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The Development and Challenges of Ecological & Environmental Think Tank in China

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Forward »

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Since its opening-up and reform, China has been in the process of rapid economic development with its people enjoying an increasingly improved standard of life. Meanwhile accompanying this dramatic economic growth is the degradation of environment which has, to some extent, damaged the gains of the opening-up and reform and prevented the economy from a healthy and sustainable development. The Chinese government is increasingly aware of that without addressing the environmental issues it is facing now, will jeopardize its long term goal of the great rejuvenation of the Chinese nation. Given the magnitude and complexity of the environmental issues in China, there is no easy way in addressing them and the solution to them entails an equal priority being given to environmental protection, ecological conservation and economic development or even higher than the latter by mainstreaming the former into the overall socio-economic decision-making

process. As a matter of fact, China has been in the struggle against environmental pollution since the very beginning of its economic take-off and trying to explore a pathway that could help address China's environmental issues in the way most suitable to China's specific circumstances.

In recent years, especially since the 12th Five-Year Plan period, the enhanced measures including legislation, policy, regulatory and economic means have been taken by the Chinese government in dealing with environmental problems, of which environmental policies have played an important role in this regard. Corresponding to this situation and in meeting the demand of governments at different levels for environmental policy tools, the environmental policy research projects on topics of a wide range have been conducted by some Chinese environmental research institutions including the Chinese Academy of Environmental Planning (CAEP).

CAEP founded in 2001, is a research advisory body supporting governments in the development of key environmental planning, national environmental policies, and major environmental engineering projects. In the past more than 10 years, CAEP has accomplished the development of the overall planning of national environmental protection for the 10th, 11th and 12th Five-Year Plan periods; water pollution prevention and control planning for key river basins; air pollution prevention and control planning for key regions; soil pollution prevention and control planning; and some regional environmental protection plans. In the same period of time, CAEP also actively engaged in research on such topics as green GDP, environmental taxation, emission trading, ecological compensation, green financing, etc. By so doing, CAEP has become an indispensable advisory body in the environmental decision-making in mainland China. According to *2013 Global Go To Think Tanks Report and Policy Advice* published by University of Pennsylvania, CAEP was ranked 31 in the field of environment in the world. Many of CAEP's research results and project outcomes regarding environmental policies have drawn great attention of decision makers and international institutions, and have been utilized to contribute to the formulation of national environmental policies concerned.

The Chinese Environmental Policy Research Working Paper (CEPRWP) is a new internal publication produced by CAEP for the purpose of facilitating the academic

exchange with foreign colleagues in this field, in which the selected research papers on environmental policies from CAEP are set out on the irregular basis. It is expected that this publication will not only make CAEP's research results on environmental policies be known by foreign colleagues but also serve as a catalyst for creating opportunity of international cooperation in the field of environmental policies, and environmental economics in particular, with a view of both the academic research and practical policy needs.

Think tank, as a research institute based on public policies, is a key source of references for decision makers, and a remarkable symbol of national soft power. As a think tank in environmental field in China, the main task of our academy is to provide comprehensively technical support for the Ministry of Ecology and Environment (MEE), and to assist MEE issue environmental polices scientifically and effectively. According to the "2018 Global Go To Think Tank Index Report" released by the Think Tanks and Civil Societies Program (TTCSP) of the University of Pennsylvania, our academy was ranked 36 out of 100 environmental think tanks globally, and was ranked No.1 in Greater China Region. As an environmental think tank, this paper tries to explore the development process of ecological & environmental think tanks in China, analyze the research topics of these think tanks, and give some suggestions for their future development.

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1. BACKGROUND

Think tanks, namely "brain trust", "brain banks" and "think banks", generally refer to those organizations which are non-profit, nonpartisan, government independent, and engaged in domestic or foreign policy research^[1]. This concept can be traced back to the 1920s in the United States, when independent advisory bodies emerged, such as the Hoover Institution established in 1919 and the Foreign Relations Committee established in 1921^[2]. Because of the unique political system of the United States, think tanks continue to grow and play an important role in the formulation of the domestic and foreign policies of the United States, influencing major decisions in the political, economic, social, military, foreign affairs, science and technology of the United States^[3]. Therefore, think tanks also enjoy the reputation of "the Third Hand"^[4], "the Fourth Sector"^[5], and "the Fifth Power"^[6] in the United States.

Think tanks began to be introduced into China after the implementation of reform and opening up of China in 1978. With the gradual deepening of reform and opening up, in order to meet the requirements of the government management system reform and the scientific and democratic decision-making, the government think tanks got unprecedented opportunities for development. Representative think tanks such as the China Institutes of Contemporary International Relations (1980) and the Development Research Center of the State Council (1985)

have been established successively. At the same time folk think tanks began to appear and get preliminary development in China, such as Beijing Stone Institute of Social Development (1988) and Horizon Research Consultancy Group (1992). In addition, under the guidance of the national "211 Project" and "985 Project", the influence of University think tanks have gradually increased. The typical representatives are the National School of Development at Peking University established in 2008 and the Institute for Contemporary China Studies at Tsinghua University established in 2011. The government, university and folk think tanks mentioned above are the three main types of think tanks in China. According to the "2018 Global Go To Think Tank Index Report" released by the Think Tanks and Civil Societies Program (TTCSP) of the University of Pennsylvania, there are currently 507 think tanks in China, making China the third largest country in the world after the United States and India in the number of think tanks^[7].

With the ozone hole, global warming, climate change and other global environmental issues becoming the focus of debate in various countries, as well as China's realistic need to solve environmental problems such as air, water, soil and ecology, the quality of China's environmental policies not only affects China's international reputation, but also concerns the well-being of people's livelihood. However, in order to obtain the goal of sustainable development, if



only relying on government agencies, it is difficult for China to sort out the complex environmental problems in a short period of time, so as to find scientific and effective solutions to balance environment, economy and society. These factors, together with the national strategic deployment of the "Eco-civilization construction", make the ecological and environmental think tank (EETT) become an indispensable part of think tank construction in China. The development of the EETTs will affect the quality of both the implementation of "comprehensively building a well-off society" and "building Beautiful China in 2035". Therefore, in-

depth study of the development status, faced problems and challenges of EETT is not only related to its future development, but also providing important reference for the construction of high-end think tanks in China. The structure of this paper is as follows: the second part focuses on the introduction of the development stages and features of China's EETT; the third part analyzes the hot topics of ecological and environmental field in recent five years; the fourth part discusses the results of the hot topics; the fifth part analyzes the challenges faced by China's EETT and puts forward some suggestions.





2. DEVELOPMENT STAGES AND FEATURES

After the reform and opening up, China's EETT began to develop and grow with the changes of China's environmental laws, regulations and policies, as well as environmental issues. And the development of China's EETT can be roughly divided into three stages: start-up stage (1978-1997), transformation stage (1998-2013) and development stage (2013 to now).

2.1 Start-up Stage (1978-1997): Problem Oriented

Process: In 1978, the *Chinese Research Academy of Environmental Sciences*, as a national institution, was established, becoming the first professional think tank in China's environmental field, opening the way for EETT to provide technical support for national environmental decision-making. However, in the early stage of reform and opening up, China vigorously developed its economic construction with weak awareness of environmental protection, and EETT were extremely limited in terms of financial funds, personnel allocation and research topics. Later on, with the deepening of reform and opening up, combined with the rapid economic development, the pollution of air, water, soil and other environmental factors has become increasingly prominent, which wakes the national environmental protection awareness and makes the government gradually take a series of measures, especially legislative documents to cope with the pollution. In 1979, the *Law of the Peoples Republic of China on Environmental Protection* was

officially promulgated, marking that the environmental protection work step onto the legal track. In 1983, Environmental Protection was listed as a national basic policy of our country, and became an important strategy of national governance system. In the 1980s, the environmental protection leading group of the State Council gradually upgraded to the independent National Environmental Protection Agency (at the level of deputy ministry), occupying a place in the national management system. In 1989, China established the policy system of environmental protection and put forward three policies and eight management systems of environmental protection. In 1995, China formulated Sustainable Development as a national strategy. At the same time, it promulgated the *21 Century Agenda of China* and formulated China's national action plan and measures for implementing the sustainable development strategy. Since the 1990s, the Chinese government has launched a series of major eco-environmental protection and control projects, including “Three Rivers (Huai River, Hai River and Liao River), Three Lakes (Dianchi Lake, Taihu Lake and Chaohu Lake), One City (Beijing) and One Sea (Bohai Sea)”, to control environmental pollution by formulating regional and watershed pollution prevention and control plans.

At this stage, the formulation of national environmental protection policies mainly depended on the governmental agencies



and the official decision-making advisory bodies, such as the *Environmental Protection Committee of the State Council*, which was established in 1984, and the *Environmental and Resource Protection Committee of the National People's Congress*, which was established in 1994. As for the EETT, such as the *Chinese Research Academy of Environmental Sciences*, their main role was to study the mechanism of environmental problems, to put forward feasible plans, and to help policy makers to introduce relevant legal measures to control environmental pollution by undertaking major scientific and technological research projects. The typical case was the problem of acid rain in the 1980s and 1990s. Focusing on the major needs of national air pollution prevention and control, during the “7th Five-Year Plan” and the “8th Five-Year Plan” periods, multiply sector research institutions, including EETT, participated in the study of acid deposition, systematically studying the acid deposition process and its effects, and also its control measures from both the national level and the regional level. The research results promoted the revision of the *Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution* in 1995, and designated acid rain control area and sulfur dioxide pollution control area. The EETTs that played a role at this stage basically had official backgrounds, such as: *Nanjing Institute of Environmental Sciences of National Environmental Protection Agency* (1978), the *Environmental and Economic Policy Research Center of National Environmental Protection Agency* (1989),

the *Research Center for Eco-Environmental Sciences of Chinese Academy of Sciences* (1986), etc.

Think tanks in universities, such as Tsinghua University and Peking University, have started to set up Environmental Engineering, Environmental Science and other majors, which are committed to the research and teaching of environmental protection in China. Semi-governmental and semi-folk think tanks, such as the *China Association of Environmental Protection Industry* (1984) have organized enterprises, institutions, social organizations and individuals engaged in activities related to ecological and environmental protection, and started the age of multi-stakeholder participation in environmental protection. In addition, folk think tanks, such as *Friends of Nature*, which was established in 1994, brings folk wisdom into the cause of environmental protection.

Feature: At this stage, the national status of EETT was relatively low, and they were less involved in national environmental decision-making process. According to the needs of national environmental protection, EETT mainly studied on single region together with single pollutant, carried out scientific research on the formation mechanism, action mode and control measures of pollutant, and played a think-tank role in the control of a key pollutant in a region. At this period, think tanks were in the initial stage of construction. Under the guidance of national policies, government think tanks, university think tanks and folk think tanks were gradually established one after another to conduct



relevant research of environmental protection. Basically at this stage, the independence of EETT was poor, where the main fund of EETT relied on national financial allocation.

2.2 Transformation Stage (1998 - 2012): Goal Oriented

Process: In 1998, the National Environmental Protection Agency was upgraded to the National Environmental Protection Administration and became a ministry-level unit. In 2008, the National Environmental Protection Administration was upgraded to the Ministry of Environmental Protection (MEP) and became a constituent Department of the State Council. At this time, the status of EETTs with official background has been gradually improved, and the research results have been valued and recognized by the state. For example, the “10th Five-Year Plan” for National Environmental Protection (2001) compiled by EETTs has been approved by the State Council, and the “11th Five-Year Plan” for Environmental Protection (2006-2010) has been issued by the State Council for the first time. In terms of national environmental governance ideas, in order to curb the rapid growth momentum of total emission of major pollutants, think tanks studied the shift from concentration control of pollutants to total emission control of pollutants, and assisted the government to introduce important institutional means such as “one control and two standards” and “333211 project”. The think tanks studied environmental zoning based on the river basins and regions, assisted the local governments implement classified governance on environmental zones, and

helped the government issue regional environmental protection plans and legal guarantees for key regional environmental protection to ensure the improvement of environmental quality.

At this stage, the EETTs were still mainly think tanks with official background. With the improvement of the status of environmental protection, EETTs have been greatly developed. Among them, the newly established government think tanks were the *Chinese Academy of Environmental Planning (2001)* and the *National Center for Climate Change Strategy and International Cooperation (2012)*.

University think tanks have ushered in a new turn in this period. With the launch of “211 Project”, “985 Project” and other major national education projects, key universities have set up consulting and policy research institutions to attract discipline talents from home and abroad, and improve their influence on decision-making and consultation at the national and social levels by studying policy issues and reporting research results to governmental departments. The representative university think tanks in ecological and environmental field were the *China Center for Energy Economics Research at Xiamen University (2005)* and the *Center for Energy & Environmental Policy Research, Beijing Institute of Technology (2009)*. At the same time, folk think tanks in the field of ecology and environment have also been greatly developed, with typical representatives such as *All-China Environment Federation (2009)*



and *China Eco-civilization Research and Promotion Association* (2011).

Feature: At this stage, the EETTs have significantly improved their status in the country, have started to participate in national environmental protection planning projects, and actively provided technical support for national environmental decision-making. Their research direction changed from problem oriented to goal oriented, and carried out the exploration and research of total pollutant control system with the goal of environmental quality improvement. At the local level, think tanks assisted key regions in environmental protection planning and other projects, and the research results were highly valued by local governments. The emphasis on environmental protection from the state to the local has greatly improved the social status of EETTs and promoted their rapid development. Government, university and folk think tanks have taken the opportunity to expand their own strength. In terms of financial management, in addition to financial allocation, the government think tank has achieved a certain degree of financial freedom and independence through undertaking local consulting projects.

2.3 Development Stage (2013 to now): System Oriented

Process: In April 2013, general secretary Xi Jinping made an important instruction on "building a new think tank with Chinese characteristics". He put forward that we should improve the decision-making consultation mechanism, and

build a high-quality think tank according to the principles of serving decisions and moderate advance. At the end of 2013, the 3rd Plenary Session of the 18th Central Committee of the Communist Party of China deliberated and passed the Decision of the Central Committee of the Communist Party of China on Several Major Issues of Comprehensively Deepening the Reform, and officially identified "strengthening the construction of new think tanks with Chinese characteristics" as a national strategy in the form of Party documents, thus ushering in new opportunities for the development of think tanks. In the field of ecology and environment, the 18th National Congress of the Communist Party of China proposed to integrate the construction of Eco-civilization into all aspects and the whole process of economic construction, political construction, cultural construction and social construction, to realize the overall layout of "Five in One", and to promote the formation of a new pattern of modernization construction with harmonious development of human and nature. Subsequently, the state successively issued a series of legal documents, such as the *Opinions on Accelerating Ecological Progress (2015)* and the *Overall Plan of Eco-civilization System Reform (2015)*, to support the implementation of Eco-civilization construction. At the same time, China has formed a new development concept from "GDP growth priority" to "protection priority". The economic and social structure (including industry, energy, transportation, land use, etc.) has started a new transformation, and the management



system has become more systematic and modern. EETTs have ushered in a new era, and their national status have been further improved. They have actively participated in the national environmental governance system, and their research results have been highly valued by the state. They participated in compiling the *Action Plan on Air Pollution Prevention and Control (2013)*, the *Action Plan on Water Pollution Prevention and Control (2015)*, the *Action Plan on Soil Pollution Prevention and Control (2016)* and other programs issued by the State Council. Their research content has also shifted from single environmental protection to overall planning of environmental protection and ecological protection, providing important technical support for the *13th Five-Year Plan for Ecological Environmental Protection* (issued by the State Council in 2016). In 2018, the *Ministry of Environmental Protection* changed its name to the *Ministry of Ecology and Environment (MEE)*, realizing institutional reform at the national level. At this time, the EETTs pay more attention to the concept of Eco-civilization construction, emphasizing that landscape, forest, land, lake and grass are a community of life, taking systematic measures to solve environmental problems, and embarking on the research of medium and long-term environmental protection strategies, such as the "Beautiful China" initiative.

At this stage, the think tanks for ecology and environment are still based on the official background. With the strategic deployment of the construction of national high-end

think tanks and Eco-civilization, the EETTs are supported by the government in terms of financial, human and material resources, and their comprehensive strength is gradually improving. The newly established university think tanks of ecology and environment in this period include *Tongji University Sustainable Development and New-Type Urbanization Think Tank (2015)* and *Research Institute of China Green Development of Tianjin University (2015)*. Representatives of folk think tanks include *Haiguo Tuzhi Research Institute*, which was established in 2015.

Feature: At this stage, the national status of EETTs has been further improved. They actively provide technical support for national environmental decision-making, participate in local practice, and add intelligence to local ecological and environmental protection. Their research contents involve traditional environmental protection, Eco-civilization construction, and integrated ecological and environmental protection. On one hand, they assisted the government to promulgate legal documents such as action plans for air, water and soil pollution prevention and control, and played a key role in pollution prevention and control; on the other hand, they carried out forward-looking research, actively cooperating with the national "Eco-civilization construction", "Beautiful China in 2035", and other strategic deployment to explore feasible plans. The government, university and folk think tanks in the field of ecology and environment have ushered in historic opportunities and are in a period of rapid development.



3. THE MAIN RESEARCH TOPICS OF ECOLOGICAL AND ENVIRONMENTAL THINK TANK

The essence of EETTs is to find better ways to protect our living environment, and the research on the topic of "environmental protection" is the foundation of the development of think tanks. Since the EETT entered the development stage, and under the national strategic background of Eco-civilization construction, "Eco-civilization" has become an important issue that cannot be avoided in think tank's research. At the same time, due to the state's institutional reform, the planning and management of "ecology" and "environment" has integrated, and the topic of "ecology and environment" has become a new focus of think tank research. Therefore, in order to have a more comprehensive understanding of the research work of China's think tanks of ecology and environment in recent years, this paper selects the three topics of "environmental protection", "Eco-civilization" and "ecology and environment" as the research subjects, and on the basis of CNKI database, uses the method of knowledge map to analyze the current research hot topics, think tank composition and distribution of these subjects.

The software CiteSpace (Version No.5.5.R2) developed by Dr. Chen Chaomei of Drexel University in the United States is selected as the knowledge map tool. This software can draw network maps such as cooperation, co-citation, keyword co-occurrence, hot spot deduction, etc. By analyzing the information in the map, we can understand the development

status and the hot spot research trend of a certain field.

The data of this paper is selected from CNKI (China Academic Journals Full-text Database) and collected on September 20, 2019. In CNKI database, the literature type is limited to journals, and the data sources are SCI source journals, EI source journals, core journals, CSSCI and CSCD. The retrieval time span is from 2014 to 2018, respectively, with the subjects of "environmental protection", "eco-civilization" and "ecology and environment", and the retrieval results and analysis are as follows.

3.1 Environmental Protection

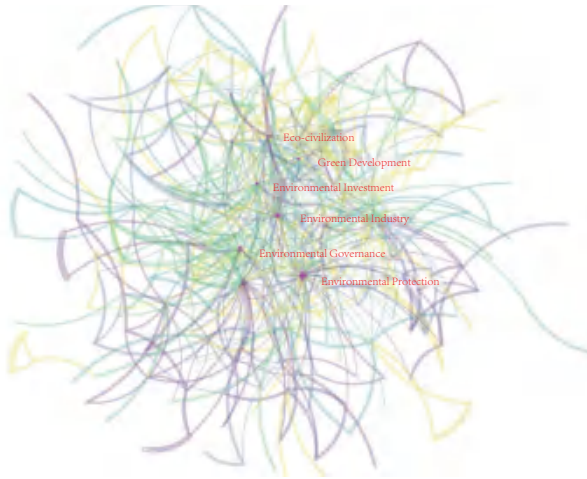
Input "Environmental Protection" into CNKI journals and search on this subject. The year is set to 2014-2018 and the source categories are SCI source journals, EI source journals, core journals, CSSCI and CSCD. A total of 1392 journal literatures are retrieved. In order to ensure the validity of the data, 1211 periodical documents were obtained by manually removing the documents with inconsistent conditions (including meetings, news, volume titles, etc.) or incomplete information.

3.1.1 Key words

Figure 1 shows the main key nodes of *Environmental Protection* subject in journals and their clustering relationship, and one node represents one keyword. The strength of clustering is characterized by intermediary



■ **Figure 1. The main keywords related with Environmental Protection from published Journals**



centrality, and the greater the intermediary centrality of a node, the stronger the connection degree in the network, the greater the influence^[8]. Generally, if the intermediary centrality of a node is ≥ 0.1 , it indicates that the node is a key node^[9]. It can be seen from Figure 1 that the clustering effect produced

by the two keywords of “environmental protection” and “environmental industry” is the most obvious. From the perspective of keyword usage frequency, select the top ten keywords according to the number of nodes for analysis, and the results are shown in Table 1. Among them, although “environmental protection tax” and “environmental regulation” contain more nodes, their intermediary centrality is less than 0.1, and their influence is slightly lower in the scope of *Environmental Protection* subject.

3.1.2. Institutions

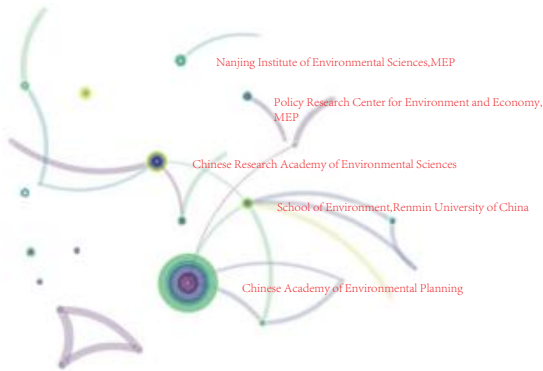
Figure 2 shows the organization distribution and clustering of journals on *Environmental Protection* subject. The larger the circle area, the more journals the organization publishes. The more connections, the more extensive inter-agency cooperation is. According to

🌿 **Table 1. The main keyword analysis related with Environmental Protection**

Rankings	Number of Contained Nodes	Intermediary Centrality	Keyword
1	146	0.53	Environmental Protection
2	49	0.21	Environmental Industry
3	43	0.13	Environmental Protection (Abbreviation in Chinese)
4	43	0.12	Environmental Investment
5	31	0.09	Environmental Protection Tax
6	30	0.15	Eco-civilization
7	27	0.08	Environmental Regulation
8	27	0.22	Environmental Governance
9	22	0.19	Public Participation
10	21	0.17	Green Development



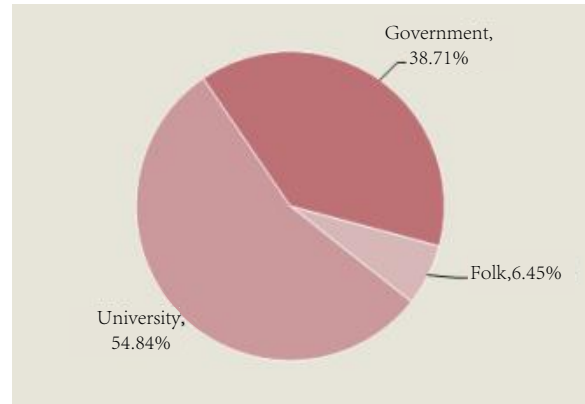
Figure 2. The main think tanks related with Environmental Protection from published Journals



the results in Figure 2, we sort out the top 10 institutions and the number of journals they published (Table 2).

Table 2 shows that the government think tanks (Chinese Academy of Environmental Planning & Chinese Research Academy of Environmental Sciences) published the largest number of papers on the subject of Environmental Protection; and half of the top 10 think tanks were government affiliated,

Figure 3. The main think tank distribution related with Environmental Protection



which established the leading position of the government think tanks.

Based on the in-depth analysis of institutions that have published no less than three papers on this subject (Figure 3), the number of university think tanks accounts for the highest proportion, more than half of the total. The proportion of government think tanks is close to 39%, while that of folk think tanks is less than 7%.

Table 2. The top ten think tanks with the number of Journals related with Environmental Protection

Rankings	Think tanks	Number of Journals published
1	Chinese Academy of Environmental Planning, MEP	36
2	Chinese Research Academy of Environmental Sciences, MEP	14
3	School of Environment, Renmin University of China	11
4	Nanjing Institute of Environmental Sciences, MEP	10
5	Appraisal Center for Environment & Engineering, MEP	9
6	Policy Research Center for Environment and Economy, MEP	8
7	China University of Political Science and Law	8
8	Research Institute of Environmental Law, Wuhan University	8
9	School of Law, Ocean University of China	7
10	School of Law, Wuhan University	7



3.2 Eco-civilization

Input "Eco-civilization" into CNKI journals and search on this subject. The year is set to 2014-2018 and the source categories are SCI source journals, EI source journals, core journals, CSSCI and CSCD. A total of 5394 journal literature are retrieved. In order to ensure the validity of the data, 4775 periodical documents were obtained by manually removing the unqualified documents.

■ **Figure 4. The main keywords related with Eco-civilization from published Journals**



3.2.1. Key words

Figure 4 shows the main keywords of *Eco-civilization* subject in journals and their clustering relationship. The results show that the clustering effect of the two keywords of “Eco-civilization construction” and “Beautiful China” is the most obvious. From the perspective of keyword usage frequency, select the top 10 keywords according to the number of nodes for analysis (Table 3). The results show that although "Eco-civilization" contains the most nodes, its intermediary centrality is lower than that of “Eco-civilization construction” and “Beautiful China”, only ranking third from the perspective of influence. Among them, “sustainable development”, “ecology and environment”, “environmental protection” and “new urbanization” contain many nodes, but their intermediary centrality values are all lower than 0.1, which shows that they are not “hot” enough in the field of *Eco-civilization*.

🌿 **Table 3. The main keyword analysis related with Eco-civilization**

Rankings	Number of Contained Nodes	Intermediary Centrality	Keyword
1	1816	0.2	Eco-civilization
2	759	0.31	Eco-civilization Construction
3	213	0.17	Green Development
4	152	0.11	Xi Jinping
5	138	0.26	Beautiful China
6	110	0.09	Sustainable Development
7	80	0.08	Ecology and Environment
8	77	0.15	Marxism
9	76	0.09	Environmental Protection
10	65	0.05	New Urbanization



3.2.2. Institutions

Figure 5 shows the institutional distribution and clustering of journals on *Eco-civilization* subject. The larger the circle area is, the more journals the institution publishes; the more lines the institution connects, the wider inter-agency cooperation it shows. According to the results in Figure 5, we sort out the top 10 institutions and the number of journals they published, as shown in Table 4.

Table 4 shows that the number of papers published by the government think tank (Institute of Geographic Sciences and Natural Resources Research, CAS) on the subject of *Eco-civilization* is the largest, followed by the University think tank (School of

Marxism Studies, Renmin University of China). Among the top ten think tanks, there are four universities of Marxism schools and one college of philosophy. It can be seen that think tanks focus more on theoretical research under the *Eco-civilization* subject, but lack practical exploration on the application of *Eco-civilization* theory. Among the ten think tanks, the proportion of university think tanks (6 / 10) is higher than that of government think tanks (4 / 10). Through in-depth analysis of institutions that have published at least three papers on this subject (Figure 6), the results show that the proportion of think tanks in universities is the highest, about 70%, and that of government think tanks is 29%, and that of folk think tanks is only 1%.

■ Figure 5. The main think tanks related with Eco-civilization from published Journals



■ Figure 6. The main think tank distribution related with Eco-civilization

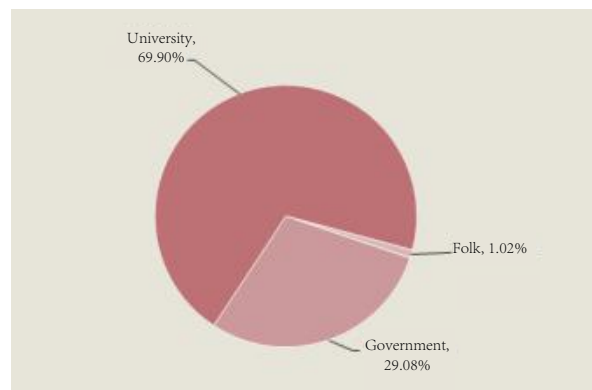




Table 4. The top ten think tanks with the number of Journals related with Eco-civilization

Rankings	Think tanks	Number of Journals published
1	Institute of Geographic Sciences and Natural Resources Research, CAS	38
2	School of Marxism Studies, Renmin University of China	31
3	School of Marxism Studies, Peking University	29
4	Institute for Urban and Environmental Studies, CASS	24
5	School of Economics, Sichuan University	24
6	School of Philosophy, Zhongnan University of Economics and Law	23
7	Chinese Academy of Environmental Planning, MEP	22
8	School of Marxism, Northeast Forestry University	21
9	School of Marxism, Jilin University	19
10	Chinese Research Academy of Environmental Sciences, MEP	19

3.3 Ecology and Environment

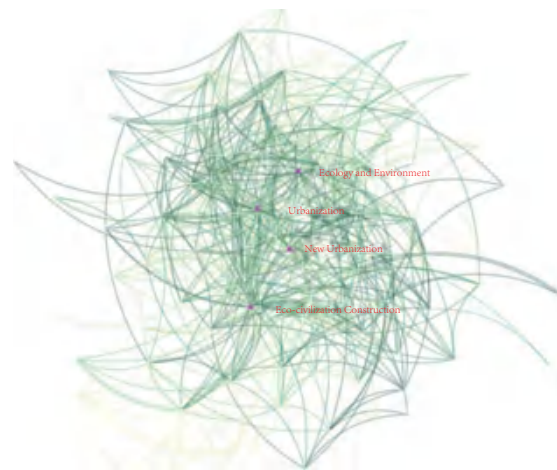
Input "Ecology and Environment" into CNKI journals and search on this subject. The year is set to 2014-2018 and the source categories are SCI source journals, EI source journals, core journals, CSSCI and CSCD. A total of 10473 journal literature are retrieved. In order to ensure the validity of the data, 9606 periodical documents were obtained by manually removing the unqualified documents.

3.3.1. Key words

Figure 7 shows the main keywords about *Ecology and Environment* subject and the clustering relationship between them, from which we can see that the four keywords of "ecology and environment", "urbanization", "new urbanization" and "Eco-civilization

construction" produce the most obvious clustering effect. From the perspective of keyword usage frequency, we selected the top ten keywords according to the number of nodes for analysis (Table 5). The result

Figure 7. The main keywords related with Ecology and Environment from published Journals





shows that keywords such as “ecology and environment”, “Eco-civilization”, “Eco-civilization construction”, “sustainable development”, etc., contain a higher number of nodes. From the perspective of intermediary centrality, only three key words in Table 5 hold the intermediary centrality value higher than 0.1, which are “ecology and environment”, “Eco-civilization

construction”, and “urbanization”, forming a cluster with certain influence under the subject of *Ecology and Environment*. As for the keywords such as “ecological compensation” and “green development”, which have accumulated in quantity of nodes, they have not yet formed a wide range of influence due to low intermediary centrality.

Table 5. The main keyword analysis related with Ecology and Environment

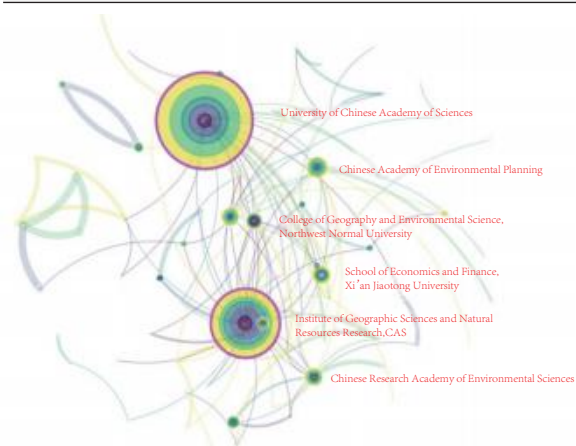
Rankings	Number of Nodes	Intermediary Centrality	Keyword
1	1026	0.14	Ecology and Environment
2	633	0.09	Eco-civilization
3	338	0.13	Eco-civilization Construction
4	250	0.08	Sustainable Development
5	212	0.04	Ecological Compensation
6	186	0.03	Green Development
7	140	0.17	Urbanization
8	131	0.06	Ecological Safety
9	130	0.07	Environmental Protection
10	123	0.07	Index System

3.3.2. Institutions

Figure 8 shows the organization distribution and clustering of journals on Ecology and Environment issues. The larger the circle area is, the more journals the institution publishes; the more lines the institution connects, the wider inter-agency cooperation it shows. According to the results of figure 8, we sort out the top ten institutions according to the number of journals published, as shown in Table 6.

Table 6 shows that the number of papers

Figure 8. The main think tanks related with Ecology and Environment from published Journals

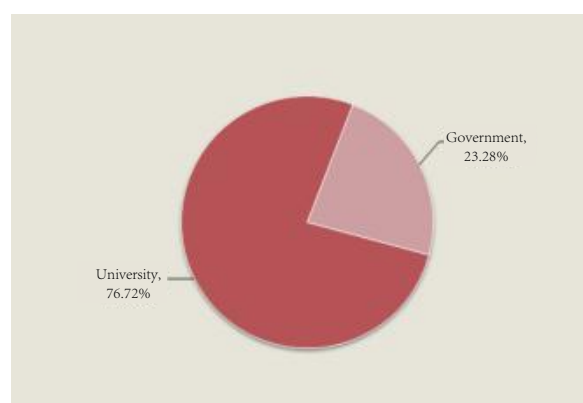




published by the government think tanks (University of Chinese Academy of Sciences, Institute of Geographic Sciences and Natural Resources Research, CAS, Chinese Academy of Environmental Planning and Chinese Research Academy of Environmental Sciences) on the subject of *Ecology and Environment* is the largest, followed by the think tanks of university (School of Economics and Finance of Xi'an Jiaotong University). Among the top 10 think tanks, 6 are affiliated to the government, including 3 under the Chinese Academy of Sciences (CAS) and 3 under the former Ministry of Environmental Protection (MEP), which shows the important supporting role of the CAS and the former MEP on the issue of "ecology and environment", and the remaining 4 are university think tanks. Based

on the in-depth analysis of institutions that have published no less than four papers on this subject (Figure 9), we can see that the proportion of think tanks in universities is the highest, reaching 76.72%, that of government think tanks is 23.28%, while folk think tanks didn't publish enough journals in this subject.

■ **Figure 9. The main think tank distribution related with Ecology and Environment**



🌿 **Table 6. The top ten think tanks with the number of Journals related with Ecology and Environment**

Rankings	Think tanks	Number of Journals published
1	University of Chinese Academy of Sciences	208
2	Institute of Geographic Sciences and Natural Resources Research, CAS	148
3	Chinese Academy of Environmental Planning, MEP	64
4	Chinese Research Academy of Environmental Sciences, MEP	53
5	School of Economics and Finance of Xi'an Jiaotong University	53
6	State Key Laboratory of Urban and Regional Ecology, CAS	50
7	Nanjing Institute of Environmental Sciences, MEP	46
8	College of Resource and Environment Sciences, Xinjiang University	42
9	College of Geography and Environmental Science, Northwest Normal University	39
10	School of Economics & Management, Northwest University	32



4. DISCUSSION OF THE RESEARCH TOPICS

1) For *Environmental Protection* subject, the clustering effect generated by keywords such as “environmental protection”, “environmental industry” and “environmental governance” is obvious and highly concerned. From the perspective of the institutional distribution of this subject, although the total number of think tanks in universities is slightly higher than that of government think tanks, most of the institutions that publish more papers are government think tanks, and they are mainly from subordinate units of the Ministry of Ecology and Environment, which shows the leading role of the Ministry of Ecology and Environment within the scope of *Environmental Protection* subject.

2) The construction of eco-civilization is an important part of the overall layout of "Promoting Balanced Economic, Political, Cultural, Social, and Ecological Progress" in China, and a series of initiative have been carried out in this regard, opening the road of the construction of eco-civilization of socialism with Chinese characteristics in the new era. Therefore, the key words of Eco-civilization subject are closely related to the vocabulary of national strategies, such as "Eco-civilization construction" and "Beautiful China", and for the contents besides the high-frequency words such as “green development”, “ecology and environment” and “sustainable development”, other party and government vocabularies include "Xi Jinping" and "Marxism" are also involved. At present, the subject of *Eco-civilization*

emphasizes on theoretical exploration and research instead of its practical application due to its start-up stage. Thus most of the relevant think tanks are university affiliated, especially the Marxist Institute of universities, which provides more relevant literature.

3) Under the limited conditions of this paper, the number of journals published on Ecology and Environment subject is about twice that of *Eco-civilization* subject, and 8 times that of *Environmental protection* subject, which is enough to show the importance of this subject. From the analysis results, the clustering effect of the keywords of “ecology and environment”, “Eco-civilization construction” and “urbanization” is obvious and highly concerned. The subject is still dominated by university think tanks in terms of the number of institutions, but most of the research institutions with official background have high literature output rate, especially those CAS and MEE affiliated, which provide important information support for the subject.

4) Think tanks can influence the formulation of public policies through media, newspapers, reports, seminars and many other ways. Therefore, the number of journals published cannot be the only standard for the influence assessment of a think tank, and it can only represent the academic influence of the think tank. Therefore, the ranking of think tanks in this paper is only effective under specific conditions, and this paper only analyzes the research focus and distribution of think



tanks in different subjects from the academic perspective.

5) The main purpose of think tanks is to influence decision-making. In this paper, think tanks in universities have a high probability of emergence, and the overall proportion is relatively large, showing a strong academic influence. However, in the process of environmental decision-making of the government in China, the reference delivered from internal track, provided by scientific research institutions with governmental background often plays an important role. The products of university and folk think tanks are rarely sent to decision makers due to the lack of specific reporting channels, so their influence on policy-making is relatively low. However, with the development of new media, the university think tanks are constantly affecting the public opinion through the way of news on their websites and public media account,

such as Weibo and WeChat, through which its dissemination channels become larger, making more voices of the think tank heard by the decision makers, and thus the influence of University think tanks is gradually improved. As for the government think tanks, they have always been the main force of EETT; They can directly report the research results to decision makers through the internal information reporting channels, thus influencing the policy-making. Even in terms of academic influence, the government think tanks are still very competitive, especially in the more professional Environmental protection subject, the institutions affiliated to the Ministry of Ecology and Environment perform better. In the future, with the acceleration of new media, the government think tank will become the backbone of influencing government decision-making and public opinion.





5. CHALLENGES AND SUGGESTIONS

In the current context of eco-civilization construction, environmental protection has been mentioned at the same level as urban development, and environmental protection decision-making has a key impact on the sustainable development of a country or region^[10]. However, China's ecology and environment decision-making system is still in the exploration and development stage, and the support ability of eco-environmental think tanks for decision-making needs to be further improved. It is full of challenges to become an international high-end think tank with certain influence.

5.1 Challenges

1) There is a great pressure of competition at home and abroad, and the Chinese characteristics of think tanks are not fully reflected. According to the ranking of global think tanks published by the University of Pennsylvania in 2018, there are only four Chinese think tanks in the world's 100 environmental think tanks, and their ranking is not high enough. The top international environmental think tanks are mainly occupied by developed countries such as Europe and the United States. With the globalization of environmental issues, the top international environmental think tanks have also begun to study China's environmental issues; comprehensive think tanks in China, such as the *Development Research Center of the State Council* and the *Chinese Academy of Social Sciences*, have also started to engage

in eco-environmental policies, which has led to greater internal and external competition pressure on China's professional think tanks in the field of ecology and environment. In addition, our eco-environmental think tanks started relatively late and the mode of their operation remain to be explored, thus some of them tend to copy the development model of western environmental think tank, and they lack self-positioning and medium and long-term plans, which lead to their development blocked due to their failure to adapt to local conditions.

2) The decision support system is not completely reasonable, and the influence of think tanks is insufficient. The decision support system of our country mainly depends on the public institutions within the government to submit to the decision-makers in the form of internal reference or report, so as to affect the formulation of policies. Because of the government background, the government think tanks have innate advantages, while the university think tanks and folk think tanks lack appropriate channels to submit their research results, which makes it difficult for them to affect the formulation of policies. The development of think tanks in China started late, so it is a long process to incorporate the suggestions of think tanks into the decision support system, and it will take time for think tanks to really play the role of policy consultants.

3) They have received great restriction



from the administrative system and the research of think tanks will have a fixed orientation. China's think tanks for ecology and environment are mainly government think tanks, supplemented by university think tanks and folk think tanks, and the government think tanks are the main ones that can influence decision-making. However, the government think tanks are restricted by the government in terms of finance, administrative affairs and personnel appointment and removal, and the research they are engaged in is obviously government oriented, which leads them to study more issues of concern to the government. In terms of the overall development of think tanks, the homogenization is serious and the differentiation is not obvious.

4) The research level of think tank is limited, and the number of international talents isn't enough. Under the influence of planned economy, the implementation of environmental policies in China is usually accompanied by government subsidies and other means, but lack of market-oriented means to solve prominent environmental problems. Comprehensive use of market-oriented means is the only way for sustainable development of environmental management, but researchers of think tanks of ecology and environment are accustomed to the study of mechanism of environmental problems rather than the study of environmental management means. Therefore, the research direction of think tanks needs to be further changed. At the same time, due to the low international influence of China's eco-environmental think

tanks, the lack of in-depth foreign exchange, and the constraints of the administrative system, it is difficult to introduce international talents with a global perspective ^[11].

5.2 Suggestions

The construction of China's high-end eco-environmental think tanks requires the joint efforts of the government and think tanks. At the government level:

First, we should establish an institutionalized decision-making consultation system to lead the sound development of think tanks. At present, the eco-environmental protection and restoration is in the "key period", "critical period" and "window period". The government gives great hope to the environmental protection work, and at the same time puts forward high requirements for sustainable development and eco-civilization construction. However, for a long time, the research on the coordination between the ecology, environment and economic development in China is not in-depth, and the research on sustainable development path in line with China's actual situation and China's relevant laws and policies are fragmented and not adaptable, which makes the task of eco-civilization construction arduous. In the face of the strong demand for policy consultation, the government should lead think tanks to participate in the decision-making process through institutionalized arrangements, so as to play their due role, which means the government should integrate the research and consultation before the decision-making of various policy issues into the normalized



institutional mechanism, constantly expand the scope and strength of government decision-making consultation, and expand the strength of government's purchase of knowledge services, so as to provide fertile soil for the development of think tanks.

Second, we should establish a normalized information communication and result submission mechanism. As a department of policy research and consultation, think tanks face a real problem that how to deliver their research results to decision makers, while the government think tanks can usually provide advice to the government in the form of "internal reference" or internal expert consultation. However, university think tanks and folk think tanks in the field of ecology and environment are lack of institutional communication and consultation channels with government departments, which makes them in the marginal state of decision-making consultation. It is suggested that the government should establish an information-based management platform for think tanks and put policy consultation needs on the platform, think tanks should upload relevant research results through the platform according to different policy needs for reference by decision makers. At the same time, data information and research results should be made public and transparent, so that other think tanks, scientific researchers and the public can refer to relevant information through the platform website, avoid repeated research and expand public participation of think tanks, and help the implementation of high-quality policies

through more "intelligence".

Third, we should introduce the mechanism of market selection, and encourage think tanks to "contend with a hundred schools of thought". The government should set up a policy consultation platform to provide a window for think tanks to submit consultation reports and research results. Encourage all kinds of think tanks to make suggestions, and give appropriate encouragement and support to think tanks that are helpful in decision-making. At the same time, it is necessary to mobilize the enthusiasm of think tanks and promote fair competition of think tanks through market-oriented management.

Fourth, we should introduce "revolving door" mechanism. We should encourage government officials to communicate with high-end think tanks on professional content, establish a "revolving door" mechanism, assist think tanks in identifying research directions, improve the research level of think tanks, and promote the transformation of think tanks' achievements.

At the think tank level:

First, think tanks should make clear their own positioning and establish a medium and long-term plan. China's Eco-environmental think tanks started late and their overall strength is weak. Under the double competitive pressure from the top international environmental think tanks and domestic comprehensive think tanks, they tend to blindly follow the trend and lack their own positioning. Think tanks should combine their own scientific research advantages,



establish a medium and long-term development plan, complete the set goals in stages and fields, create characteristic think tank products, and gradually build their own advantages.

Second, think tanks should improve their management level and strictly control the quality of research results.

Think tanks should strengthen their internal management, especially the establishment of results review mechanism. Taking the World Resources Institute (WRI) as an example, WRI has a special "science and research department" to conduct internal and external review procedures for research reports, problem briefs, working papers, technical documents and other research results. After the circulation of publishing plan - first draft of report - internal review - external review - formal publishing report, and finally reviewed and agreed by the director of research department and the director of "science and research and development department", the results can be released to the public. It is precisely because of strict quality requirements and results review process that WRI has become the world's top think tank in the field of resources and environment ^[12]. Therefore, only by establishing a strict results review mechanism can we promote the embodiment of high-quality results of China's eco-environmental think tanks.

Third, think tanks should establish personnel reward mechanism and introduce high-end first-class talents.

Think tanks are "thought factories" and "expert groups", and people are the core

driving force of think tanks. The construction of high-end think tanks needs to be promoted by the first-class talents with international vision, rich experience, interdisciplinary and cross-cutting fields. However, most of the domestic eco-environmental think tanks are those who have the government background, their capital expenditure is subject to financial constraints, the salaries of the staff are subject to the government system and only through "fixed number of years" could the staff have opportunities to obtain professional titles and other welfare, which is not conducive to attracting talents. Therefore, think tanks should break through institutional barriers and innovate reward mechanisms. They should mobilize people's enthusiasm through multi-channel reward mechanisms such as achievement award and consultation award, and attract external top-ranking talents by establishing differentiated reward and subsidy mechanisms, so as to guide the high-quality development of think tanks.

Fourth, think tanks should establish a multimedia results dissemination mechanism to strengthen policy and social influence.

Think tanks take policy research as their mission and aim to influence public policy and public opinion. Therefore, in addition to providing research reports and internal references directly to government departments, think tanks can also convey their views to the public and guide public opinion, so as to achieve the purpose of influencing policies. Think tanks should make use of the advantages of the Internet to establish multimedia dissemination channels,



update the research results and information dynamics of the think tanks on the platform of the website, WeChat Public Account and Weibo Public Account, etc., establish a normalized reporting system with the media, and at the same time establish information feedback with the public, answer questions of public concern on social platforms, and form information interaction in order to expand social influence.

Fifth, think tanks should strengthen international cooperation and improve the level of think tanks' internationalization.

Due to the global nature of environmental issues, think tanks of ecology and environment should have an international perspective, actively participate in international projects, and provide decision-making advice and policy recommendations for global environmental policy-making.

At present, the overall research level of China's EETTs is weak, the degree of internationalization is not high, and lack of international discourse power, which are not commensurate with China's position as an international power. Therefore, the government should actively guide the EETTs to establish "going out and bring-in" initiative and strengthen international exchanges and cooperation. We can rely on international projects, take international conferences as a platform, and take international talent exchange and cooperation as a link to establish a comprehensive and multi-field cooperation framework. At the same time, it is necessary to clarify the international operation rules of China's EETTs, so that they can be connected to the operation orbit of the international environmental think tanks.





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Appendix 1

Table 1. Chinese Ecological Think Tank Professional Influence Ranking(No.1-10)

2017		2016	
Rankings	Institutes	Rankings	Institutes
1	Chinese Academy of Environmental Planning	1	Chinese Academy of Environmental Planning
2	Policy Research Center for Environment and Economy, Ministry of Environmental Protection	2	Policy Research Center for Environment and Economy, Ministry of Environmental Protection
3	Chinese Research Academy of Environmental Sciences	3	Chinese Research Academy of Environmental Sciences
4	National Center for Climate Change Strategy and International Cooperation (NCSC)	4	Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences
5	Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences	5	China Institute for Marine Affairs (CIMA)
6	China Institute for Marine Affairs (CIMA)	6	National Center for Climate Change Strategy and International Cooperation (NCSC)
7	Development Research Center of the Ministry of Water Resources	7	Development Research Center of the Ministry of Water Resources
8	State Grid Energy Research Institute Co., Ltd	8	National Forestry Administration Economic Development Research Center
9	China Center for Energy Economics Research	9	Tongji University Sustainable Development and New Type Urbanization Think-Tank
10	Center for Energy & Environmental Policy Research, BIT	10	Center for Energy & Environmental Policy Research, BIT

Source: 2018 Chinese Think Tanks Report—Influence Ranking and Policy Suggestions and 2017

Chinese Think Tanks Report—Influence Ranking and Policy Suggestions.



Appendix 2


Table 2. World Environmental Think Tanks Influence Ranking

2018		2017	
Rankings	Institutes	Rankings	Institutes
1	Potsdam Institute for Climate Impact Research (PIK) (Germany)	1	Potsdam Institute for Climate Impact Research (PIK) (Germany)
2	Stockholm Environment Institute (SEI) (Sweden)	2	Stockholm Environment Institute (SEI) (Sweden)
3	World Resources Institute (WRI) (United States)	3	World Resources Institute (WRI) (United States)
4	Center for Climate and Energy Solutions (C2ES) (United States)	4	Center for Climate and Energy Solutions (C2ES) (United States)
5	Third Generation Environmentalism E3G (United Kingdom)	5	Third Generation Environmentalism E3G (United Kingdom)
6	Worldwatch Institute (United States)	6	Worldwatch Institute (United States)
36	Chinese Academy For Environmental Planning (CAEP) (China)	36	Chinese Academy For Environmental Planning (CAEP) (China)
38	Chinese Research Academy of Environmental Sciences (CRAES) (China)	38	Chinese Research Academy of Environmental Sciences (CRAES) (China)
44	Civic Exchange (China)	48	Civic Exchange (China)
79	Chinese Environmental Protection Foundation (CEPF) (China)	79	Chinese Environmental Protection Foundation (CEPF) (China)

Source: 2018 Global Go To Think Tank Index Report and 2017 Global Go To Think Tank Index Report.

CAEP Scientific Research Platforms

Center for Emission Trading

Center for Ecological Environmental Compensation

Center for Environmental Research on Beijing-Tianjin-Hebei Region

Center for Heavy Metal Pollution Prevention

Center for Climate Change and Environmental Policy

Center for Environment and Health

Center for Environmental Zoning

Center for Ecological Environment in Yangtze River Economic Zone

Center for Environmental PPP

Center for Environmental Protection Tax

Center for Investment Performance Management

Center for Ecological Environment and Economic Accounting

Center for Rural Environmental Protection

Center for Regional Air Quality Simulation and Control

Center for Environmental Auditing

Center for Marine Eco-environmental Planning

Center for Environmental Decision-making and Performance Assessment

Center for Yellow River Eco-civilization





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