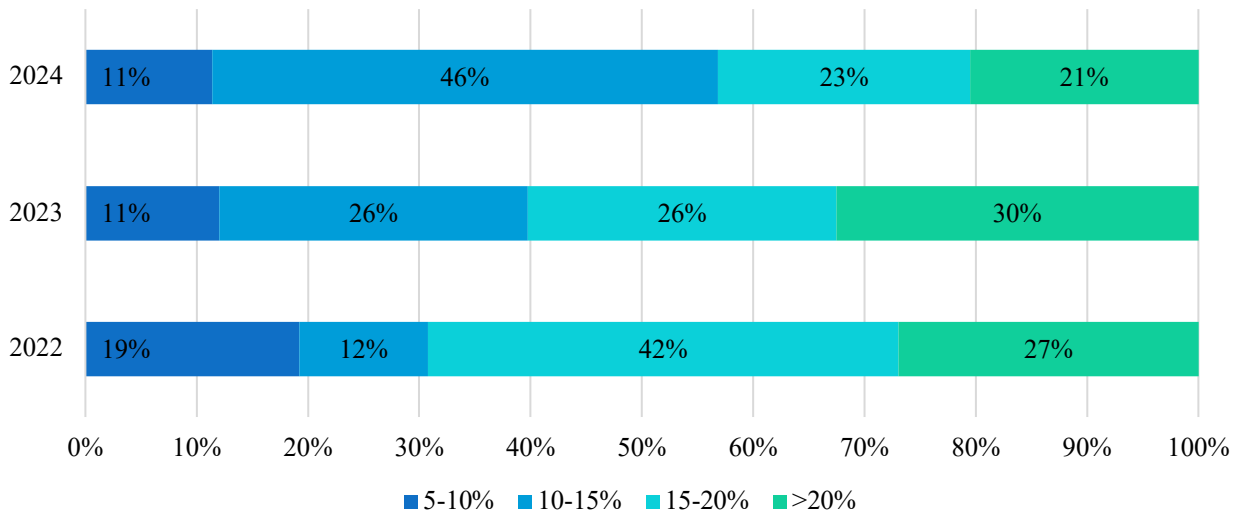


Figure 4: CO₂ emissions levels at peak

3 Primary energy and coal consumption

Among the 44 experts surveyed, more than half believe that China’s primary energy consumption will peak before 2030 (see Table 2). This view not only reflects the experts’ optimistic outlook on China’s progress in controlling energy consumption growth, but also their confidence in the government’s efforts in advancing energy transition and energy-saving policies. Meanwhile, 9 experts adopt a more cautious stance, predicting that primary energy consumption will peak around 2035. This forecast may be based on an analysis of China’s continued economic growth and long-term energy demand trends, as well as the potential lag effects of energy structure adjustments and technological advancements.

However, it is worth noting that 10 experts remain conservative about the future growth of China’s primary energy consumption. They believe that, after 2030, China’s primary energy consumption will continue to grow. This view may stem from expectations of China’s ongoing economic development and concerns about the unavoidable energy demand increases associated with industrialization and urbanization. These experts may think that despite China’s active efforts in energy transition and emissions reduction, the pressures of economic development will sustain energy demand growth for some time.

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

When do you expect China's total primary energy consumption to peak?		
Options	Number of experts	
	2023	2024
A. Already at the Peak	7	5
B. By 2030	47	20
C. By 2035	13	9
D. After 2035	22	10

The 2024 survey results regarding the peak time of China's total primary energy consumption clearly show a divergence in expert opinions. On one hand, some experts remain optimistic, with the proportion of those believing China’s energy consumption has already reached the Peak continuing to rise, from 4% in 2022 to 8% in 2023, and 11% in 2024. At the same time, although the proportion of experts predicting that China's primary energy consumption will peak after 2035 has slightly decreased compared to the previous two years (from 19% in 2022 to 25% in 2023, and slightly down to 23% in 2024), it still represents a significant proportion, indicating that some experts have a more delayed view on the peak of China's energy

consumption.

On the other hand, while the majority of experts continue to hold an optimistic view that China’s primary energy consumption will peak before 2030, a growing number of experts now expect the peak to occur between 2030 and 2035. This proportion has risen sharply from 15% in 2023 to 21% in 2024.

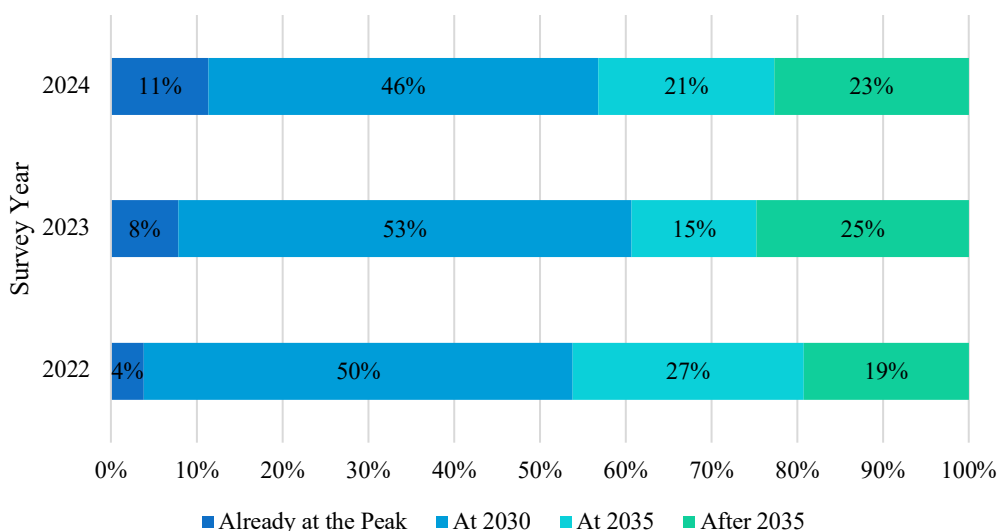


Figure 5 : Year of peak primary energy consumption in China

China has clearly announced that during the 14th Five-Year Plan period, it will strictly control the growth of coal consumption, with gradual reductions expected in the 15th Five-Year Plan period. This policy direction suggests that China’s coal consumption may peak around 2025. To address this issue, we interviewed 44 experts this year, gathering a range of perspectives. Specifically, 16 experts (36%) believe that China's coal consumption has already reached the Peak. However, an equal number of 16 experts take a more cautious view, suggesting that China's coal consumption has not yet reached its peak. Additionally, 12 experts (27%) expressed uncertainty, stating that the timing of the peak in coal consumption is closely linked to China’s political and economic developments in the coming years. This perspective underscores the uncertainty surrounding the peak of coal consumption and the need to consider multiple factors to make an accurate prediction.

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

Do you think China’s coal consumption has already reached the peak?			Peak year		
Options	Number of experts		Year	Number of experts	
	2023	2024		2023	2024
A. Yes	18	16	2025	12	7
B. Not sure	30	12	2026	4	0
C. No	40	16	2027	2	0
			2028	6	2
			2029	0	1
			2030	5	4
			2035	1	2
			2038	1	0
			2040	1	0
			Not sure	8	0

Compared to the survey results from the past two years, the current expert opinions on the timing of China's coal consumption peak show a more concentrated trend. Specifically, the proportion of experts who believe that China's coal consumption has already reached the Peak significantly increased, from 20% in 2023 to 36% in 2024 (see Figure 6). This increase indicates that an increasing number of experts now recognize that China’s coal consumption has either already reached the Peak or will soon do so. Meanwhile, the proportion of experts who believe that China’s coal consumption has not yet reached the Peak has shown a declining trend. Starting at 73% in 2022, this proportion decreased to 45% in 2023 and further dropped to 36% in 2024. This change reflects the growing consensus among experts regarding the downward trend in China's coal consumption, suggesting that the peak may be imminent.

It is also worth noting that the proportion of experts uncertain about the year of coal consumption peak has decreased compared to the previous year. In the 2023 survey, 34% of experts expressed uncertainty about the timing of the peak, but in 2024, this proportion dropped to 27%. This shift suggests that, with the continued implementation of China’s energy transition policies and the gradual effectiveness of coal consumption control measures, expert opinions on the timing of the coal consumption peak are becoming

more unified and clearer.

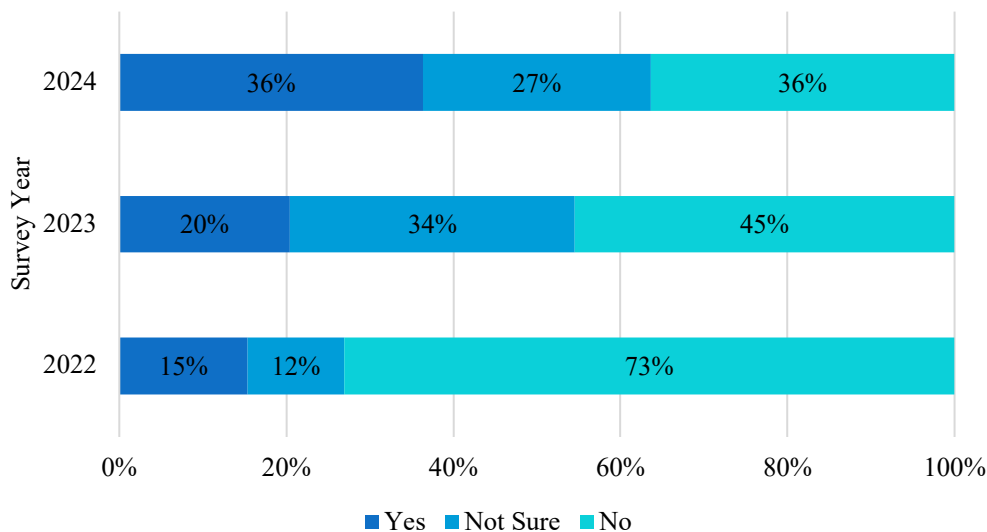


Figure 6: Has China’s coal consumption reached the peak?

Similar to last year's survey results, among experts who believe that coal consumption has not yet peaked, more tend to think that it will peak by 2025 (see Table 3 and Figure 7).

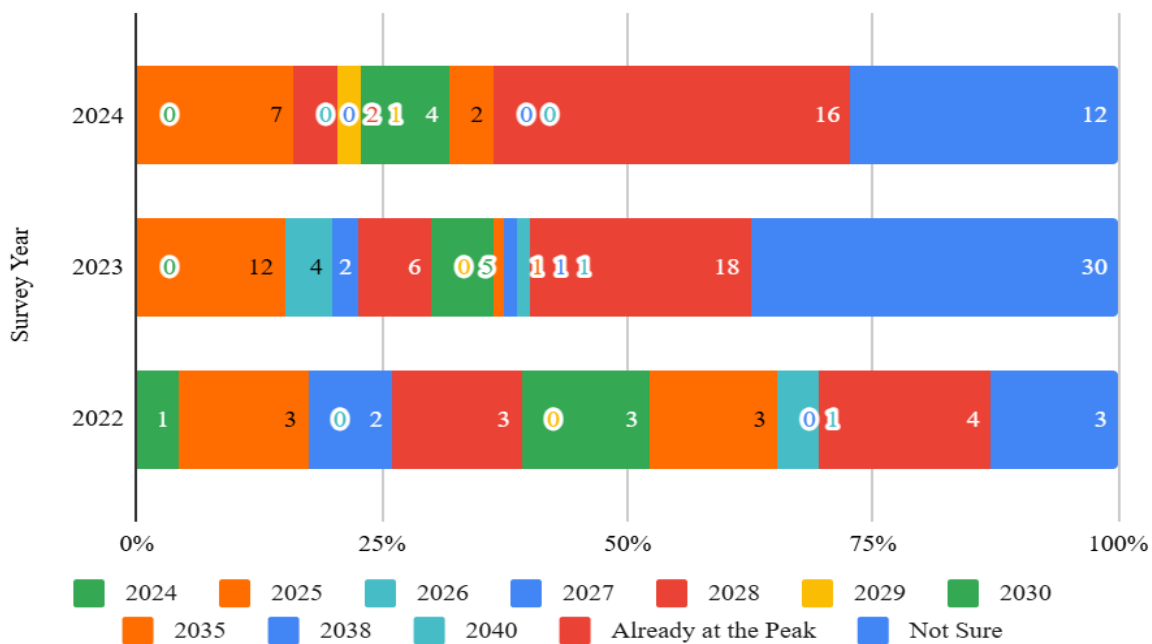


Figure 7: Number of responses for different years of coal consumption peak

4. The power sector

The importance of the power sector in China’s carbon reduction efforts is undeniable, as it accounts for approximately 40% of the country's total emissions and is one of the major sources of carbon dioxide emissions. At the same time, the power sector plays a crucial role in the decarbonization of other sectors. However, experts’ predictions regarding the timing of the peak in carbon emissions from the power sector show some differences. According to the survey results, nearly one-third (13 experts) predict that China’s power sector will reach its carbon emission peak after 2030. This forecast suggests that, despite the Chinese government's implementation of a series of emission reduction measures in the power sector, experts believe that carbon emissions in the sector will continue to rise for some time before reaching their peak. Meanwhile, four experts predict that the peak in carbon emissions from the power sector will occur between 2026 and 2030 (see Table 4).

Table 4 : Survey results on the peak year of carbon emissions in China’s power sector

When do you predict CO ₂ emissions in China’s power sector will peak?			Peak year		
Option	Number of experts		Year	Number of experts	
	2023	2024		2023	2024
A. Already reached the peak	5	5	2026	1	0
B. Before 2025	35	22	2027	7	1
C. Between 2026 and 2030	22	4	2028	5	3
D. After 2030	27	13	2029	1	0
			2030	5	0
			Not sure	3	0

The survey results on carbon dioxide emissions from China's power sector have shown a growing consensus among experts over the past two years. Specifically, the proportion of experts predicting that the power sector will reach its carbon emission peak before 2030 has remained around 70%. Notably, in the 2024 survey, 11% of experts firmly stated that the power sector’s carbon emissions have already reached the Peak, nearly doubling the 6% reported in 2023. This significant change not only reflects experts’ recognition of the progress made in carbon reduction within the power sector but also indicates their

optimistic expectations for continued emissions reductions in the future.

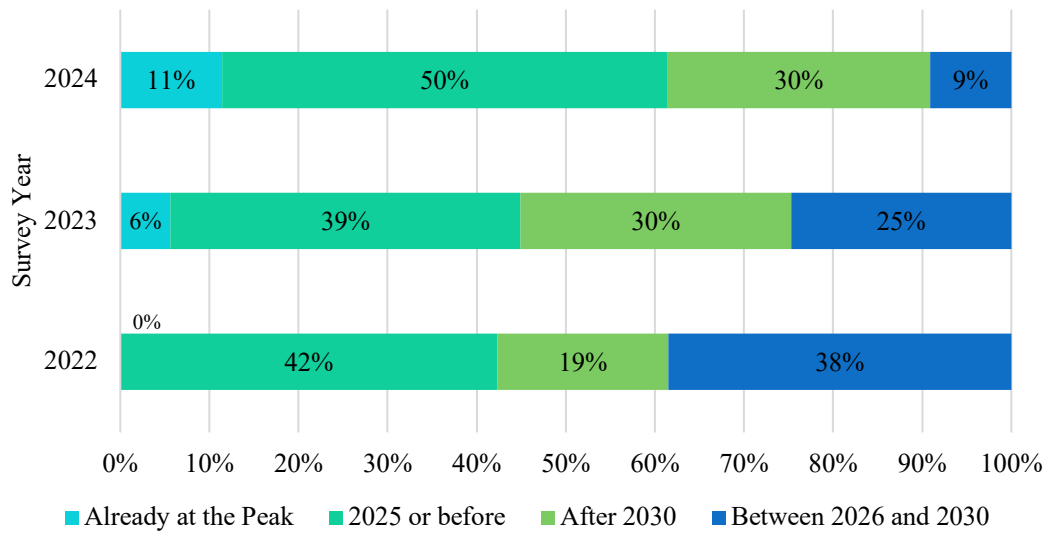


Figure 8: Peak year of CO₂ emissions in China's power sector

5. The industrial sectors

The steel industry is China's second-largest source of carbon emissions. As shown in Table 5, expert predictions about the timing of peak carbon emissions from China's steel industry are gradually converging. Specifically, 12 experts (27%) believe that the industry's carbon emissions have already reached the Peak, while 18 experts (41%) predict that the peak will occur before 2025. This data indicates that the majority of experts hold an optimistic view.

Additionally, 10 experts take a more cautious stance, predicting that carbon emissions from the steel industry will peak after 2030, while 4 experts forecast that the peak will occur between 2026 and 2030. These varied opinions not only reflect different perspectives on the prospects for carbon reduction in China's steel industry but also highlight the challenges and uncertainties the industry faces in the process of emissions reduction.

It is noteworthy that even among those predicting the peak to occur between 2026 and 2030, there is a tendency to expect the peak to occur earlier within that timeframe. Specifically, 2 experts predict that carbon emissions will peak in 2026, with one expert each forecasting peaks in 2027 and 2028.

Table 5; Survey results on the peak year of CO₂ emissions in China's steel industry

When do you predict CO ₂ emissions in China's steel industry will peak?			If the peak is expected to occur between 2026 and 2030, which specific year within this range do you consider most likely?		
Option	Number of experts		Peak year	Number of experts	
	2023	2024		2023	2024
A. Already reached the peak	13	12	2026	2	2
B. Before 2025	35	18	2027	0	1
C. Between 2026 and 2030	20	4	2028	3	1
D. After 2030	21	10	2029	5	0
			2030	4	0
			Not sure	6	0

As shown in Figure 8, compared to 2023, the 2024 survey results on the peak carbon emissions timeline for China's steel industry reveal a more optimistic outlook among experts regarding the industry's emissions reduction efforts and future development. Specifically, in the 2024 survey, 27% of experts believe that carbon emissions from the steel industry have already reached the Peak, a significant increase from 15% in 2023. Meanwhile, the proportion of experts predicting that the industry will reach its carbon emissions peak before 2025 also rose to 41%, surpassing 39% in 2023 and 27% in 2022.

In the 2024 survey, the proportion of experts predicting that the peak will occur between 2026 and 2030

significantly decreased to 9%, a sharp decline from 42% in 2022 and 22% in 2023. This reflects a general shift in experts' expectations for the peak to occur earlier. The proportion of experts predicting the peak will occur after 2030 remained relatively stable at 23%, compared to 24% in 2023, showing little change.

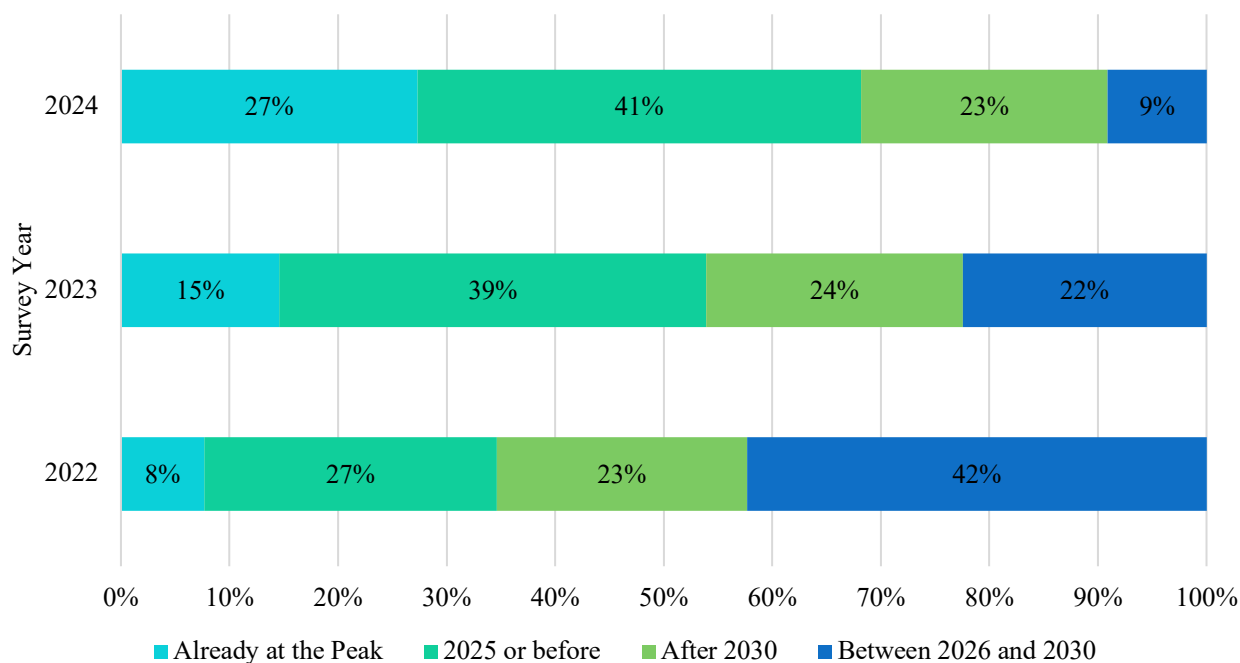


Figure 9 : Peak year of CO₂ emission in China's steel industry

The cement industry is ranked as China's third-largest carbon emitter. As shown in Table 6, the 2024 survey revealed that over 70% of experts (31 experts) believe that carbon emissions from China's cement industry will peak before 2025. Specifically, 20 experts think the industry's emissions have already reached the Peak, while 11 experts predict the peak will occur before 2025. Further research into the experts who predicted the peak would occur between 2026 and 2030 shows that none of them expect the peak to occur in 2027. However, 2 experts forecast the peak to occur in 2028, 1 expert in 2029, and another expert predicts it will occur in 2030.

Table 6 : Survey results on the peak year of CO₂ emissions in China’s cement industry

When do you predict CO ₂ emissions in China’s cement industry will peak?			If the peak is expected to occur between 2026 and 2030, which specific year within this range do you consider most likely?		
Option	Number of experts		Peak year	Number of experts	
	2023	2024		2023	2024
A. Already reached the peak	19	20	2026	0	0
B. Before 2025	34	11	2027	2	0
C. Between 2026 and 2030	15	4	2028	4	2
D. After 2030	21	9	2029	2	1
			2030	3	1
			Not sure	4	0

A comparison of the 2024 and 2023 surveys on the peak timing of carbon emissions in China’s cement industry reveals a more optimistic view among experts regarding the industry’s carbon reduction progress and actual peak timing, particularly regarding the likelihood of peaking before 2025. Notably, in the 2024 survey, 46% of experts believe that carbon emissions from the cement industry have already reached the peak, a significant increase from 21% in 2023. This increase is mainly attributed to the shift in perspective of experts who originally predicted the peak would occur after 2030. In 2024, only 9% of experts held this

view, a significant decrease compared to 38% in 2022.

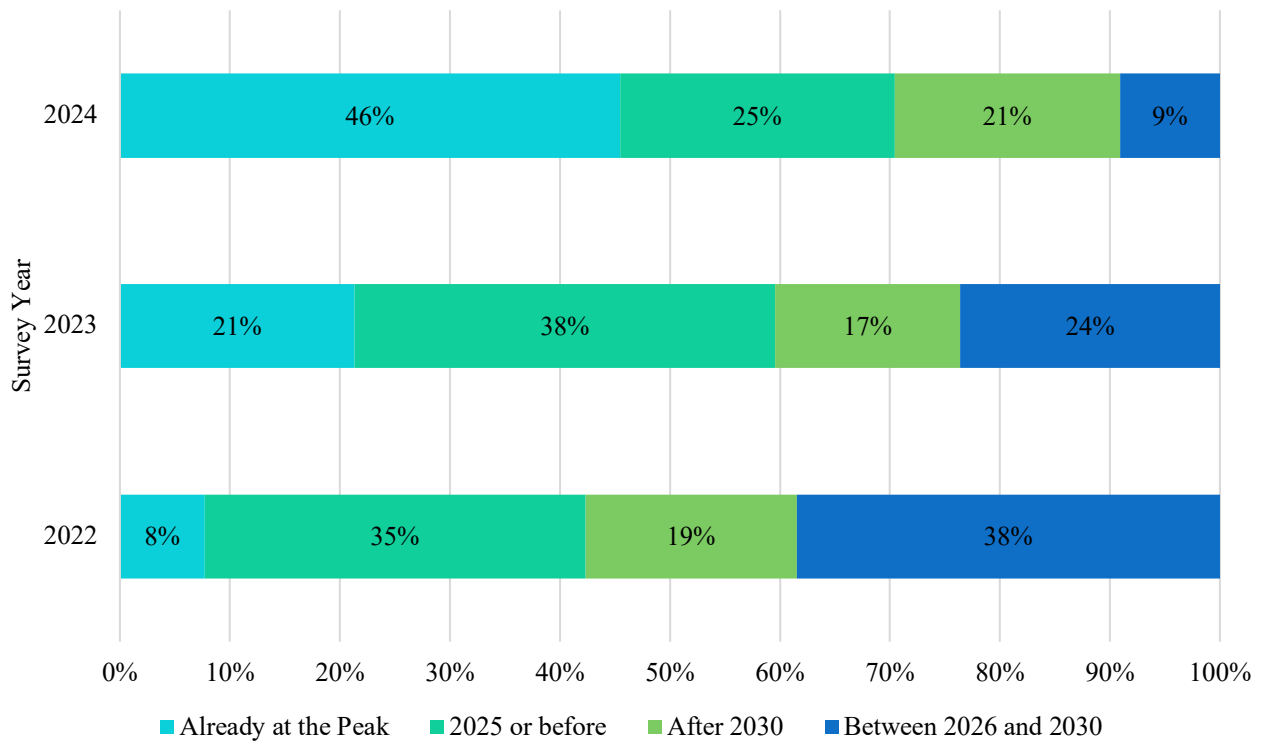


Figure 10 : Peak year of CO₂ emission in China's cement industry

6. The transport sector

Since the 1980s, China’s transportation sector has witnessed a dramatic increase in the number of passenger and freight vehicles, directly leading to a significant rise in energy consumption and carbon dioxide emissions. Among these, road transport, as the largest source of carbon emissions in the sector, remains heavily dependent on fossil fuels. To effectively reduce carbon emissions in the transportation sector, a series of comprehensive measures must be implemented.

As shown in Table 7, the 2024 expert survey reveals that 21 experts (48%) believe that carbon emissions from China’s transportation sector will peak before 2030. Meanwhile, 20 experts (46%) predict that the peak will occur between 2030 and 2035. In contrast, only a few experts (3) believe that the peak will occur between 2035 and 2040, and none of the experts predict that the transportation sector will reach its peak after 2040.

Table 7 : Survey results on the peak year of CO2 emissions in China’s transport sector

When do you predict CO2 emissions in China’s transport sector will peak?		
Option	Number of experts	
	2023	2024
A. Before 2030	33	21
B. Between 2030 and 2035	38	20
C. Between 2035 and 2040	13	3
D. After 2040	5	0

Compared to previous predictions, these results indicate a more optimistic outlook from experts regarding the peak timing of carbon emissions in China’s transportation sector. The 2024 survey results, in contrast to 2023, show a notable shift towards earlier peak predictions. The proportion of experts who believe the peak will occur before 2030 has significantly increased from 37% in 2023 to 48% in 2024. The percentage of experts predicting that the peak will occur between 2030 and 2035 remains relatively stable. Additionally, the proportion of experts predicting that the peak will occur between 2035 and 2040 has decreased from 15% in 2023 to just 7% in 2024.

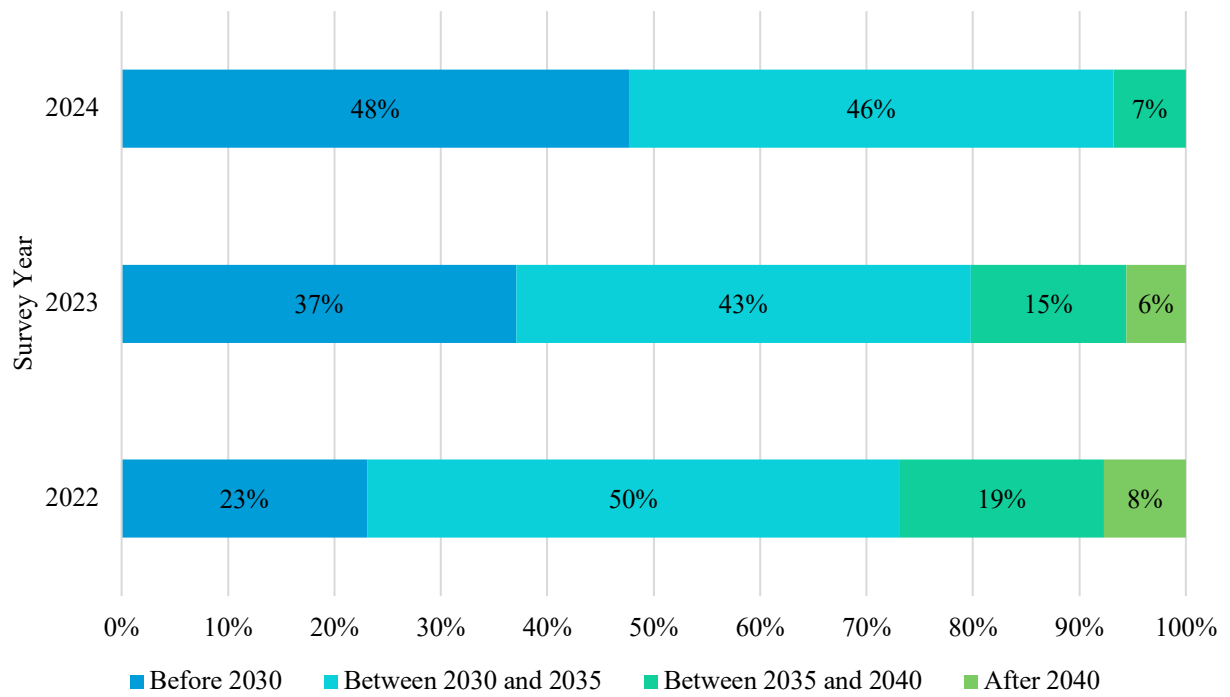


Figure 11 : Peak year of CO₂ emission in China's transport sector

7. New dynamics

In 2024, experts have expressed divergent views on how the post-pandemic economic situation in China will affect the energy transition process. More than half (52%) of the experts believe that the economic conditions following the pandemic will accelerate the energy transition. This optimism may stem from the emergence of low-carbon trends during the pandemic, such as the reduction in demand for high-carbon industrial products like cement due to a tightening real estate sector, the rapid development of the renewable energy industry, and the national policy emphasis on developing green "new productive forces."

However, 43% of experts are concerned that the current economic conditions will slow down the energy transition process. This view likely considers that economic development may be prioritized over low-carbon energy transformation, with fossil fuels being relied upon for energy security. Additionally, one expert believes the economic situation will not have an impact on the energy transition, and another expert expressed uncertainty. This suggests that, given the significant uncertainties in China's current economic situation, it is challenging to accurately predict the specific effects on 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?		
	Number of experts (%)	
	2023	2024
A. No impact	8 (9%)	1 (2%)
B. Accelerate the transition	45 (51%)	23 (52%)
C. Slow down the transition	30 (34%)	19 (43%)
D. Not sure	6 (7%)	1 (2%)

In 2024, experts' opinions on whether China's "dual carbon" strategy and goals need to be adjusted are relatively consistent. The majority (71%) of experts recommend maintaining the "dual carbon" goals without wavering, while making adaptive adjustments to the implementation strategies and action plans. This suggests that, in achieving the "dual carbon" goals, it is important to assess the situation and adjust the

pace based on actual circumstances, ensuring that the progress is appropriately managed.

However, 16% of experts believe that the goals could be moderately lowered to facilitate economic development, reflecting their concern for economic growth. Additionally, 11% of experts propose setting more ambitious targets, indicating a belief in the need for more aggressive actions toward achieving carbon reduction.

Table 9 : Survey results on how to progress China's "dual carbon" goals

What are your thoughts on how to better progress China's dual carbon goals		
	Number of experts (%)	
	2023	2024
A. Prioritise economic development in the short-term	11 (12%)	7 (16%)
B. Be prepared to make adaptive adjustments in the implementation of strategies and action plans	58 (65%)	31 (71%)
C. The strategy and objectives remain steadfast, and strategies and actions should not be swayed by economic conditions	8 (9%)	0 (0%)
D. Perhaps we can consider more ambitious goals	7 (8%)	5 (11%)
E. No suggestion	5 (6%)	1 (2%)

Compared to last year's survey, there has been an increase in viewpoints advocating for accelerating the energy transition process, rising from 34% to 43% (see Figure 12). This trend is likely explained by the growing contribution of clean energy sectors to driving economic growth. Additionally, the proportion of experts suggesting a more flexible approach to implementing carbon neutrality goals has increased from 65% in the 2023 survey to 71% in 2024 (see Figure 13). This is likely due to China's energy transition entering a more challenging phase, where significant and complex changes are required to reconfigure the entire energy system. As such, a more flexible approach is essential to ensure further progress in the transition.

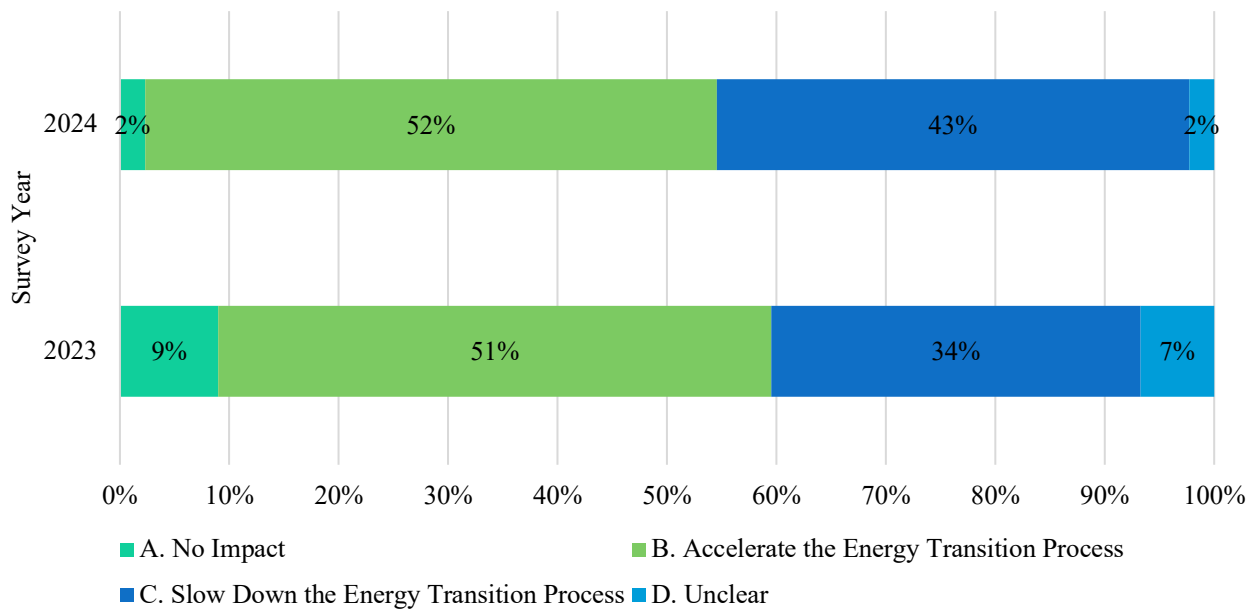


Figure 12: Impact of economic conditions on energy transition

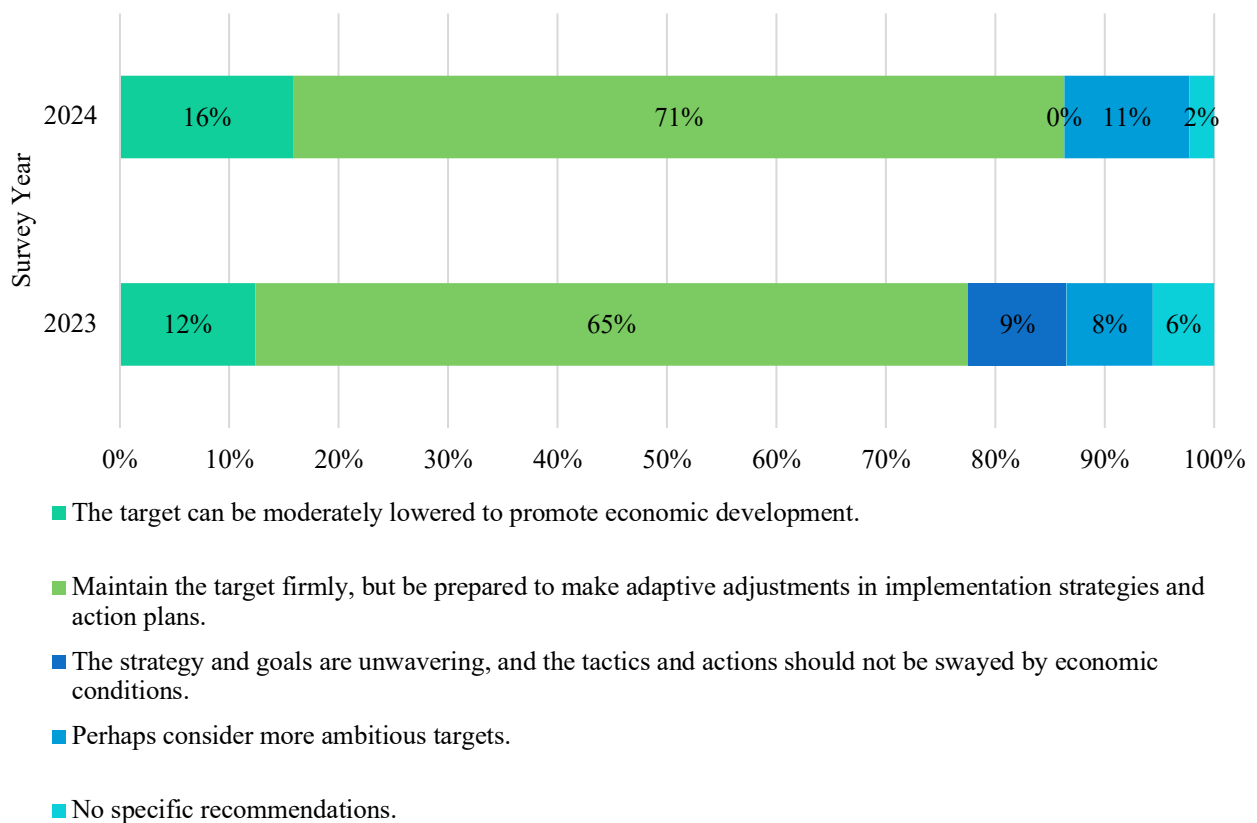


Figure 13: Suggestions for the “dual carbon” goals